Comments on February 11, 2004, US EPA Region IX
Response to Comments from G. Fred Lee, PhD, DEE, on the
Lava Cap Mine Superfund Site Mine Area Feasibility Study

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Presented below are my comments on the inadequate and/or unreliable responses provided February 11, 2004, by the US EPA and its contractor CH2M Hill to the comments that I submitted November 14, 2003, on the US EPA's Draft Lava Cap Mine Superfund Site Mine Area Feasibility Study (FS) dated October 2003.

The US EPA's proposed remediation approach for the waste tailings in the mine area of the Lava Cap Mine Superfund site involves the construction of a landfill (covered waste pile) as a means of least expensively being absolved of the responsibility for the Lava Cap Mine remediation, and thereby transferring the responsibility for the long-term remediation problems on to the state of California and the people of the area who are impacted by the covered waste pile.

At the US EPA national Technical Assistance Grant (TAG) workshop held about a year ago in Albuquerque, New Mexico, I presented a discussion of the problems with landfilling as a remediation approach at Superfund sites:

> Lee, G. F., "Improving the Quality of Science/Engineering in Superfund Site Investigation & Remediation II: Onsite Landfilling," PowerPoint slides of the presentation at the US EPA Technical Assistance Grant Workshop, Albuquerque, NM, February (2003). http://www.gfredlee.com/Show-SuperfundAlbuquerque.pdf

Recently, I have developed a review paper of the potential problems with this approach, which is currently in press in a peer-reviewed international journal:

> Lee, G. F. and Jones-Lee, A., "'Superfund' Site Remediation by Landfilling - Overview of Landfill Design, Operation, Closure and Postclosure Care Relative to Providing Public Health and Environmental Protection for as Long as the Wastes in the Landfill will be a Threat," Submitted for publication, January (2004). Preprint available at http://www.gfredlee.com/LFoverview.pdf

This review is designed to help the public understand the significant deficiencies with the US EPA's and state regulatory agencies' approaches toward landfilling of hazardous wastes and wastes that can adversely impact public health and the environment. This review provides information on many of the issues I have discussed below on the unreliable information provided by the US EPA and its contractor for the Lava Cap Mine site (CH2M Hill) on the ability of their

proposed landfill (waste tailings pile) design to comply with Title 27's requirements of containing leachate for as long as the tailings in the waste pile will be a threat.

Specific Comments on Responses to Comments

Page 1, last paragraph under number 2, in response to my comment about the inadequate stormwater runoff water quality monitoring that has been conducted by the US EPA at the Lava Cap Mine Superfund site, the US EPA states,

> *"…we believe that the sampling and analysis activity undertaken at the site has resulted in accurate quantification of arsenic loading in Little Clipper Creek downstream of the mine (including loading during the rainy season)."*

As I have commented repeatedly over the past almost three years, the US EPA's approach for attempting to estimate the load in streams of arsenic and other pollutants derived from the mine site and nearby areas on which Lava Cap Mine tailings have been deposited has been significantly deficient, in that the monitoring program has failed to follow well known principles of reliable water quality monitoring of particulate transport. It is well established in the water quality sampling literature that over 90 percent of the particulates derived from erosion/land runoff that are transported in a stream occur near the peak of the hydrograph, in the upper 10 percent of the flows. The approach that the US EPA has used in sampling Little Clipper Creek at the Lava Cap Mine Superfund site, of picking a date for each quarterly sampling, irrespective of the flow conditions and recent rainfall runoff events, is well known to be technically flawed and unreliable. The US EPA's response to my previous comments on this issue ("… *we believe* …" that our monitoring is reliable), is superficial and self-serving in support of an inappropriate position.

The Agency claims in its comments that failure to properly estimate the loads of particulate arsenic from the mine area is not a significant deficiency, since remediation at the mine area will involve capping the tailings, thereby removing them from contact with surface water. In the first paragraph on page 2, the Agency states,

> *"Under this proposal, monitoring would continue in order to determine post-construction water quality in Little Clipper Creek downstream of the mine."*

There are several aspects of this situation that have not been adequately discussed. In my previous comments, I pointed out on several occasions that windborne tailings have been deposited outside of the tailings deposition area on the mine area hillsides. The current residual of these tailings is not proposed to be remediated. It is likely that, under high runoff conditions, part of these tailings will be transported to and downstream in Little Clipper Creek. With respect to future monitoring on Little Clipper Creek after remediation, it will be essential that the US EPA's current approach of hit-and-miss sampling with respect to runoff events not continue to be followed. Instead, proper flow measurements and proper sampling as a function of the hydrograph, for several stormwater runoff events, should occur each year. The sampling, based on when those doing the sampling select a date to collect samples, must be terminated in favor of event-based sampling. This is the technically valid, appropriate approach to follow at the Lava Cap Mine Superfund site.

Under number 3 on page 2, the US EPA asks if I was being critical of the US EPA's analysis of the organic matter content of the samples. The answer is that I was not. The point of concern of this comment was the clarification on the aquatic chemistry discussed in the FS.

Page 2, number 5, with respect to my comment on the failure to properly consider methylmercury formation, the US EPA states,

> *"… literature derived values tend to be conservative due to the assumptions made in determining the values."*

That statement is not true with respect to mercury and some other constituents. As I discussed, the methylation of mercury leads to formation of the primary toxicant (methylmercury) for human health and some wildlife. However, the toxicity tests that are used for assessing the toxicity of mercury do not necessarily include methylmercury as the test species. Under these conditions, the estimates of the toxicity of mercury are not conservative, but can significantly underestimate mercury toxicity.

Page 2, number 6, with respect to the CTR criteria being superseded by the December 2002 US EPA recommended criteria, basically the US EPA states that the Agency is going to use the now outdated CTR criteria, rather than the US EPA's updated recommended criteria. This is a technically invalid approach. The least that should be done in a credible Superfund site investigation and hazard/risk assessment is to indicate what the CTR criteria are and also discuss in the FS that these criteria have been superseded by the US EPA's December 2002 recommended criteria and discuss what that means with respect to the FS. To rely on an out-of-date criterion as a method of assessing risk is technically invalid and should not be practiced by the US EPA, especially in light of the fact that the Agency has published updated information on the issue. It is inappropriate on the part of the US EPA to perform remediation to meet out-of-date criteria for regulating constituents.

On page 3, number 8, with respect to my comment about the application of the Tributary Rule to Little Clipper Creek, the US EPA again provided an inappropriate response. As I have pointed out, based on my discussions with the Central Valley Regional Water Quality Control Board (CVRWQCB) staff responsible for development of water quality objectives and their implementation, the Tributary Rule applies to Little Clipper Creek. The Basin Plan is explicitly clear on Tributary Rule applications, and unless the CVRWQCB changes the Basin Plan, the Tributary Rule is applicable to Little Clipper Creek.

Page 4, numbers 9 and 10, with respect to the appropriateness of using the US EPA "political" MCL for arsenic as a basis for establishing cleanup levels, the US EPA staff state,

> *"USEPA has determined in this instance that the arsenic MCL is a relevant and appropriate standard."*

This is not an appropriate response to my comment. As I have repeatedly pointed out, the US EPA drinking water MCL of 10 µg/L is a politically based number that is applicable to certain

types of water supplies. In accordance with CVRWQCB requirements, it would not be applicable to cleanup of waste-polluted situations, such as at the Lava Cap Mine Superfund site. I know from discussions with the staff and actions at other Superfund sites that the CVRWQCB will not allow politically based drinking water MCLs to be the basis of cleanup of polluted groundwaters where the pollution arose from mismanagement of wastes.

Under number 10, it is stated that,

> *"USEPA finds that the 10 µg/L standard for arsenic is protective of human health under this exposure pathway."*

This is a self-serving statement in support of a politically determined standard that has no technical validity. With respect to the McHenry statement, please provide me with a copy of this letter from him which indicates that 10 µg/L is an appropriate cleanup objective for waste-derived materials.

With respect to number 11 on page 4, where I have pointed out in my comment that John Marshack has prepared guidance on selecting water quality goals, this could take precedent over statements made by McHenry on this issue.

With respect to number 13 on page 5, where I have commented on the inadequacies of the 50-year cost estimates, my primary concern is that the US EPA's FS document does not properly characterize the need for funding beyond 50 years, and that the true cost of certain remediation approaches which leave wastes at the site are far beyond those that the US EPA has projected, since the wastes will be a threat forever. A credible FS discussion would include at least mention of this issue.

Page 5, last paragraph states,

> *"The plastic materials used today for conventional municipal and hazardous waste sites have an estimated life span from 200 to 400 years. Based on the performance of existing landfill liners it is estimated that little to no deterioration would occur over a period in excess of 200 years."*

This statement occurs repeatedly throughout the FS. I have been involved in landfill liner research at the request of the US EPA beginning in the 1970s. Further, because of my chemistry background, including graduate-level work on free radical chemistry, I am familiar with the unreliable information that has been developed on the expected life of thin plastic sheeting liners under free radical attack. Those who understand physical chemistry and free radical attack on polymeric chains know that the approaches that have been used to estimate the rate of degradation of HDPE liners are without technical merit. They represent a gross, inappropriate extrapolation of a few years' data to hundreds of years. No one who properly understands physical chemistry and the Arrhenius equation should ever make such extrapolations. Since the US EPA has provided highly unreliable information on this issue, I request that the technical basis for the 200-year value be provided, so that it can be properly reviewed. I am confident, based on having been involved in this matter for over 20 years, that this review will show that

the US EPA in their response to my comments has provided inadequate information on the expected behavior of the plastic sheeting in the cover.

Page 6, number 14, with respect to my comment on the inadequate information presented in the FS on projected costs of remediation associated with covering the waste pile, where landfill containment systems that are well known to eventually fail are proposed to be used by the US EPA, the US EPA states,

> *"… USEPA knows of no entity whether federal, state, local, non-profit, or industry, which would conduct business by setting aside today sufficient funds to pay out a string of costs over* [a] *five hundred year period."*

A critical review of the landfilling literature (see my website, www.gfredlee.com) shows that several respected groups have examined this issue and pointed out that the current approach for postclosure funding, which is what the US EPA is recommending be used at the Lava Cap Mine site, is fundamentally flawed in addressing the long-term costs. As a recent example of this situation, the California Integrated Waste Management Board (CIWMB) is conducting a review of the inadequacy of the current postclosure care period for landfilled wastes. As part of that effort, I developed a discussion of this issue, which was submitted to the CIWMB:

> Lee, G. F., "Workshop on Landfill Postclosure and Financial Assurance," Comments submitted to Mike Paparian, California Integrated Waste Management Board, by G. Fred Lee & Associates, El Macero, CA (2003).
> http://www.gfredlee.com/paparian10-30-03T.pdf

This is a topic that I have been involved in since the early 1980s, when it was first proposed that there be only 30 years of minimal postclosure care funding provided, associated with the operation of a landfill. I have found no one who understands these issues who feels that that is an adequate approach.

As discussed in my comments to the CIWMB, it is generally recognized that a reliable way to properly address this issue is through a dedicated trust fund, established at the time the landfill is developed, which is of sufficient magnitude to generate sufficient income so that funds will be available in perpetuity to address plausible worst-case scenario failures. From a public health and environmental risk standpoint, a "worst case scenario failure" would be failure of the waste pile cover to prevent moisture from entering the wastes, and failure of the groundwater monitoring system to detect the polluted groundwater before it has left the waste pile area. This is the scenario that should be evaluated with respect to the ability to detect this situation with the proposed approaches and the cost for remediation associated with it. As discussed in my writings and as is well known, the current approach for addressing postclosure care funding is fundamentally flawed and not adequate to protect the health, welfare and interests of future generations who are potentially influenced by a proposed landfill or landfill expansion for as long as the wastes are a threat.

Page 7, under number 15, again the US EPA states,

"… the performance of existing landfill liners indicates that little or no deterioration of HDPE membranes would occur over a period in excess of 200 years."

What is the technical basis for that statement? It needs to be critically reviewed by experts, so that the public impacted by the Lava Cap Mine Superfund site remediation can properly understand the superficiality of that statement. Also in that response, the statement is made that,

"Any moisture present in the waste at the time it is placed in the onsite disposal cell (Alternative 2-5) would be captured by the impermeable liner and leachate collection system."

This is propaganda and is self-serving on the part of the US EPA and its consultants. No liner is "impermeable." The literature is clear that, even with high-quality construction, there will be leaks through the liner. Further, there is no question about the fact that there will be deterioration of the liner over time, which can readily occur in a much shorter period than the 200 years that the US EPA is trying to represent as a reliable indication of the durability of HDPE liners.

The statement is made that, "*Sources of leaks, if any, will be investigated and remedied."* How will this be done? Without installing a leak detection system, there is no way through visual inspection of the waste pile cover to reliably investigate the points where the low-permeability layer of the cover is leaking. I have raised this issue in the past, and the US EPA and its contractor have not addressed the issue, but have simply stated that they are going to detect the points where leaks are occurring. They need to be more specific about how anyone is going to detect actual points of leakage of the low-permeability layer of the cover, and the approach that they specify for doing this should be presented for public review.

Page 7, second paragraph states,

"The amount of leachate generated in an onsite disposal cell would decrease rapidly after construction. Unlike refuse disposed in municipal landfills, the dewatered tailings would not provide a source of continued leachate production. The amount of leachate generated would decrease rapidly because no precipitation would be allowed to infiltrate through the top cap."

This is another example of the superficial responses to comments I have made on deficiencies in the FS that the US EPA and its contractor have provided. There is no question about the fact that there will be leakage through the cap, that free radical attack will eventually cause the low-permeability layer to deteriorate, and that, while shortly after construction of the cap (if high-quality construction is achieved) there can be a significant reduction in the amount of leachate produced in the Lava Cap Mine covered tailings pile, over time moisture will penetrate through the so-called "impermeable" layer in the cap, generating leachate again. Those who made the comment that the covered tailings pile at the Lava Cap Mine are different from municipal solid waste landfills, with respect to long-term leachate generation, do not understand municipal landfill situations and have not properly discussed these issues. There is no difference between

municipal Subtitle D landfills and the Lava Cap Mine proposed covered tailings pile, since both will generate leachate over time.

In the same paragraph the statement is made that,

> *"The integrity of the soil cover would be monitored to identify problem areas such as portions of the vegetative cover requiring replanting, eroded or damaged areas, areas lacking free drainage, and areas having repeated or severe differential settlement."*

This response does not address the issue that I have repeatedly raised in my previous comments. How will those responsible for maintaining the covered tailings pile after the US EPA is no longer responsible for site remediation detect when the low-permeability layer of the cover fails to prevent moisture from entering the wastes? The US EPA and its contractor's response on this issue is another of the superficial responses that cause those who understand these issues to conclude that the US EPA is not a credible source of information on this issue, since it allows its contractors to make superficial statements on waste pile cover inspection. None of the approaches listed in the paragraph quoted above will address detection of the points of deterioration of the low-permeability layer of the cover.

Page 7, number 16, with regard to my comment on the inability to properly monitor the inevitable leakage through the waste pile cover, the US EPA states,

> *"Nevertheless, USEPA and its contractor CH2M Hill believe it is possible to design state of the art leak detection systems and monitoring well networks to identify potential releases with the intention of repairing any breaks in containment before significant offsite impacts occur."*

How will this be done? It is my experience, having been involved in review of about 75 landfills, where about 20 percent or so are located over fractured rock, that statements are made by the regulatory agency and contractor that this will be done, yet in fact, those who truly understand and reliably report on this issue, such as Haitjema (1991), of the University of Indiana,

> Haitjema, H., "Ground Water Hydraulics Considerations Regarding Landfills," *Water Res. Bull.* 27(5):791-796 (1991),

have pointed out that it is impossible to do this reliably, using approaches that are typically followed. According to Haitjema (1991),

> *"An extreme example of Equation (1) (aquifer heterogeneity) is flow through fractured rock. The design of monitoring well systems in such an environment is a nightmare and usually not more than a blind gamble.*
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> * * *
>
> *Monitoring wells in the regional aquifer are unreliable detectors of local leaks in a landfill."*

As I have discussed, any groundwater monitoring system should be designed to have a high degree of reliability in detecting at least 95 percent of the leachate-polluted groundwater when it reaches the point of compliance for groundwater monitoring. This is in accord with US EPA regulatory requirements and those of the state of California. In a fractured rock system, the "plumes" of polluted groundwater will move along the fractures, which makes it almost impossible to detect leakage at the point of compliance. I did not suggest that the cleanup of the mine area be held up until the groundwater investigation is completed, as implied by the response on page 7. What I did suggest is that the US EPA and its contractor reliably discuss these issues and not continue this superficial approach of stating that they are going to detect when leakage occurs by some undefined approach. The issue that I have raised is that the monitoring of groundwater pollution at the Lava Cap Mine Superfund site is virtually impossible without tremendous expense, well beyond anything that the US EPA has ever proposed in the past or will likely propose for the Lava Cap Mine site. As I have discussed, this means that the inevitable leakage of the waste pile cover system must be approached differently than the approach that is proposed by CH2M Hill.

Page 7, number 17 continues to the top of page 8, where it states,

> *"CH2M Hill estimates that full replacement of the cap materials would not be required during the 50 year period of analysis. As discussed previously, with proper installation and maintenance to avoid puncture of HDPE, caps proposed in Alternatives 2-3, 2-4, and 2-5 should remain impermeable to surface infiltration for at least 200 years."*

CH2M Hill has no technical basis for making that judgment. The US EPA should be required to provide full documentation for external peer review of such statements, so that the public can understand the unreliability of the information that the US EPA is allowing its contractor, CH2M Hill, to provide in its FS documents. There is no history of the rates of free radical attack on HDPE in a landfill cap environment. It will certainly be appreciably greater than for a landfill bottom liner. The point in my raising this issue was that the FS developed by CH2M Hill does not even discuss these issues. This is another example of a superficial approach toward addressing the issue of the inevitable failure of the containment system, where by ignoring all of the well known failure mechanisms, US EPA hopes to gain approval for a covered waste pile that could become a site that would have to be remediated again.

Page 8, number 19, with regard to the adequacy of monthly sampling, the response focuses on human health risk assessment, rather than the real issue of concern, which is ecological impacts. Again, the US EPA/CH2M Hill has not properly addressed the issue raised in my comment. Much shorter periods of time can be adverse to aquatic ecosystems, which would not be detected by monthly sampling.

Page 8, number 20 is another superficial discussion of the ability of the waste pile cover/cap to contain the wastes in the pile for as long as the wastes are a threat. The US EPA should require CH2M Hill to reliably discuss this issue, rather than presenting propaganda in support of an inadequate cover for the wastes that are proposed to be contained at the Lava Cap Mine Superfund site.

Page 9, number 21, with regard to the STLC reliability for estimating whether a waste is a threat to cause groundwater pollution, I have been personally involved in over a million dollars of research on leaching characteristics of various types of waste. I have also observed the results of research by many others. In connection with the development of the EP Tox test, which was the forerunner of the STLC and TCLP, Dr. Jones-Lee and I presented a paper at an ASTM conference criticizing the US EPA's approach for developing the EP Tox, which tied for first place as best paper presented at the conference on waste classification. The EP Tox, TCLP, STLC, etc., are all arbitrarily developed tests where the conditions of the test have no relationship to the leaching that will, in fact, occur in the wastes in contact with water. This should be obvious since the leaching that is already occurring by exposure of the tailings to water in the tailings pile in the mine area, as well as the deposition area near Lost Lake, shows that there is appreciable naturally occurring leaching. The US EPA/CH2M Hill has responded to my comment by stating, "*USEPA has determined that the STLC is the regulatory testing criteria that applies.*" This determination is inappropriate in that this test does not properly characterize the potential for leaching arsenic from the tailings. There is no need to invoke some arbitrarily developed test to determine whether there is a leaching hazard. The existing information from the naturally occurring leaching shows that the arsenic in the tailings is leachable at concentrations that are a significant threat to human health and the environment.

Page 9, number 23, in response to my comment regarding the statement that "*The goals of Alternative 2-5 are to prevent migration of contaminated sediment into Little Clipper Creek …,*" the US EPA states

> *"It is USEPA's goal to design a monitoring and maintenance regimen that will ensure that the remedy remains protective of human health and the environment over time."*

I have repeatedly observed that regulatory agencies and consultants working on behalf of landfill applicants make such statements; however, they never define what they mean by "over time." The requirement in California is that protection must continue for as long as the wastes are a threat. If this is what is meant, it should be explicitly stated, with a discussion of how this will be accomplished over the thousands of years that the tailings in the covered waste pile at the Lava Cap Mine site will be a threat. How is the US EPA going to "ensure" that this will be accomplished? The fact is that the Agency cannot ensure this with its proposed approach for remediation of the site. At best, the US EPA's approach simply postpones the problem and passes it on to future generations, who could experience health problems, lost water resources and damage to the environment by the proposed remediation approach.

With respect to the State of California assuming responsibility for funding the protection of public health and the environment from the landfilled wastes in perpetuity, California regulatory agencies have a poor record of accomplishing even short-term protection, much less long-term protection. In connection with the California Integrated Waste Management Board's review of the current GeoSyntec landfill compliance study, I have provided detailed comments on the fundamentally flawed approach that GeoSyntec has indicated it will use for determining compliance of a landfill with regulatory requirements. GeoSyntec's approach is to rely on the ability of the staff of the Regional Boards to detect and properly report on landfill problems. As discussed in my comments,

Lee, G. F., "Comments on the California Integrated Waste Management Board Landfill Facility Compliance Study," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, November 2003, http://www.gfredlee.com/CIWMBcomments11-20-03.pdf

Lee, G. F., "Comments on the California Integrated Waste Management Board Landfill Facility Compliance Study Phase I Report - Results of Screening of 224 California MSW Landfills, Developed by GeoSyntec Consultants, Inc., December 2003," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, January (2004), http://www.gfredlee.com/CIWMBCompliance Study comments.pdf

while some Regional Board staffs understand the problems, they are under political pressure not to proceed to properly address them. I have repeatedly observed, since 1989 when I became involved in the details of landfilling regulations in California, that some Regional Board staff ignore obvious groundwater pollution by landfills, fail to use simple Darcy Law calculations to estimate the rate of leakage through a clay liner, allow groundwater monitoring systems based on vertical wells spaced hundreds to as much as 1,000 feet apart at the point of compliance to detect fingerlike plumes of leachate caused by initial leakage of liners, etc. I have recommended that the way to address these problems is through third-party independent monitoring on behalf of the potentially impacted public, where those who propose a particular landfilling approach fund in perpetuity the investigations of the landfill containment system, to prevent groundwater pollution by landfill leachate.

Page 10, number 26, the US EPA states,

"The conceptual design of the onsite disposal cell in Alternative 2-5 includes siting, construction, and monitoring components that are designed to prevent leakage of leachate, and thereby conform with the Title 27 groundwater protection Performance Standard for Class II landfills."

What the US EPA did not say is that this design has to conform to the Performance Standard of no groundwater pollution for as long as the wastes are a threat. The US EPA acknowledges that the liner in the cover will eventually deteriorate. Whether it is 30 years, 50 years, 100 years, 200 years or 1,000 years in the future, it will occur. Title 27 requires prevention of leakage from the system for as long as the wastes are a threat – i.e., in the case of the arsenic tailings at the Lava Cap Mine site, forever. The proposed design for the waste pile cover at the Lava Cap Mine site will not comply with this requirement.

Page 11, number 27, the US EPA focuses on plausible worst-case scenario failure occurring only with respect to seismic activity. The plausible worst-case scenario failure includes the ultimate deterioration of the liner in the cover and the inability to properly monitor when this failure occurs. This should be discussed.

Page 12, number 28, the US EPA has not reliably addressed the issue I have raised of the need for a full footprint leak detection system under the waste pile. As I have discussed, the

current design, where the leak detection system will occur under only part of the footprint, is fundamentally flawed with respect to detecting the eventual leakage through other areas of the waste pile.

Page 13, number 30, the US EPA again presents a superficial, technically invalid assessment of the HDPE membrane. This issue must be properly reviewed by external peer reviewers who do not earn income by promoting the development of landfills.

Page 14, number 33, my comment asked, "*Will any of these monitoring events* [of Little Clipper Creek] *be specifically targeted to high flow conditions…?"* The response is more of the superficial approach, where the US EPA states,

> *"Depending on how the monitoring schedule is set up one or two of the four planned quarterly events will fall during the rainy season."*

Proper monitoring of any creek or waterbody requires event-based monitoring. In this case, the event is stormwater runoff. The proposed approach for monitoring Little Clipper Creek is inadequate and should not be adopted. It should be changed to include event-based monitoring.

Page 16, number 42 is concerned with my comments on the work by Schwazbach of the USGS, where he has found in the San Francisco Bay Area that methylmercury is adverse to fish-eating birds. The US EPA's response, *"… no one paper can serve as the basis for USEPA's action …,"* is another example of the unreliable information that is being provided. The Schwazbach presentation is not "one paper." It represents a considerable intensive effort of research by the USGS. Further, there is evidence from other areas of the country that this phenomenon occurs elsewhere.

"Overall, the FS was inadequate in that it failed to discuss the long term problems with the covered waste pile approach of mine area remediation. The responses to my comments on these issues perpetuated providing inadequate and in some instances unreliable information on key issues. It is important that the Agency adequately and reliably inform the public about the true costs and long term problems with the various remediation approaches that it chooses to propose as alternative approaches for remediation of the Lava Cap Superfund site mine area.