Summary of Review Comments and Actions Taken

Comments provided by Idaho Department of Environmental Quality	
1. Please list the following additional acronyms in your LIST OF ACRONYMS: LC, EC, IC, and MATV. It would be beneficial to define some terms (e.g., negative control, teratogenesis) either in the text or in a glossary.	Edits made.
2. I was hoping to see some sort of conclusions by Golder Associates in the appendix. If there was any extrapolation of winter stress syndrome to Yellowstone cutthroat trout as Section 3.4.3 is titled, I didn't see it. What does Golder Associates conclude in regard to WSS and YCT? After all this review, I would also like at least some deductions on the part of Golder Associates on Se and fish in the Smoky Canyon Mine area and the area-wide phosphate patch. For example, based on all the papers/reports examined for the document, does Golder Associates agree with Hardy (2005) that "... selenium exposure did not represent a threat to cutthroat trout in Blackfoot River ..."?	We have provided a summary paragraph in Section 3.4.3 regarding the application of WSS to YCT. The potential for WSS-induced mortality to occur is a species-specific issue, and extrapolating Lemly's conclusions from warm-water to cold-water fish is problematic in part because of their different feeding strategies. The purpose of this Appendix is to provide an unbiased data compilation/synthesis from which readers can draw their own conclusions. Providing our own opinion in the Appendix would negate the value and credibility of the appendix. Further, we have not conducted a systematic weight-of-evidence evaluation of the data that would allow us a high level of certainty in drawing conclusions. However, we do note that the available data indicate that population-level impacts of selenium exposures to YCT are unlikely at present exposure levels. An impact is an adverse effect that threatens not just individuals but population viability.
3. Selenium standards and guidelines are presented for EPA, Canada, and British Columbia. Please include if applicable guidelines used in other countries (e.g., Australia)?	Guidelines from Australia have been added to provide additional context. See Section 4.2.
4. In the document Smoky is spelled either Smoky or Smokey. It should be consistent and probably spelled Smoky as found on the USGS 1:24000 topographic maps. Also on the USGS 1:24000 topographic maps there is no creek listed for Pole Canyon. If the reference to Pole Creek in the appendix is to the stream that many call Pole Canyon Creek, then it should be mentioned that Pole Creek and Pole Canyon Creek are synonymous.	Edits made throughout document to convert "Smokey" to "Smoky", as well as "Pole Canyon Creek" to "Pole Creek".
5. Names of major streams (e.g., Crow Creek, Sage Creek, Tygee Creek) should be included on Figures 3, 4, 7, 8, and 9.	Edits made.

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6. Page v. NM is Not Measured.	Edit made.
7. Please reconcile the following. The Executive Summary (Page ii, Paragraph 3) states that "There is overlap ... however, the lowest acute toxicity is associated with cold-water species." On Page 6, Paragraph 2, you state, "There was considerable overlap ... but the lowest acute values were associated with warm water species and the highest acute values were associated with cold-water species."	We have corrected the Executive Summary to reflect that the lowest acute toxicity is associated with warm-water species rather than cold-water species as initially indicated.
8. Page 6, Bluegill. In Cleveland et al. (1993), the NOEC for mortality was 330 *u*g/L while the NOEC for condition factor was 1,120 *u*g/L. Please explain because either I don't understand NOEC or the fish died long before the Se concentration had a chance to affect growth. Line 7, you probably want to insert "After 60 d, there ***were*** significant ..."	Text has been rephrased to clarify that the NOEC for condition factor was calculated based on the surviving fish at Day 60. The editorial comments have been addressed.
9. Page 8, Chinook Salmon, Paragraph 1. It was not clear to me the first and second time I read this paragraph that the dilution series was for both well water and blended SLD/San Joaquin River water. Perhaps the following language might make it clearer. For both studies (well water and SLD/San Joaquin River water), a dilution series was used consisting of 0.25X, 0.5X	Edit made.
10. Page 15, Kennedy, Line 9. Change 21.2 ug/g dw to 21.2 µg/L	Original units from Kennedy et al. (2000) are correct as presented.
11. Page 17, De Rosemond, Paragraph 1, Line 6. The first macroscopic should probably be microscopic.	Edit made.
12. Page 17, Muscatello, Paragraph 1, Line 4. Egg Se concentration was repeated.	Edit made.
13. Page 28, footnote. Hodson et al. should be (1980).	Edit made.
14. Page 29, Paragraph 1 after first two bullets, Line 8. It probably should read "... may cause ..."	Edit made.
15. Page 30, Brown Trout. In the Berg and Bremset (1998) study of overwintering brown trout lipid content, what were the average and range for surviving fry?	Value originally reported was the mean lipid content. Berg and Bremset (1998) do not provide data for individual fish. Footnote added to text to clarify.
16. Page 32, Selenite, Line 7. The LOEC ranged from 112.7 to >47 *u*g/L. Please substitute as exact number instead of >47.	Text rephrased to indicate that 47 µg/L was the highest concentration tested, and therefore LOEC is correct as first presented.
17. Page 32, last bullet, Line 3. You probably want to insert "... it can ***be*** calculated ..."	Edit made.

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18. Page 33, Selenite. The process to derive the FCV is explained except for how the final acute-to-chronic ratio is determined. How is the final acute-to-chronic ratio determined? If the calculated FCV is 44.7 *u*g/L which is below the chronic value of 55.2 *u*g/L for rainbow trout as reported in one study, please explain, if known, why EPA halved 55.2 *u*g/L to get a CCC of 27.6 *u*g/L.	Additional text provided to describe how ACR was calculated, as well as how EPA substituted the calculated FCV.
19. Page 33, Selenate. Again, how is the final acute-to-chronic ratio determined? Line 6, the first selenium IV should probably be selenium VI.	ACR addressed as above. Edit made regarding Se IV versus Se VI.
20. Page 37, Tissue Guideline, Line 3. I think that it should read "... see Section ***5.0*** for ..."	Edit made.
21. Page 40, Section 5.2, Paragraph 2, Line 4. Should the i.e., actually be an e.g.? Threshold is defined as a "... concentration above or below which certainty is attained ..." Therefore, I assume that a threshold could be a concentration above which we know effects will occur, but we are not sure if effects will or will not occur below that threshold. Line 4, concentration should be singular to read "... a certain threshold concentration, but ..."	Edits made.
22. Page 40, Section 5.2.1, Line 7. Eliminate the "mark to read "... 16 *u*g/g dw."	Edit made.
23. Page 41, beginning Line 3. Realizing that Golder Associates are not the authors of the DeForest et al. (1999) review, please, if possible, clarify the statement "... the authors hypothesized that exposure to inorganic selenium in water will result in observed adverse effects at lower tissue concentrations than exposure to organic selenium in diets since inorganic selenium is rapidly depurated from fish." My conclusion from this hypothesis is that organic selenium accumulates at higher concentrations in fish than inorganic selenium because of depuration and that this tissue accumulation of inorganic selenium is different than tissue accumulation of organic selenium as it has adverse effects at lower concentrations. From reading everything in the document previous to this, I must have missed the conclusions or studies that would lead to this hypothesis.	Clarified this section to indicate that the implications regarding differential accumulation of various forms of selenium are presented as a hypothesis by Deforest et al (1999) to support their decision regarding study selection. This section was not intended to provide a comprehensive evaluation of DeForest's hypothesis. We have summarized the current state of knowledge regarding Se bioaccumulation in Section 3.1.3.

24. Page 45, Paragraph 1, Line 10. The sentence should end with a period instead of a comma.	Edit made.
25. Page 45, Paragraph 2, Line 1. Eliminate the second and, change compares to compare to read "... (in review) compare these ..."	Edit made.
26. Page 55, Section 6.2.3, Sediment, Line 2. Do you mean Salt River Watershed rather than Reservoir?	Edit made.
27. Table 2, Footnote 5. An should be a to read "... corresponds to a mean ..."	Edit made.
Comments provided by Idaho Fish and Game	
1. ("Natural adaptation of biotic community") IDFG state there is no published information/proof that resident fish populations in Crow Creek have greater resistance to selenium and suggest this may be hard to show given the lack of reference streams from which to make comparisons. This indicates to us that they may: 1) be unaware of the selenium data on fish in upper Crow Creek and Deer Creek from USGS, GYC, and Simplot, or; 2) not consider these data to be representative of "reference streams". Either way, we think Dave Chapman should be made aware of this statement from IDFG.	See Section 6.2.2. We have added content that shows that YCT populations in the study area are relatively healthy despite elevated Se concentrations. We believe that this information is evidence that supports that adaptation may be occurring.
2. ("Seasonal fish collection") Time of collection (season) is relevant to selenium levels in fish tissue (because fish tissue Se level is linked to prey consumption) and should be examined in the Se data. We think this should be looked at in our Fisheries appendix and some mention of this topic should be made in the appendix by Dr. Chapman.	See Section 6.2.2. We have added content to discuss the potential confounding effect of seasonality on Se tissue concentrations in fish.

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3. ("Seasonal fish movements") Three main life histories exist for fish (resident, adfluvial, fluvial) individuals should be assigned to appropriate population components, if known. This is certainly something that should be considered when interpreting chemistry data in fish tissue within a large watershed area like Crow Creek. Different fish species are categorized differently with regard to their movements in a drainage. For those species that are known to potentially move quite a bit, we should recognize uncertainty related to interpreting chemistry data for such species. A short explanation of the three life histories and potential for each to occur in the Study Area is probably sufficient for the appendix.	See Section 6.2.2. We have added content to discuss the potential confounding effect of differing life history strategies on Se tissue concentrations in fish.
Comments provided by NewFields	
1. Lemly's protocols for NEPA assessments of selenium hazards have not been presented or reviewed. Public comments on the draft EIS specifically refer to those protocols, and Lemly included a copy of the procedure with his comments. Any insight Golder/Chapman may be able to provide regarding the Lemly protocol would be of interest.	We have prepared a review of "A procedure for NEPA assessment of selenium hazards associated with mining" (Lemly, in press) which was submitted under separate cover.
2. Lemly's book, Selenium Assessment in Aquatic Ecosystems (2002), is based on published papers that were considered in the report, as well as some work that has not been reviewed. In order to complete the review of Lemly's work, reference to the book and all associated research may be helpful.	No edits made. We have cited Lemly (2002) as well as the relevant preceding peer-reviewed journal articles and book chapters that formed the majority of the content of Lemly (2002).
3. Add names of streams to all map figures.	Edits made.
4. Section 5.1.2 provides an initial discussion of the data considered by EPA for the chronic criterion. I think it would be beneficial to provide a paragraph on the different SMAVs and GMAVs that are included in the Draft criterion and the range of salmonid effects concentrations. The variability in the effects range for chronic selenium endpoints is important to discuss in this section. It also illustrates that EPA selected one of the lowest values.	We have added content to summarize the ranges of SMCVs and GMCVs for all species, as well as the range for salmonids only.
5. Section 5.3 Page 45, 1st sentence - What conditions? Please define.	Edit made to define conditions as "cold-water"

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6. Section 5.3 - A section that discusses adaptation and expands on the last paragraph relative to species tolerance should be included here if more literature is available that describes these types of conditions, particularly for salmonid species.	No edits made. We have already summarized the available studies that have commented on adaptation and acclimation to Se. We are not aware of any other papers that provide additional information on this topic.
7. Section 6, 1st paragraph References to Smoky Creek Mine should be corrected to Smoky Canyon Mine.	Edit made.
8. Section 6.2.1, last paragraph on page 52. This paragraph is confusing for readers not familiar with data from the site. We suggest revising to create three separate paragraphs: *"Selenium water concentrations are summarized in Table 3: station locations are shown in Figure 3. Rather than reporting data for individual monitoring stations, the selenium water data presented in Table 3 have been grouped together by regions within the watershed (e.g., all stations on Crow Creek above Sage Creek were grouped together, and all stations on Deer Creek were grouped together).* *Selenium is typically not detectable (<0.2 ug/L to <1.1 ug/L) in water from stations upstream of mining influences (Crow Creek, Deer Creek, upper Pole Canyon Creek, Upper Sage Creek, Upper Smoky Creek, the north fork of Sage Creek, and upper Tygee Creek), and the average concentrations at those stations are less than 1.1 ug/L. The maximum selenium concentrations reported for stations upstream of mining influences range from 2.85 ug/L to 11 ug/L. Only upper Sage Creek and Crow Creek water collected upstream of Sage Creek had selenium concentrations reported higher than 5 ug/L.* *At stations that were considered to be mine-impacted, mean selenium concentrations ranged from 0.7 to 541 ug/L ..."*	Edit made; also, additional content added.
9. Section 6.2.3, Sediment section, 1st sentence Reference is made to the Salt River Reservoir. Is this supposed to read Salt River Watershed?	Edit made.

10. Section 6.0: A summary of conclusions that can be drawn from the existing site-specific data could be included here. The summary in this report would then serve as the basis for discussion presented in the final EIS.	A summary has been provided.
Comments provided by JBR	
1. In section 6.2.2 it would be good to elaborate on the statements in the second and third paragraphs that fish in background conditions had elevated selenium concentrations. These statements should be expanded with a discussion of the chemistry data. I would also like a discussion added that other, biological information included in the CNF RFP EIS and BE indicates that the same areas (Deer Creek and Crow Creek) are characterized as having strong YCT populations (pp 3-181 to 3-182 Revised Forest Plan (RFP) FEIS) and the Palisades/Salt YCT metapopulations are thought to have a low risk of extinction from mining (p 4-161 RFP FEIS and BE on p. D-224 Appendix D RFP FEIS). Perhaps there are other, State of Idaho and State of Wyoming studies (Idaho DFG fish surveys from 1986 and 1999-2000; U. of Wyoming graduate studies of Salt River and Crow Creek 1996 and 1997 that describe the biological condition of the YCT in the Crow Creek basin that can be discussed. What I think is important to describe is that the available biological information suggests that YCT are doing well in the Crow Creek basin yet the selenium samples taken to date indicate naturally elevated selenium concentrations in these fish. If we can simply just state the apparent contradiction between healthy YCT populations in streams that have Se levels above the proposed thresholds that would be beneficial? This suggests that the YCT may not be as sensitive to selenium toxicity as some might think.	We have added text to Section 6.2.2 which summarizes the available data from the sources listed. We have also added a statement regarding the implications of the observed healthy YCT populations in areas such as Crow Creek. However, we caution that a definitive conclusion is not possible that the elevated Se in fish in the Crow Creek drainage area are solely attributable to natural sources. At present, the data are not sufficient to exclude the possibility that fish are migratory and therefore exposed to selenium from both natural and mine-related sources. Despite this limitation, we agree that YCT populations are healthy despite elevated tissue concentrations, and have included this observation in the report. We have also included reference to an upcoming publication (Chapman 2007) that summarizes the burden of evidence that cold-water fish including YCT are less sensitive to selenium than warm-water fish species.

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2. In this same area, I think there should be a paragraph on the general geology of the Crow Creek basin describing the fact that large outcrop areas of Phosphoria formation are present in the basin and the Phosphoria f. is known to contain elevated selenium. This is likely the reason why the selenium is present in the baseline condition of the Crow Creek basin. Also, this erosion of Phosphoria shale into the basin streams has occurred over geologic time so the conditions are likely at steady state.	Paragraph added to beginning of Section 6.0 based on the DEIS and USGS documents.
3. In the middle of the top paragraph on pg 54 of the Appendix is a statement that Hardy's studies did not result in significant adverse effects to offspring. A similar statement in the DEIS was attacked by Lemly et al. This statement should be expanded with more narrative written in light of the comments received from Lemly et al.	We have added content to provide a more complete summary of the results from Hardy (2005) in light of the issues raised by Dr. Lemly.
4. Jim Capurso, the fisheries biologist from the Forest Service has reviewed the Appendix … he would like you guys to beef up Section 6 some more. Specifically in Section 6, he believes it would be helpful to discuss the wide differences that have been noted in some of the selenium samples taken by different sampling efforts in the same streams. For instance, using the literature (and perhaps sample locations), he would like you to attempt to explain the differences. In addition, he states that it may be helpful to try to obtain the QA/QC documents of the labs that analyzed the samples to help explain why there may have been such differences in some of the data.	We have added content to Section 6.2.1 and 6.2.2 to expand upon the distributions of data from different sources. We have also discussed QA/QC data where they are available; however, not all data sources have detailed QA/QC. We have noted in the text whether or not we were able to access the detailed QA/QC files.
5. On page 52 of the draft, he commented that the Appendix simplifies the presentation of the data by combining data collected in the same area. He states that this simplification is probably not helpful because it does not explain the large differences in some of the data. Jim feels that it would be helpful for the Appendix to use the literature to try to explain the differences. For instance, the time of year of sampling, the sex of the fish, the life history of the fish, etc may affect the amount of selenium in its tissues.	We have added content to describe the potential confounding effects of factors such as fish size, sex and lifestage. However, site-specific details for each factor for all fish were not available, and therefore, we cannot complete a detailed investigation regarding these factors.

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6. One more thing, for Figure 5 in the Appendix (or other places this information might be used), the agencies would like to have you change the data collected from SF Sage Creek to be classified as not-impacted/background.	Edits made.
Comments provided by Jim Capurso	
1. General comment #1: it may be good for Dr. Chapman to comment on Lemly's NEPA related draft paper, but I don't know if we want him to comment on the policy side of it. You see, from my perspective, the most significant problem with the paper is not the biological science, but the political science and I don't know how much experience Dr. Chapman has in that.	We have prepared a review of "A procedure for NEPA assessment of selenium hazards associated with mining" (Lemly, in press) which was submitted under separate cover. This review focused on technical issues with the hazard assessment protocol rather than its policy application.
2. In general Comment #2, it would be good for Dr. Chapman to provide his thoughts on how to improve Lemly's assessment protocol because we intend to use it for monitoring and if there's ways to improve it, we would sure be interested in hearing about them.	We have prepared a review of "A procedure for NEPA assessment of selenium hazards associated with mining" (Lemly, in press) which was submitted under separate cover. This review provided recommendations for improvement of the hazard assessment protocol.