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Dear Mr. Holsinger and Ms. Chartrand,

This letter and enclosure is in response to your January 23, 2009 petition for correction of information, which was received by this office on February 5, 2009. This data challenge against the Rocky Mountain Research Station (RMRS) General Technical Review (GTR)-209 was submitted by you in accordance with the United States Department of Agriculture (USDA) Information Quality Act (IQA); Public Law 106-554-&515 and the USDA Information Quality (IQ) Guidelines. The petition was filed under the USDA Guidelines for Regulatory Information and receipt was acknowledged via our letter dated February 17, 2009.

We have addressed each of your concerns in the enclosed synthesis from our independent reviewers. Based on that review we have denied your data challenge.

If you are dissatisfied with this response, you may submit a Request for Reconsideration (RFR). The RFR must be postmarked, shipped by an overnight delivery service, faxed, or sent by e-mail within 45 days after the date of this letter transmitting our decision on your original request for correction. An RFR filed after the 45-day deadline may be denied as untimely. The RFR should reference this letter and its enclosure. Additional requirements and information for an RFR are listed in the USDA correction of information website:
http://www.ocio.usda.gov/qi_guide/corrections.html. An RFR may be submitted to the following street address, facsimile, or email address:

USDA Forest Service
Attn: George Vargas/Data Quality Officer
Mail Stop 1113, 1SW Yates Building
1400 Independence Ave, SW
Washington, DC, 20250
Fax: 202-260-3245
gvargas@fs.fed.us

Sincerely,

for THELMA J. STRONG
Director, Office of Regulatory and Management Services

Enclosures



Colorado Woolgrowers, et.al. Data Quality Act Petition: “A Review of Disease Related Conflicts Between Domestic Sheep and Goats and Bighorn Sheep.” General Technical Report RMRS-GTR-209, by Timothy J. Schommer and Melanie M. Woolever, September, 2008. (hereafter, this document is referred to as ‘GTR-209’ or Schommer and Woolever (2008)).

Request and Petitioner (P 2)

The Petition was submitted January 23, 2009, by Kent Holsinger and Laura L. Chartrand, Attorneys for the Colorado Woolgrowers, et al. (“petitioners”) filed under United States Department of Agriculture (USDA) Quality of Information (QOI) and USDA QOI Guidelines for Regulatory Information. The Petition was accepted and an acknowledgement letter sent February 17, 2009.

Petitioners have challenged a U.S. Forest Service Rocky Mountain Research Station (RMRS) General Technical Report (GTR) entitled *A Review of Disease related Conflicts Between Domestic Sheep and Goats and Bighorn Sheep*, RMRS-GTR-209 (May 2008) (“GTR 209”) on several grounds. In general, petitioners have asserted that GTR 209 is both biased and inaccurate.

Description of Information to Correct (P. 3)

The petition states that corrections are needed for the Bighorn RMRS-GTR-209 first published in May, 2008 and that it is inaccurate, unreliable, biased. The petition alleges the Bighorn Report: “(1) was developed with unsound research methods; (2) ignores studies that do not support its thesis; (3) jumps to conclusions that are not scientifically supported but are pure conjecture; (4) disseminates information that is not objective or reliable and lacks basic scientific integrity; (5) Therefore, the utility of this information is questionable.

Petitioners request that the USDA Forest Service (FS) retract the Bighorn Report and all reliance thereon in existing and subsequent forest plans, forest plan amendments, as well as decisions on grazing permits and grazing permit renewals. Alternatively, the petitioners request that the U.S. Forest Service issue an amended Bighorn Report that uses sound analytical methods and the best data available ensuring transparency and objectivity in the information disseminated. (P.3-4).

For this responsive document, complaints within the petition have been synthesized into 1 general contention and 16 specific contentions.

Background on the USFS Bighorn Report (P.3)

The purpose of GTR 209 was to provide a review of existing scientific literature concerning the potential for disease transmission from domestic sheep and goats to bighorn sheep which may lead to significant die-offs of bighorn sheep. The authors of GTR 209 did not report on any original scientific studies or research conduction by the authors. Rather, GTR 209 identifies numerous studies on the subject, and briefly summarizes the methods used in those studies and the results obtained. The scope of GTR-209 did not include critiquing the studies cited,

evaluating the methods used, or suggesting alternative conclusions or hypotheses that could have been reached.

GTR-209 was first released May, 2008 and during the publication review process it was revised, reprinted and disseminated in September, 2008. It is available on the RMRS web site and was attached to the petition. No other supporting documents were attached to the petition. Several of the arguments in the petition were submitted in response to Payette Risk Analysis when it was open to public comment in 2006. The Payette National Forest is currently engaged in preparing a Forest Plan Supplemental Environmental Impact Statement on Bighorn Sheep.

IV. Noncompliance with OMB and/or USDA Information Quality Guidelines (P.5-7)

- A. Data Quality Act and OMB Guidelines**
- B. USDA Information Quality Guidelines**
- C. Objectivity of Regulatory Information**
- D. Utility of Regulatory Information**
- E. Integrity of the Regulatory Information**

Review Findings: Section IV. A-E is basically a duplication of the USDA/OMB QOI Guidelines. No comment is necessary.

General Contention:

General Technical Report (GTR 209) (1) was developed with unsound research methods; (2) ignores studies that do not support its thesis; (3) jumps to conclusions that are not scientifically supported but are pure conjecture; (4) disseminates information that is not objective or reliable and lacks basic scientific integrity; (5) therefore, the utility of this information is questionable.

Discussion:

The manuscript was submitted to the USDA Forest Service Rocky Mountain Research Station (RMRS) to be considered to be published as a General Technical Report. The RMRS role was to oversee the blind review process, specifically to select reviewers, solicit their reviews and ensure that the manuscript was scientifically creditable, defensible and met Research and Development Quality Control and Quality Assurance guidelines.

The RMRS contacted potential reviewers and eventually received four reviews. All reviewers were senior wildlife specialists and experts with over 80 years of collective experience, including bighorn sheep. Identities of the reviewers were held anonymous, known only to the RMRS. Reviews were transmitted to the authors with direction to address the comments.

The authors in collaboration with the National Forest System Washington Office, Watershed, Fish, and Wildlife staff addressed the review comments and revised the manuscript. The RMRS reviewed the revision, focusing on the adequacy of responsiveness of addressing review comments, found the manuscript to be satisfactory, approved it for publication, and forwarded it to the RMRS Station Editor for publication.

Review Findings: The U.S. Forest Service undertook a blind peer review process designed to guard against bias and ensure a scientifically defensible report. The blind peer review conducted on GTR-209 met scientific peer review standards established by the U.S. Forest Research and Development for General Technical Report publications. The peer review meets the criteria stated in the USDA Quality Guidelines for Objectivity of Scientific Research and Regulatory Information that require a high level of quality and objective peer review. Therefore, the information within GTR-209 is deemed to be credible.

Specific Contentions in the Petition

Each contention discussed in the petition is treated separately below, with the contention displayed, discussed, and followed by a review finding.

1. Issue: The USFS Bighorn Sheep Report Lacks Objectivity (1) - Abstract Shows Immediate Bias (P. 7-9).

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contend that GTR-209 demonstrated immediate bias against domestic sheep when it stated:

“Although efforts to identify organisms causing pneumonia in bighorn sheep following contact with domestic sheep have identified multiple bacteria species, the complete range of mechanisms/causal agents leading to epizootic disease events are not completely understood.” (Schommer and Woolever 2008:i).

“The USFS Bighorn Report, thus, leads a reader to assume that “multiple bacteria strains” from domestic sheep have been identified as the cause for pneumonia in bighorn sheep. Yet, the same USFS Bighorn Report acknowledges that “the complete range of mechanisms/causal agents leading to epizootic disease events **are not completely understood.**” (Emphasis added by petitioners) Schommer at i.”

The petitioners indicate that GTR-209 leads readers to assume that “multiple bacteria strains” from domestic sheep have been identified as the cause for pneumonia in bighorn sheep. They then contend that this statement leads to the inference that scientific research has proven that domestic sheep transfer fatal diseases to bighorn sheep. The petitioners cite the opinion expressed in Miller and others (2008) that a common *Pasteurellaceae* strain or other agent directly linking bighorn epidemics to either domestic sheep interactions has not been demonstrated unequivocally to date.

Discussion: This contention is one of semantics rather than interpretation of science. Following a careful reading, it can be seen that the quote from GTR-209 does not assert that “multiple bacteria strains” from domestic sheep have been identified as the cause for pneumonia in bighorn sheep. Rather, it says that during efforts to identify the organisms that caused pneumonia in bighorn sheep, multiple species of bacteria were identified. The reference to domestic sheep in this statement only provided the context that the pneumonia in bighorn sheep that was being investigated occurred after contact with domestic sheep.

In addition, as an abstract, this statement is intended to provide an extremely brief overview into the authors' review of the literature and their conclusions. Authors are necessarily limited in the amount of detail they can include in an abstract.

Review Finding: The petitioners have not demonstrated that GTR-209 lacked objectivity in the factors.

2. Issue: The USFS Bighorn Sheep Report Lacks Objectivity (2) - Contact Hypothesis (P. 8)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that the hypothesis referred to in the following statement from RMRS- GTR-209 is not supported by the results of scientific investigations (P. 8):

The following is a review and summary of the experimental methods and evidence relative to the hypothesis that bighorn sheep have a high likelihood of contracting fatal respiratory disease following contact with domestic sheep, characterized as the "contact hypothesis" (Wehausen and others in prep). [From GTR-209:3].

Discussion: The USDA QOI guidelines instruct authors to "Use sound analytical methods in carrying out scientific and economic analyses and in preparing risk assessments". Conducting a literature review, as the authors of the GTR-209 have done, is the accepted standard in the field for bringing together a body of knowledge on an issue. Upon reading the GTR-209, Schommer and Woolever did a thorough job of assembling and reviewing the scientific literature. The literature they reviewed supports the hypothesis that bighorn sheep have a high likelihood of contracting fatal respiratory disease following contact with domestic sheep.

The hypothesis that bighorn sheep have a high likelihood of contracting fatal respiratory disease following contact with domestic sheep has been the basis for research on determining the causes of fatal respiratory disease epidemics in bighorn sheep population for many years (Callan and others 1991; Foreyt 1989, 1990, 1994; Onderka and Wishart 1988). The petitioners contend that science findings do not support this hypothesis quoting Marie S. Bulgin's opinion that "There is just NO scientific basis for this premise." However, careful reading of the statement in question reveals that Schommer and Woolever (2008:3) did not assert that the hypothesis was correct but only that they intended to review and summarize scientific studies that explored the hypothesis.

In addition, Dr. Bulgin's letter of comment to the Payette National Forest is not appropriate for use in a scientific review of the literature on bighorn sheep disease issues. Dr. Bulgin's letter has not undergone peer review, and so should not be included in a literature review.

Review Finding: The petitioners have not demonstrated that GTR-209 lacked objectivity in the statement quoted. They acted appropriately in conducting a review of published research and in forming conclusions that are supported by the scientific literature.

3. Issue: The USFS Bighorn Sheep Report Lacks Objectivity – Inclusion of the Monello (2001) article (P.7).

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that GTR-209 did not fully report the findings presented by Monello and others (2001). It is the petitioners' opinion that the data presented in GTR-209 had been "cherry-picked" to support the contact hypothesis (P. 9). The petitioners specifically state:

The Monello, Murray, and Cassierer report found that 88% of pneumonia-induced die-offs occurred at or within three (3) years of peak population numbers. This finding suggests that density-dependent forces such as food shortage or stress are a principal contribution to bighorn sheep susceptibility to pneumonia. This information does not appear in the USFS Bighorn Report. (P. 9).

Discussion: Monello and others (2001) reported on an analysis of records of bighorn population attributes obtained from herds found across the species' range, to compare the biological and environmental factors associated with populations that had experienced a die-off induced by pneumonia versus those that had not experienced a die-off.

Specifically, they aimed to test the following predictions: (i) contact with domestic sheep is a principal mode of infection with pneumonia causing strains of *Pasteurella* spp. and thus outbreaks occur in proximity to domestic sheep grazing areas; (ii) density dependent forces (i.e., food limitation, stress, competition) predispose bighorns to pneumonia outbreaks and thus herds experience die-offs at or near population peaks; (iii) inclement weather predisposes bighorns to pneumonia outbreaks and thus herds experience die-offs during periods of abnormal temperature or precipitation. Their results implied that density-dependent forces and proximity to domestic sheep both contribute importantly to pneumonia epizootics in bighorns and these two factors may act either sequentially or in concert to promote disease outbreaks. As Monello and others (2001) state:

"Alternatively, pneumonia outbreaks may occur during population peaks because of the effects of high density on movement and dispersal. Indeed, it is plausible that bighorn herds occupy larger ranges during population peaks, and thus may be more likely to contract *Pasteurella* spp. from other bighorn herds or even from domestic sheep herds." p. 1429, Monello and others (2001:1429).

These two mechanisms **are not mutually exclusive**. The evidence of one mechanism does not disprove the other. Ultimately, Monello and others (2001) conclude:

"Our finding that herds in the pneumonia-induced-dieoff category were located significantly closer to domestic sheep grazing areas than herds in the non-dieoff category supports the contention that domestic sheep are a common source of infection with lethal strains of *Pasteurella* spp. (see also Goodson 1982)" (Monello and others 2001:1429).

Schommer and Woolever (2008:2) cite the Monello and others (2001) publication in GTR-209 to support their statement that "...herds found at peak population or in close proximity to domestic sheep tend to be more susceptible to die-offs..." They also included the following statement

“Finally, Monello and others (2001) concluded that bighorn herds are rendered vulnerable to pneumonia transmission of *Pasteurella* spp. from domestic sheep serving as reservoir hosts” (Schommer and Woolever 2008:3).

are more susceptible to die-offs they did not discuss the details of why that may have occurred (i.e., density dependent forces such as food limitation, stress, and/or competition). One of the stated purposes of GTR-209 was to “...review the science related to disease, particularly respiratory disease, in sympatric populations of domestic sheep (*Ovis aries*) and goats (*Capra hircus*) and bighorn sheep (*Ovis canadensis*)...” (Schommer and Woolever 2008:1). Monello and others (2001) results suggested that bighorn herds are rendered vulnerable to pneumonia partially through density-dependent factors. Reporting and discussing this finding would have been within the stated purpose of GTR-209 and would have provided a more complete review of the science relating to disease in bighorn sheep.

Review Finding: The petitioners have not demonstrated that GTR-209 lacked objectivity in the statement quoted, rather they focused their discussion on factors affecting disease in bighorn sheep. Furthermore, the GTR-209 authors did not “cherry-pick” or selectively represent the Monello and others (2001) article. In contrast, the GTR-209 and the Monello and others (2001) article have the same main conclusion: that domestic sheep appear to be a source of infection of *Pasteurella* spp. Second, the GTR-209 authors do state that the environment plays a role in disease outbreaks, saying:

“Although malnutrition, harsh weather, and other stressors may exacerbate susceptibility to disease, viruses, parasites, and bacteria can weaken or kill bighorn sheep”. (GTR P.7)

4. Issue: Inclusion of the CAST Report. (P. 8)

Contention: On page 8, the petitioners state that:

“The inference that science has proven that domestic sheep transfer fatal diseases to bighorn sheep comes into direct conflict with the findings of the Council for Agricultural Science and Technology (“CAST”) report entitled Pasteurellosis Transmission Risks between Domestic and Wild Sheep (“CAST Report”) published in August 2008”.

Discussion: There are two important responses to this claim: first, GTR-209 was first published in May 2008, before the CAST Report was published (GTR-209 was edited and printed into its final form in September 2008). The USDA Guidelines on the Objectivity of Regulatory Information states that agencies and offices must use “the best available data”. The CAST Report was published *after* the date of first publication of this GTR, and therefore was not available to the authors. The CAST report is not in conformance with the USDA/OMB QOI Guidelines and should not be accepted or considered as part of the petition.

The second response to this claim is that reading the CAST Report leads to similar conclusions as the GTR-209. Both documents present on the “Payette Science Panel Findings” (USDA Forest Service 2006) and the Western Association of Fish and Wildlife Agency Findings (WAFWA 2007). For example, on page 4 of the CAST Report, the authors state that,

“Available data suggest that interactions between wild and domestic sheep carry some inherent risk of precipitating pneumonia in wild sheep under range conditions (USDA–FS 2006). Given the limitations of today’s tools, the most practical approaches identified thus far for minimizing this risk involve simply preventing interspecies interactions that could result in respiratory pathogen transmission between wild and domestic sheep (WAFWA 2007).”

Finally, in the Conclusion of the CAST report, the authors state that,

“Preventing contact between wild and domestic sheep, better monitoring of exchanges and interactions between wild sheep populations, and managing population and habitat quality all have some value in improving and maintaining the overall health of wild sheep populations and preventing pneumonia epidemics”.

Review Finding: The petitioners claim that the conclusions of GTR-209 conflict with the CAST Report is not true. The CAST Report and GTR-209 have similar conclusions regarding the complexity and incomplete knowledge about the epidemiology contributing to the risk of interspecies transmission and the need for special and temporal separation under very difficult open range conditions. Although, of course, Schommer and Woolever would not have had access to a publication that was published after their document was at the printer.

5. Issue: USFS Bighorn Report fails to comply with both OMB and USDA Regulatory Information Guidelines (P 10)

Contention: The petitioners state that the GTR-209 does not identify known sources of error and limitations in the data, and therefore falls short of the OMB and USDA Regulatory Information Guidelines and requirements for objectivity. The petitioners state:

“The USFS Bighorn Report fails to comply with both OMB and USDA Regulatory Information Guidelines. Nowhere does the USFS Bighorn Report explain the rationale for selecting certain data and deciding not to refer to other data, such as that referenced herein, in the analyses. In fact the existence of significant data highlighting the uncertainty of USFS Bighorn Report’s hypothesis is not even mentioned. The USFS Bighorn Report does not ensure transparency in its dissemination of information by identifying known sources of error and limitations in the data”

Discussion: The GTR-209 was subjected to a formal, independent, external peer review, which ensured the document’s objectivity, following the USDA Regulatory Information Guidelines. The guidelines state:

“Where appropriate, subject the analysis to formal, independent, external peer review to ensure its objectivity. If analytic results have been subjected to such a review, the information may generally be presumed to be of acceptable objectivity. However, in accordance with the OMB standard, this presumption is rebuttable based on a persuasive showing by a petitioner in a particular instance, although the burden of proof is on the complainant.”

The independent, external peer review of the GTR-209 was coordinated by the Rocky Mountain Research Station of the USDA Forest Service. Four independent scientists individually reviewed the GTR-209 and their comments were incorporated. In addition, the authors of the GTR-209 do

discuss limitations in the studies compiled throughout the GTR-209. For example, when presenting the unplanned pen experiments in the GTR-209, the authors state that these early "unplanned experiments... were accidental in nature and, therefore, lacked any experimental design. However, because of the information garnered from those captivity situations, they still serve as tests of the contact hypothesis." (GTR-209 P. 3)

Review Finding: Given the independent, external peer review of the GTR-209 and the authors' discussion of the limitations of different studies, the GTR-209 is considered to be objective and meets OMB and USDA Guidelines for Regulatory Information.

6. Issue: The Bighorn Sheep Report Lacks Objectivity - Scabies (P. 10-11)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of scabies is misleading, not accurate, and not reliable. The petitioners specifically state:

The USFS Bighorn Report wrongfully suggests that domestic sheep infest bighorn sheep with a mite that is host specific and with a disease that has not been present in the United States for more than thirty years! (P. 11).

Discussion: Schommer and Woolever's (2008:2-3) discussion of scabies in GTR-209 is limited to historical accounts of large-scale population losses in the nineteenth century that were principally attributed to scabies introduced by domestic sheep and to a summary statement that included scabies in a list of diseases shared by domestic and bighorn sheep.

Researchers reporting on population declines in bighorn sheep concluded that the initial declines were principally attributed to scabies introduced by domestic sheep (Buechner 1960; Honess and Frost 1942; Jones 1950; Smith 1954). This conclusion was based largely on clinical evidence of scabies in bighorn sheep during die-offs and the fact that these scabies outbreaks closely followed the introduction of domestic sheep. More recent research supports the hypothesis that the scabies mite is not host specific and is not native to North America (Ramey and others 2000). In addition, scabies continues to be present in domestic livestock, other wildlife in the United States and is of concern to bighorn sheep managers.

Also, while it is generally acknowledged that scabies was eradicated from domestic sheep in the United States in the early 1970s, domestic sheep are still routinely treated to ensure they remain free of infestations. This is necessary because scabies infestations continue in domestic cattle (Gates and Wescott 2000) in the United States, which could lead to re-infestations of domestic sheep.

Review Finding: The petitioners have not demonstrated that Schommer and Woolever (2008) lacked objectivity in the statement quoted, rather that they did not qualify their statements with the fact that scabies has not been reported in domestic sheep since the 1970s.

7. Issue: The USFS Bighorn Sheep Report Lacks Objectivity - Unplanned Pen Experiments (P.12-13)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of observations from unplanned pen experiments is misleading, not accurate, and not reliable. The petitioners specifically state:

The USDA Regulatory Information Guidelines require U.S. Forest Service to use the best data available and ensure transparency "by identifying known sources of error and limitations in the data." Yet, the underlying information on unplanned pen experiments was based purely on circumstantial rather than scientific evidence, and the limitations of relying upon circumstantial evidence are not addressed in the USFS Bighorn Report. (P. 13)

Discussion: Schommer and Woolever (2008:3-4) discussed the published results of unplanned contact between domestic sheep and confined bighorn sheep because they provided information relevant to the contact hypothesis. When discussing the unplanned pen experiments the GTR-209 states:

"The contact hypothesis has been tested numerous times in captive situations. Two tests were accidental in nature and, therefore, lacked any experimental design. However, because of the information garnered from those captivity situations, they still serve as tests of the contact hypothesis." (GTR-209, P. 3)

Therefore, the GTR-209 states that these initial accidental encounters were unplanned. Although these initial reports were observational in nature, these encounters represent the start of a line of research inquiry that has grown and developed over the past 25 years. The authors of GTR-209 present all the planned pen experiments and inoculation research that occurred after these initial observations, in order to present the full picture of research in this subject area. These initial observational studies are not presented as conclusive proof, but rather serve to set the stage for consecutive studies.

The petitioners cited Hailey and others (1972), Taylor (1973), and Blaisdell (1976) (all published in gray literature) as reports of incidences where penned bighorn sheep encountered die-offs without exposure to domestic sheep. The bighorn sheep deaths reported by Blaisdell (1976) were not attributed to pneumonia. Some of the bighorn sheep deaths reported by Hailey and others (1972) and Taylor (1973) were attributed to pneumonia. However, it should be noted that these results were anecdotal observations without experimental design. There was limited control of the timing and observation of the animals that died. It could not be established that there was not contact with domestic sheep prior to infection.

Review Finding: The petitioners have not demonstrated that GTR-209 lacked objectivity in their discussion of observations from unplanned pen experiments. Schommer and Woolever (2008:3) acknowledged that the findings in the publication they referenced in this section were accidental and were not based on studies with experimental designs. The findings they reported had been

published in a peer-reviewed journal article and provided information relevant to the objectives

8. The USFS Bighorn Sheep Report Lacks Objectivity – Unplanned Penned bighorn sheep deaths without contact with domestic sheep (P. 13-16)

Contention: On page 13 of the Petition, the petitioners state that the USFS Bighorn Report does not “discuss instances where penned bighorn sheep encountered die-offs without exposure to domestic sheep”. The petitioners then go on to list several examples from Dr. Marie Bulgin’s opinion letter to the Payette National Forest.

Discussion: First, Dr. Bulgin’s letter is not valid for inclusion in a literature review. Second, the examples listed are not valid examples of penned bighorn sheep encountering die-offs without exposure to domestic sheep.

Dr. Bulgin’s letter of comment to the Payette National Forest is not appropriate for use in a scientific review of the literature on bighorn sheep disease issues. Conducting a literature review, as the authors of the GTR-209 have done, is the accepted standard in the field for bringing together a body of knowledge on an issue. Dr. Bulgin’s letter to a National Forest has not undergone peer review, and is not appropriate to be included in a literature review.

In addition, in these three examples of bighorn sheep listed from the *Desert Bighorn Council Transactions*, the original literature does not describe the relationship between penned animals and domestic stock. It is unclear to what degree these animals associated with domestic sheep. For example, in the Hailey and others (1972) report the bighorn sheep were initially translocated from a different state. There is no discussion of domestic livestock interactions before, during, and after translocation.

The second example cited, Taylor and others (1973) reported on one dead animal from the Dutch Creek enclosure (the penned enclosure mentioned in Dr. Bulgin’s letter), and suggested that poisonous plants might have killed the animal:

“Since only 1 animal from Dutch Creek was examined, the disease problems there is not known. Because of the liver pathology observed in that animal, an examination of the enclosure for poisonous plants will be done by a plant specialist.” (Taylor and others 1973:50).

The third example cited, Blaisdell and others (1976), also does not provide any information about interactions with domestic livestock, although the article does state the animals had at various points escaped from the pen.

Essentially, these three examples listed are brief notes published in the 1970s, as experiments with pneumonia disease transmission with domestic sheep were first starting to be discussed in the literature, which may explain why there is insufficient discussion of the role of domestic animals. Regardless, these notes are not directly relevant to the disease transmission discussed in the GTR-209, and it is unclear why they have been chosen for inclusion in the Petition. They do not represent the best science or data available.

Review findings: The authors of the GTR-209 were objective and did not incorrectly omit any instances where penned bighorn sheep encountered die-offs without exposure to domestic sheep. The examples put forth, from Dr. Bulgin's letter, are not directly relevant to the GTR-209 and do not really discuss bighorn and domestic sheep interaction.

9. Issue: The USFS Bighorn Sheep Report Lacks Objectivity -Planned Pen Experiments (P. 13-16)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of observations from planned pen experiments is misleading, not accurate, and not reliable. The petitioners specifically state:

The studies reviewed and noted in the USFS Bighorn Report did not utilize these advances and did not, then, reflect the best available data. Moreover, the best available data concludes that transmission of disease from domestic sheep to bighorn sheep in the natural environment has not been scientifically proven. The USFS Bighorn Report does not clearly identify sources of uncertainty affecting data quality, i.e., the failure to employ scientific advances in sample collection and disease identification, but instead bases its conclusion that domestic sheep can transmit disease to bighorn sheep upon unsound science used in the planned pen experiments study. (P. 15-16).

The planned pen experiments reviewed in the USFS Bighorn Report lacked the scientific tools necessary to evaluate the organisms present within the animal or the possibility of transmission to bighorn sheep. (P. 13)

The petitioners cited the opinions of C. S. Ward from his comments on the document: "USFS Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn Sheep on the Payette National Forest" dated 14 July 2006. In Ward's opinion the research reported in the published articles cited by Schommer and Woolever (2008:4) in their discussion of planned pen experiments was not completed using recent technical advances. Therefore, in Ward's opinion, the results presented in those published papers are not valid.

Discussion: As stated above, letters of comment to the Payette National Forest are not appropriate for use in a scientific review of the literature on bighorn sheep disease issues. Conducting a literature review, as the authors of the GTR-209 have done, is the accepted standard in the field for bringing together a body of knowledge on an issue. As Dr. Ward's letter to a National Forest has not undergone peer review, it is not appropriate to be included in a literature review

Schommer and Woolever (2008:3) reported the results of the 10 experiments reported in five research articles, three of which were published in peer-review journals and two in the gray literature. They did not interpret the results of these studies but only summarized their findings. Since we do not have complete citations to the articles Ward referenced in his opinion piece it is difficult to evaluate the technical advances noted by him. However, it appears that most of the techniques he discussed were published after the research on the planned pen experiments was

experiments have not been completed using these technical advances so it is not possible to evaluate whether the results may be different with their use.

The points made by the petitioners, that diagnostic veterinary techniques have improved over time, especially with the advent of the use of genetic data, is true, but does not negate earlier research findings. Researchers can only use the best techniques available to them at the time, and acceptance in peer reviewed journal should ensure that only acceptable techniques are used. In addition, with the best practices for disease research, researchers are more likely to accurately detect the presence of *Pasteurellaceae* organisms. For example, incidences of *Pasteurellaceae* organisms may have gone up in Ward and others' (1997) study, due to:

“in part, from eliminating prolonged periods between collection and culturing of samples that occurred in the earlier study”

Therefore, earlier studies would have tended to **underestimate** the presence of *Pasteurellaceae* organisms, not overestimate it. Finally, the data summarized and presented in the GTR-209 from the planned pen experiments do not deal with incidence of *Pasteurellaceae* organisms, but rather, report that all the animals died of respiratory disease.

“All 23 bighorn sheep tested in these 10 trials died of respiratory disease following contact with domestic sheep or were euthanized when close to death. In every case, all the domestic and hybrid sheep remained healthy.” p 4, GTR-209.

Review Finding: The petitioners have not demonstrated that GTR-209 lacked objectivity in their discussion of research results from planned pen experiments. The authors of GTR-209 appropriately conducted a literature review, including the most recent studies and previous studies. The development of newer genetic techniques does not invalidate or contradict the results of older studies.

10. Issue: The USFS Bighorn Sheep Report Lacks Objectivity - Planned Pen Experiments With Other Species. (P. 16-17)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of observations from planned pen experiments with other species is misleading, not accurate, and not reliable. The petitioners specifically state:

“The USFS Bighorn Report focuses upon the presence of the goat near the bighorn sheep prior to the die-off and ignores the actual scientific findings. Once again the USFS Bighorn Report demonstrates a bias against domestic sheep and goats and cherry-picks the information presented to support its hypothesis.”(P. 17).

Discussion: Schommer and Woolever (2008:4-5) discussed the published results of three studies of planned contact between confined bighorn sheep and species other than domestic sheep that were conducted to test the stress hypothesis. They also reviewed three published studies that reported interactions between domestic goats and bighorn sheep.

The petitioners contend that the results of a study (Rudolph and others 2007) were misrepresented by Schommer and Woolever (2008). Schommer and Woolever (2008:4) stated:

Recently, however, domestic goats have been implicated in fatal disease transmission to bighorn sheep. Some goats carry *Mannheimia* and *Pasteurella* species that have been identified in bighorn sheep disease events. DNA analysis conducted during a 1995 to 1996 Hells Canyon bighorn die-off revealed that a feral goat and two bighorn sheep shared a genetically identical *P. multocida* and *M. haemolytica* (Rudolph and others 2003; Weiser and others 2003).

This statement by Schommer and Woolever (2008:4) accurately reflected the published findings of Rudolph and others (2003) and Weiser and others (2003). Rudolph and others (2003:897) stated:

It was concluded that identical *Pasteurella* strains were shared by the goats and bighorn sheep. Although the direction of transmission could not be established, evidence suggests transmission of strains from goats to bighorn sheep. Goats may serve as a reservoir of *Pasteurella* strains that may be virulent in bighorn sheep; therefore, goats in bighorn sheep habitat should be managed to prevent contact with bighorn sheep.

Weiser and others (2003:542) stated:

The most notable suggestive evidence of transmission includes that of the dermonecrotogenic strain isolated from the feral goat and one of the bighorn sheep found in close proximity. Because this strain was not isolated from any of the other bighorn sheep in the study, it appears that the goat was the most probable source.

Rudolph and others (2007) was not cited by Schommer and Woolever (2008) in their discussion of domestic goats and bighorn sheep.

Review Finding: Reading the conclusions of the original article makes it clear that the authors' assertion in the GTR-209 (that goats have been implicated in disease transmission to bighorn sheep) is appropriate. Therefore, the GTR-209 represents the conclusions of the original papers, Rudolph and others (2003) without bias. Furthermore, since the publication (Rudolph and others 2007) cited by the petitioners as being misrepresented by Schommer and Woolever (2008) was not cited in this section their contention is moot.

11. Issue: The USFS Bighorn Sheep Report Lacks Objectivity -Inoculation Experiments (P. 17-18)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of published results of inoculation experiments is misleading, not accurate, and not reliable. The petitioners suggest that the inoculation experiments reported in Foreyt and others (1994) were invalid because the inoculation experiments used from 10,000 to 10,000,000 times the level necessary to cause disease. The petitioners specifically state:

The inoculation experiments discussed in the USFS Bighorn Report serve no utility other than to bias the reader. (P. 17).

The peer reviewed and published CAST Study also found that ALL strains of *haemolytica* including those originating from wild sheep caused some form of pneumonia, in direct contrast to the USFS Bighorn Report. (P. 17)

Discussion: Schommer and Woolever (2008:4-5) discussed the published results of six studies that reported on inoculations of bighorn sheep to test the hypothesis that specific strains of pneumophilic bacteria frequently carried by healthy domestic sheep are the cause of fatal pneumonia in bighorn sheep following contact between these species.

The petitioners contend that a similar review (Miller and others 2008) conducted after Schommer and Woolever (2008) completed their review reached different conclusions. Specifically, Schommer and Woolever (2008:5) reported the results of studies (Foreyt and Silflow 1996; Onderka and others 1988) in which the source of the *M. haemolytica* inoculum was from healthy bighorn sheep. The three bighorn sheep used in the two trials showed no clinical signs of disease after the inoculations, nor did the seven domestic sheep similarly inoculated. Whereas Miller and others (2008) reported that the resulting pathology from experimental inoculations of wild sheep varied among strains used, but all strains caused some form of pneumonia.

Foreyt and Silflow (1996) stated “Based on our results the cytotoxic and noncytotoxic strains of *P. haemolytica* A11 used in these experiments were not lethal in bighorn sheep when administered intratracheally...” supporting the summary statement from Schommer and Woolever (2008). However, Miller and others (2008) did not cite the Foreyt and Silflow (1996) publication in their review.

Onderka and others (1988) reported that clinical signs of infection were not observed following inoculation. The inoculated bighorn sheep was euthanized 10 days post inoculation. Necropsy of the animal showed evidence of infection.

Foreyt and others (1994) discussed the relatively high level of bacteria used in inoculations in the discussion of their original article:

“Although the numbers of bacteria used in these experiments may not accurately reflect a natural exposure, nevertheless, one contact control bighorn sheep died within six days after its penmates received the inocula, and healthy domestic sheep inoculated with equal or greater numbers of bacteria remained healthy after inoculation indicating greater susceptibility of bighorn sheep to infection and fatal pneumonia. Because *P. haemolytica* A2 is a common isolate in domestic sheep, the likelihood of transmission from domestic sheep to bighorn sheep would be significant in contact situations. Based on these and previously reported data, all contact between bighorn sheep and domestic sheep should be avoided to prevent transmission of pathogenic strains of *P. haemolytica* of domestic sheep origin that cause pneumonia in bighorn sheep.” (Foreyt and others 1994:144).

The **relative** response to inoculation by bighorn and domestic sheep is a valid scientific comparison which led the authors to the conclusion held throughout this scientific body of literature, namely, bighorn and domestic sheep contact should be avoided.

Review Finding: The articles cited by Schommer and Woolever (2008) support their statement and not that of the petitioners or Miller and others (2008). The methods in the Foreyt and others (1994) article were appropriate. The Miller and others (2008) publication was not likely available to the GTR authors and did not cite the informative Foreyt and Silflow (1996) publication in their review. The petitioners have not demonstrated that Schommer and Woolever (2008) lacked objectivity in their discussion of inoculation experiments.

12. Issue: The USFS Bighorn Sheep Report Lacks Objectivity - Microbial Transmissibility. (P.18)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of published results of transmissibility of microbes is misleading, not accurate, and not reliable. The petitioners specifically state:

“The USFS Bighorn Report downplays the effects of respiratory disease in domestic sheep to support its hypothesis that contact with domestic sheep devastate bighorn sheep.” (P. 18).

The petitioners supported their contention by quoting a portion of the 2006 commentary Glenn Weiss provided on the “Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn Sheep on the Payette National Forest.” The Weiss commentary documented that numerous studies have been done since 1990 on respiratory diseases in domestic sheep. This led him to the conclusion that domestic sheep have apparently not demonstrated many resistances to respiratory diseases or the need for these scientific studies would not exist. The petitioners state:

“In his 2006 comment discussing the Payette National Forest risk analysis, Dr. Glenn Weiss addresses similar comments as follows: I conducted a PubMed (the National Institutes of Health scientific publication service) search of the referenced scientific literature using the key words “sheep pneumonia Pasteurella.” There were 136 journal articles in the PubMed database, 21 dealing with bighorn sheep, leaving 115 dealing with domestic sheep pneumonia Pasteurella. Fifty-eight (58%) of these 115 journal articles were published from 1990 to present. Therefore, respiratory disease in domestic sheep has apparently not demonstrated many resistances or the need for these scientific studies would not exist. Weiss, Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn Sheep on the Payette National Forest (2006).³” (P. 18)

Discussion: This comment and literature search are irrelevant to the GTR-209. First, as stated above, the use of non-peer reviewed literature such as a comment to a forest planner is not appropriate to use in a literature review. Therefore, Dr. Weiss's comments should not be incorporated in the petition. Second, sheep are a commercially important species and it is unsurprising that there are more publications on respiratory disease in domestic sheep than in bighorn sheep. That fact in no way disproves the assertion that bighorn are more susceptible to bacterial infection. This point is well supported by scientific evidence (from peer-reviewed literature) in the GTR-209.

Schommer and Woolever (2008:7-8) discussed the published results of numerous studies that reported on the transmissibility of microbes. Relative to the point of contention, they wrote:

Bighorn sheep appear to be more susceptible to respiratory disease than are domestic sheep. Dubay and others (2002) and Miller (2001) suggested that bighorn sheep did not co-evolve with the same set of pathogens as domestic sheep because of an evolutionary distance between them. Hiendleder and others (2002) estimated this distance at 5.63 million years. In addition, bighorn sheep immune response cells have a reduced capacity to kill bacteria compared to domestic sheep immune function (Dubay and others 2002; Frank and others 2004; Silflow and others 1993). This observation provides a very plausible reason why bighorn sheep may die of bacterial respiratory disease and pneumonia when in contact with domestic sheep while the domestics show no signs of disease.

Schommer and Woolever (2008) did not assert that domestic sheep do not have susceptibility to respiratory diseases, only that bighorn sheep are much more susceptible to respiratory diseases than domestic sheep. There is ample scientific evidence to support this.

Review Finding: The petitioners have not demonstrated that Schommer and Woolever (2008) lacked objectivity in their discussion of the transmissibility of microbes. The GTR-209 did not downplay the effects of respiratory disease in domestic sheep. The results of the database search Dr. Weiss describes are unsurprising and irrelevant.

13. Issue: The USFS Bighorn Sheep Report Lacks Objectivity - Demographics 1

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of published results of demographics associated with disease in bighorn sheep is misleading, not accurate, and not reliable. The petitioners specifically state:

The USFS Bighorn Report notes that Gross and Clifford quantitatively evaluated the degree of risk between domestic and bighorn sheep for Sierra Nevada bighorn and found proximity of domestic sheep a major negative factor bighorn restoration [sic]. What the USFS Bighorn Report fails to discuss is the fact that domestic and Sierra Nevada sheep have grazed the same region for 300 years, and no study has documented a respiratory related die-off in these bighorn sheep to date. (P. 18-19).

Discussion: Schommer and Woolever (2008:7-8) reported that published models have predicted that disease originating from domestic sheep and goats is a problem for mountain sheep.

Relative to the point of contention, they wrote:

Proximity of domestic sheep as a factor in the dynamics of mountain sheep populations is a major consideration in the models constructed by Gross and others (1997, 2000).

Clifford and others (2007) quantitatively evaluated the degree of risk between domestic and bighorn sheep for Sierra Nevada bighorn sheep (*Ovis canadensis californiana*).

The petitioners did not provide support for their contention or evidence for their statement that "...domestic and Sierra Nevada sheep have grazed the same region for 300 years, and no study has documented a respiratory related die-off in these bighorn sheep to date."

Gross and others (1997) derived age-specific mortality and fecundity rates from observations of 143 radio-collared bighorn sheep that were captured in or near Canyonlands National Park in southeastern Utah. Gross and others (2000) estimated model parameters from studies of bighorn sheep in Badlands National Park (South Dakota) and from published information on other bighorn populations. Both studies modeled the demographic consequences of epizootics on the survival of bighorn sheep using information in the published literature and using unpublished information for radio marked animals in the Beaver Creek subpopulation (Dinosaur National Monument metapopulation, Colorado) before, during, and after an active epizootic, and information on marked animals in the infected Needles and South San Juan subpopulations in Utah. These studies did not address populations of bighorn sheep in the Sierra Nevada and are not relevant to the petitioners' contention.

Clifford and others (2007) used spatial, demographic, and disease data to assess the risk and impact of a respiratory disease outbreak in Sierra Nevada bighorn sheep resulting from contact with domestic sheep. This information was needed because endangered Sierra Nevada bighorn sheep number fewer than 400 individuals. They believed that pathogens present in domestic sheep grazing in public and private areas located within or adjacent to Sierra Nevada bighorn sheep populations may threaten the recovery and persistence of this unique subspecies, but that the degree of risk has not been quantitatively evaluated. These authors noted that although direct contact between Sierra Nevada bighorn sheep and domestic sheep has not been documented in the past 30 years (possibly as a result of the limited distribution and low numbers of bighorn), bighorn sheep have been documented traveling into domestic sheep grazing allotments in recent years, and probability of contact will increase as the Sierra Nevada bighorn sheep numbers increase and the populations expand their geographic range.

Despite the petitioners' statement that "...no study has documented a respiratory related die-off in these bighorn sheep..." the US Fish and Wildlife Service considers transmission of disease to the endangered Sierra Nevada population of bighorn sheep from domestic sheep to be one of the primary risks facing this population (US Fish and Wildlife Service 2003).

Although the petitioners asserted that domestic sheep have been present in the Sierra Nevada for 300 years, published accounts of the history of domestic grazing in this area indicate that domestic sheep were initially introduced in the 1860s (Allen-Diaz and others 1999).

Review Finding: The petitioners have not demonstrated that GRR-209 lacked objectivity in this aspect of their discussion of published results of demographics associated with disease in bighorn sheep.

14. Issue: The USFS Bighorn Sheep Report Lacks Objectivity -Demographics 2. (P. 19)

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not accurate, not reliable, and not unbiased (P. 7). The petitioners assert that the authors of the GTR-209 did not accurately report examples of bighorn sheep remaining healthy after contact with domestic sheep. They contended that Schommer's and Woolever's (2008) discussion of

published results of demographics associated with disease in bighorn sheep is misleading, not accurate, and not reliable. The petitioners specifically state:

“The USFS Bighorn Report also states that the authors have not found any published reports where fenced or free-ranging bighorn sheep herds remained healthy with domestic sheep in the region. This is false. The study by Ward AC, Hunter DL, Jaworski MD, Benolkin PJ, Dobel MP, Jeffress JB, Tanner GA (1997) *Pasteurella* spp. in sympatric bighorn and domestic sheep. *Journal of Wildlife Diseases*, 33(3): pages 544-57, reviewed several instances where the presence of domestic sheep did not adversely affect bighorn sheep. (P. 19).

Discussion: Schommer and Woolever (2008:9) specifically reported the following:

No published reports could be found that document fenced or free-ranging bighorn sheep herds remaining healthy when living directly with domestic sheep herds.

A review of Ward and others (1997) showed that the instances where the authors found domestic sheep to intermingle with bighorn sheep were not well documented. On the Tobin Range and the East Range, contact was deemed probable but unknown. On the Desatoya and Granite Ranges, domestic sheep were seen with bighorns but the amount of contact was unknown. As stated by Ward and others (1997):

“The length of time that the domestic sheep were on the various ranges was not known. It is estimated that domestic sheep trespassed on the Tobin Range for 2 to 4 wk during the 1991 grazing season. Interaction of domestic sheep and bighorn sheep on the Tobin Range was probable but the duration of contact is unknown. Those on the East Range were removed approximately 2 wk after they were first observed in close proximity to the water sources for bighorns in the fall of 1991. Interactions of bighorn sheep with domestic sheep was very probable since they would have shared a common water source. The domestic ewe and her undocked lamb were observed with bighorns prior to their removal from the Desatoya Range in the fall of 1992. A domestic castrated male sighted with bighorn sheep on the Granite Range was judged to have been there for approximately 2 wk prior to removal in October of 1992.” (Ward and others 1997:545)

Although, domestic sheep were observed with or in proximity to bighorn sheep in this study, physical contact between the species was not observed. Bighorn sheep populations were subsequently extirpated on two of the ranges where domestic sheep were observed while increasing on the other two.

Review Finding: The petitioners have not demonstrated that Schommer and Woolever (2008) lacked objectivity in this aspect of their discussion of published results of demographics associated with disease in bighorn sheep. The encounters between domestic and bighorn sheep in this paper are unclear, and the results of these encounters is also unclear. Additional consideration of this incident does not change the overall conclusions of the GTR, however.

15. Issue: The USFS Bighorn Sheep Report Lacks Objectivity -Demographics 3

Contention: The petitioners claimed the GTR-209 failed to comply with OMB and USDA Guidelines for Regulatory Information by presenting non-objective information that is not

accurate, not reliable, and not unbiased (P. 7). They contended that Schommer's and Woolever's (2008) discussion of published results of demographics associated with disease in bighorn sheep is misleading, not accurate, and not reliable. The petitioners specifically state:

Current studies are looking at over 300 desert bighorn in Arizona that have co-mingled for generations without ill-effect. The suggestion in the USFS Bighorn Report that bighorn sheep will not remain healthy after contact with domestic sheep is not supported by the evidence. Yet, it is presented in the USFS Bighorn Report as a fact supporting "the hypothesis that bighorn sheep have a high likelihood on contracting fatal respiratory disease following contact with domestic sheep." Schommer at 3. (P. 19-20)

Discussion: The petitioners did not cite the source of the information presented in this contention.

Since the source of the information presented in this contention was not revealed, it cannot be evaluated or verified. Therefore it does not provide any apparent support to this contention.

Reviewer's Finding: The petitioners have not demonstrated that Schommer and Woolever (2008) lacked objectivity in this aspect of their discussion of published results of demographics associated with disease in bighorn sheep.

16. Issue VI. Effect of the Aforementioned Errors (P.21)

Contention: The petitioners and their members" will be negatively impacted by the dissemination of this false information regarding domestic sheep's capabilities to spread numerous diseases, including scabies, anaplasma, and babesia." Damage from "reductions or changes to grazing permits based on the false information in the USFS Bighorn Report.", and "the local economies will negatively impacted, as well as hurting the local social and economic stability of these areas by reducing or removing sheep producers."

Reviewer's Finding: Although the potential negative impact of this information to the industry may be an important factor to consider in management decisions, the potential future impact of the information is not relevant to the task of evaluating the scientific credibility of GTR 209 and whether it is an objective and unbiased review of published scientific information.

Conclusion

GTR 209, first released in May 2008, is a review and synopsis of then-existing peer-reviewed scientific studies concerning the potential for disease transmission from domestic sheep and goats to bighorn sheep. In essence, petitioners claim the report lacks objectivity and is inaccurate. However, as demonstrated in the above discussion in response to petitioners' specific allegations, GTR 209 is unbiased, accurate and fully complies with the Data Quality Act and applicable agency guidelines. The report ensured transparency by providing a clear explanation of the purpose and scope of the review, identifying clearly the sources and literature reviewed, and describing their limitations. GTR 209 explains the sources of uncertainty regarding the precise mechanisms for disease transmission, microbiological organisms that may cause mortality and factors that cause die-offs to occur. In addition, the Forest Service

undertook a blind peer review process designed to guard against bias and ensure a scientifically defensible report. The report is objective.

Petitioners also allege that GTR 209 is inaccurate in its characterizations of the studies discussed in the report and failed to discuss alternative conclusions that could have been reached based on the data and other factors. As clearly stated in the report, the purpose of GTR 209 was not to critique the studies cited, evaluate the methods used, or suggest alternative conclusions or hypotheses that could have been reached. Instead, the report is a review of peer reviewed literature in which the authors briefly summarized the study methods used and the results obtained. The discussion of studies cited in GTR 209 is accurate in its portrayal of the studies and methodologies used, and did not improperly exclude relevant, conflicting scientific studies or data.

The petitioners' request that GTR 209 be retracted or that the Forest Service issue an amended report is denied.