Response to Comments Specific to Phoenix Production Company Sheldon Dome WY-0024953
March 9, 2015

1. The permittee noted typographical and definition errors in the 3D and 3E tribal water quality descriptions included in the Statement of Basis.

   Response: *EPA also notes the typographical errors in the 3D and 3E definitions in the Eastern Shoshone and Northern Arapaho Tribes' (Tribes') water quality requirements, which were reproduced in the Statement of Basis.*

2. The permittee indicates that the distance from the discharge point in the unnamed ephemeral drainage to the confluence with Dry Creek is 3.95 **stream miles** and the distance from the Dry Creek confluence to the confluence with the Wind River is 18.67 **stream miles**.

   Response: *Comment noted. The Statement of Basis has been updated to reflect changes.*

3. The permittee states EPA incorrectly classified the receiving waters and provided an incorrect definition of a Class 3B water in paragraph 2 of the Statement of Basis. The permittee states further that after review of the Tribal water quality requirements they believe the unnamed ephemeral tributary should be classified as a 3E water, **whose flows are exclusively the result of permitted effluent discharges…** and under natural conditions (i.e., without the Sheldon Dome effluent) would be designated as a Class 4B and Dry Creek below the confluence with the unnamed ephemeral tributary would be 3B or 4B.

   Response: *EPA acknowledges it included the incorrect definition of a 3B water in the Statement of Basis and will update the document to include the correct definition of a 3B water. EPA believes it correctly classified the unnamed ephemeral tributary. The following definition is from the Tribes' water quality law:*

   > (ii) Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the Reservation at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 3B waters.

The table below is excerpted from the Tribal Stream Classification and Lists:

Wind River (above Boysen Res upstream to Red Creek) **2AB**
Mission Cr **(from confluence with Wind R upstream to Wyoming Canal)** 2C
Mission Cr **(upstream from Wyoming Canal)** 2E
Dry (Pasup) Cr **(from confluence with Wind River, upstream to perennial flow)** 3B
Dry (Pasup) Cr **(from perennial flow, upstream)** 2C

The unnamed ephemeral tributary to which the Sheldon Dome facility discharges has not been assigned a class in the Tribal water quality requirements. The tributary flows into Dry Creek and the table above indicates Dry Creek is considered a 3B water from the confluence with the Wind River upstream to perennial flow. The perennial flow stops just upstream of the confluence of the unnamed tributary and Dry Creek. Thus, the tributary flows into an ephemeral portion of Dry Creek. The tributary exhibits the same ephemeral characteristics as Dry Creek for at least 3 miles upstream until the Sheldon Dome flow is present in the drainage. From this point upstream to the Sheldon Dome discharge (0.67 stream miles), the flow in the drainage is dominated by the discharge. Given the lack of stream classification in tribal law, the ephemeral characteristics of the majority of the stream reach, and its shared characteristics with Dry Creek, EPA has concluded that it is best characterized as a Class 3B water.

4. Comment stated that there was misunderstanding of the Discharge Monitoring Report (DMR) data reported for total dissolved solids (TDS) (method and interpretation) and that no violation of the existing permit occurred.

   Response: *EPA acknowledges that no violation for TDS occurred for the second half of 2005 since the limit of 5,000 mg/L did not become effective until one year after the effective date of the permit (September 2005). EPA has corrected the Statement of Basis.*

5. The permittee notes that the Statement of Basis indicates that two ranchers submitted documentation of the beneficial use of the discharge, when in fact the two letters actually represent five ranchers.

   Response: *EPA acknowledges the correction and has updated the Statement of Basis.*

6. The permittee commented that the Statement of Basis contains an incorrect statement on the limits for conductance, chloride, sulfate, and TDS, asserting that they have been in effect as long as the facility has been covered by National Pollutant Discharge Elimination System (NPDES) permits. The permittee noted that these specified limits have only been in place since the 2005 issuance of the permit.

Response: *EPA concurs that this is an error and has removed the sentence.*

7. The permittee commented that if a fluoride limitation of 4 mg/L or less was placed in the permit, they would likely be out of compliance based on the one effluent sample collected for permit renewal in 2010. They also stated the use of a 2 mg/L fluoride value to evaluate reasonable potential (RP) for permit limitations was overly protective of requirements under Section 20 of the Tribal water quality law.

   Response: *EPA is not proposing to place a fluoride limitation in the permit at the present time. EPA lacks sufficient effluent monitoring data to determine the variability of the discharge and to assess the RP of the discharge. Permit monitoring requirements for fluoride will remain unchanged from the proposed permit.*

   Fluoride has had a recommended safe concentration for livestock for the last 40 years (see EPA's Water Quality Criteria 1972) the University of Wyoming Agriculture Extensions Service bulletin B-1183. After review of the comment provided, EPA did not find any additional compelling research to alter the recommended concentration of 2.0 mg/L fluoride referenced in the Statement of Basis. In addition, the numeric standards for fluoride in water for cattle consumption containing less than 2.0 mg/L of fluoride also assumes that this concentration should be safe for sheep, cervids, and horses. (1972 WQ criteria). EPA believes the 2.0 mg/L fluoride is an appropriate standard to evaluate for ensuring the discharge is of good enough quality for livestock consumption.

   1972. Water Quality Criteria 1972. Section V. National Academy of Sciences. Washington D.C. Available through http://www.epa.gov/nscep/index.html verified 10 March 2014. (Note: You will need to search for the specific document by title.)

   2008. M. F. Raisbeck, Riker S.L., Tate C.M., Jackson R., Smith M.A., Reddy K.J., Zygmunt J.R., Water Quality for Wyoming Livestock and Wildlife: A review of the literature pertaining to the health effects of inorganic contaminants. (UW AES bulletin B-1183). Available at http://www.uwyo.edu/ces/pubs/b1183/ verified 10 March 2014.

8. The permittee commented on monitoring requirements for fluoride, iron and zinc and suggested that sufficient monitoring data to establish RP could be obtained with the Toxic Pollutant Screen requirement. The permittee further states that data obtained during the Toxic Pollutants Screens is adequate and that quarterly monitoring for these constituents is unnecessary.

   Response: *EPA agrees with this comment. EPA has determined, based on the limited data currently provided, that fluoride, iron and zinc are possible constituents of concern. The Toxic Pollutant Screen requirements will provide EPA with the necessary data points to make a RP determination for fluoride and iron.*

   An effluent limit has been included for zinc and will have quarterly monitoring requirements. Zinc will be excluded from the Toxic Pollutants Screen to remove duplicative monitoring requirements.

The proposed permit contained a Method Detection Limit table in Section 1.3.4 Toxic Pollutant Screen which implied the listed detection limits applied only to the Toxic Pollutant Screen requirements. The EPA intended to have a separate section designation for the Method Detection Limits table and has revised the Statement of Basis and Permit to reflect that the table applies to all monitoring requirements under section 1.3 of the permit. The Method Detection Limits table will be renumbered as section 1.3.5 in the final permit.

9. The permittee argues that testing for many of the acid and base/neutral organic compounds and volatile organic compounds required in the toxic screen are unnecessary because either the pollutants are not expected to be present in the discharge (chlorinated and fluorinated compounds) or there are not aquatic life standards for the pollutants and the receiving water does not have a human health use (e.g. benzene, ethylbenzene, toluene, naphthalene, and xylene).

   Response: *As discussed in the Statement of Basis, EPA believes there is insufficient data to fully characterize the effluent. As a result, EPA cannot determine if the discharge has RP and, thus, if effluent limitations are necessary for many pollutants expected to be present in the discharge. Although the presence of chlorinated or fluorinated compounds were not detected in the discharge during one historic monitoring event, the analytical method used for other pollutants of concern will include these compounds and EPA cannot modify the method for purposes of this individual permit. The new Toxic Pollutant Screen requirement for volatile and base/neutral organics, metals listed in 40 CFR Part 122 Appendix D, Tables II, III, and IV is necessary to provide supplemental data to EPA so that the variability of these pollutants in the discharge can be evaluated for purposes of evaluating RP of such pollutants to exceed tribally-adopted water quality requirements. Such variability is required to be evaluated under 40 CFR § 122.44(d)(1)(ii) when assessing RP with respect to EPA-approved WQSs, and therefore, EPA considered it appropriate to evaluate such variability when assessing RP with respect to tribally-approved water quality requirements. EPA believes that sufficient data will be collected as part of the Toxic Pollutant Screen requirement along with future permit re-application requirements to evaluate RP for the list of pollutants.*

   The permittee identified several of the organic constituents, i.e. naphthalene, benzene, toluene, and ethyl benzene, as lacking aquatic life standards. While EPA does not have recommended aquatic life criteria for these pollutants, the pollutants are known toxics which could contribute to whole effluent toxicity (WET) failure and violate the Tribes' narrative requirement for toxics.

10. The permittee stated that additional monitoring for chloride and total recoverable Radium 226 should be removed from the toxic pollutants screening because the information is already provided in required monitoring. Further comments state that reported DMR data for Radium 226 misleadingly reflected only semi-annual results when in fact the permittee did the quarterly monitoring required by the permit.

Response: *Chloride and total recoverable radium 226 were not included in the Toxic Pollutants Screen for this permit and were only included in the quarterly monitoring in the self-monitoring requirements in Section 1.3.2 of the permit. As noted in response to comment above, however, the proposed permit contained a Method Detection Limit table in Section 1.3.4 Toxic Pollutant Screen which may have caused confusion for readers. EPA recognizes this and has revised the Statement of Basis and Permit to separate the Toxic Pollutant Screen requirements, and to reflect that the Method Detection limit table applies to all monitoring requirements under Section 1.3 of the Permit.*

The DMR form provides for reporting of the maximum, minimum, and average of the pollutant as well as the frequency of analysis for the reporting period. The quarterly monitoring results were reflected in the semiannual DMR in the frequency of analysis column.

11. The permittee commented that WET monitoring should not be included because they did not believe the test is appropriate for a Class 3B water.

    Response: *WET monitoring and/or limitations are appropriate for discharges containing pollutants in amounts that may cause or contribute to an excursion of numeric or narrative water quality requirements. This includes all waters classified for aquatic life use, not just large rivers. WET requirements ensure that all aquatic life uses are protected through the entire waterbody including those areas immediately downstream of a discharge. The Tribes' water quality requirements designate aquatic life as a use for Class 3B waters. Because the receiving water and the downstream Dry Creek are Class 3B waters, and because aquatic life is present in the receiving water, WET testing is appropriate for this permit.*

12. The permittee commented that "The aquatic communities present in the Sheldon Dome discharge have adapted and evolved to live in the produced water under ambient discharge conditions… and there would naturally be zero aquatic life in this drainage if not for the presence of the discharge water. Under natural conditions this drainage would be totally dry **almost 100%** of the time with **no associated aquatic life**."

    Response: *EPA disagrees with several assertions in the permittee's statements including the premise that the receiving water would contain zero aquatic life if not for the discharge. With respect to protection of aquatic life uses, EPA considered tribally adopted designated uses as well as existing uses for determining appropriate criteria for use in establishing water quality based effluent limits (WQBELs) and/or monitoring requirements. The Sheldon Dome facility discharges to an ephemeral tributary to Dry Creek, which the Tribes have designated as a Class 3B water. For the reasons described in response #3, EPA has concluded that the ephemeral tributary is also best described as a Class 3B water. Class 3B water are those waters which normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the Reservation at some stage of their life cycles. Given this classification and description, EPA believes protection of the full potential of aquatic resources is required.*

As described in EPA's response to the permittees comments on the receiving water classification, only a small portion of the receiving stream (~0.67 stream miles of ~3.95 stream miles) may at the present time contain what the permittee described as "aquatic communities …that have adapted and evolved to live in the produced water." EPA does not agree that this small portion of the receiving water represents the conditions of the stream nor represents the fully attainable aquatic life use that would be present if appropriate aquatic life criteria were met in the entire receiving water. Therefore, EPA believes the WET monitoring requirement is appropriate to ensure all aquatic life uses and narrative water quality requirements are maintained in the receiving water.

13. The permittee further states "Sour oilfield discharges, such as Sheldon Dome, are likely to fail an acute WET test without extensive treatment to remove sulfide. The permittee commented that such treatment is expensive, that it is likely that it will be uneconomic for Phoenix to treat the water to remove potential toxicity, and that Phoenix would rely on injection of all of the produced water to keep this facility in compliance."

    Response: *The EPA agrees that discharges high in sulfide like sour oilfield wastewater are likely to fail an acute WET test. No cost information was provided by the permittee on possible treatment options for sulfide (as H_2S) or other information demonstrating that the injection option is the only means for facility compliance. The EPA notes, however, that it has worked with a similar facility on the Wind River Indian Reservation with a similar discharge to successfully implement a low cost treatment alternative for sulfide, and demonstrate compliance with permit WET requirements. WET requirements are established to ensure that this permit will comply with the CWA. Such treatment technology could be applied to the discharge from this facility, as well. If the permittee chooses injection as a disposal option for the wastewater, the permittee will need to comply with EPA Safe Drinking Water Act Underground Injection Control regulations.*

14. The permittee commented that on page 9 of the permit the use of the phrase "conduct an additional test within two (2) weeks of the date the permittee learned of the test failure" implied completion of an additional test within that time frame, and they suggested the word "conduct" be replaced with "initiate". The permittee also requested the timeframe for conducting an additional test be changed to four (4) weeks instead of two (2) weeks due to lab issues.

    Response: *EPA agrees to modify the permit language to "initiate an additional test" on page 9 of the permit. EPA does not agree to change the re-testing requirement to four weeks. WET testing labs are fully equipped and prepared to conduct the testing as required by the NPDES Regulations. If the permittee's laboratory has difficulty in meeting the testing requirements in the specified time, EPA recommends the permittee pursue testing services with other qualified lab(s) to conduct WET testing.*

15. The permittee requested that the second paragraph of section 1.3.1.1., discussing monitoring and permit limits relative to periods of reinjection and discharge conditions, be removed. The permittee stated that since Phoenix has no injection capacity at this facility, the paragraph should not be included in the permit.

Response: *The language from Page 5 of the permit appears as follows:*

> 1.3.1.1. General Effluent Limitations:
> There shall be no discharge of waste pollutants into navigable waters from any source (other than produced water) associated with production, field exploration, drilling, well completion, or well treatment (i.e. drilling muds, drill cuttings, and produced sand).
>
> During reinjection conditions, monitoring is not required, however, if the need to discharge into the adjacent drainageway arises, all monitoring shall be required and effluent limitations met as described in this permit.

EPA has removed the second paragraph of this section from the final permit. All discharges must be in accordance with the terms and conditions of the permit and it is unnecessary to reiterate that those terms and conditions must be met during various production scenarios.

16. The permittee states that Sheldon Dome effluent will not meet the proposed limit for sulfate (daily max or 30-day average). The permittee further cites the following issues: 1) the University of Wyoming report is overly conservative and highly speculative; 2) many natural sources for livestock watering in Wyoming are naturally high in sulfate; 3) there are many variables affecting the performance of livestock including breed genetics, quality of forage, living conditions, availability of water, climate, precipitation, predators, etc.

    The permittee argues that the Tribal water quality requirements for agricultural water supply state that "Degradation of such waters shall not be of such an extent to cause a measurable decrease in crop or livestock production," and that there have not been any cases of such a measureable decrease to elevated levels of sulfate or fluoride in its discharge.

    Response: *The sulfate limitation is a technology based effluent limit (TBEL) based on an EPA Effluent Limitation Guideline (ELG), not a WQBEL based on the Tribes' water quality requirements. Under the applicable technology-based requirements for the Agricultural and Wildlife Water Use Subcategory of Part 435, discharges of produced water must be of 'good enough quality' to be used for wildlife or livestock watering or other agricultural uses. The EPA's previous permit limitations for total dissolved solids (TDS), chloride, and sulfate were based on similar requirements for livestock protection imposed by the State of Wyoming on oil and gas production facilities outside the Wind River Indian Reservation in the State of Wyoming. For this renewal permit, the EPA reviewed current information from literature and studies to establish limitations which are protective of livestock and wildlife consumption of the produced water discharge.*

    The University of Wyoming Report, "Water Quality for Wyoming Livestock and Wildlife Report" (the "AES bulletin") was published first in 2007 as a research paper and then in 2008 by the University of Wyoming Extension as Experiment Station Bulletin. (2008. M. F. Raisbeck, et al). To become an Experiment State Bulletin the document must be peer reviewed, with additional reviews from the US Department of Agriculture (USDA). EPA believes that, having gone through both peer review and review by the USDA, the AES bulletin represents the best available science concerning the effects of drinking water quality in Wyoming on livestock. EPA has no indication that the research captured in this bulletin is speculative and thus has chosen to adopt its recommendations for the purposes of writing these permits.

Before adopting the recommended sulfate concentrations in the AES bulletin, however, EPA evaluated them to ensure they would ensure that discharges of produced water are of good enough quality for wildlife and livestock uses. That evaluation is summarized as follows:

The AES bulletin includes a review of the health effects of inorganic contaminants on livestock and wildlife. The AES bulletin recommends, "Assuming normal feedstuff [Total Sulfur] concentrations, keeping water $SO4^{2-}$ concentrations less than 1,800 mg/L should minimize the possibility of acute death in cattle. Concentrations less than 1,000 mg/L should not result in any easily measured loss in performance." The AES bulletin recommendation is based on the common understanding of total intake. The EPA evaluated this recommendation to determine the impacts of these contaminants, including sulfur, on the beneficial use of produced water, and what level of such contaminants would provide water of 'good enough quality' as contemplated in Subpart E.

When evaluating the Total Sulfur(S) intake by livestock, the dry matter intake and the intake of S through drinking water together yield the total intake. The National Research Council (NRC) "2005 Mineral Tolerance of Animals: Second Revised Edition" recommends maximum tolerable levels (MTL) for a variety of minerals. The MTL is the maximum intake of a mineral that an animal can ingest without suffering adverse effects, and is typically presented as a concentration in feed or water. The 2005 NRC report recommends an MTL for sulfur of 0.5 % of the daily intake of feed and water based on dry weight equivalent for ruminants fed diets of at least 40% forage. EPA used this MTL as the basis for evaluating what concentration of sulfur in produced water discharges would be of good enough quality for cattle. EPA assumed that if the total concentration of sulfur in feed and water for cattle was greater than .5%, the cattle would suffer adverse effects and the water would not be of good enough quality.

For purposes of this analysis, EPA assumed that 100% of feed for cattle consuming the produced water discharges is forage. A University of Wyoming Extension document looked at forage mineral concentrations, including Sulfur in Big Horn County, Wyoming (See Horn No Date). This document provided the following concentrations:

0.17 % S Median
0.17% Mean
0.22% was 85 %tile
0.26% was the 95^{th}%tile.

EPA is confident that this data indicates Wyoming forage concentrations range from 0.1% to 0.3% S with an average of approximately 0.2% (see Horn). These concentrations are also reflected in the AES bulletin, which assumed sulfur concentrations in forage of 0.1%S, 0.2%S and 0.3%S on a dry matter basis.

To determine likely total sulfur intake for cattle consuming produced water discharges, EPA utilized a sulfur calculator developed by Colorado State University Veterinary Teaching Hospital. EPA looked at each forage S content (0.1%, 0.2%, 0.3%) with various concentrations of sulfate, ranging from 500 mg/l to 4,000 mg/L. The calculator EPA employed the following assumptions and inputs when running the sulfur calculator:

1. *Young rapidly growing cattle 600# Estimate at 7-9 months*
2. *Recently placed on water*
3. *Mineral Tolerance of Animals 2005*
4. *Maximum Tolerable Levels (Sheep and Cattle) as 0.3 %Dry Matter for those on High Concentrate diet*
5. *0.5% as Dry matter for high forage diet (as % DM includes Food and Water). We used 0.5%*
6. *For Calculation used Sulfur calculator from CO VTH at http://dlab.colostate.edu/webdocs/tools/sulfurcalc.cfm*
7. *Three temperatures used to describe the impact of additional water intake at higher temperatures.*
8. *Area shaded greater than or equal to 20% above MTL of 0.5% S as DM*

The sulfur calculator generated the following output for forage with .1%S:

In-take of S as % DM			
Feed 100% - 0.1%	Air Temperature		
SO_4 in H_2O (mg/L)	40°F	70°F	90°F
500	0.15	0.17	0.22
1000	0.21	0.23	0.34
1500	0.26	0.3	0.46
1800	0.29	0.34	0.53
2000	0.31	0.37	0.58
2500	0.37	0.43	0.7
3000	0.42	0.5	0.82
3500	0.47	0.57	0.94
4000	0.53	0.63	1.06

The sulfur calculator generated the following output for forage with .2%S:

In-take of S as % DM			
Feed 100% - 0.2%	Air Temperature		
SO_4 in H_2O (mg/L)	40°F	70°F	90°F
500	0.25	0.27	0.32
1000	0.31	0.33	0.44
1500	0.36	0.4	0.56
1800	0.39	0.44	0.63
2000	0.41	0.47	0.68
2500	0.47	0.53	0.8
3000	0.52	0.6	0.92
3500	0.57	0.67	1.04
4000	0.63	0.73	1.16

The sulfur calculator generated the following output for forage with .3%S:

In-take of S as % DM			
100% - Feed 0.3%	Air Temperature		
SO_4 in H_2O (mg/L)	40°F	70°F	90°F
500	0.35	0.37	0.42
1000	0.41	0.43	0.54
1500	0.46	0.5	0.66
1800	0.49	0.54	0.73
2000	0.51	0.57	0.78
2500	0.57	0.63	0.9
3000	0.62	0.7	1.02
3500	0.67	0.77	1.14
4000	0.73	0.83	1.26

These three charts indicate that at all concentrations of S in forage there is a direct relationship between water intake and temperature: the higher the temperature the greater the water intake. As a result, as temperature increases, the total intake of sulfate (and, therefore, sulfur) also increases. UW AES bulletin B1183 utilized a forage S content of 0.2%, and the Horn study indicates that the average S content of forage in Wyoming is about .2%. As a result, EPA concluded that it is reasonable to base its analysis on an S content of 0.2% in forage for cattle on the Wind River Indian Reservation.

Thus, EPA relied upon the 0.2% forage content chart:

In-take of S as % DM			
Feed 100% - 0.2%	Air Temperature		
SO_4 in H_2O (mg/L)	40°F	70°F	90°F
500	0.25	0.27	0.32
1000	0.31	0.33	0.44
1500	0.36	0.4	0.56
1800	0.39	0.44	0.63
2000	0.41	0.47	0.68
2500	0.47	0.53	0.8
3000	0.52	0.6	0.92
3500	0.57	0.67	1.04
4000	0.63	0.73	1.16

Assuming a forage content of 0.2%, this chart indicates that during times when the temperature is 70F, the sulfur MTL for cattle is exceeded by 20% when the water consumed by the cattle exceeds 3,000 mg/L SO4. When the temperature is 90F, the sulfur MTL for cattle is exceeded by 26% when the water consumed by the cattle exceeds 1800 mg/L SO4. EPA believes that this aligns with the AES bulletin with the same forage content of 0.2%, which recommended "keeping water $SO4^{2-}$ concentrations less than 1,800 mg/L" to minimize the possibility of death in cattle.

As the permittee notes in its comments, the impact of the intake of sulfur (and other inorganic chemicals) in cattle and other livestock depends on many variables. These can include livestock breed, livestock producer management practices, livestock acclimation to waters with high sulfate concentrations, water management practices (e.g., mixing high sulfate concentration water with low sulfate concentration water to achieve desired ambient conditions), and many others. Thus, EPA must write permits to ensure that discharges of produced water are "of good enough quality" for livestock and wildlife regardless of other factors that come into play during the water's beneficial use. EPA's reevaluation of the recommendations in the AES bulletin using base information from the NRC 2005 Mineral Tolerance of Animals 2nd Revised Edition and the Sulfur calculator from Colorado State University Veterinary Teaching Hospital produced similar water quality to the recommendations in the AES bulletin. EPA has thus concluded that the recommendation made in the AES bulletin are reasonably safe for most circumstances. Moreover, EPA has found no other compelling criteria to suggest that a different sulfate limit is appropriate. As a result, the sulfate permit limitations in the final permit remain unchanged.

Horn, Blaine E. (no date) Mineral Content of Range Grass Big Horn Mountain Area. University of Wyoming Cooperative Extension Service Available at http://www.uwyo.edu/ces/county/johnson/files/mineral-report.pdf verified 18 March 2014.

2005. National Research Council. *Mineral Tolerance of Animals: Second Revised Edition*. Washington, DC: The National Academies Press, 2005 Available from http://www.nap.edu/catalog.php?record_id=11309 verified 10 March 2014.

2008. M. F. Raisbeck, Riker S.L., Tate C.M., Jackson R., Smith M.A., Reddy K.J., Zygmunt J.R.. Water Quality for Wyoming Livestock and Wildlife: A review of the literature pertaining to the health effects of inorganic contaminants. (UW AES bulletin B-1183). Available at http://www.uwyo.edu/ces/pubs/b1183/ verified 10 March 2014.

Sulfur calculator from CO VTH at http://dlab.colostate.edu/webdocs/tools/sulfurcalc.cfm

17. The permittee commented on sulfide toxicity and the relationship between total sulfides and the dissociation product hydrogen sulfide. The permittee requested the limit for sulfide be expressed as hydrogen sulfide instead of total sulfide.

    Response: *EPA agrees with the permittee that the effluent limitation in the proposed permit was expressed incorrectly as total sulfide. The references to "sulfide" in the effluent limit table in Section 1.3.1.3 and the monitoring requirement table 1.3.2 and footnote d of that table have been replaced with "sulfide as H_2S." Since there currently is no approved analytical method for sulfide (as H_2S) under 40 CFR Part 136 which can detect the pollutant at that low of a concentration, EPA added in a Reporting Level for sulfide (as H_2S) in the final permit of 0.10 mg/L (100 µg/L) which is achievable under the approved procedures of 40 CFR Part 136. As described in the permit, any detection of sulfide (as H_2S) above the Reporting Level will be considered a violation of the permit. Values reported below 0.10 mg/L (100 µg/L) will be considered in compliance with the permit conditions.*

18. The permittee commented that the proposed limit for total sulfide is not appropriate for the type of receiving water and that although EPA has allowed a compliance period in the permit to achieve the limitation, they will not be able to meet the limit without "extensive treatment" and they would rely on 100% injection of the produced water.

    Response: *EPA disagrees that the limitation for sulfide (as H_2S) is not appropriate for the receiving water. As explained above in the response to previous comments, the receiving water is a Class 3B water, and the permit limitation is based on protection of the aquatic life designated use for that class. The aquatic life criterion for sulfide as H_2S, 0.002 mg/L, is contained in the Tribes' water quality requirements, and the value is equivalent to EPA's published recommended criterion for sulfide (as H_2S)for protection of aquatic life. Since there is no dilution available in the receiving water, the value is to be met at the end of the pipe.*

19. The permittee commented that the proposed limit for chloride should not be applied to a Class 3B receiving water and the permit conditions be changed back to the previous permit limit of 2000 mg/L.

    Response: *EPA established a new permit limit for chloride based on protection of the aquatic life use of the receiving water. The chloride criteria for acute and chronic receiving water concentrations were adopted by the Tribes and are equivalent to EPA's 304(a) recommended water quality criteria for protection of aquatic life. The acute and chronic criterion were established as daily maximum 860 mg/L and monthly average 230 mg/L due to the lack of dilution in the receiving water. See response to comments #12 and #18 above.*

20. The permittee requested that the existing oil and grease monitoring frequency (i.e., monthly) be retained, rather than the new weekly monitoring requirement in the proposed permit. The permittee stated that the existing oil and grease monitoring frequency has been adequate to detect any oil and grease pass through at this facility.

    Response: *After reviewing the compliance monitoring information submitted by the permittee, EPA believes the increase in monitoring frequency for Oil and Grease is appropriate due to the frequent reporting of results close to the permit limit of 10 mg/L. The average concentration reported in the fourteen results reported since 2005 was 9.0 mg/L and 71% (10/14) of those results exceeded 9.3 mg/L Oil and Grease. EPA therefore believes increasing monitoring of the pollutant is appropriate and a weekly frequency will be retained in the final permit.*

21. The permittee requests that the implementation of the mercury monitoring plan be based on two mercury samples exceeding 0.77 mg/L rather than one. The permittee believes any detection of mercury in a sample will likely be due to lab error, and argue that is likely the case of the October 25, 2005 sample. Re-analysis of the same sample or analysis of a follow up sample is needed to validate the mercury results over 0.77 mg/L. The permittee further requests that any mercury monitoring requirements and permit limits be based on dissolved mercury instead of total mercury, as dissolved mercury would be the bio-available form. A dissolved mercury standard, for purposes of aquatic life protection, would be consistent with the Tribes' water quality requirements.

    Response: *The permittee has submitted no documentation to substantiate that the results from the 2005 sample were due to lab contamination. However, an older mercury sampling and analysis method was used at that time. Use of proper sampling and lab techniques for analysis is critical; the permit requires use of clean methods and should be strictly adhered to. Any exceedance of the 0.77 mg/L using the proper sampling and analytical methods would be a cause for concern and a second sample is not necessary. The EPA disagrees with the request that any mercury monitoring requirements and permit limits be based on dissolved mercury. The total mercury monitoring requirements and permit limits are based on the EPA recommended water quality criteria and the Tribes' water quality requirements, which are expressed as the total recoverable form and which include the dissolved and suspended fractions. Therefore, the EPA is not going to change these requirements in the permit.*

22. The permittee requests a compliance schedule for all new or more stringent effluent limits in the final permit for which they cannot immediately achieve compliance.

    Response: *EPA agrees the facility cannot meet the proposed discharge limitations for sulfate, sulfide, and chloride without treatment and will address each pollutant separately due to the basis of the limit. EPA's ability to provide a period of compliance under the Clean Water Act (CWA) and the NPDES permitting rules at 40 CFR Part 122 is limited. Section 301(b)(1)(A) requires point sources to immediately comply with effluent limitations based on technological standards. As a result, compliance schedules providing for a delay in achieving compliance are unavailable for TBELs. However, EPA has long interpreted CWA Section 301(b)(1)(C) as allowing compliance schedules for WQBELs if authorized under State law. See In the Matter of Star-Kist Caribe, Inc., 3 E.A.D. 172, 175, 177 (1990); Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits, memorandum from James Hanlon, Office of Wastewater Management to Alexis Strauss, Director, Water Division, Region 9, May 10, 2007.*

The Tribes have adopted water quality requirements that include a provision authorizing the use of compliance schedules. Thus, compliance schedules are available for WQBELs in this permit.

The permit limit for sulfate is a TBEL under 40 CFR Part 435, Subpart E. As a result, a permit compliance period is not allowed for this pollutant. The permit limits for chloride and sulfide are WQBELs based on the Tribes' water quality requirements. As a result, EPA has provided a 36-month compliance period in part 1.3.3. of the permit.

23. A comment was received stating that the existing beneficial use of water would be jeopardized by the loss of the discharge. The comment supported the use of the discharge in providing riparian habitat and benefits to aquatic and non-aquatic life including plants, as well as domestic and wildlife uses, in an area where little or no water is available for this type of habitat or uses.

Response: *EPA understands that the discharge currently provides riparian meadow/wetland and open surface water habitat for many aquatic and non-aquatic species, as well as providing a source of drinking water for livestock and terrestrial wildlife. EPA evaluated appropriate water quality criteria for aquatic life, and livestock and wildlife, in establishing the effluent limitations for the renewal permit. The new and revised permit limitations will ensure that the discharge quality is sufficient to maintain both aquatic life and agricultural/wildlife uses in those riparian/wetland and open water areas.*