

BHP Navajo Coal Company



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November 17, 2011

Ms. Brenda Steele, Navajo Mine Coordinator
Indian and Federal Programs Team
Office of Surface Mining/Western Regional Coordinating Center
P.O. Box 46667
Denver, Colorado 80201-6667

**Re: Navajo Mine Permit Number NM-0003F; Rev 1105
BNCC Navajo Area IV North Mine Revision (OSM No. NM-0003-F-R03)
Technical Evaluation Response to Technical Deficiency Response**

Dear Ms. Steele,

BHP Navajo Coal Company (BNCC) is submitting for your review and approval eight (8) copies of the responses to the technical deficiencies identified in the Area IV North response to technical deficiency submittal.

During the technical evaluation (ARMS No. 11/03/24-05) of the Area IV North Technical Deficiency Response on September 27, 2011, OSM identified several additional deficiencies that have been addressed. A summary of each technical deficiency is described below in italics with BNCC's response following each deficiency identified.

Chapter 3

- 1. A short paragraph should be added to Chapter 3 indicating the Area IV North Cultural Resources Programmatic (PA) is being revised and updated to better accommodate current and proposed mining and associated activities. The "new" PA will contain the remaining elements and ongoing requirements of the existing PA.*

BNCC Response –.A short paragraph was added to Chapter 3 to accommodate OSM's request.

Chapter 12- Bond:

2. *Appendix 12C was updated to include a discussion on prediction points that had been removed from the use, but still were shown in the April submittal (text and tables C and E). BHP also said they corrected a reference to Table 11-16D. However, none of these revised pages were submitted to OSM for review in the September 27 submittal. BHP must submit the revised pages that show the noted changes. Once received, OSM's concerns will have been addressed.*

BNCC Response –Per OSM's request, BNCC agreed to submit the bond as a separate submittal, but address all of OSM's technical deficiencies in the cover letter that addressed the Area IV North technical deficiencies. The bond was submitted on September 23, 2011 as Rev 1119. The pages OSM requested are included with that submittal.

Chapter 6, Chapter 7 and PHC

Address clarity concerns listed under 30 CFR 777.11(a)(2)

The PHC, Appendix 6-G, Appendix 11-VV, and Appendix 11-WW have incorrect reference to NNEPA standards (see in text comments for specific examples). (TE page 2, §777.11(a)(2))

BNCC Response:

BNCC has updated references to NNEPA standards.

A table in PHC of all applicable surface water quality standards needs to be included to clarify the discussion, this should include all NNEPA 2007 designated uses for surface water on BNCC, specifically livestock watering, fish consumption, secondary human contact, and aquatic and wildlife habitat. (TE Page 2, §777.11(a)(2))

BNCC Response:

BNCC has included the NNEPA designated uses and a reference (Chapter 11 Section 11.6.3.2) to the Navajo Nation surface water quality standards. In addition a BNCC has included the following language: "The Navajo Nation Environmental Protection Agency (NNEPA) has designated uses, Fish Consumption (FC), Secondary Human Contact (ScHC), Aquatic and Wildlife Habitat (A&WHbt), and Livestock Watering (LW), for all Waters of the Navajo Nation (NNEPA WQP, 2008), which includes drainages within the Navajo Mine permit area. There are no other higher levels of designated use for surface water resources within the Navajo Mine permit area." (Navajo Nation Environmental Protection Agency Water Quality Program (NNEPA WQP), 2008. Navajo Nation Surface Water Quality Standards 2007, passed by Navajo Nation Resources Committee May 13, 2008.

http://water.epa.gov/scitech/swguidance/standards/wqslibrary/upload/2009_03_31_standards_wqslibrary_tribes_navajo.pdf (verified 16 November 2011)).

Discuss all available data for a complete and accurate assessment. All data in the submission and Chapters 6 and 7 (specifically Tables 6-2 and 7-7) should be checked for accuracy against the groundwater data spreadsheet submitted on [17 October 2011] and the surface water data spreadsheets submitted on [4 October 2011]. See comment under 30 CFR 777.11(c)

BNCC Response:

BNCC has updated Tables 6-2 and 7-7 and all tables in Chapter 11 and Appendix 6.G based on the groundwater data spreadsheet submitted on 17 October 2011 and the surface water data spreadsheets submitted on 4 October 2011. The text in Chapters 6, 7, and 11 and in Appendix 6.G has been revised based on the complete data set and associated tables.

Text in Chapter 7 Section 7.4.6 stating that all data is stored in an in house database (last updated [August 2002]) must be modified to say that it is organized in a spreadsheet available to OSMRE and BNCC. Also, the time necessary to compile monitoring data and the fact that some data is still missing puts the validity of the referenced database to question, which OSMRE finds concerning. (Page 3, §777.11(c))

BNCC Response:

BNCC maintains compliance with water quality reporting obligations required by 30 CFR 777.11(b). However, BNCC will augment compliance with this requirement by including the following commitment in Section 7.4.7 Reporting: "BNCC will provide all water quality information to OSMRE in an electronic format on a quarterly basis."

(3) OSMRE made the following comments related to accuracy and completeness:

- *Verify appendix 6.E, Table 6.4-1, and Exhibits 11-166, 6-1, and 6.G-1 for accuracy and completeness. See comment under 30 CFR 780.21(b)(1).*
- *"Figure 11-1 66 was found to be missing locations for KF-8 and KF98-02, both of which are present in the BNCC data spreadsheet from 10/17/11, this needs to be fixed. (TE Page 4, §780.21(b)(1))*
- *"...Figure 11-166 needs to be updated." (TE Page 12, §780.21(i)(2))*
- *"Location and ownership of wells adjacent to the BNCC permit area can be found in Appendix 6.E. The information in Appendix 6.E, however, needs to be verified against information in Exhibits 11-166, [Appendix Exhibit] 6-1, and [Appendix Exhibit] 6.G-1, along with table 6.4-1 for accuracy and completeness." (TE Page 4, §780.21(b)(1))*
- *"Appendix 6-E does, however, need to be verified for accuracy and completeness, see above comment under 30CFR 780.21 (1)." (TE page 8, §780.21(e))*

BNCC Response:

Information in Appendix 6.E, Figure 11-166, Table 6.4-1, and Exhibits 11-166, 6-1, and 6.G-I has been updated to be accurate and complete.

Exhibit 11-166 was not updated as requested. Monitoring well name KF-8, listed in the groundwater data table submitted to OSM on 17 October 2011, is an alias for well KF83-8, shown on Exhibit 11-166. BNCC will revise the groundwater data table to update the well name and resubmit the groundwater table by 31 January 2012. Well KF98-02 is located outside of the map extents for Exhibit 11-166. This well is located south and upgradient of the Navajo Mine permit Area. Well KF98-02 and other wells, used in the development of the conceptual numerical hydrogeologic model to support the PHC, in Area IV South and Area V of the Navajo Mine coal lease are shown on Exhibit 6.G-1 and in Figure 3.2-2 of the Appendix 11-WW (Groundwater Modeling Report).

(4) OSM made several comments or references to surface water impoundments:

- *Discussion of impoundments should be expanded in the PHC, to address fully containing vs. not fully containing ponds, historic discharge events, and water quality. See comment under 30CFR 780.21(b)(2)*
- *"Discussion of impoundments needs to be expanded in the PHC to address fully containing vs. not fully containing structures, historic discharge events, and water quality." (TE Page 5, §780.21(b)(2))*
- *"Discussion of impoundment water quality should be expanded in the PHC." (TE page 9, §780.21(f)(3)(iii))*
- *"Discussion of impoundments should be expanded in the PHC, to address fully containing vs. not fully containing ponds, historic discharge events, and water quality." (TE page 10, §780.21(f)(3)(iv)(E))*

BNCC Response:

BNCC has revised the text in Section 11.6.1.2 and Section 11.6.3.2 to describe the surface water impoundments. The revisions to these sections describe the difference in the pond design as it relates to storm event and whether the ponds are "fully containing" or "not fully containing". Text has also been added to describe historic discharge events and impoundment water quality.

OSMRE suggested that BNCC include a discussion of an impoundment outside of its permit area. BNCC has chosen not to include a discussion about this impoundment. BNCC does not control the impoundments outside of its permit area and therefore cannot guarantee these impoundments are suitable surrogates for baseline water quality for pre-mine in permit area impoundments. BNCC will comply with 30 CFR 816.49(b)(2), which states that impoundments left after

reclamation must meet the applicable surface water quality standards for the intended use of the impoundment and will not result in a diminution of the water quality and quantity of water utilized by adjacent land users.

(5) Expand the sensitivity analyses discussion and include an error analysis for both the Area I model and the Area IV and V Model (Appendix 11-WW). Additionally the objectives for the Area IV and V model need clarification. See comment under 30 CFR 780.21(d)

BNCC Response:

BNCC has clarified the groundwater modeling objectives in Appendix 11-WW, in Chapter 11, and in Appendix 6.G. Appendix 11-WW has been revised to provide further discussion of the constrained calibration process. An uncertainty and error analysis section has been added as Section 11.6.2.4.4 to provide further discussion of model error and PHC predictions. The PHC has relied on methods described in the US Army Corps of Engineers (1999) "Engineering and Design Manual-Groundwater Hydrology" (EM 1110-2-1421) to assess model prediction error and model uncertainty in the PHC. Although the model predictions are hypotheses that will need to be re-examined as mining and reclamation proceeds, the modeling results are useful in predicting the likely range of changes in hydrologic conditions and the likely time frames might be associated with these changes.

The Area I sulfate transport model in Section 11.6.2.3.1 has been revised to provide further discussion of model error with respect to sulfate reduction rates and goodness of fit model calibration. Section 11.6.2.3.1 has been expanded to discuss the likely relationship between sulfate and TDS concentrations in groundwater transport through the Fruitland Formation between the Bitsui Pit and the San Juan River alluvium. This section also includes calculations that show the potential change in TDS concentrations in the San Juan River alluvium along the Fruitland Formation subcrop resulting from varied sulfate reduction interpretations associated with the transport model.

(6) Provide the necessary future information for examination of model prediction as outlined in the comment under 30 CFR 780.21(f)(3)(ii). "The placement and migration potential of CCBs may potentially impact the water quality of the San Juan River. To assess this concern OSMRE needs confirmation of Area I model predictions" (TE Page 9, §780.21(f)(3)(ii)).

BNCC Response:

Section 11.6.2.4.4 in the PHC describes how monitoring will be performed and used to reduce the uncertainty in model predictions over time so that appropriate mitigation could be implemented, if required.

(7) OSMRE requires the submittal of a water level contour map and GIS layer for the Fruitland Formation (including Area I) every 5 years so that time of travel predictions can be validated. Results of each of these should be compared to predictions from both groundwater models in the annual hydrology reports. See comment under 30 CFR 780.21(f)(3)(ii)

BNCC Response:

BNCC commits to submit a water level contour map (i.e., a potentiometric surface map) for the Fruitland Formation every five (5) years to OSMRE. BNCC will submit the potentiometric surface map with the next bi-permit term comprehensive hydrology report (Chapter 11 Section 11.6.6), and then submit the potentiometric surface map and electronic data every five years as directed by OSM's technical comment. BNCC will coordinate with OSM on the format prior to initial submittal, as it is unsure which mapping software will be used. In general, BNCC does not object to providing a "GIS layer for the Fruitland Formation", but BNCC does require a more precise description on what GIS information OSMRE is seeking to obtain. BNCC will work with OSMRE to obtain this description and to provide the required information.

(8) The discussion needs to be expanded in sections 11.6.3.3 .1 and 11.6.3.3.7 to address water quality criteria for all NNEPA designated uses. See comment under 30 CFR 780.21(f)(3)(iv)(B) "...analysis of important water quality parameters: however this discussion needs to be expanded to incorporate the complete available data set. Additionally, the discussion needs to be expanded in sections 11 .6.3 .3.1 and 11 .6.3.3.7 to address water quality criteria for all NNEPA designated uses." (TE page 9, §780.21(f)(3)(iv)(B))

BNCC Response:

BNCC has expanded the discussion in Section 11.6.3.3.1 and Section 11.6.3.3.7 to address important water quality criteria. These water quality discussions incorporate the complete surface water data set submitted to OSM on 4 October 2011.

(9) Discussion of the Cottonwood Arroyo under section 11.6.3.3.7 should be expanded to include discussion of surface water quantity. See comment under 30 CFR 780.21(f)(3)(iv)(D). "Discussion of the Cottonwood Arroyo under section 11.6.3.3.7 should be expanded to include discussion of surface water quantity specifically incorporating analysis of the continuous gage monitoring data collected from 1997-1999 especially a discussion of the available hydrographs (see Appendix 7-L of the PAP)." (TE Page 10, §780.21(f)(3)(iv)(D))

BNCC Response:

BNCC has revised the text in Section 11.6.3.3.7 to address the comparison of pre-mine and post-mine sedimentology and hydrology SEDCAD modeling. A component of the SEDCAD modeling is an estimation of peak flows (water quantity) for given storm events at select locations. BNCC did not revise the text in

Section 11.6.3.3.7 to included a discussion of continuous gage monitoring data collected between 1997 and 1999, as this data and analysis are already presented in Chapter 7 Surface Water Hydrology.

(10) OSMRE made several comments regarding the groundwater monitoring program.. See Comments under 30CFR780.21(i)(2):

1. *Monitoring locations to be reinstated*
 - a) *QACW-2B (also add to Table 6-3)*
 - b) *GM-17*
 - c) *Bitsui-2*
 - d) *SJKF84 #5*

2. *New monitoring locations*
 - A. *Alluvial monitoring on main and south forks of Cottonwood, as close to permit boundary as possible and in locations that will not be mined through*
 - B. *Upstream alluvial monitoring on Chinde as close to permit boundary as possible*
 - C. *Nested Fruitland well in a minimum of the No.3 and No.8 coal seams on the northwest side of the IV North pit, between the pit and the Cottonwood. The well must be located such that it will not be mined through. (TE Page 13, §780.21(i)(2))*

3. *Fluoride needs to be moved from the detailed parameters listed in section 6.6.13.2 and footnote one of Table 6-5 to the standard suite of groundwater sampling parameters (Table 6.4).” (TE Page 12, §780.21(i)(2))*

BNCC Response:

BNCC commits to revise its groundwater monitoring program to address OSMRE's Technical Evaluation comments. BNCC is currently evaluating if the wells identified by OSMRE (QACW-2B, GM-17 (North Fork of the Cottonwood Arroyo), Bitsui-2, and SJKF84 #5) are in a condition suitable for groundwater monitoring. If the wells are suitable for monitoring, BNCC will submit a permit revision to include these wells in its groundwater monitoring program. If the wells are not suitable for monitoring, BNCC will coordinate with OSMRE to discuss appropriate next steps which may include installation of replacement wells, if necessary.

BNCC agrees to conduct alluvial groundwater monitoring along the upstream reaches of the Chinde Wash, Middle Fork (Main Fork) of the Cottonwood Arroyo, and South Fork of the Cottonwood Arroyo. The alluvial groundwater along the North Fork of the Cottonwood Arroyo, will be monitored by GM-17 or similar alluvial well. BNCC will coordinate with OSM on the location and well construction requirements for the new alluvial wells. BNCC will submit a permit revision to include these new alluvial wells in the groundwater monitoring program by 01 March 2012. BNCC acknowledges that other permits, certifications, or approvals, outside of OSMRE's regulatory jurisdiction, may be required before installation and operation of certain monitoring locations can occur. BNCC will work with OSMRE

and other regulatory agencies to ensure that all necessary approvals are obtained in a manner that allows new monitoring to be initiated as soon as practicable.

BNCC has added fluoride to the standard suite of groundwater parameters (Table 6-4). Table 6-4 and Table 6-6 have been updated to address OSM Technical Evaluation comments. Table 6-5 will be part of the reference criteria update submitted to OSM by 02 December 2011.

4. *OSMRE made several comments related to BNCC updating the previously approved reference criteria:*

- *Recalculate criteria using the entire available data set*
- *Replace current reference criteria of mean plus 2 standard deviations with the median plus the median absolute deviation" (TE Page 13, §780.21(i)(2))*
- *"Groundwater reference criteria need to be recalculated using the entire set of baseline data available in the updated BNCC groundwater data spreadsheet from 10/17/11. Reference Criteria should also be established for QACW-2, QACW-2B, and GM-17." (TE Page 12, §780.21(i)(2))*
- *"...OSMRE finds that defining the reference criteria as the mean plus two standards of deviation, in other words approximately the 98th percentile, is not statistically sound nor protective enough, and requires that BNCC replace all reference criteria with the median plus the median absolute deviation, or approximately the 75th percentile." (TE Page 12, §780.21(i)(2))*

BNCC Response:

BNCC is currently conducting a statistical analysis of the groundwater reference criteria to determine the median and median absolute deviation. The revised reference criteria and discussion will be based on the entire groundwater data set provided to OSM on 17 October 2011 and satisfy OSM Technical Evaluation comments.

BNCC will submit a proposal for revised groundwater reference criteria and the revised applicable sections of the Navajo Mine permit application package by 31 January 2012.

(11) OSMRE made several comments related to BNCC's surface water monitoring program. See Comments under 30CFR 780.21(j)(2)"

(1) Monitoring to be reinstated

- a. Continuous gage monitoring on Chinde Wash*
- b. Quality and continuous gage monitoring on Cottonwood Arroyo*

(2) Water quality parameters

- a. Expand Table 7-10 to include aluminum, arsenic, cadmium, lead and nitrate*
- b. Instate mercury monitoring on Chinde Wash and Cottonwood Arroyo for a period of three years after which OSMRE will reevaluate the necessity of this monitoring." (TE Page 15, §780.21(j)(2))*

BNCC Response:

BNCC will revise its surface water quality and quantity monitoring program to address OSM's Technical Evaluation comments. BNCC will coordinate with OSM on the location and type of monitoring equipment required to "...characterize and differentiate NAPI influences, and support permanent channel design. At a minimum BNCC will install and operate continuous flow monitoring at a location in the North Fork of the Cottonwood Arroyo upstream of mining activities and at a location in the Main Fork of the Cottonwood Arroyo downstream of mining activities. In addition BNCC will install and operate continuous flow monitoring at a location upstream of mining activities in the Chinde Arroyo.

BNCC acknowledges that other permits, certifications, or approvals, outside of OSMRE's regulatory jurisdiction, may be required before installation and operation of certain monitoring locations can occur. BNCC will work with OSMRE and other regulatory agencies to ensure that all necessary approvals are obtained in a manner that allows new monitoring to be initiated as soon as practicable. BNCC also suggests that OSMRE work with the Navajo Nation and other agencies within the Department of Interior to further identify and require monitoring where necessary to characterize the influence of NAPI operations on water resources.

BNCC has updated Table 7-10 to include aluminum, arsenic, cadmium, lead, mercury, and nitrate to the surface water quality parameter list (Table 7-10)

(3) OSMRE made several comments related to BNCC updating the previously approved surface water reference criteria:

- a. Recalculate criteria using the entire available data set*
- b. Submit actions to be taken associated with exceedance of surface water reference criteria*
- c. Submit analysis of other potential reference criteria, to replace the mean plus 2 standard deviations, with justification as to the best one, to be reviewed by OSMRE" (TE Page 15, §780.21(j)(2))*

BNCC Response:

BNCC believes that the surface water reference criteria are not useful as currently written in the PAP or as proposed by OSMRE. Consequently, BNCC is proposing to remove Section 11.6.6.1 from the permit revision application. Reference criteria were initially established as a screening tool that would trigger the requirement to expand the suite of groundwater monitoring parameters when reference criteria were exceeded. Although reference criteria for surface water were described in the approved PAP, there were no 'trigger levels' established to prompt analysis of additional water quality parameters. This is because the suite of parameters currently being used by BNCC to monitor surface water quality at Navajo Mine is extensive. In addition, BNCC is proposing to increase the number surface water quality parameters in response to OSMRE Technical Evaluation comment No. 11. The approach of using a detailed suite of monitoring parameters for surface water

is not consistent with the screening approach that is being implemented for the groundwater monitoring program. BNCC believes that the proposed surface water monitoring program should not follow the screening approach being used for groundwater.

If OSMRE prefers a screening approach be used for surface water monitoring, then BNCC would propose to update Section 7.3 with OSMRE's recommendation for establishment of reference criteria for pH, TDS, major cations (calcium, magnesium, sodium, potassium), and major anions (carbonate, bicarbonate, sulfate, chloride), iron, selenium, boron, and fluoride based on a median plus two median absolute deviations. If reference criteria are exceeded over four consecutive sampling periods, then BNCC would commit to expanding the suite of parameters to include aluminum, arsenic, cadmium, lead, mercury, and nitrate to be analyzed in subsequent samples collected at that location.

BNCC will provide a permit revision to OSMRE 30 days after receiving notification of OSMRE's preference for either the expanded analysis or the screening approach. If needed, BNCC will work with OSMRE to develop other acceptable alternatives.

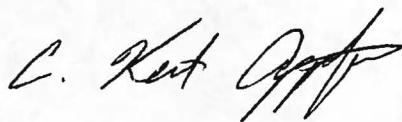
Instructions for the replacement of updated permit contents follow:

<u>Revisions</u>	<u>Comments/Instructions</u>
<i>Table of Contents</i>	Remove and replace the entire Table of Contents
Ch. 3 Vol. 2, <i>Text</i>	Remove and replace Chapter 3; page 3-9 (Cultural Resources) with the new page.
Ch. 6 Vol. 7 <i>Text</i>	Remove and replace pgs 6-1, 6-1a, 6-23, 6-29, 6-29a, 6-30, 6-33, 6-34 with revised pages.
Ch. 6 Vol. 7 <i>Table</i>	Remove and replace Table 6-1 (Aquifer Discharge Characteristics), Table 6-4 (Groundwater Sampling parameter list) and Table 6-6 (Analytical Methods and Detection Limits) with revised tables.
Ch. 6 Vol. 7 <i>Appendix</i>	Remove and replace Appendix 6E (Water Supply Wells & Springs within and adjacent to the Navajo Mine Lease) with the revised appendix; Remove and replace Appendix 6G (Baseline Groundwater Update for Area IV North) with revised appendix; Remove and replace Appendix 6G Tables with revised tables.
Ch. 7 Vol. 8 <i>Text</i>	Remove and replace pages 7-17 thru 7-21, 7-31, 7-33, 7-35, 7-35a, 7-39, and 7-47 thru 7-50 with revised pages.

- Ch. 7 Vol. 8 *Table* **Remove and replace** Table 7-7 (Summary of Surface Water Monitoring Data) with revised table.
- Ch. 11 Vol.12, *PHC* **Remove and replace** Section 11.6 (Probable Hydrologic Consequences) on pages 11-144 through 339 with revised pages.
- Ch. 11 Vol 13B
Appendix **Add** Appendix 11-VV Navajo Mine: Mine Spoil Leachate Test Analyses);
Add Appendix WW (Area IV Groundwater Modeling Report).

If you have any questions regarding this submittal, please contact Kent Applegate at (505) 598-3269

Yours sincerely,



C. Kent Applegate
Superintendent NEPA Process

Enclosure – 2 CDs containing the contents of this submittal
(1 CD for OSM / 1 CD for Navajo Nation)