SECTION 39

FISH AND WILDLIFE ENHANCEMENT

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LIST OF REVISIONS DURING PERMIT TERM

REV. NUMBER	REVISION DESCRIPTION	DATE APPROVED

SECTION 39 FISH AND WILDLIFE ENHANCEMENT

The pre-mine conditions on the Pinabete Mine Plan permit area (permit area) supported numerous wildlife species in multiple habitats types, as discussed in Section 16 (Fish and Wildlife). Wildlife species encountered and documented during pre-mine baseline resource surveys include raptor, avian non-raptor, mammal, and herptile species. For a complete listing of all species documented during the pre-mine baseline refer to Section 16 (Fish and Wildlife). The pre-mine wildlife habitat types are generally associated with the different pre-mine vegetation communities (i.e., alkali wash, arroyo shrub, badlands, dunes, thinbreaks, and sands). These habitat types developed over time and are a function of climate, available water, geology, and soil types. Restoration of the exact pre-mine habitat types may be unfeasible due to mining and reclamation operations altering the underlying geologic structure and homogenizing the pre-mine soil types into a single topdressing resource through salvage, stockpiling, and replacement operations. Rather than restore the same pre-mine wildlife habitats, ~~BHP Navajo Coal~~Navajo Transitional Energy Company (~~BNCC~~NTEC) will create an environment which includes the components needed for suitable wildlife habitats and that supports the primary post-mining land use of livestock grazing. The discussion presented below describes the habitat components used to enhance the reclamation area for wildlife species.

39.1 Fish and Wildlife Enhancement Plan

~~BNCC~~NTEC is committed to protecting and minimizing the impacts to wildlife resources from mining and reclamation activities associated with the Pinabete mine plan. The fish and wildlife protection plan, discussed in Section 40 (Environmental Protection), presents methods and procedures used to protect the wildlife resources within and around the permit area. However, some impacts to wildlife species and habitats may be necessary to safely conduct mining and reclamation activities. ~~BNCC~~NTEC has developed short-term and long-term wildlife mitigation measures to address and mitigate these necessary impacts. Short-term mitigation measures include monitoring the existing populations and replacing lost features, such as nests, dens, or burrows. The fish and wildlife monitoring plan, discussed in Section 42 (Monitoring Maintenance, Inspections, and Examinations), presents ~~BNCC~~NTEC's short-term mitigation procedures and measures. Long-term mitigation measures, discussed below, include reestablishing habitat components, such as topography, vegetation, and water sources.

~~BNCC~~NTEC will reclaim the disturbed areas of the permit area by implementing a geomorphic reclamation approach, discussed in Section 34 (Post-Reclamation Topography) and Section 38 (Post-Reclamation Surface Stabilization and Sediment Control). The created landforms will posses compatible topography and comparable erosional stability to the surrounding undisturbed landscape. The constructed geomorphic landscape will contain variations in slopes and aspects in uplands, while conveying both run-on and run-off in appropriate channels. The topographic variations, or surface heterogeneity, provided by

the geomorphic reclamation approach make it possible to reestablish wildlife habitats comparable to the pre-mine landscape (Brenner 2000).

39.1.1 Topography

~~BNCC~~NTEC will utilize the geomorphic reclamation approach to create post-mine topography in the permit area which benefits both livestock and wildlife. The pre-mine and undisturbed topographic condition of the permit area lacks trees and has minimal vegetative cover. Livestock and wildlife are dependent on the topographic features to protect them against the summer sun and winter winds. The geomorphic reclamation surface will provide elevation and topographic variety beneficial for viewing, hiding, and resting (Parrish and Anderson 1994; Proctor et al. 1983).

~~BNCC~~NTEC will construct rock habitat structures within the reclaimed areas. These constructed habitat structures will replace some of the habitat structures lost during mining. Studies in Wyoming and Montana have shown a significant relationship between wildlife use of reclaimed areas and the presence and configuration of rock habitat structures (Stoecker et al. 1985). Rock habitat structures placed on reclaimed areas provide perches for birds and cover for small- and medium-sized mammals and reptiles. Wildlife utilization of rock habitat structures is generally documented by white wash, trails, and animal observations. The location and configuration of habitat structures influence utilization by various wildlife species. Habitat structures placed lower in the topography and other protected areas promote use by mammals, while habitat structures placed near the crest of slopes and protected from prevailing winds serve as perching and nesting sites for raptors (Green and Salter 1987; Tessman 1982).

Rock habitat structures constructed by ~~BNCC~~NTEC may be either rock piles or rimrock-type structures. The topography of the reclamation area influences the selection and construction of the rock habitat structure types. Typically, rock piles are placed on areas with flatter slopes, while rockrims are placed on the crest of slopes. The recommended design for rock piles is a variable length pile comprised of a core of large boulders (i.e., greater than 3 ft in diameter) surrounded by rocks with 1 to 3 ft diameters (Green and Salter 1987; Tessman 1982). Rockrim structures replicate rock-capped ridges and exposed linear rock ledges. ~~BNCC~~NTEC will construct these features by embedding large rocks in a wall-like formation along the slope contour and placing topdressing and/or root zone material around the structures. This will create a more natural-looking structure and provide a stable burrowing site. ~~BNCC~~NTEC's experience has shown that rocks with linear faces are best for constructing rockrim structures. These types of rocks are not as common as rocks with rounded faces within the Pinabete mining area and thus will only be constructed when suitable rock materials are available.

The density and composition of the rock habitat structures are dependent upon the type and amount of suitable rock material available from mining operations. The Office of Surface Mining Reclamation and

Enforcement (OSM) recommends a minimum density of one rock pile covering an area of 500 sq ft per 80 ac. Based upon experience gained at Navajo Mine, much of the overburden material excavated during mining is not resistant to weathering and quickly breaks down when exposed to erosional elements. ~~BNCC~~NTEC will strive to meet OSM's recommendation; however, the size and density of the rock habitat structures will be dictated by the limited availability of suitable material within the mining area.

39.1.2 Revegetation

The establishment of a diverse reclamation vegetation community is an integral component of post-mining wildlife habitats, providing both forage and cover for the wildlife species. The suitability of a reclamation area for wildlife species depends upon habitat diversity, which includes establishing diversity in both the vertical (multiple vegetation life forms in the seed mix) and horizontal (spatial distribution of vegetation species) structures of the vegetation community (Parmenter and MacMahon 1990).

The revegetation plan and revegetation success criteria for the Pinabete permit application package, discussed in Section 37 (Post-Reclamation Vegetation), are intended to create diversity in both vertical and horizontal structures. ~~BNCC~~NTEC has developed seed mixes that contain multiple native species selected specifically for the species' adaptations to the permit area and revegetation requirements of the mine. Each seed mix is comprised of a variety of life forms, forbs, grasses, and shrubs, to develop diversity within the vertical structure of the community. Most of the revegetation seed mix species are palatable to livestock and various wildlife species, and provide cover for wildlife. ~~BNCC~~NTEC addresses horizontal structure diversity by its revegetation success criteria, presented in Section 37 (Post-Reclamation Vegetation). Diversity success criterions were included to ensure that multiple vegetation species become established. This ensures that the reclamation area does not become a mono-culture of a single species or life form. Vegetation mono-culture communities typically have low habitat value for multiple wildlife species. The shrub density success criterion reflects the emphasis to establish herbaceous species in the early stages of reclamation and to promote livestock grazing, the primary post-mining land use.

Horizontal structure diversity is also important, as the movement patterns of wildlife species documented in the pre-mine surveys of the permit area vary greatly. Therefore, to enhance the suitability of the reclamation areas for all wildlife species it is important to create diversity across numerous scales, from landscape (acres) to stands (square feet) down to individual plants (Parmenter and MacMahon 1990). On a landscape level, ~~BNCC~~NTEC will revegetate the permit area with multiple seed mixes for upland areas and will target a high shrub mix for low-lying areas. Besides enhancing these features for wildlife use, these seeding applications will establish reclamation vegetation communities that simulate the distribution patterns of habitat types on undisturbed areas. ~~BNCC~~NTEC's experience with pre-mine vegetation communities and vegetation establishment on reclamation areas indicates that shrubs are more likely to establish in drainage bottoms and on small swales in the topography while herbaceous species will

dominate the upland areas. Shrubs established in low-lying areas may become dense and tall, commensurate with the availability of moisture. The application of a high shrub seed mix will mitigate the potential loss of habitat associated with the arroyo shrub vegetation community.

Plant community succession, a natural ecological process, and the constructed topography will further assist in developing horizontal structure diversity. ~~BNCC~~NTEC's experience with revegetation communities has shown that over time, the revegetation species begin to show preference for certain topographic positions. The geomorphic reclamation approach will aid in influencing the succession processes. The geomorphic reclamation surface integrates slope and aspect variations to create stable landforms compatible with the surrounding undisturbed landscape. These varying topographic conditions will help to promote the establishment of a diverse and self-sustaining vegetation community and provide a diverse horizontal vegetation structure.

39.1.3 Water Sources

Section 16 (Fish and Wildlife) and Section 18 (Water Resources) indicate there are limited pre-mine water features found within the permit area. The existing water features are a function of climatic and hydrologic conditions and pre-mine land use of the permit area. The permit area receives an average of 5.6 inches of annual precipitation, as presented in Section 12 (Climate). One primary drainage that crosses the permit area is the Pinabete Arroyo. The Surface Mining Control and Reclamation Act of 1977 (SMCRA) defines this drainage as an intermittent stream, since its watershed is greater than 1 sq mi (30 CFR 701.5); however, the drainage is ephemeral in nature, and its flow is flashy and occurs only in response to short duration, high intensity precipitation events. The shallow alluvium within this drainage may periodically become saturated but insufficient water is available to support base-flow conditions, as discussed in Section 18 (Water Resources). The few water features that exist within the permit area are mainly man-made impoundments designed to harvest surface water for livestock.

The advancing mining operations are likely to impact the pre-mine livestock impoundments. ~~BNCC~~NTEC will construct impoundments (i.e., highwall impoundments and sediment control ponds) ahead of the mining pits for sediment and drainage control. The sediment and drainage control plans are discussed in Sections 25 and 26, respectively. Wildlife may seasonally utilize these impoundments during mining operations when water is present. However, these are temporary impoundments designed to meet permitted storm water standards and enhance the safety of the mining area. These impoundments may be removed and reclaimed or they may remain in the post-mine reclamation as permanent impoundments. ~~BNCC~~NTEC may also take advantage of low-lying areas during the backfilling and grading operations to create small area depressions, described in Section 34 (Post-Reclamation Topography). These small depressions will be established on an opportunistic basis to enhance topographic diversity and to function as seasonal surface water collection sites. Unlike the larger permanent impoundments, or replacement

stock ponds, which function as water sources for livestock and wildlife, these small depressions will create microtopographic niches for establishment of mesic and/or hydric plant species. ~~BNCC~~NTEC expects these impoundments and small area depressions to have similar water quality and respond similarly to seasonal water quantity fluctuations as the pre-mine impoundment water quality and quantity monitoring conditions discussed in Section 18 (Water Resources). Further discussion on ~~BNCC~~NTEC's replacement of pre-mine water features and use is presented in the hydrologic reclamation plan presented in Section 35.

The ephemeral nature of the Pinabete Arroyo does not make it a good open water source for livestock and wildlife. This is consistent with the pre-mine water use of the natural channel discussed in Section 18 (Water Resources). Water sources along the pre-mine channel are mainly from dug alluvial wells; replacement of these alluvial wells and other pre-mine existing water uses are discussed in Section 35 (Hydrologic Reclamation Plan) and Section 41 (Probable Hydrologic Consequences).

The Clean Water Act permitting, discussed in Section 8 (Compliance with Air and Water Quality Laws and Regulations), addresses the replacement and mitigation of the functions and values of jurisdictional waters of the United States. ~~BNCC~~NTEC will comply with all applicable Navajo Nation Environmental Protection Agency, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers regulatory requirements for compliance with applicable provisions of the Clean Water Act. Copies of these permits are available for review at the mine site.

Personnel

Persons or organizations responsible for data collection, analysis, and preparation of this permit application package section:

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~~Vivie Melendez~~	Company (disclosed agent)
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References

Brenner, F.J. 2000. Wildlife and Fishery Considerations in Surface Mine Reclamation. In *Reclamation of Drastically Disturbed Lands*, edited by R.I. Barnhisel, R. G. Darmody, and W. L. Daniels, pp. 399-413. American Society of Agronomy. Madison, Wisconsin.

Brown, D.R. 1976. Hydrogeology and Water Resources of the Aztec Quadrangle, San Juan County, New Mexico. MS thesis. New Mexico Institute of Mining and Technology. Socorro, New Mexico.

Green, J.E., and R.E. Salter. 1987. Methods for Reclamation of Wildlife Habitat in Canadian Prairie Provinces. Prepared for Environmental Canada and Alberta Recreation, Parks, and Wildlife Foundation by the Delta Environmental Management Group Ltd. Edmonton, Alberta, Canada.

Parmenter, R.R, and J.A. MacMahon. 1990. Faunal Community Development on Disturbed Lands: An Indicator of Reclamation Success. In Evaluating Reclamation Success: The Ecological Consideration—Proceedings of a Symposium, edited by J.C. Chambers and G.L. Wade. Technical Report NE-164. U.S. Department of Agriculture, Forest Service, Charleston, West Virginia.

Parrish, Tierny L., and Stanley H. Anderson. 1994. Handbook of Methods to Reclaim Wildlife Habitat on Surface Mines in Wyoming. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, Wyoming.

Proctor, B.R., R.W. Thompson, J.E. Bunin, K.W. Fucik, G.R. Tamm, E.G. Wolf. 1983 Practices for Protecting and Enhancing Fish and Wildlife on Coal Surface-Mined Land in the Green River-Hams Fork Region. FWS/OBS-83/09. United States Department of the Interior, Fish and Wildlife Service, Office of Biological Services, Washington, D.C.

Stowe, Robert R. 1996. Topography. In Handbook of Western Reclamation Techniques, edited by M.M. Hansen, W.H Hutchinson, R.L. Liedtke. pp. III-1–III-25. Office of Surface Mining Reclamation and Enforcement, Western Region Coordinating Center, Denver, Colorado.

Stoecker, R.E., R.W. Thompson, and R.D. Comer. 1985. An Evaluation of Wildlife Mitigation Practices at Western Coal Operations. Final report to the Office of Surface Mining prepared by Thorne Ecological Institute, Boulder, Colorado.

Tessman, S. 1982. Measures for Restoring Wildlife Habitat on Reclaimed Mine Lands. Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne, Wyoming.