

### 3 Description of the Proposed Action and Alternatives

---

This section describes the proponent's proposed Project, and alternatives to the Project developed through the NEPA process. The Proposed Action consists of four main components:

1. OSMRE consideration of NTEC's Pinabete Mine Plan SMCRA permit application to begin operations in 2016 and continue operations through 2041 in 5 year permit renewal increments
2. OSMRE consideration of renewal of NTEC's existing Navajo Mine SMCRA permit (NM-0003F) that would expire in 2014
3. BIA consideration of the FCPP Lease Amendment Number 3 for FCPP's continued operation through 2041
4. BIA and BLM consideration of the Navajo and Hopi renewal of existing ROWs for continued operation and maintenance of four transmission lines extending from the FCPP all set to expire by 2018

Two Federal Actions that were completed prior to the Draft EIS: OSMRE's approval of a SMCRA permit transfer associated with the NTEC acquisition of 100 percent equity of NMCC, whose assets included the lease of the Navajo Mine, and EPA's issuance of a FIP for the installation of BART at the FCPP. These are not considered part of the Proposed Action, but part of the environmental baseline. The effects of these two completed Federal Actions on the environmental baseline are described in this EIS as the Interim Period (2014 to 2018). The environmental analysis in this EIS considers the Proposed Action, and the environmental effects of continuing operations of the Navajo Mine, FCPP, and the transmission lines.

CEQ and Department of Interior NEPA regulations require the Lead Agency to rigorously explore and objectively evaluate all reasonable alternatives, including the No Action Alternative. If applicable, alternatives that are outside the Lead Agency's jurisdiction may be evaluated, if such alternatives would accomplish the Proposed Action's purpose and need (40 CFR 1502.14). Section 3.1 outlines the screening-level analysis used by OSMRE for all of the alternatives explored and evaluated. This screening-level analysis led to the selection of alternatives retained for full analysis, at the same level of detail as the Proposed Action, in this EIS. Table 3-1 lists all potential alternatives identified and provides a summary comparison of each alternative to the screening-level analysis criteria. An action alternative was carried forward for full analysis in the EIS if the alternative satisfied all screening-level analysis criteria. Section 3.2 then presents those alternatives (including the Proposed Action and No Action Alternative) that meet the selection criteria and are carried forward for full analysis in the EIS. Section 3.3 provides a discussion of the alternatives summarized in Table 3-1 that were considered by OSMRE but not carried forth for more detailed analysis in the EIS, along with the results of the screening-level analysis and the reasons for the determination.

**Table 3-1 Comparison of Alternatives Considered in Screening-Level Analysis**

Alternative	Screening-Level Analysis Criteria			Carried Forward for Full Analysis
	Meets Purpose and Need	Technically Feasible	Economically Feasible	
Proposed Action	Yes	Yes	Yes	Yes
Navajo Mine Extension Plan	Yes	Yes	Yes	Yes
Alternative Pinabete Mine Plan	Yes	Yes	Yes	Yes
Alternate Ash Disposal Area Configuration	Yes	Yes	Yes	Yes
No Action	No	Yes	N/A	Yes
Conversion of FCPP to Renewable Energy – Natural Gas	No	Yes	No	No
Conversion of FCPP to Renewable Energy – Solar Power	No	Yes	No	No
Conversion of FCPP to Renewable Energy – Wind	No	Yes	No	No
Conversion of FCPP to Renewable Energy – Geothermal	No	No	No	No
Conversion of FCPP to Renewable Energy – Biomass	No	No	No	No
Solar Thermal/Coal Hybrid	Partially	No	No	No
Carbon Capture and Storage	Yes	Unknown	No	No
Implement Highwall or Longwall Mining Technique	No	Yes	No	No
Off-Site Coal Supply	No	Yes	No	No

### 3.1 Screening-Level Analysis Criteria

The following analysis criteria were used -to determine which alternatives would be subject to the full analysis, at the same level of detail as the Proposed Action, in this EIS:

- The alternative meets the purpose and need of the Proposed Action (see Section 1.3).
- The alternative is technically feasible within the Project timeframe.
- The alternative is economically feasible.

Table 3-1 summarizes the results of applying these criteria to the alternatives described in Section 3.2 (alternatives carried forth for full analysis in the EIS) and Section 3.3 (alternatives considered but not carried forth for full analysis). In addition to these criteria, each description of an alternative includes a comparative impact analysis to the Proposed Action. This description informs the screening-level analysis. For those alternatives carried forward for full analysis, the level of detail is equivalent to that for the Proposed Action.

## **3.2 Alternatives Carried Forward for Detailed Analysis**

All of the alternatives considered for detailed analysis in the EIS include the elements of continued operations of the Navajo Mine and the FCPP described in Section 2. The Project components described in this section are new activities in addition to the continued operations.

### **3.2.1 Alternative A – Proposed Action**

Under the Proposed Action, OSMRE would approve NTEC's Pinabete SMCRA permit application and Navajo Mine SMCRA application for permit renewal. In addition, BIA would approve Amendment 3 of FCPP's lease with the Navajo Nation as well as approve the ROW renewal for the four associated transmission lines, and Navajo Mine access roads. The subsections below describe the specific details of each of these four actions. The Proposed Action addressed in this EIS also includes the completion of the various lease renewal approval and permit processes by the cooperating agencies with jurisdiction over the Project (see Table 1-1).

#### **3.2.1.1 *Navajo Mine***

##### **Changes in Workforce**

Under the Proposed Action, it is anticipated that Navajo Mine employment would decrease from approximately 526 to approximately 397 full-time employees. Employee reduction began after the shutdown of FCPP Units 1, 2, and 3 on December 31, 2013. However, it is not anticipated that this workforce reduction would require layoffs, but would be a gradual result of natural attrition as employees reach retirement age.

##### **Renewal of Navajo Mine Permit**

Consistent with SMCRA's requirements, NTEC will submit a renewal request for the existing SMCRA permit, OSMRE Permit No. NM-0003F that is set to expire on September 25, 2014. The existing SMCRA permit authorizes surface coal mining and reclamation on approximately 20,590 acres. In accordance with the regulations at 30 CFR 750.12(c)(1)(ii) and 774.15(a) and 30 USC 1256(d), a valid permit issued pursuant to an approved regulatory program carries with it the right of successive renewal within the boundaries of the existing permit, upon expiration of the permit term.

Considering that the permit term will expire prior to OSMRE's anticipated completion of the EIS and prior to the currently expected March 2015 Record of Decision (ROD). OSMRE will administratively extend Federal Permit NM0003F, allowing NTEC to continue surface coal mining and reclamation operations under the current permit, as described in Section 2.2.1.1, provided that the applicant has met all renewal application requirements and procedures in accordance with 30 CFR 750.12(c)(1)(ii) and 774.15(a). Upon completion of the EIS, the subsequent issuance of the ROD for the pending Pinabete Permit Application will also address OSMRE's decision on the administratively delayed and pending permit term renewal for Federal Permit NM0003F.

##### **Approval of Pinabete Permit**

BNCC submitted an application to develop a new permit area for surface coal mining and reclamation operations for Navajo Mine operations beyond July 6, 2016 (Pinabete Permit Area) to OSMRE in April 2012. OSMRE determined the Pinabete permit application to be administratively complete on May 10, 2012, and OSMRE held informal conferences on August 11, 2012, at the Tiis Tsoh Sikaad (Burnham) Chapter House and August 13, 2012 at the Nenahnezad Chapter House. In 2013, the ownership of the Navajo Mine was transferred from BNCC to NTEC. Therefore, NTEC is now the applicant for the SMCRA permit for the Pinabete Permit Area. The information below was provided by the Pinabete Permit SMCRA application. The new permit area would be used to supply coal to FCPP and fulfill NTEC's coal sale obligations through 2041 in 5-year permit renewal increments.

### **Pinabete Permit Area Location**

The proposed Pinabete Permit Area includes 5,569 acres and would be composed of portions of the current Navajo Mine Permit Area (portions of Area IV North, OSMRE Permit No. NM-0003F) and additional unpermitted areas of the Navajo Mine Lease Area (Area IV South; see Figure 3-1).

### **Mining Operations**

The Pinabete Permit Area would be mined in the same manner described for the current Navajo Mine operations using surface coal mining methods adapted for multiple coal seam mining. Overburden would be removed primarily through dragline stripping, although overburden may also be stripped by dozer and/or truck loader operations. The typical sequence for multiple seam mining is as follows:

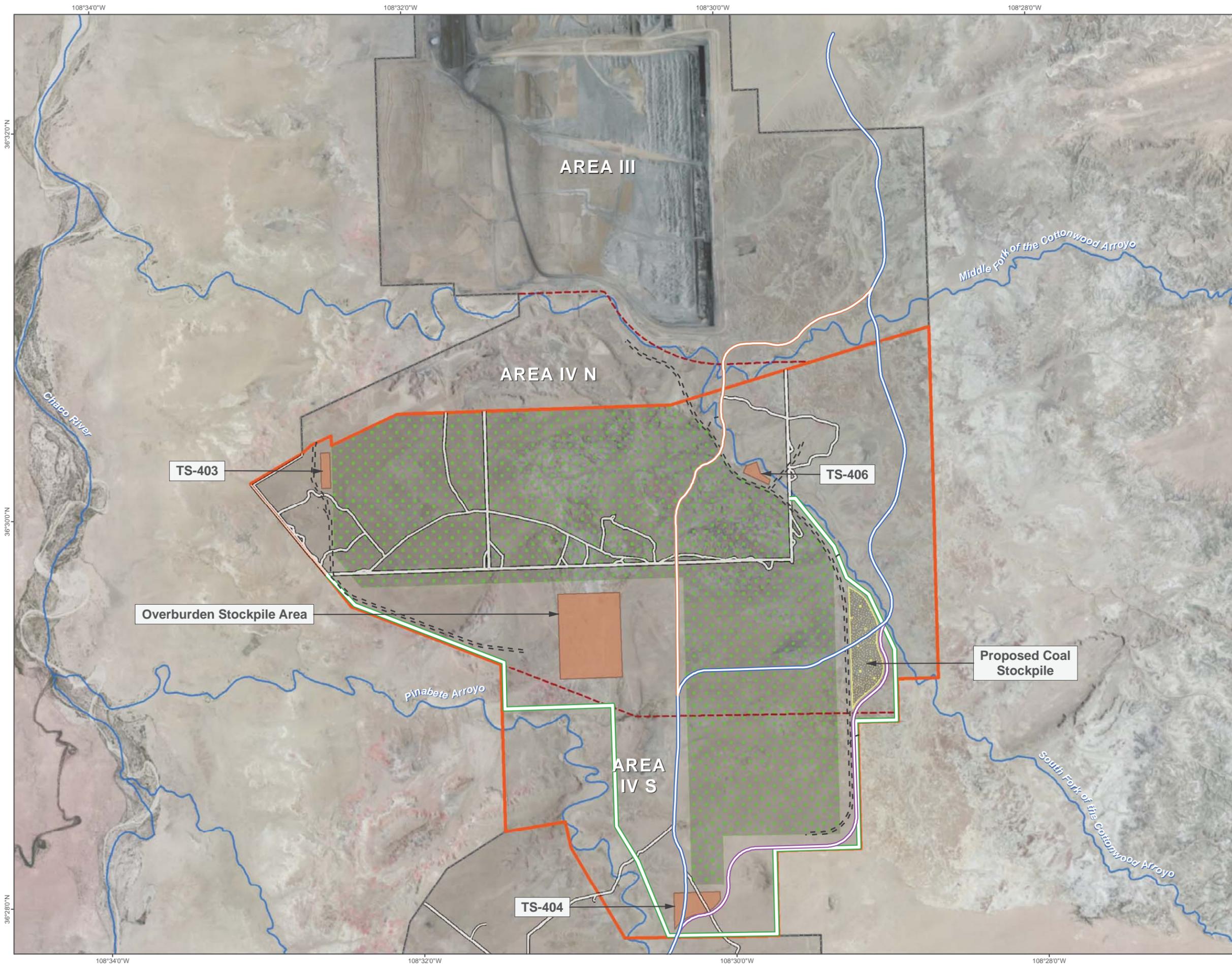
- Vegetation and topdressing removal
- Overburden drilling and blasting
- Overburden stripping
- Coal drilling and blasting
- Coal removal
- Interburden drilling and blasting
- Interburden removal
- Coal drilling and blasting
- Coal removal

Equipment to be used during these operations is listed in Table 3-2. Table 3-3 summarizes the estimated acres of mining stripline disturbance over the 25-year life of the permit area.

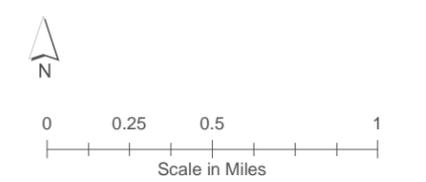
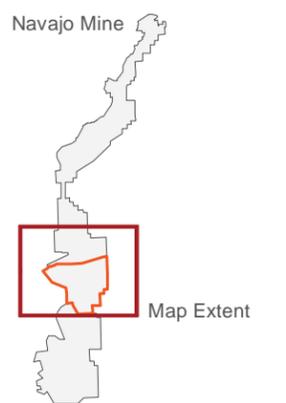
**Four Corners Power Plant  
and Navajo Mine Energy Project**

ALTERNATIVES

**Figure 3-1**  
Alternative A  
Proposed Pinabete Permit Area



- PROJECT BOUNDARIES**
- Navajo Mine Lease Area
  - Navajo Mine Resource Areas
  - Proposed Pinabete Permit Boundary
- PROJECT FACILITIES**
- Topdressing Stockpile
  - Mining Disturbance Area
  - Proposed Field Coal Stockpile
- ROAD NETWORK**
- Existing Burnham Road
  - Proposed Burnham Road
  - Vacated Burnham Road
  - Proposed Haulroad
  - Proposed Ancillary Roads
  - Existing Ancillary Roads



This Page Intentionally Left Blank

**Table 3-2 Major Mining Equipment Used in the Pinabete Permit Area**

Equipment Type	Number Typically in Use (per day) <sup>1</sup>
Draglines	3
Overburden Drills	3
Coal Drills	2
Track Dozers	13
Rubber Tire Dozers	2
Front-end Loaders, Large	7
Front-end Loaders, Small	4
Graders	6
Scrapers	3
Coal Haul Trucks	5
End Dump Haul Trucks	7
Mix Trucks	2
Water Trucks	4
Cable Reels	2
Locomotives (electric)	4
Rail Cars	42
Stemming Trucks	1

<sup>1</sup>The types and number of equipment are subject to change during the permit term due to fluctuations in production levels, equipment outages, and equipment replacement schedules

Source : OSMRE 2012; HDR Engineering, Inc. 2012

**Table 3-3 Acres Disturbed by Mining by Year**

Permit Term	Year(s)	Acres Disturbed
1	1	101
	2	115
	3	89
	4	88
	5	89
2	6-10	746
3	11-15	512
4	16-20	636
5	21-25	368
<b>Total</b>		<b>2,744</b>

**Vegetation and Topdressing Removal**

Vegetation within the Permit Areas would gradually be removed and re-claimed on an ongoing basis as mining activities occur over time. As proposed within the Pinabete Permit Area, 4,104 acres of the 5,569 acres would be disturbed as a result of mining activities. The immediate mining area, i.e. striplines and pits, would disturb approximately 2,744 acres, while the proposed support facilities would disturb approximately 1,360 acres (see Table 3-4 for a breakdown of the vegetation types, which would be disturbed by mining in the Pinabete Permit Area).

**Table 3-4 Vegetation Types Which Would Be Disturbed Within the Pinabete Permit Area**

<b>Vegetation Type</b>	<b>Acres</b>
Alkali Wash	1,273
Arroyo Shrub	31
Badlands	836
Dunes	267
Sands (Sandy Soils)	1,094
Thinbreaks	603
<b>Total Area of Disturbance</b>	<b>4,104</b>

Similar to the Navajo Mine Permit Area, past soil investigations of the Pinabete Permit Area by BNCC have determined that negligible topsoil exists within the area; any material that is deemed suitable for plant growth is, therefore, considered a “topsoil substitute.” NTEC will salvage suitable topdressing in the Pinabete Permit Area as is described for the current Navajo Mine. One existing and two future stockpiles have been planned for the Pinabete Permit Area. Topdressing stockpile TS-403, located in the northwestern corner of Area IV North was constructed in 2010 under Navajo Mine Permit NM-0003F and has a maximum capacity of 250,000 cubic yards. Topdressing stockpile TS-404, located at the southern boundary of Area IV South, is planned for construction in 2024 with a maximum capacity of 1.2 million cubic yards. Topdressing stockpile TS-406, located in the northeastern corner of Area IV North, is planned for construction in 2022 with a maximum capacity of 60,000 cubic yards (Figure 3-1). In general, topdressing is not removed from stockpiles until required for redistribution on graded areas. However, stockpiles may be relocated to facilitate mining and/or reclamation. Information on the volume of relocated topdressing is provided to OSMRE prior to and upon completion of the reclamation activities.

NTEC estimates that during the life of the Pinabete Permit Area it would haul about 5.8 million tons of coal and 6 million cubic yards of other materials annually. NTEC would use a dedicated fleet of vehicles to perform all coal hauling, topdressing removal, overburden prestripping, spoil mitigation, interburden removal, regrading, and topdressing replacement activities.

**Coal Production**

The anticipated tonnage to be mined from the Pinabete Permit Area and from the Navajo Mine Permit area for each fiscal year of the initial permit term and each 5-year period thereafter is presented in Table 3-5. Annual total tonnage may be subject to change depending on the demand for coal and availability of mining equipment. The estimated annual production needed to fulfill the proposed future coal sales to the FCPP is approximately 5.8 million tons annually. The annual average may decrease in the last permit term, when it is anticipated that mining will only occur for the three years.

**Table 3-5 Anticipated Coal Production by Permit Term for the Pinabete and Navajo Mine Permit Areas**

Permit Term	Year(s)	Coal Mined (million tons)
1	1	6.276
	2	5.380
	3	5.303
	4	6.178
	5	5.858
2	6-10	29.290 <sup>1</sup>
3	11-15	29.290 <sup>1</sup>
4	16-20	29.290 <sup>1</sup>
5	21-25	17.574 <sup>2</sup>
<b>Total</b>		<b>134.439</b>

<sup>1</sup> 5.858 million tons of coal mined per year for a total of 29.290 million tons over five years.

<sup>2</sup> 5.858 million tons of coal mined for the first 3 years and 0 tons mined during years 4 and 5.

**Coal Handling**

Similar to coal handling practices in the Navajo Mine permit area, haul trucks would transport the coal out of the Pinabete pits along pit ramps to primary haul roads and finally into field coal stockpiles. The Pinabete Mine Plan includes one future coal stockpile area, to be constructed in 2024, operational in 2025, and removed in 2041. The stockpile would be located in the eastern part of Area IV South, adjacent to the proposed Burnham Road realignment, with a maximum capacity of 1,000,000 tons. To facilitate blending, the stockpile would be segregated into several piles by coal quality. Coal from the Area IV South field coal stockpile would be loaded by front-end loaders and transported by haul-trucks to the Lowe Stockpile (Area III) for loading into the railcars for delivery to FCPP. No changes to the existing railroad are proposed.

Surface runoff from the Area IV South field coal stockpile would be collected in a sediment pond for evaporation. Berms and v-ditches would be installed to direct the flows to a sediment pond. A site-specific sediment control design would be submitted and approved prior to the start of topsoil removal and overburden stockpiling. The stockpile would be removed for final backfilling and grading at the end of mining operations, after 2039.

**Special Materials Handling and Disposal Procedures**

Limited quantities of potentially acid- and toxic-forming materials (PATFMs) may be encountered during mining operations. PATFMs are materials that exceed root-zone suitability standards; that is, materials that have a pH less than 5 s.u. and a pH value greater than 9 s.u., an acid-base account less than -5 tons of CaCO<sub>3</sub>/1000 tons, greater than 2.5 ppm of total selenium, or greater than 0.26 ppm of soluble selenium. Of the more than 13,000 root-zone samples collected at Navajo Mine between 1991 and 2011, less than 4 percent of samples were unsuitable for pH values, less than 1 percent were unsuitable for acid-base account values less than -5 tons of CaCO<sub>3</sub>/1000 tons, less than 1 percent were unsuitable for total selenium values, and less than 1 percent were unsuitable for soluble selenium values based on NTEC’s root-zone suitability criteria (Table 12-3 OSMRE Root Zone Suitability Criteria for Navajo Mine, Chapter 12, BNCC SMCRA Permit NM-0003F).

Initial geologic analysis and overburden characterization indicates no widespread occurrence of PATFMs within the Pinabete Permit Area. Instead, the characterization suggests a net alkaline environment for the majority of interburden layers across the permit area, although in some locations, the rock strata associated with the interburden above No. 6 coal seam (I6) have soluble selenium concentrations that exceed OSMRE suitability criteria.

Any PATFM encountered would be disposed of in a mined-out area long the bottom of a pit, similar to the coal mine waste described above. BNCC has developed a *Combustibles and Coal Mine Waste Fire Control Plan* that describes procedures that may be used for burying or covering PATFMs and combustibles not suitable for supporting plant growth encountered during reclamation operations.

### **Other Waste**

NTEC may establish a landfarm in accordance with SMCRA and Navajo Nation regulations within the Pinabete Permit Area to bioremediate petroleum-contaminated soils that are collected on site. There are no current plans to establish a landfarm within the Pinabete Permit Area; however, there are provisions in the permit to establish one if needed.

### **Buildings and Support Facility Areas**

The main support facility for the Pinabete Permit Area operation would be the existing Area III support facilities. Irrigation and dust suppression water supply would be provided from an extension of the existing raw water pipeline at Navajo Mine. The existing pipeline terminates near the southern end of the Dixon Haul Road in Area III and would be extended to Area IV North and South at a future date prior to beginning irrigation and revegetation for reclamation. All of these support facilities would remain in use for the duration of the permit period (through 2041). No new support facilities are proposed for construction.

Power for Pinabete Permit Area operations would be supplied over a 69-kV distribution system. The mainline within the permit area would be approximately 13.5 miles long and loop around the mining area. Approximately 5.8 miles of existing powerline were constructed in 2010 associated with Navajo Mine Area IV North development. Approximately 7.7 miles of new powerline are proposed for construction prior to development of the mining operations in Area IV South. In addition, stub lines would be constructed off the mainline at approximately 5,000-foot intervals to service the mining operations. Powerlines would be constructed and designed in a manner to prevent electrocution of raptors (APLIC 2006). Mine communication would be conducted using an existing microwave-based radio and telephone system.

### **Support Roads**

NTEC would use both primary and ancillary roads during mining operations in the Pinabete Permit Area. Primary roads are those used to transport coal and spoil, main access roads to the mining areas used by small and heavy equipment, and access roads to the support facilities. Ancillary roads are those used infrequently by small vehicles for accessing environmental monitoring stations, ponds/water control structures, surveying, and powerline service inspection, as well as haul roads to topsoil stockpiles and temporary roads used during construction of support facilities.

Primary roads are designed by a New Mexico-registered professional engineer to meet the SMCRA performance standards of 30 CFR Subchapter K and the Mine Safety and Health Administration standards and requirements for roads. Road widths for primary roads may vary between 30 and 120 feet wide, include multiple traffic lanes, and may separate light and heavy equipment. Additionally, primary roads are designed, constructed, and maintained in a manner to minimize the contribution of additional suspended solids to surface water runoff. Primary road crossings would use engineered crossing designs according to all applicable permit regulations. Road crossing and other infrastructure would be designed to minimize the impacts to stream channels. Culverts may be placed at topographic lows or areas where roads intersect drainage channels and are designed to safely pass the peak discharge from a 10-year, 6-hour storm event and minimize the alteration of the stream channel.

Ancillary roads are generally constructed using a road grader to create the road surface. Typical widths range between approximately 12 feet for small vehicle roads and approximately 80 feet for topsoil haulage roads. Ancillary roads use low water crossings or culvert crossings depending on the depth of the incised intersecting channels.

The Pinabete Permit proposes construction of approximately 5 miles of primary roads and approximately 22 miles of ancillary roads to the Navajo Mine transportation network (Figure 3-1; Table 3-6). Relocating a public access road is the only circumstance NTEC would construct roads outside the mine lease; this action would require ROW approval from BIA (see Section 3.2.1.2).

### **Reclamation**

BNCC developed a post-mining topography based on a computer simulation of mining in the Pinabete Permit Area. The computer simulation models the mining methods and dragline operation to create a simulated post-mining topography that was used to optimize the mass balance of the final surface configuration design. Through combination of the post-mining topography and final surface configuration designs, BNCC developed mass-balanced logical reclamation blocks for the mining area. Unbalanced surplus material would be redistributed within the reclamation blocks. Backfilling and grading would be completed in these logical reclamation blocks, which follow the stripping sequence and allow for large areas to be regraded at one time.

In most cases, reclamation blocks would become available every 1 to 3 years in each mining area. Conducting reclamation in larger blocks would provide for a more consistent topography between regraded areas, minimize the disturbance of areas that have already been reclaimed, and increase operation efficiencies by regrading larger reclamation blocks. Additionally, the number of temporary drainage and sediment control structures can be reduced by regrading larger portions of the post-mine watersheds.

The areas around active ramps and final pits would remain ungraded until all mining activities are complete to preserve the material required to fill in these features. Backfilling and grading operations of each logical block would be divided into primary and secondary regrade operations.

Primary regrading operations would use track dozers to level off the spoil ridges. Primary regrading would be accomplished as necessary to accommodate the final surface configuration and reclamation schedule. Some pits and ramps might not have sufficient backfill material readily available for track dozers to adequately regrade the area. In these instances, supplemental equipment (e.g., scrapers, draglines, end-dump trucks) may be used to assist primary regrading activities by redistributing existing backfill material. Secondary regrading may, if needed, follow primary grading for additional contouring of the land surface to accommodate topdressing replacement.

During the process of secondary grading, small depressions may be established on an opportunistic basis. These features are intended to enhance postmining topographic diversity and act as seasonal surface water collection sites. Highwalls and ramps would be backfilled and graded per the modeled final surface configuration design plan. Portions of highwalls may remain in the final surface configuration as bluff-like features to replace natural escarpment features for wildlife habitat. Rock habitat structures would be constructed within reclaimed areas to provide wildlife habitat.

Regraded spoils are systematically sampled for root-zone suitability and mitigated with suitable root-zone material as required. Unsuitable root-zone material may be mitigated by disposing in the mined-out pits or left in place and capped with suitable root-zone material. Salvaged topdressing material, from either stockpiles or in-situ sources, is then redistributed using haul trucks, dozers, and graders, in varying depths on the regraded plot. The topdressed areas are prepared for seeding using standard agricultural practices (e.g. ripping and disking) to reduce soil compaction and prepare the seedbed for seeding. Depending upon the level of compaction, dozers, graders, or standard agricultural tractors may be used to prepare the seedbed.

**Table 3-6 Proposed Project Roadways**

Road ID	Road Type	Purpose	Length (feet)	Width (feet)	Maximum Grade (%)	Surface Material	Construction Date	Removal or Reclamation Date
East Haul Road and Service Road Loop	Primary	Access/haulage	16,600	120	3.5	Gravel	2023	2041
West Haul Road	Primary	Haulage	10,900	80	NA	Gravel	2025	2041
TS-403 Haul Road	Ancillary	Access/haulage	450	60	1.0	Dirt	2016	2041
TS-404 Haul Road	Ancillary	Access/haulage	NA	NA	NA	Dirt	2025	2041
TS-406 Haul Road	Ancillary	Access/haulage	NA	NA	NA	Dirt	2023	2041
Well PA-1 Access Road	Ancillary	Access	3,235	12	12.5	Dirt	Existing	2041
Well PA-2 Access Road	Ancillary	Access	2,370	12	3.0	Dirt	Existing	2041
Area IV North Access Road	Ancillary	Access	32,000	12	10	Dirt	Existing	2041
Met Station 3 Access Road	Ancillary	Access	3,500	12	9.5	Dirt	Existing	2041
69 kV Powerline-A4N	Ancillary	Access	30,800	12	10	Dirt	Existing	2041
69 kV Powerline-Pinabete	Ancillary	Access	40,700	12	10	Dirt	2023	2041

In general, reclamation activities would seek to establish geomorphically appropriate features consistent with the native landscape. However, in some instances this approach might not be feasible or applicable. In these instances, NTEC would implement a traditional reclamation approach based on “hard-engineered” structures (e.g., placement of riprap or terraces). BNCC has designed the post-reclamation topography and drainages within the Pinabete Permit Area to blend with existing drainages along the perimeter of the mine permit and convey water from undisturbed upstream, off-lease watersheds to either Pinabete Arroyo or Cottonwood Arroyo. Cottonwood Arroyo and Pinabete Arroyo would not be mined under the Proposed Action. Mining operations would temporarily intercept precipitation runoff from the tributary drainages that flow into the Cottonwood Arroyo and Pinabete Arroyo from the permit area. No stream diversions are anticipated to be required for the Pinabete Mine Plan. Once reclamation is completed within the permit area, precipitation runoff from these reclaimed areas would flow through reclaimed channels to Cottonwood Arroyo, Pinabete Arroyo, the unnamed tributary to the Chaco River, and then into the Chaco River.

The reclaimed areas are revegetated to ensure that the land is capable of supporting the post-mining land use, which is designated as livestock grazing and wildlife habitat. Revegetation would be initiated on areas that have been graded and topdressed. Revegetation activities, including seeding, mulching, and irrigation applications, may begin as early as January and will be completed by the end of October. Seed mixtures were developed utilizing the research and experience gained from revegetation programs at Navajo Mine and San Juan Coal Company’s San Juan Mine. BNCC has developed seed mixes that utilize up to 21 different native plant species; 10 grasses, 4 forbs, and 7 shrub species that are all native to the San Juan Basin.

The irrigation system for the permit areas would consist of a solid-set system, which uses various sizes of aluminum pipe to cover the vegetation block. This system allows for optimum timing and scheduling and has led to more efficient water use without adverse effects on seed germination and vegetation establishment. Irrigation would be applied to the revegetation blocks from March to mid-October, but may vary depending upon natural precipitation and temperatures. Small areas of reseeding, interseeding, or first-time seeding may not be irrigated based on their size and proximity to irrigation delivery lines and pumps. The irrigation schedule for the first growing season would be divided into a germination cycle and support cycle. During the germination cycle, it is anticipated that approximately 4.6 inches of water would be applied over the course of 13 days; and, during the support cycle, approximately 0.57 inch of water would be applied approximately every two weeks beginning immediately following the germination cycle and continuing through mid-October.

Revegetation blocks would receive light irrigation during the second growing season to promote root development. This would generally be a one-time application of approximately 1.15 inches of water over five hours. Additional irrigation may be applied during drought periods. The water source for irrigation is the San Juan River. Water would be moved from the San Juan River to Morgan Lake, pumped into a pond at Navajo Mine North Facilities, and subsequently transported via pipelines to the irrigation plots.

Revegetation success studies would be conducted, as needed, during the responsibility period to identify trends in the revegetation communities and to evaluate the progress of the revegetation effort. Bond release revegetation studies would be conducted to evaluate whether the revegetated community has developed into a diverse, stable, and self-sustaining vegetation community, specifically by comparing two out of the last four years of the bond period to success criteria. Bond release studies may be conducted six years after any augmented seeding, fertilizing, irrigation, or other similar activity, excluding approved grazing or husbandry practices. All revegetation sampling, interim, and bond release studies would be conducted between June and October to provide for a sampling period that would result in the highest expression of revegetation species. Before collecting bond release samples, the areas proposed for sampling will be discussed with OSMRE. The sampling and subsequent determination of whether revegetation fulfilled bond release requirements will be conducted in accordance with the SMCRA permit.

To determine revegetation success for the permit area a set of standards would be established that would be used to compare the reclaimed lands to a reference area. The revegetated community must meet the revegetation success criteria in any two of the final four years of the bond period. Revegetation success criteria would include annual success criteria for total vegetative cover (i.e., percent cover of live plants plus litter), and total vegetation production (i.e., annual and perennial vegetation production), as well as technical standards shrub density, and species diversity.

To demonstrate revegetation success, the revegetated communities would be compared to the approved Area IV North reference areas from the Navajo Mine permit. Reference areas are located outside of mining activities; are of sufficient contiguous size to adequately determine vegetation success parameters; are similar in plant composition to baseline vegetation communities; and are able to be managed similar to the revegetation communities. The reference areas are posted to identify the area as a reference area and fenced to control livestock grazing. These areas are managed similar to the reclamation areas (areas that have been regraded, topdressed, and seeded) to which it will be compared. Both areas, reference and reclamation, will experience the same management practices within a given year. In the event that future mining-related activity impacts the reference areas, potential replacement reference areas would be identified either within or outside of the permit or lease area.

### **Proposed Burnham Road Realignment and Support Road Construction**

In order to conduct operations in the Pinabete Permit Area, NTEC would realign 2.8 miles of the existing Burnham Road to route public traffic around mine activities and traffic. Burnham Road will not need to be relocated until approximately 2022. NTEC will submit an application to the BIA for the ROW to realign Burnham Road prior to that date. Burnham Road would be designed by a New Mexico-registered professional engineer to meet the NNDOT and NMDOT standards as well as SMCRA performance standards of 30 CFR Subchapter K and the Mine Safety and Health Administration standards and requirements for roads.

In November 2012, BNCC submitted applications to BIA for the ROW renewal of the Navajo Mine Access Road, which provides access in Area III. The Navajo Mine Access Road is 4,528 feet long, and no improvements or additional construction activities are proposed. In February 2013, BNCC also submitted an application to the BIA for the ROW renewal of the Access Road/Power and Communication lines from the FCPP Lease Area to the Navajo Mine Lease Area. Similar to the Pinabete Permit Area SMCRA application, upon transfer of ownership of the Navajo Mine to NTEC, the applicant for the ROW renewal of the Navajo Mine Access Road and Access Road/Power and Communication line changed from BNCC to NTEC. This ROW is 1.3 miles long and no improvements or additional construction activities are proposed for either ROWs. In May 2013, BNCC submitted a ROW renewal for the El Paso Bridge Access Road ROW, which provides primary access from the bridge at the San Juan River near the Nahnanezad School approximately 6.6 miles ending at FCPP. This ROW renewal is in the original location since installation and no changes or additional construction activities are proposed for this ROW.

In addition, NTEC would construct two new haul roads, currently planned for construction in 2023 (Table 3-6).

#### **3.2.1.2 FCPP**

APS, as operating agent and on behalf of FCPP's participant owners, recently executed a lease amendment (Lease Amendment No. 3) with the Navajo Nation to extend the term of the lease for the FCPP an additional 25 years, to July 6, 2041. The Navajo Nation also consented to renewal of rights-of-way for the FCPP plant site and for the APS El Dorado and Cholla transmission lines and ancillary facilities, including the Moenkopi Substation across Navajo Nation Tribal Trust lands. BIA approval of Lease Amendment No. 3 is required pursuant to 25 U.S.C. 415, and BIA approval of the right-of-ways is required pursuant to 25 U.S.C. 323. The Hopi Tribe has also consented to the renewal of the right-of-way for the APS El Dorado line across Hopi Tribal Trust lands.

If BIA approves the lease amendment and rights-of-way under federal law, APS would continue to operate as described in Section 2, which includes discontinuing operation of Units 1, 2, and 3, and continued operation of units 4 and 5 for the duration of the lease agreement. As part of its BART compliance requirements, APS would install SCRs on Units 4 and 5. Ammonia is used in the SCR process as an agent to reduce NO<sub>x</sub>. The ammonia required for the process would be delivered to FCPP by truck and stored on site prior to use. Depending on the type of ammonia or urea-derived ammonia (liquid or solid) and the number of truck loads required, there are differing levels of associated environmental impacts and risks. These risks are specific to Hazards and Human Health; accordingly, the relative impacts are assessed in that Section 4.15.2.1. They are not considered as alternatives to the Proposed Action because they are associated with BART compliance, for which EPA has already issued a Final Rule, which was exempt from NEPA. Rather, the ammonia options are analyzed as part of the evaluation of the environmental consequences of continuing operations of FCPP.

Other than the installation of SCR, Units 4 and 5 would continue operating as described in Section 2.3. Although it is estimated that the shutdown of Units 1, 2, and 3 reduced annual water consumption by 5,000 to 7,000 acre-feet per year, the water supply system to the FCPP would not change. The size of the leased acreage or footprint of the FCPP facilities would not change. All three switchyards of Units 1, 2, and 3 will remain in service to distribute power from the FCPP and other generators. Other than routine maintenance and repair, no changes or modifications are anticipated for the three FCPP switchyards, the existing transmission lines, Moenkopi Substation, 12-kV Moenkopi line, or Moenkopi access road during the lease term.

### **Interim Period (2014-2018)**

The EPA BART FIP, which is exempt from NEPA, required that APS choose how it will implement the BART rule by December 31, 2013. On December 30, 2013, the purchase and sale transaction of Southern California Edison's share of Units 4 and 5 to APS was completed and Units 1, 2, and 3 were shut down.

During the interim period between the 2014 required shutdown date through July 2018 (when SCR must be installed and operational), the FCPP would operate only Units 4 and 5 as described under the current operations (Section 2). After July 2018, APS would operate Units 4 and 5 with SCR installed if the Proposed Action is approved.

The activities required to comply with EPA's BART FIP are conservatively considered as part of the environmental baseline in this EIS, since APS committed to them by December 31, 2013. This EIS also analyzes the environmental effects of these FIP compliance actions in comparison to historical operations through its analysis of continuing operations of FCPP.

### **Changes to Coal Combustion Residue Management**

Ash waste generated from Units 4 and 5 would continue to be placed in Dry Fly Ash Disposal Area (DFADA) Sites 1 and 2 until these sites reach capacity. Unit 4-5 FGD waste will continue to be pumped to the Lined Ash Impoundment until it reaches capacity or in the event that new regulatory requirements dictate that it be discontinued. Subsequently, APS plans to mix FGD waste with ash and dispose of it in a DFADA. APS would construct as many as six additional DFADAs to accommodate future disposal of all fly ash, bottom ash, and FGD waste generated through the duration of the lease term. Each site is anticipated to be approximately 60 acres and approximately 120 feet high (Table 3-7). Estimated annual storage volumes would be 1,118 acre-feet per year. Each site is anticipated to be in operation for 5 years. Once the storage capacity of each site is met, FCPP would close the facility using an evapotranspiration cover. The evapotranspiration cover would include a layer consisting of finer grained sands, silts, and clay soils and an erosion layer consisting of soil and rock mixture. The material for the cover would be borrowed from five areas inside the existing APS lease area. The amount of borrow required for closing the ash disposal sites was determined using topographic data and assumed final slopes of the closed

areas. Based on these calculations, approximately 6.6 million cubic yards of borrow is available within the FCPP Lease Area and 4.8 million cubic yards would be required for closure. As closure would be conducted at the end of each site operation, in some instance, material would be borrowed from a DFADA construction site to cap existing, full capacity disposal sites. In addition to the five new sites, a surge pond (lined impoundment) would be constructed to capture generated FGD waste and historic ash impoundment seepage intercept water. All soil for impoundments and berms surrounding the impoundment would be borrowed from one of the five areas inside the existing FCPP Lease Area (Figure 3-2).

The EPA is currently considering whether to manage CCR as either a Subtitle C hazardous waste or a Subtitle D solid waste. It is anticipated that EPA will issue a Final Rule on the matter sometime in late 2014. FCPP will comply with EPA's Final CCR rule, irrespective of which CCR management option is selected. This issue is addressed further in Section 4.15, Solid and Hazardous Wastes.

**Table 3-7 Summary of Ground Disturbance Area at FCPP**

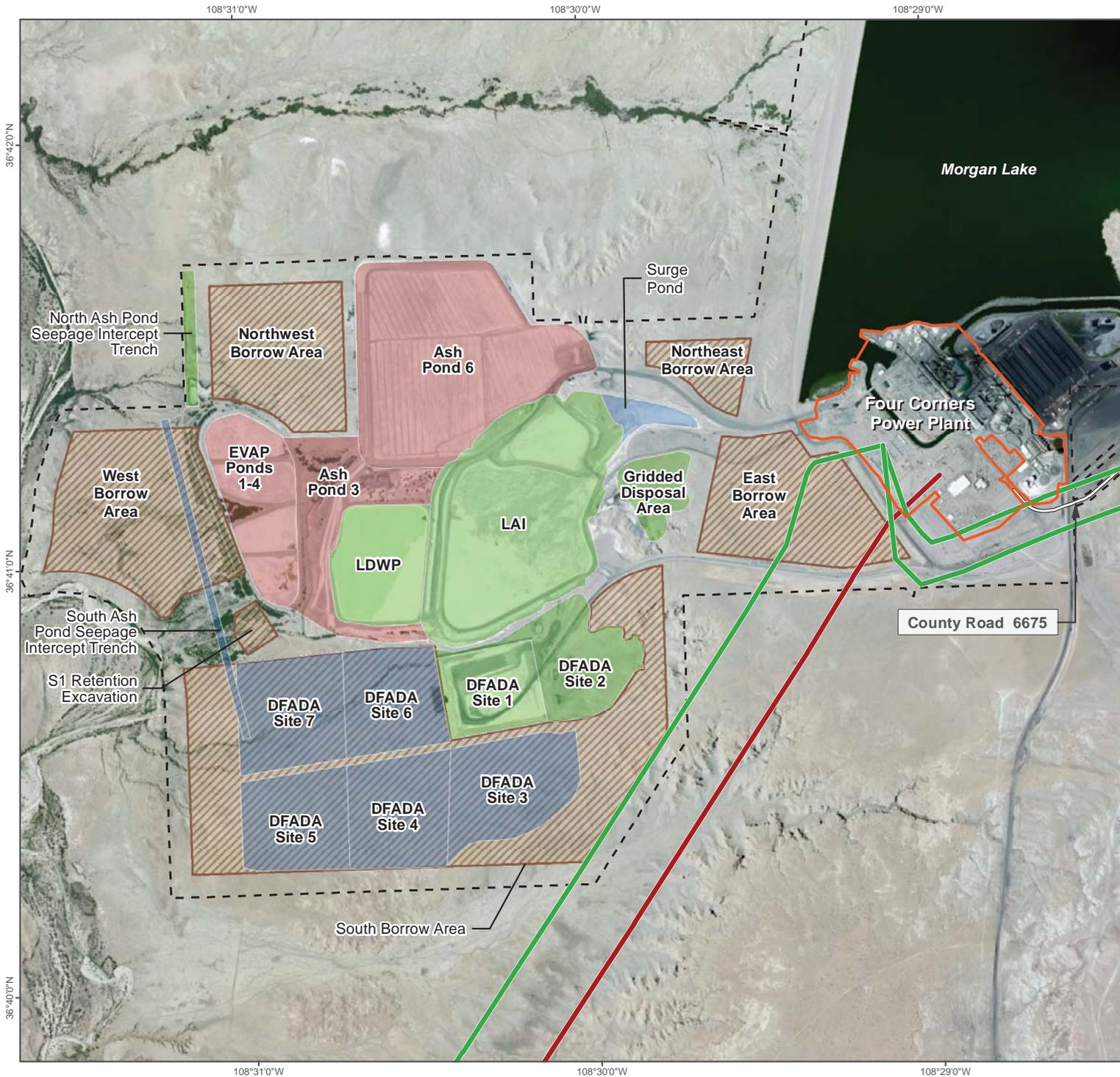
<b>Ash Disposal Areas</b>	<b>Area (acres)</b>
DFADA 1	39
DFADA 2	34
DFADA 3A	28
DFADA 3	51
DFADA 4	61
DFADA 5	63
DFADA 6	41
DFADA 7	68
Total	385
<b>Borrow Pit Areas</b>	<b>Area (acres)</b>
East Borrow Area	91
Northeast Borrow Area	23
Northwest Borrow Area	83
S1 Retention Excavation	6
South Borrow Area <sup>1</sup>	407
West Borrow Area	121
Total	731

<sup>1</sup>There is approximately 32 acres of overlap between the south borrow area and the DFADAs, resulting in a total disturbance acreage of 1,052 acres.

# Four Corners Power Plant and Navajo Mine Energy Project

ALTERNATIVES

**Figure 3-2**  
Existing and Proposed Ash Disposal Areas at Four Corners Power Plant



### PROJECT FACILITIES

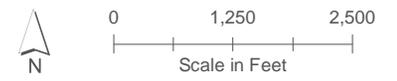
- Power Plant Lease Boundary [---]
- Fence Line [—]

### TRANSMISSION LINES

- 345kV [—]
- 500kV [—]

### ASH FACILITIES

- Existing Active Facility [■]
- Existing Inactive Facility [■]
- Future Facility [■]
- Areas of Borrow Sources [■]



This Page Intentionally Left Blank

### **3.2.1.3 Connected Actions - Transmission Lines**

According to CEQ's NEPA Guidelines Section 1508.25(a)1, actions are connected if they:

- Automatically trigger other actions that may require EISs,
- Cannot or will not proceed unless other actions are taken previously or simultaneously, or
- Are interdependent parts of a larger action and depend on the larger action for their justification.

Connected actions are closely related and, therefore, their environmental consequences are to be analyzed in the same EIS as the Proposed Action and alternatives. Existing transmission lines directly associated with the FCPP require ROW renewals within the period of time this NEPA review is conducted. These transmission lines, owned and operated by APS or PNM, are considered connected actions to the continued operation of the mine and power plant. No new transmission lines would be developed as a Project component. However, the potential environmental impacts from the continued operations of the transmission lines are analyzed in this EIS. These transmission lines are listed below and shown in Figure 1-1:

1. FCPP to West Mesa Switchyard – The Navajo lease for this transmission line expires in June 2018. Another former BLM ROW conveyed to the Navajo Nation in 1994 expires in May 2016. Both portions of the line are dependent on the FCPP's continued operation.
2. FCPP to Moenkopi Substation – Navajo and Hopi leases expire December 2016 and March 2017, respectively. This line was formerly used to transmit electricity from the FCPP to the Southern California Edison service territory. As described in Section 2.3.4, Southern California Edison divested its share of the FCPP and no longer imports power from FCPP to California. Following completion of the sale, APS no longer uses the transmission line west of Moenkopi to transmit power from the FCPP to the SCE service territory. The line would be used to bring power into APS' service territory. As such, this action cannot proceed unless the FCPP continues operation. At the request of APS, the transmission line segment from the Moenkopi substation to the Navajo Nation boundary is also included, as a similar action to the connected action.
3. FCPP to Cholla Substation – The Navajo lease for this transmission line expired in May 2011. The BLM lease for the portion of the line from the Navajo Nation boundary to Cholla Substation was renewed in 2012, with the term extending to 2041. Therefore, for the purposes of this EIS, only the renewal of the lease for the portion of the line from FCPP to the Navajo Nation boundary is considered a connected action: 86 percent of the use of this line is to transport FCPP electricity to APS customers. The remaining 14 percent use of this line is for other utilities besides FCPP.
4. FCPP to San Juan Switchyard – The Navajo lease for the 4.5-mile portion of the line on the Navajo Nation expires in August 2015. The line is used to transmit FCPP electricity to PNM customers and between FCPP and the PNM San Juan Generating Station. As such, the transportation of electricity on this line cannot proceed unless the FCPP continues operation.

Operations and maintenance of the transmission lines would remain as described in Section 2.5 No new towers or access roads would be constructed as part of the Project, and no changes to the existing ROW would occur.

### **3.2.2 Alternative B – Navajo Mine Extension Project Mine Plan**

#### **3.2.2.1 *Navajo Mine***

Under Alternative B, OSMRE would disapprove the Pinabete permit application, and NTEC would seek approval from OSMRE for an alternative mine plan for the Navajo Mine. This alternative also includes all other federal actions described in Table 1-1. Under this alternative, NTEC would seek a 5,412-acre SMCRA permit and proposed mining disturbance in approximately 4,998 acres (Figure 3-3). Mining would commence with the construction of a new boxcut near the western lease boundary and progress eastward in north-south orientated striplines. The mining block would be divided into a North Pit and a South Pit. NTEC would operate two draglines, one in each mine pit. After the coal is exposed by the stripping operation, it would be either drilled and blasted or ripped by dozers before mining. Once the coal is broken up, it would be mined by front-end loaders and haul trucks. Coal would be transported to a field coal stockpile on the western permit boundary, prior to being transported 8.4 miles to Lowe Stockpile in Area III via primary haul roads.

Under this alternative, the mining would occur through Pinabete Arroyo and require a diversion of flows from the arroyo around mining activities. Surface flows from Pinabete Arroyo upstream of the mine plan would be diverted into No Name Arroyo. The diversion would remain for the duration of proposed mining.

Under this alternative, NTEC would realign 6.2 miles of Burnham Road along the eastern lease boundary. This alternative would also include construction of 12.6 miles of primary roads and 13.7 miles of ancillary roads.

Under Alternative B, OSMRE would renew the existing Navajo Mine Federal permit (NM0003F). For both the Navajo Mine Permit Area and the expanded SMCRA permit area, operations and reclamation would be conducted as described under the Proposed Action.

Reclamation activities would include reconstruction of a new Pinabete Arroyo channel through reclaimed areas and reestablishing the approximate original channel location, in addition to all reclamation activities described for the Proposed Action.

#### **3.2.2.2 *F CPP***

Under Alternative B, the BIA would approve the lease amendment for F CPP, and F CPP would operate as described under the Proposed Action. No changes are proposed.

#### **3.2.2.3 *Transmission Lines***

Under Alternative B, the transmission line ROWs would be approved and they would continue to be operated and maintained as described under the Proposed Action. No changes are proposed.

#### **3.2.2.4 *Comparison to Selection Criteria***

OSMRE and BIA have compared Alternative B to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that the Navajo Mine Extension Project meets the purpose and need of the Proposed Action and is technically and economically feasible. This action alternative is feasible and has been carried forward for analysis.

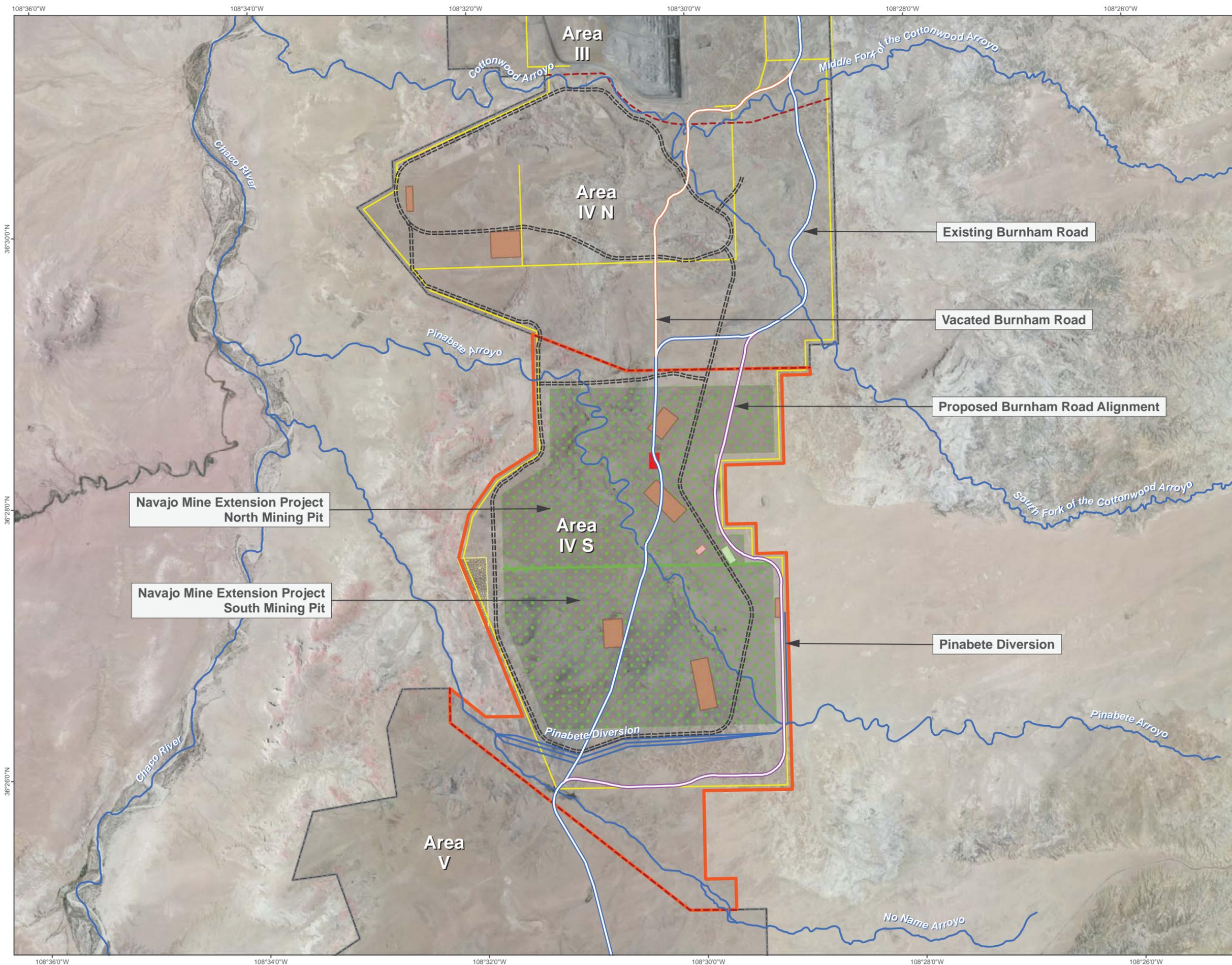
#### **Purpose and Need**

Under this alternative, the Navajo Mine would continue to supply coal to the F CPP. This alternative would provide sufficient coal reserves to fulfill the proposed Project (2016-2041). The F CPP would continue to provide baseload generation for its electricity customers, and the transmission lines would continue to be operated and maintained. This alternative would provide for continued employment of Navajo at the mine and power plant and would continue coal royalty revenues to the Navajo Nation by the mine.

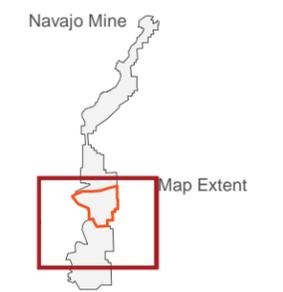
**Four Corners Power Plant and Navajo Mine Energy Project**

ALTERNATIVES

**Figure 3-3**  
Alternative B  
Navajo Mine Extension Project



- PROJECT FACILITIES**
- ANFO Silo ■
  - Borrow Area ■
  - Explosives Magazine ■
  - Mining Disturbance Area ■
  - Powerline —
  - Topdressing Stockpile ■
  - Proposed Field Coal Stockpile ■
- PROJECT BOUNDARIES**
- Navajo Mine Lease Area □
  - Navajo Mine Resource Areas □
  - Navajo Mine Extension Project Permit Boundary □
- ROAD NETWORK**
- Existing Burnham Road —
  - Proposed Burnham Road —
  - Vacated Burnham Road —
  - Proposed Haulroad - - -



This Page Intentionally Left Blank

**Technical Feasibility**

This alternative is technically feasible.

**Economic Feasibility**

This alternative is economically feasible, although not necessarily cost-effective, because NTEC would need to construct the Pinabete diversion and support facilities and expend more resources during reclamation to extract the same amount of coal described for the Proposed Action. According to NTEC cost estimates, the Pinabete Diversion would have to be completed early in the mining sequence and require an approximately \$30 million (in 2005 dollars) additional infrastructure expense. The infrastructure costs, including the Pinabete Diversion, haul roads, power lines, ancillary roads, and support facilities, would likely cost an additional \$70 million dollars over the course of the Project. The longer haul roads would likely require the purchase of an additional five coal haulers (\$15 million) to maintain sufficient production rates, and additional labor would likely be required for coal haulage, maintenance of haul roads, and maintenance of the additional equipment. As such, there would likely be an approximate 10 percent increase in operating expenses due to the longer haul roads and labor.

**3.2.2.5 Comparison of Impacts to Proposed Action**

This alternative would result in 28 acres of greater disturbance to waters of the U.S. than the Proposed Action. In addition, NTEC would need to construct 5 more miles of roadways and 8 more miles of transmission lines than described for the Proposed Action. The haul distance from the field coal stockpiles to Lowe Stockpile would also increase by approximately 3 miles. Table 3-8 compares the area that would be disturbed under Alternative B to that of the Proposed Action.

**Table 3-8 Comparison of Disturbance Area between Alternative B and the Proposed Action**

<b>Impacts</b>	<b>Navajo Mine Extension Project</b>	<b>Proposed Action</b>
SMCRA Permit	5,412.4 acres	5,568.6 acres
Conceptual disturbance footprint	4,998.0 acres	4,103.5 acres
Proposed relocation of Burnham Road	6.2 miles	2.8 miles
Approximate impact to waters of the U.S.	33.0 acres	5.0 acres
Length of primary roads	12.6 miles	5.2 miles
Length of ancillary roads	14.1 miles	15.6 miles
Length of new powerlines	15.5 miles	7.7 miles
Haul distance from field coal stockpiles to Lowe Stockpile	8.4 miles	5.2 miles

**3.2.3 Alternative C – Alternative Pinabete Mine Plan**

**3.2.3.1 Navajo Mine**

Under this alternative, OSMRE would disapprove the Pinabete permit application, and NTEC would seek approval from OSMRE for a new 10,094-acre SMCRA permit area and proposed mining disturbance in approximately 6,492 acres. This alternative also includes all other federal actions described in Table 1-1. Mining would be located in both Area IV North and Area IV South, as described for the Proposed Action, and would supply coal through 2041. Mining activities in Area IV North would continue along the existing striplines to the south. The Area IV South pit would be located southwest of Pinabete Arroyo and would require a new boxcut to develop the pit. Once the boxcut is complete, only two draglines would be needed, one in each pit. Coal from the Area IV North pit would be hauled directly to Lowe Stockpile in

Area III for a distance of 3.7 miles. A field coal stockpile would be located in Area IV South, and coal from the Area IV South pit would be hauled to this stockpile prior to being hauled the 8.4 miles to Lowe Stockpile. NTEC would realign 6.2 miles of Burnham Road as described under the Proposed Action. In addition, approximately 15.1 miles of primary haul roads and 14.8 miles of ancillary roads would be constructed (Figure 3-4). In addition, NTEC would construct approximately 16.8 miles of powerlines extending the existing transmission lines from the Navajo Mine Permit Area to the new permit area.

Under this alternative, OSMRE would renew the existing Navajo Mine SMCRA permit (NM0003F). For both the Navajo Mine Permit Area and the new SMCRA permit area, operations and reclamation would be conducted as described under the Proposed Action.

### **3.2.3.2 FCPP**

Under Alternative C, the BIA would approve the lease amendment for FCPP, and FCPP would operate as described under the Proposed Action. No changes are proposed.

### **3.2.3.3 Transmission Lines**

Under Alternative C, the transmission line ROWs would be approved, and they would continue to be operated and maintained as described under the Proposed Action. No changes are proposed.

### **3.2.3.4 Comparison to Selection Criteria**

OSMRE and BIA have compared Alternative C to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that the Alternative Pinabete Mine Plan meets the purpose and need of the Proposed Action and is technically feasible. Therefore, this alternative is carried forward for analysis.

## **Purpose and Need**

Under this alternative, the Navajo Mine would continue to supply coal to the FCPP. This alternative would provide sufficient coal reserves to fulfill the proposed project (2016-2041). The FCPP would continue to provide baseload generation for its electricity customers, and the transmission lines would continue to be operated and maintained. This alternative would provide for continued employment of Navajo and Hopi at the mine and power plant and would continue coal royalty revenues to the Navajo Nation by the mine.

## **Technical Feasibility**

This alternative is technically feasible, although NTEC would need to construct infrastructure and support facilities (16 arroyo crossings) in addition to those described for the Proposed Action.

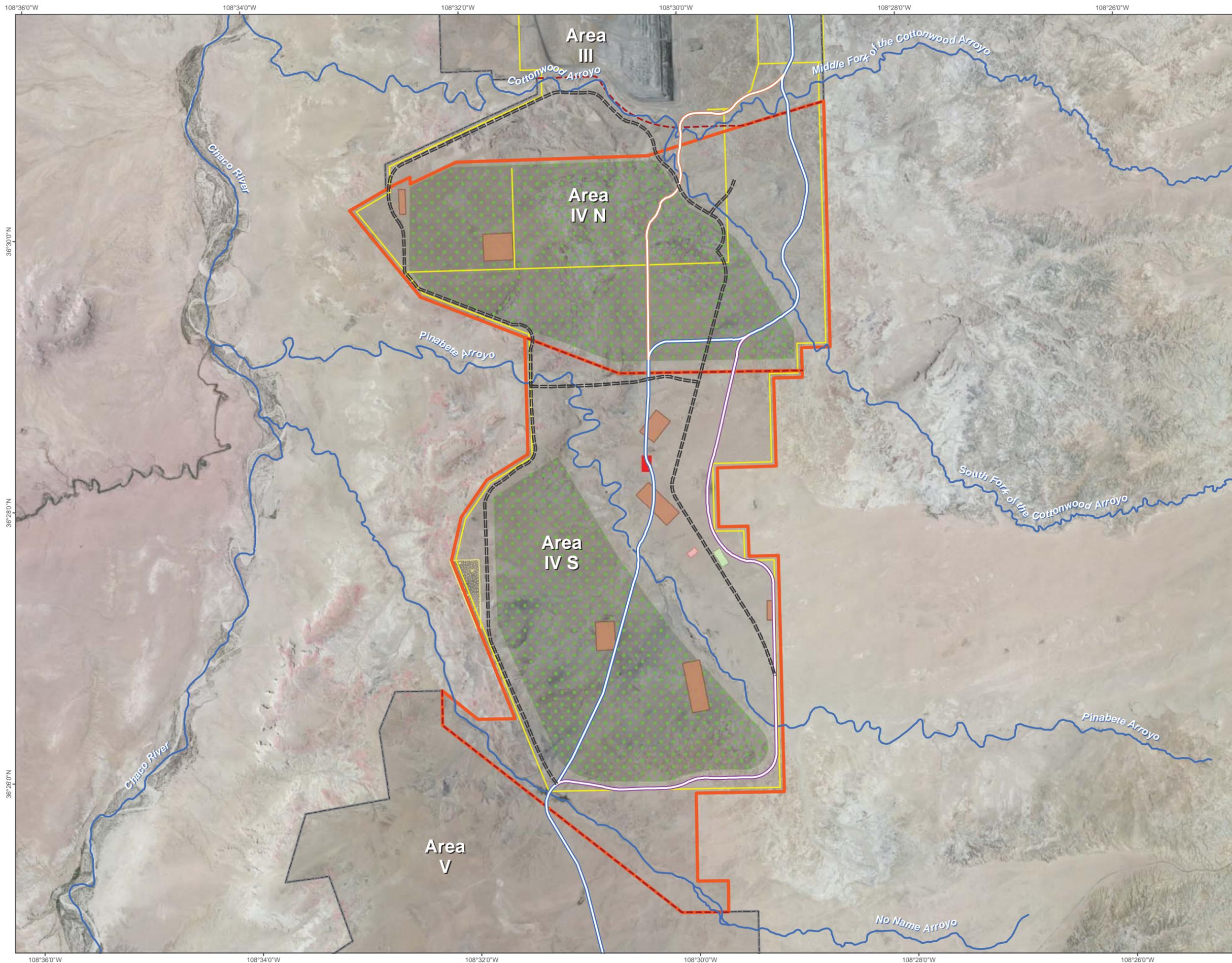
## **Economic Feasibility**

This alternative is economically feasible, although not considered cost-effective because more coal would be extracted than what is needed for the FCPP (approximately 134 million tons between 2016-2041; to meet OSMRE and BLM's requirements for maximum economic recovery, all coal in the pits would be mined). According to BNCC cost estimates, the infrastructure costs, including haul roads, powerlines, and support facilities, for this alternative would likely be an additional \$40 million dollars over the proposed Project. The longer haul roads would likely require the purchase of an additional five coal haulers (\$15 million) to maintain sufficient production rates, and additional labor would likely be required for coal haulage, maintenance of haul roads, and maintenance of the additional equipment. As such, there would likely be an approximate 10 percent increase in operating expenses due to the longer haul roads and labor.

**Four Corners Power Plant  
and Navajo Mine Energy Project**

ALTERNATIVES

**Figure 3-4**  
Alternative C  
Alternative Pinabete Mine Plan



**PROJECT FACILITIES**

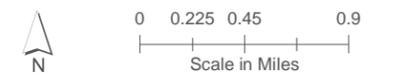
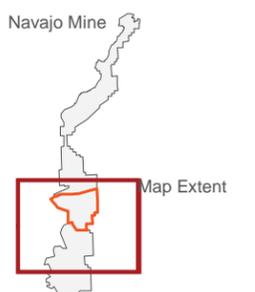
- ANFO Silo
- Borrow Area
- Explosives Magazine
- Mining Pit
- Powerline
- Topdressing Stockpile
- Proposed Field Coal Stockpile

**PROJECT BOUNDARIES**

- Navajo Mine Lease Area
- Navajo Mine Resource Areas
- Alternative Pinabete Permit Boundary

**ROAD NETWORK**

- Existing Burnham Road
- Proposed Burnham Road
- Vacated Burnham Road
- Proposed Haulroad



This Page Intentionally Left Blank

**3.2.3.5 Comparison of Potential Impacts to Proposed Action**

Under this alternative, approximately 1.6 more acres of waters of the U.S. would be impacted than under the Proposed Action. In addition, NTEC would need to construct over 10 more miles of roadways and 8 more miles of transmission lines than described for the Proposed Action. The haul distance from the field coal stockpiles to Lowe Stockpile would also increase by about 3 miles. Table 3-9 compares the area that would be disturbed under Alternative C to that of the Proposed Action.

**Table 3-9 Comparison of Disturbance Area between Alternative C and the Proposed Action**

	<b>Alternative Pinabete Permit</b>	<b>Proposed Action</b>
SMCRA Permit (acres)	10,093.9	5,568.6
Conceptual disturbance footprint (acres)	6,492.2	4,103.5
Proposed relocation of Burnham Road (miles)	6.2	2.8
Approximate impact to waters of the U.S. (acres)	6.6	5.0
Length of primary roads (miles)	15.1	5.2
Length of ancillary roads (miles)	14.8	15.6
Length of new powerlines (miles)	15.5	7.7
Haul distance from field coal stockpiles to Lowe Stockpile (miles)	8.4	5.2

**3.2.4 Alternative D – Alternate Ash Disposal Area Configuration**

This alternative was identified by APS as a potential reduction in the environmental effects of the proposed ash disposal configuration. This alternative considers an alternate configuration for the disposal of CCR that reduces the area of disturbance.

**3.2.4.1 Navajo Mine**

Under this alternative, OSMRE would approve the Pinabete permit application and renew the SMCRA permit for the Navajo Mine permit. The Navajo Mine would operate as described under the Proposed Action. No changes are proposed.

**3.2.4.2 FCPP**

Under this alternative, BIA would approve the amended lease for the FCPP, and the plant would continue to operate as described under the Proposed Action. However, instead of constructing seven DFADAs, APS would construct a single “super cell” DFADA that would be approximately 350 acres total (Figure 3-5). Construction of a single large DFADA would eliminate the number of impoundment walls and roads through the CCR area. The site would still be constructed in phases. As each subsequent site is constructed, the liner and leachate collection system would be extended such that the sites would act as a single facility. The DFADA would be setback at least 300 feet from the FCPP Lease Area boundary. The proposed borrow areas would remain as described in the Proposed Action and would be located in the area of future expansion of the super cell; therefore, the potential reduction in ground disturbance resulting from the DFADA would not be realized during excavation of the borrow pits.

**3.2.4.3 Transmission Lines**

Under this alternative, BIA and BLM would extend the ROW leases for the subject transmission lines. The transmission lines would continue to be operated and maintained as described for the Proposed Action. No changes are proposed.

#### **3.2.4.4 Comparison to Selection Criteria**

OSMRE and BIA have compared Alternative D to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that the Alternative Pinabete Mine Plan meets the purpose and need of the Proposed Action and is technically feasible. Therefore, this alternative is carried forward for analysis.

##### **Purpose and Need**

Under this alternative, the Navajo Mine would continue to provide coal to the FCPP as described under the Proposed Action. FCPP would continue to operate as described for the Proposed Action; therefore, the plant would continue to provide reliable baseload generation to its existing customers. The subject transmission lines would continue to transmit energy produced at the FCPP. As both the FCPP and Navajo Mine would remain in operation, this alternative would provide for continued employment and economic development of the Navajo Nation and Hopi Tribe. Therefore, this alternative would meet the purpose and need of the Proposed Action.

##### **Technical Feasibility**

This alternative is technically feasible.

##### **Economic Feasibility**

This alternative is economically feasible.

# Four Corners Power Plant and Navajo Mine Energy Project

## ALTERNATIVES

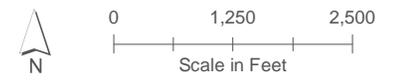
**Figure 3-5**  
Alternative Ash Disposal Area Configuration



**PROJECT FACILITIES**  
 Power Plant Lease Boundary [---]  
 Fence Line [—]

**TRANSMISSION LINES**  
 345kV [—]  
 500kV [—]

**ASH FACILITIES**  
 Existing Active Facility [—]  
 Existing Inactive Facility [—]  
 Future Facility [—]  
 Areas of Borrow Sources [—]



This Page Intentionally Left Blank

### 3.2.4.5 Comparison of Potential Impacts to Proposed Action

Table 3-10 compares the area that would be disturbed under Alternative D to that of the Proposed Action.

**Table 3-10 Comparison of Disturbance Area between Alternative D and the Proposed Action**

Ash Disposal Areas	Ash Disposal Alternative	Proposed Action
DFADA 1		39
DFADA 2		34
DFADA 3A		28
DFADA 3		51
DFADA 4		61
DFADA 5		63
DFADA 6		41
DFADA 7		68
Total		385
<b>Super Cell (Alternative D)</b>	350	
<b>DFADA Height</b>	120	120
<b>Borrow Pit Areas</b>	731	731

Note: There is approximately 32 acres of overlap between the south borrow area and the DFADAs, resulting in a total disturbance acreage of 1,052 acres.

### 3.2.5 Alternative E – No Action Alternative

Under the No Action Alternative, the following agency decisions would be made:

- OSMRE would deny the SMCRA permit for the Pinabete Permit Area
- OSMRE would not renew the SMCRA permit for the Navajo Mine Permit Area
- BIA would not approve the lease amendment for the FCPP
- BIA would not approve the realignment of Burnham Road
- BIA and/or BLM would not renew the leases for the four subject transmission line ROWs
- All other agencies approvals described in Table 1-1 would not occur

#### 3.2.5.1 **Navajo Mine**

Under the No Action Alternative, the Navajo Mine Permit would not be renewed and the Pinabete permit application would not be approved. In accordance with SMCRA regulations at 30 CFR 750.12(c)(1)(ii) and 774.15(a), a valid permit issued pursuant to an approved regulatory program carries with it the right of successive renewal within the boundaries of the existing permit, upon expiration of the permit term. The existing permit for the Navajo Mine, including coal resources Areas I, II, and III, and portions of Area IV North within the Navajo Mine Lease Area (Federal Permit NM0003F), as proposed by the applicant, is administered on a 5-year renewal schedule with the current permit term expiring on September 25, 2014. Considering that the permit term will expire prior to OSMRE's anticipated completion of the EIS and prior to the currently expected March 2015 ROD, OSMRE will administratively extend Federal Permit NM0003F allowing NTEC to continue surface coal mining and reclamation operations under the current permit until the

ROD is issued, provided that the applicant has met all renewal application requirements and procedures in accordance with 30 CFR 750.12(c)(1)(ii) and 774.15.

Upon completion of the EIS, the subsequent issuance of the ROD for the Project will address OSMRE's decision on the administratively delayed and pending permit term renewal for Federal Permit NM0003F and also for the new application for the Pinabete Mine permit. If OSMRE did not renew the Navajo Mine Permit and did not approve the Pinabete permit application, NTEC would cease to mine coal and would begin final reclamation activities in Areas II, III, and IV North.

Unless otherwise requires by the Navajo Nation as provided in the applicable lease and rights-of-way documents, all ancillary buildings and facilities (e.g., communication lines, railroad) would be removed, and the land would be reclaimed according to OSMRE requirements and performance standards. Accordingly, the NTEC workforce would begin reductions in 2015. NTEC would complete backfilling and grading activities by 2022 and revegetation activities by 2024. Reclamation and environmental monitoring activities would continue for a minimum of 10 years after revegetation until OSMRE's approval affirming that all reclamation requirements have been met and OSMRE jurisdiction is terminated (2034 at the earliest).

### **3.2.5.2 FCPP**

Under this alternative, the FCPP Lease Amendment # 3 would not be approved by BIA. The Plant would discontinue operation and the site would be decommissioned in accordance with the requirements of the 1960 and 1966 leases and existing 323 ROW grants for the plant site. Specifically, upon lease and ROW termination:

- APS would be required to leave the following structures in place: office buildings, warehouses, laboratories, machine shops, cafeterias, recreational buildings, dams, dikes and roads.
- Subject to the bullet below, APS may in its sole discretion choose to remove or to leave in place any or all other facilities, structures and improvements, including for example coal handling facilities, the boilers, turbines, generators, duct work, pollution control devices, stacks, storage facilities, other buildings, the pumping plant, the water pipeline from the San Juan River to Morgan Lake, and any other APS- or co-owned property (collectively referred to as "removable property").
- Upon the Navajo Nation's request, APS would be required to remove all the "removable property" described above. If the Navajo Nation did not request such removal, any "removable property" not removed would become the property of the Navajo Nation.
- If the river pumping plant and the pipeline to Morgan Lake were removed, Morgan Lake would evaporate and cease to exist over time. If APS chooses to leave the river pumping plant and the pipeline intact, and the Navajo Nation took possession of those facilities, it is not known the extent to which the river pump station would be operated. If the river pump station was not operated to provide water to Morgan Lake, it would evaporate and cease to exist over time.
- The Four Corners transmission switchyards are located within the geographic boundary for the Four Corners Plant Site lease and ROW. The Four Corners switchyards would no longer be authorized. Discontinued operation of these switchyards would prevent operation of several transmission lines, which could undermine regional reliability.
- The Ash Disposal Areas would be closed consistent with applicable federal environmental requirements. These areas include the following existing sites:
  - Lined Decant Water Pond, inclusive of Ash Pond 3
  - Lined Ash Impoundment, inclusive of Ash Pond 4 and 5
  - DFADA sites 1 and 2
  - North and South Ash Pond Seepage Intercept Trench
  - Gridded Disposal Area

APS would decommission all facilities that are not required or permitted to be left behind by the 1960 and 1966 leases. Decommissioning would require environmental abatement activities in the power block, including removal of environmental and safety hazards (e.g., asbestos, lead paint), and chemicals and oils. All waste generated during this phase would be managed and disposed of in accordance with applicable federal environmental regulations. Dismantling and demolition would commence following the removal of asbestos, PCB, lead paint and any other hazardous chemicals. Upon removal of structures and facilities, the structural foundations would be removed to 24 inches below grade, the site profiled to allow for proper drainage, and native vegetation planted as applicable.

### **3.2.5.3 Transmission Lines**

Under the No Action Alternative, the ROWs for the four subject transmission lines would not be approved. As the subject lines primarily transmit power from the FCPP, under the No Action Alternative, the current power source for the transmission lines would be removed. The lines would either be decommissioned and dismantled or left in place to transmit power from another power source in the region. As with the FCPP, decommissioning and dismantling activities would need to be coordinated with the Navajo Nation, Hopi Tribe, and the BLM so that the area meets the specific needs of the planned reuse. Compliance with all environmental laws and regulations would occur throughout the demolition process. The timeline for this process is not mandated in regulatory statutes and is unknown at this time.

Under this alternative, BIA would not renew the 323 federal grants of ROW for the 500 kV line from the Four Corners switchyard to the Moenkopi Switchyard and then to the reservation boundary, or the two 345 kV lines from the switchyard at Four Corners to the Navajo Nation reservation boundary. Further, BIA would not renew the 323 ROW grant for the Moenkopi Switchyard, access road, and 12 kV power line. Without renewed ROW for these transmission lines, APS would no longer be authorized to locate and operate the transmission system on tribal lands.

Similarly, under the No Action Alternative, BIA would not renew the 323 federal grants of ROW for PNM's Four Corners to Cholla 345 kV and Four Corners to West Mesa 345 kV transmission lines. Without renewed ROW for these transmission lines, PNM would no longer be authorized to locate and operate the transmission system on tribal lands. Likewise, BLM would not renew the 323 federal grants of ROW on BLM land for the Four Corners to West mesa 345 kV transmission line and PNM would no longer be authorized to locate and operate those facilities on BLM lands.

Failure to renew the referenced ROW could result in the removal, or at least the cessation of operation, of some or all of the APS and PNM transmission and ancillary facilities. Failure to renew the ROW for the Moenkopi Switchyard would potentially affect other existing transmission facilities that use the switchyard. This transmission system is critical to maintaining the reliability of the regional grid, and ceasing to utilize this infrastructure would undermine regional power reliability. Therefore, the operation of this switchyard would be critical regardless of whether FCPP continues to operate. It is possible that if the currently pending lease renewal request for the FCPP is denied, then APS or another company would seek to obtain a lease or ROW grant for the FCPP switchyard, the Moenkopi Switchyard and the transmission lines. Whether such a request would be approved is speculative at this time.

### **3.2.6 Applicant Proposed Measures, Standard Operating Procedures, and Best Management Practices applicable to all Action Alternatives**

APS, BNCC, and PNM have proposed many protective measures that would be implemented as part of the proposed action; these include mitigating measures for certain environmental impacts, standard operating procedures and best management practices that are designed to avoid or minimize potential impacts related to operation of the FCPP, Navajo Mine, and associated transmission lines. Since these protective measures are part of the proposed action, they are not listed as specific mitigation measures in each resource evaluation. However, if the project is approved, they would become part of the permit that

is transferred from BNCC to NTEC and therefore be binding to NTEC as an enforceable part of the proposed action and must be completed in order to comply with the terms of approvals.

These measures are described below by resource area. These measures would apply to all action alternatives.

The information in this section is compiled from the resource area analyses in Sections 4.1 through 4.18 and applicant provided materials submitted to OSMRE and BIA.

### **3.2.6.1 Air Quality**

#### **Navajo Mine**

Fugitive dust control measures at the Navajo Mine include the following:

- Unpaved haul roads and ancillary roads are watered with water trucks as needed to suppress dust.
- Heavily traveled portions of unpaved primary roads may be stabilized with chemical suppressants, or water as needed to suppress dust.
- Haul roads are graded as necessary during hauling operations
- High-use routes of travel in mining areas are graded as necessary.
- Maximum vehicle speed on paved and unpaved mine roads is limited to 45 mph within the permit area for all mine vehicles.
- Travel of unauthorized vehicles on other than established roads is restricted
- The area of disturbed land is minimized. This includes the number and size of areas to be blasted at any one time.
- Curtains are installed around the drill stems on overburden drills. Water sprays and/or vacuum dust suppression systems are used to help suppress fugitive dust emissions when drilling overburden material.
- Regular inspections for coal fires are made throughout the mine area. If a coal fire ignites by spontaneous combustion, that portion of the coal is separated or buried to extinguish the fire where possible.
- Coal placed at the field coal stockpiles is smoothed and compacted as necessary to reduce spontaneous fires and fugitive dust, and allow the coal trucks to operate on the stockpile.
- Dust control during construction of a soil stockpile is done as needed by spraying the working area with water from a water truck. Inactive stockpiles will be mulched and/or seeded.
- Haulage vehicles are inspected regularly for proper function, which includes inspection of the haulage vehicle container body and if necessary, repairs are conducted as soon as practicable.

#### **Four Corners Power Plant**

Pursuant to the FIP for the FCPP, the facility has prepared and implements a Dust Control Plan (APS 2012). The FIP requires a description of dust suppression methods for coal handling and storage facilities, CCR handling and storage facilities, and road sweeping activities. Fugitive dust control measures described in the plan include the following:

- Roadways are sprayed with water and dust suppressant. Employees follow speed limits to reduce dust.

- Materials that are stored outdoors are spraying with water and/or chemical stabilizers. Exposed surfaces are minimized and when handling materials, the drop height into trucks is minimized.
- Alkyl sulfonate is added to coal conveyors and tripper enclosures.
- For CCR handling, moisture is added and height control is used when dropping material into trucks. During placement of CCR, compaction control, added moisture, and slope control are used, as well as dust suppressant and periodic fabric covering of slopes.

### **Transmission Lines**

Vehicle access will be restricted to existing roads and within the APS and PNM ROWs.

Vehicles traveling offroad within the APS and PNM ROW will minimize impacts to the landscape and resources to the extent possible, reduce travel speeds, and minimize the number of trips back and forth.

#### **3.2.6.2 Climate Change**

No specific measures are proposed.

#### **3.2.6.3 Earth Resources**

### **Navajo Mine**

#### **Resource Recovery and Protection Plan**

NTEC will incorporate a Resource Recovery and Protection Plan developed for the maximum economic recovery, utilization and conservation of federally administered leasable coal reserves.

#### **Topdressing Management Plan**

NTEC has prepared a Topdressing Management Plan that details the requirements for topsoil replacement over the regraded spoil surface. OSMRE guidelines for reclamation programs and projects identify soil conditions that must be considered during reclamation, including soil pH and acid-forming spoils, sodic zones, and toxic substance occurrence in soil.

NTEC would utilize numerous stockpiles within the permit area for storing topdressing (and potentially regolith material, if needed). To minimize loss from wind and water erosion, stockpile surfaces (top and sides) would be mulched and seeded. Topdressing stockpiles that are left undisturbed for greater than 6 months would also be mulched, and those undisturbed for 1 year or greater would be seeded and mulched during the appropriate seeding period.

Gradient terraces are earthen embankments or ridges that reduce erosion by slowing, collecting and redistributing surface runoff. Gradient terraces would be built in the permit area to reduce sheet and rill erosion, prevent gullies, and provide water harvesting mechanism for the semi-arid region.

#### **Surface Stabilization and Sediment Control Plan for Reclaimed Lands**

As required by SMCRA, NTEC would prepare a Surface Stabilization and Sediment Control Plan for Reclaimed Lands. The control measures and techniques presented in this plan would be the best technology currently available (BTCA) that has been demonstrated as to successfully minimize erosion from reclaimed lands and prevent excessive sediment contributions to receiving streams in the arid Southwest. In order to determine the most appropriate stabilization measures, NTEC would:

- survey adjacent areas for hydrologic parameters (e.g., drainage density, channel type, etc.);
- estimate discharge from the reclamation area;
- compare discharge estimates with channel dimensions in the survey area to verify estimates;

- determine the appropriate channel types for the reclamation area slopes and valley bottom using fluvial geomorphic techniques that are designed and constructed to restore ephemeral streams to appropriate longitudinal plans and profiles, gradients, and cross-sections, including aquatic habitats that approximate pre-mining stream channel characteristics;
- design valley wall slopes with the minor channel to the determined drainage density;
- design the appropriate major valley channel; and
- incorporate the channels into the FSC for the valley wall slopes and valley bottom.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No construction or maintenance activities will be performed during periods when the soil is too wet to support construction equipment.

If traffic control structures (e.g., boulders, barriers, dips) must be moved, they will be returned to the original position/design when work is complete.

#### **3.2.6.4 Cultural Resources**

##### **Navajo Mine**

NTEC will conduct testing and mitigation of historic properties prior to ground disturbance and incorporate Pinabete Mine Programmatic Agreement (PA) requirements to avoid, reduce or mitigate potential impacts to historic properties within the proposed Pinabete Mine permit area. As part of the proposed Project, ground-disturbing activities near eligible sites would be monitored by a qualified archaeologist. A Navajo Cultural Specialist would be invited to participate in the site monitoring. A testing and data recovery program would be implemented prior to ground-disturbing activities at identified significant sites. Historic properties would be avoided by redirecting pedestrian and vehicular traffic away from the site during construction and facility operation.

In addition, NTEC will provide use of the Ceremonial Hogan within the Navajo Lease area to employees and their family members for traditional Native American ceremonies.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No specific measures are proposed.

#### **3.2.6.5 Water Resources/Hydrology**

##### **Navajo Mine**

##### **Groundwater Monitoring Plan**

NTEC developed a groundwater monitoring plan, as part of its SMCRA application, to monitor changes in the quantity of the groundwater resource during mining and subsequent reclamation. The monitoring plan will collect groundwater information from specified hydrogeologic units (coal seams from Fruitland Formation, PCS, and alluvium of the Chaco River, Cottonwood Arroyo, and Pinabete Arroyo) as well as backfill locations. The goal of the monitoring plan is to collect data on groundwater quality and quantity to

monitor any changes that may occur as a result of mining and reclamation such that if changes are detected, mining and reclamation operations can be adjusted to prevent adverse effects.

### **Sediment Control Plan**

NTEC will prepare and implement a Sediment Control Plan to help minimize sediment loss from water and wind erosion. The plan will include such methods as stabilizing stockpiles by mulching and seeding, retaining sediment in disturbed areas using berms, storing topsoil for reclamation, sumps, or sediment ponds to capture runoff. The primary control measure to decrease sediment runoff would be the use of sedimentation ponds. Sedimentation ponds are designed to retain the surface runoff and sediment from either the 100-yr-6-hr or 10-yr/24-hr storm event. There would be no discharge onto undisturbed areas or beyond the permit area from precipitation events up to and including the 10-yr-24-hr event. All discharges from the disturbed areas would be covered under an NPDES permit where required.

Professional Engineers would design and certify that sedimentation ponds would contain runoff from a 100-year, 6-hour or 10-year, 24-hour storm event (berms, v-ditches, or channels would be used to divert flows from the disturbed areas into the ponds).

NTEC would implement BMPs to avoid and minimize water quality impacts during mining by controlling runoff and sedimentation into nearby channels, including minimization of disturbance footprints, establishment of stream buffer zones, employment of upstream diversions or highwall impoundments, use of sediment ponds, perimeter berms or containment features, and reseeded areas prepared for reclamation as soon as practicable. NTEC would comply with SMCRA requirements and EPA NPDES permits under CWA Section 402 to control the discharge of sediment within the active mining sectors of the Pinabete and Navajo Mine permit areas.

NTEC may need to place additional ponds in series to retain the runoff and meet 40 CFR Part 434 standards until the area can be completely reclaimed. In such cases, NTEC would submit a revision to the Reclamation Plan to OSMRE for review and approval at least 60 days prior to initiating construction activities for additional ponds. Berms may be used to prevent sediment and flows from leaving the disturbed area and to convey flows to sedimentation ponds.

In accordance with the Stormwater Management Plan, NTEC further minimizes stormwater exposure to pollutants by implementing the following measures:

- Train employees to maintain appropriate load volumes in haulage equipment;
- Transport blasting agents in enclosed vehicles;
- Provide employees on the handling and management of potential pollutants and good housekeeping procedures;
- Minimize fugitive dust by applying dust suppression product annually and water, on an as needed basis, to roads.
- Regular inspection and maintenance of BMPs by qualified personnel;
- Inspect mine vehicles and equipment operating on the railroad and roads for leaks or safety hazards
- Conduct routine maintenance of vehicles and equipment to minimize the possibility of potential pollutant releases occurring from leaks or accidents in areas exposed to stormwater.

### **Minimization of Impacts to Waters of the U.S.**

NTEC would avoid impacts to Cottonwood and Pinabete Arroyos except for a potential future haul road and light vehicle crossing on Cottonwood Arroyo. NTEC has developed the mine plan for Areas IV North and IV South with the purpose of preserving the natural flow of Cottonwood and Pinabete Arroyos to the extent

practicable. The two arroyos would not be diverted for mining purposes under the proposed Project; in addition, flow would not be retarded except for a potential road crossing on Cottonwood Arroyo. NTEC has also established a 100-foot stream buffer zone along Cottonwood and Pinabete Arroyos.

#### **Surface Water Monitoring Plan**

In accordance with the Surface Water Monitoring Plan submitted as part of the Pinabete Permit Application to OSMRE, NTEC would conduct regular monitoring of surface water quantity and quality in Pinabete and Cottonwood arroyos for the duration of the permit period. Monitoring would be conducted at five stations (three historic and two new stations) and would be collected quarterly. Water quality monitoring results would be submitted quarterly to OSMRE.

#### **Spill Prevention, Control, and Countermeasure Plan**

NTEC maintains and implements a Spill Prevention, Control, and Countermeasure (SPCC) Plan that identifies areas of risk, specifies appropriate controls for bulk storage areas, identifies control strategies for managing potential spills, and lists procedures for safely disposing of any contaminated materials.

#### **Four Corners Power Plant**

In accordance with their NPDES permit, FCPP operates under a SWPPP. Stormwater within the lease area either is contained via berms, discharged to Morgan Lake, or drains to one of three outfalls on site.

In addition, the following Structural Controls are used on site:

- Oil and chemicals stored inside buildings at Main and Chemical Warehouses;
- Reduced number of oil and chemicals stored outside, at the 345 switchyard;
- Concrete apron over the dirt bank at 4/5 Intake (SW1);
- Prompt cleanup of spills and leaks using absorbents to prevent the discharge of pollutants;
- Drip pans and absorbents are used under or around leaky vehicles and equipment;
- Washwater drains to a proper collection system; and
- Rock and concrete barriers surrounding the perimeter of the plant proper next to Morgan Lake and cooling water canals leaving and entering the Lake (APS 2012).

FCPP would continue to operate in accordance with the existing NPDES permit and the SWPPP. In addition, a SPCC Plan would be implemented in order to prevent and contain any adverse effects of the spilled material to the surrounding environment.

#### **Transmission Lines**

To protect groundwater, hazardous fluid spill prevention and protection practices would be implemented (see Section 4.15, Hazardous and Solid Wastes).

PNM and APS would implement standard construction BMPs to prevent degradation of surface waters during transmission line maintenance activities.

Staging areas for loading and unloading of equipment will be located in previously disturbed areas, but outside of floodplains and other wet areas.

Specific plans or proposed measures for fugitive-dust control, erosion, and sedimentation control, site reclamation, and stormwater-runoff control would be implemented as part of the construction process. BMPs would be implemented requiring that temporary measures, such as silt fences and straw bales, should be placed in ditches and along portions of the site perimeter to control erosion and meet NPDES requirements during all maintenance activities that involve construction or site disturbance (e.g., tower replacement, ROW

clearing). To protect the water quality of area surface waters during maintenance activities, any and all of the BMPs required by the appropriate authorities should be implemented and maintained. These BMPs could include such measures as the installation of a double-walled silt curtain in the river or wash surrounding construction activities and installation of silt fencing and other erosion and sediment control measures when working in the floodplain to protect all adjacent wetland and drainage ways.

### **3.2.6.6 Vegetation**

#### **Navajo Mine**

##### **Environmental and Biological Resource Compliance Monitoring Plan**

NTEC would prepare a compliance monitoring plan for all construction projects to ensure implementation of BMPs to avoid impacts to vegetation, as listed below. This plan would meet SMCRA permit conditions. The plan would identify the frequency and type of monitoring required by qualified natural/biological resources personnel. The plan would be submitted to Navajo Nation Department of Fish and Wildlife (NNDFW) for approval prior to any construction.

##### **Noxious Weed Management Plan**

NTEC would prepare and implement a Noxious Weed Management Plan to prevent the introduction and spread of noxious and invasive weeds in the permit areas. The plan would require the purchase of revegetation seeds from reputable vendors, which are not contaminated, with weed seed. Similarly, NTEC would obtain native grass mulch from credible producers to minimize introduction of noxious and invasive weeds into revegetated areas. Seed vendors and mulch producers may be inspected by NTEC to audit their quality control procedures and ensure their products are free of noxious and invasive weeds. The introduction of noxious weeds will be controlled in reclaimed areas by using weed-free mulch and seed.

##### **Other SMCRA-Required Protective Measures**

NTEC would implement all best management practices and protective measures as required by the permit, including the following:

- All construction personnel would attend an environmental protection briefing prior to working on any construction site in the project area. This briefing is designed to familiarize workers with statutory and contractual environmental requirements and the recognition of and protection measures for sensitive vegetation community and wildlife habitats.
- Protective barriers would be placed around specified sensitive vegetation communities as identified by the NNDFW. Barriers would be installed prior to construction and field inspected by NNDFW or OSMRE personnel to verify proper placement.
- Aboveground structures (i.e., transmission towers) would be sited and designed in order to minimize disturbance to sensitive wildlife habitats and to minimize adverse effects to landscape features such as topography and vegetation.
- Imported soils, fills, or aggregates would be free of deleterious materials (i.e., trash, construction debris, noxious weeds). Sources of imported materials would be submitted for OSMRE or Navajo Nation approval prior to construction.

### **Revegetation Plan**

BNCC has developed comprehensive revegetation plans to be implemented in both the Navajo Mine Permit Area and Pinabete Permit Area based on experience re-establishing vegetation on previously disturbed areas at the Navajo Mine. Implementation of the Revegetation Plans would establish a diverse, stable, and self-sustaining vegetation community composed of native species capable of meeting the post-mining land use. Both plans have been reviewed and would satisfy the following criteria:

- Adequate cover capable of stabilizing the soil surface from erosion;
- Adequate forage to sustain the post-mining land uses (i.e., livestock grazing and wildlife habitat); and
- Suitable species composition for enhancement of wildlife forage and cover.

### **Four Corners Power Plant**

No specific measures are proposed.

### **Transmission Lines**

Operators will ensure that utility mower, track or other offroad equipment, which has high potential to carry noxious weeds (not including service vehicles, pick-up trucks, passenger cards, bucket trucks, or utility vehicles/all-terrain vehicles) are free of soil, weeds, vegetative matter, or other debris that could harbor seeds prior to entering tribal lands.

#### **3.2.6.7 Wildlife and Habitats**

##### **Common to All Project Components:**

- A construction work schedule would be prepared for all construction projects to minimize noise and human activity effects to wildlife in adjacent habitats.
- Protective barriers would be placed around specified sensitive wildlife habitats. Barriers would be installed prior to construction and field inspected by natural resources personnel to verify proper placement.
- Aboveground structures would be sited and designed in order to minimize disturbance to sensitive wildlife habitats and to minimize adverse effects to landscape features such as topography and vegetation.
- Preconstruction surveys would be conducted, as specified by the NNDFW, by a qualified biologist to identify the number, type, and location of special-status species documented within the Project Area.
- Most initial clearing and grading would be conducted outside of the bird breeding season. If any grading, clearing, brushing, or construction were to occur during the bird breeding season (approximately February 15 through August 31), a qualified biologist would conduct a survey of the habitat to determine whether there are active bird nests in the area, including raptors and ground nesting birds. The survey would begin not more than three days prior the beginning of work. If an active nest was observed, a minimum 300-foot buffer (500 feet for raptors) would be established using temporary fencing. The buffer would be in effect as long as work is occurring and until the nest is no longer active.
- Speed limits would be posted to minimize vehicular collisions with wildlife and decrease fugitive dust emissions.

- All construction activities would be completely confined to the areas of potential ground disturbance for each Project component. Clearing of vegetation and ground disturbance would be minimized to the greatest extent possible.
- Stationary noise sources would be located as far as possible from sensitive wildlife habitat areas.
- Excavation sites would be monitored or covered to avoid trapping wildlife, and routes of escape for wildlife would be maintained. The construction site would be inspected daily for appropriate covering and flagging of excavation sites. Each morning the construction site would be inspected for wildlife trapped in excavation pits. A qualified biologist would be available to inspect excavations before refilling occurs.
- Proposed electrical transmission and distribution lines would be designed and constructed utilizing the most current “raptor-safe” design (APLIC 2006).
- Following completion of any construction activities, all tools, equipment, barricades, signs, surplus materials, debris, and rubbish would be removed from the project work limits upon completion.
- The impact of dust pollution on wildlife would be expected to be localized near construction areas and would be minimized by dust control measures such as dust suppression (watered with water trucks), stock pile stabilization, and appropriate use of haul roads.

## **Navajo Mine**

### **Fish and Wildlife Enhancement Plan**

In addition to the measures listed above, BNCC has developed a Fish and Wildlife Enhancement Plan as part of its SMCRA application to reduce short-term and long-term impacts to wildlife. Proposed measures include monitoring the existing populations and replacing lost features, such as nests, dens, or burrows.

### **Wildlife Monitoring and Mitigation Plan**

BNCC has implemented and NTEC will continue to maintain a wildlife monitoring program for the NTEC mining lease area that extends from Area IV North northward through Area I, hereafter referred to as Navajo Mine. The monitoring and mitigation plan for the permit area, combined with the current Navajo Mine (OSMRE Permit No. NM-0003F) wildlife monitoring plan has the following objectives:

- to assure that mitigation measures are limiting the impact of mining as intended;
- to identify the presence of additional important wildlife habitats that may occur (e.g., new raptor nests);
- to identify additional unanticipated impacts that require development of specific mitigation measures;
- to describe and characterize the wildlife use of reclaimed areas; and
- to generally track important wildlife activities in the mine lease area.

Procedures employed to minimize or prevent impacts to wildlife during the operation of the mine will include: (1) limiting the amount of vegetation and topography disturbed to only that necessary to conduct mining; (2) designing facilities, such as transmission lines, to prevent mortality of raptors; and (3) monitoring important wildlife habitat, such as raptor nests, so appropriate plans to avoid major undesirable impacts can be developed and implemented.

Minimizing the area disturbed to only that necessary to safely conduct mining will avoid unnecessary disturbance of wildlife habitat. Location of important wildlife habitats (such as rimrocks, raptor nests, and water sources) will be considered when planning the location of haul roads and ancillary facilities so that they can be avoided as much as practicable. Wildlife will be monitored during daily mining activities. The

presence of any threatened or endangered species will be noted and OSMRE and NNDFW will be notified immediately if present.

To protect raptors from direct mortality due to electrocution, the design and construction of electric powerlines and other transmission facilities on the permit area will meet the guidelines set forth in "Suggested Practices for Raptor Protection on Powerlines - the State of the Art in 1996" (Avian Power Line Interaction Committee (APLIC), 1996).

BNCC also implemented and NTEC will continue to implement a Raptor Monitoring Program on three years recurrent cycles as follows:

- **Year 1:** Aerial survey all raptor nesting habitat within the permit area and a one mile buffer zone (with exception of agricultural fields disturbed and operated by NAPI)
- **Years 2 and 3:** Ground survey of all raptor habitat within a one mile buffer zone (with exception of agricultural fields disturbed and operated by NAPI) of the most active mining areas (active pits, coal stockpiles, shop and office areas, major topdressing stockpiles, and future mining pits) where the majority of the noise and disturbance by mining or mine personnel activity will take place.

Raptor surveys will be conducted during the breeding season (April through June) to document the status of known and unknown nests (e.g., active, inactive). Initial surveys will be conducted between April 1 and 15 and follow up surveys of those areas determined as active territories will be conducted between May 15 and June 15 (or closest date a suitable aircraft is available).

Buffer zones will be established around active raptor nests located on and adjacent to the permit area. The buffer zones will be established through consultation with the BIA and NNDFW on a site and species specific basis as necessary. Raptor nests will be monitored to identify potential problem areas relative to the mining operations on the permit area. If raptor nesting success is affected by mining activity, NTEC will consult with the NNDFW, BIA, and USFWS to develop plans to limit impacts. Such plans will be developed on a site by site basis and could include rescheduling of mining activities and moving or taking of nests as necessary. Any work involving the handling of raptors or their nests will require special permits and would be closely coordinated with the NNDFW and USFWS to ensure the safety of the birds and promote the use of the breeding territory in the future.

Unless authorized by NNDFW, prairie dog colonies with active nesting burrowing owls will not be disturbed during the nesting season (late March through July) (Marks and Ball, 1983) to avoid impacts to active nests. Prior to conducting surface disturbance activities during the nesting season areas will be examined to determine if burrowing owls are nesting. If burrowing owls are nesting, activities that would disturb the nest will be managed to mitigate impacts or other appropriate measures will be conducted as necessary after consultation with the Navajo Nation Department of Fish and Wildlife (NNDFW) and US Fish and Wildlife Service (USFWS). Historic and active prairie dog towns will be monitored for possible burrowing owl occupation during the two and three year raptor surveys.

Reoccupation of the reclaimed area by prairie dogs and other burrowing mammals will be monitored to determine if burrows will be available for use by burrowing owls. If no burrows are present on reclaimed areas, NTEC will consult with the NNDFW and BIA to determine if artificial burrows are necessary on the reclaimed area to promote use by burrowing owls. Burrowing owls have readily accepted artificial burrows (Collins and Landry, 1977; Henry and Blus, 1981), but the acceptance of artificial burrows on reclaimed areas has not been proven (Marks and Ball, 1983).

In accordance with reclamation plan, rock habitat structures will be constructed in reclaimed areas to provide perches for birds and cover for small- and medium-sized mammals and reptiles. Disturbed areas will be revegetated to create diversity in vertical and horizontal plant community structures. These areas will be revegetated with seed mixes that contain multiple species that are native to the area, palatable to

livestock and various wildlife species and provide wildlife cover. Specific surveys will be conducted to monitor wildlife use of reclaimed areas annually during the summer and winter.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

For herbicide treatments, between April 15 and August 15, the contractor will watch for ground nesting birds when driving the spray vehicle within the ROW. If any are seen, the operation will be stopped and the area completed utilizing handheld or backpack sprayers, while keeping the quad/utility vehicle mounted sprayers on the existing road.

For herbicide treatments, the applicator will look for nests prior to treatment of a plant. If active nests are found during the course of application, spraying will cease and be postponed until after August 15.

For routine vegetation maintenance, workers will watch for nesting birds. If an active nest is found, the vegetation containing the active nest will be avoided until after the nesting season. If active nests must be relocated for safety or reliability reasons, protocols found within the APS or PNM Avian Protection Plan will be followed.

While working in riparian areas, workers will reduce the number of trips in and out, use hand crews if possible, minimize time spent working within the riparian area, and/or stage vehicles and materials outside riparian areas, if possible.

#### **Wildlife Protection Program**

All transmission structures have been designed with adequate line clearances to prevent electrocutions and meet APLIC design guidelines. In addition to the measures listed above, in order to identify and manage risk to avian species by electrocution, APS implements a Wildlife Protection Program designed to minimize the danger of energized lines for birds of prey and a variety of mammals. Similarly, PNM implements an Avian Protection Plan designed to minimize electrocution risk to wildlife and documents collisions and electrocutions on a yearly basis through USFWS to identify wildlife hazards across their service area. The BMPs and avoidance measures for transmission line maintenance activities are intended to reduce impacts to special status species that may utilize habitat within the ROW or protected avian species that nest on the transmission structures.

#### **3.2.6.8 Special Status Species**

##### **Common to All Project Components**

NTEC, APS, and PNM will coordinate and fund development of a Colorado pikeminnow population viability analysis model for the San Juan River Basin to assess management options that best support conservation and recovery of the species based on specific scenarios representing existing and future environmental conditions. The population viability analysis model will be made available to the USFWS for use in the San Juan River Basin Recovery Implementation Program for the programs future use following the Section 7 consultation process for the FCPP and Navajo Mine Energy Project.

##### **Navajo Mine**

Wildlife will be monitored during daily mining activities. The presence of any threatened or endangered species will be noted and OSMRE and NNDFW will be notified immediately if present.

### **Four Corners Power Plant**

Before vegetation is removed, it will be evaluated for southwestern willow flycatcher habitat. If habitat is identified, a protocol survey is conducted during seasonal presence periods. If southwestern willow flycatchers are determined to be present, protective measures will be evaluated and adopted.

### **Transmission Lines**

Biologically sensitive areas will be marked or mapped prior to construction or maintenance to avoid impact to known populations of threatened or endangered species.

If suitable nesting habitat for Mexican spotted owls is identified within ¼ mile of the transmission lines, APS will implement breeding season timing restrictions from March 1 to August 31 for all routine maintenance activities.

Where suitable habitat for sensitive plants exists within the APS or PNM ROW, vehicles will remain on existing roads while traveling through suitable habitat.

No vegetation maintenance activities (pruning, removal, or herbicide applications) will occur within a 200-meter buffer around the identified occupied, suitable habitat for the federally endangered Mancos milkvetch. All identified suitable habitat will be considered occupied and a 200-meter buffer avoidance area will be applied.

### **3.2.6.9 Land Use and Transportation**

#### **Navajo Mine**

NTEC would compensate customary users for loss of grazing areas in accordance with Navajo Nation and BIA requirements. NTEC would also assist with the permanent relocation of three dwellings located within the proposed Pinabete Permit Area of the Navajo Mine Lease. NTEC's agreement with the Navajo Nation for the Navajo Mine Lease requires compensation of families and individuals with land use rights within the lease area.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No specific measures are proposed.

### **3.2.6.10 Socioeconomics**

#### **Navajo Mine**

NTEC will implement a Native America hiring and vendor preference policy.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No specific measures are proposed.

### **3.2.6.11 Environmental Justice**

No specific measures are proposed.

### **3.2.6.12 Indian Trust Assets**

No specific measures are proposed.

### **3.2.6.13 Visual Resources**

#### **Navajo Mine**

NTEC would conduct interim reclamation of exhausted mine pits to reduce the overall visual impact of the mine area. Interim reclamation activities include backfilling pits, replacing topsoil, contouring the landscape, and reseeding.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No specific measures are proposed.

### **3.2.6.14 Noise and Vibration**

#### **Navajo Mine**

Blasting would be conducted only during daytime hours, except during emergencies. NTEC would comply with applicable laws governing the use of explosives to control effects of airblast and vibration outside the Pinabete Mine area and inform members of the public of blasting activities. Protective measures include:

- Posting signage on public road entrances;
- Sounding audible blast warnings;
- Publishing blast schedules; and
- Conducting pre-blast surveys as requested

As discussed under Section 4.2.6.9, NTEC would assist with the relocation of residences within the Pinabete Permit Area, which would reduce the number of sensitive receptors, which could be affected by loud noise.

#### **Four Corners Power Plant**

No specific measures are proposed.

#### **Transmission Lines**

No specific measures are proposed.

### **3.2.6.15 Hazardous and Solid Wastes**

#### **Navajo Mine**

##### **Hazardous Waste Management**

BNCC implemented and NTEC will continue to implement a Waste Management Plan and Chemical Procurements systems and complies with all applicable tribal, state and federal waste handling, management and disposal regulations for proper handling and disposal of all wastes, including universal wastes, special wastes, and recycled materials, generated at the Navajo Mine.

#### **Four Corners Power Plant**

No specific measures are proposed.

## **Transmission Lines**

No specific measures are proposed.

### **3.2.6.16 Recreation**

No specific measures are proposed.

### **3.2.6.17 Health and Safety**

#### **Navajo Mine**

NTEC's health and safety program provides a systematic and integrated approach to the management of health and safety issues. The program consists of evaluating risks, developing programs to eliminate or mitigate the risk, auditing the programs for effectiveness, and implementing improvements or changes to the program based on feedback from the audit process. The health and safety program is used as a tool for NTEC to manage health and safety risks and minimize health and safety impacts both on site and off site. Based on health and safety risk assessments, safety protocols, MSHA regulations, and Navajo Mine policies and practices, all employees receive safety training applicable to their work area and level of risk. This training includes MSHA Part 48 training, which requires that any employee or contractor working on site for more than 5 days within a 12-month period must receive no less than 24 hours of training before being assigned to work duties. Annual refresher training (8-hour) is required after 1 year. By regulation, MSHA-approved instructors conduct all courses (BNCC 2012; BNCC 2012a; BNCC 2012b).

All training is documented, and records are maintained on NTEC's Learning Management System (LMS). LMS captures the training title, date, and name of the attendee. If training is MSHA-required, such as the Part 48 annual refresher or Part 77 Certified Supervisor, then in addition to being input into LMS, each participant receives a federal Form 5000-23 (BNCC 2012a).

In addition, NTEC will control public access to the Navajo Mine leave with fencing, signage and security posts and seal temporary bore holes from exploration drilling or monitoring well installation to eliminate hazards to people and wildlife.

#### **Four Corners Power Plant**

The APS safety program is designed to follow a proactive plan to create a safety culture whereby employees are expected to work safely and are empowered to make the decisions and take the actions necessary to work safely. This goal is accomplished by delegating and communicating stop work authority to all personnel, including contractors. Documented safety procedures are coupled with a requirement to perform documented pre-job briefs on each job and a Job Hazard Analysis as needed.

Required safety training is completed in numerous areas to ensure employees have the knowledge necessary to work safely. Safety performance observation is used as a means of developing meaningful data to develop trends to assist with setting training requirements and to ensure written safety procedures are followed. The observation process also provides a venue for employee engagement to help build positive safety habits. APS also has an accident/incident investigation process to aid in determining causes of any incidents as well as to establish measures to prevent recurrence of an incident (BNCC 2012a).

## **Transmission Lines**

### **APS Worker and Public Safety Programs**

APS has a training program that includes employees who provide production and maintenance work on the transmission lines. Required safety training is completed in numerous areas to ensure employees have the knowledge necessary to work safely. Examples of some of the safety training topics include Fall Arrest Equipment Inspection and Storage, Fall Protection, Switchyard Entry, Fire and Emergency Evacuation, Hearing Conservation, Hazard Communication, and Ladder and Stairway Safety.

APS has a public safety program to reduce risks to the public and to property from activities on or near APS facilities (APS 2012). The objectives of the APS Public Safety program are:

- Ensure public knowledge of and compliance with the applicable electrical safety laws, regulations, codes, and standards.
- Ensure that the public and first responders are made aware of the electrical hazards relating to activities on or near APS' electrical facilities.
- Ensure that all public safety-related incidents and activities are evaluated with respect to applicable laws, codes, regulations and standards and that timely consultation and recommendations are provided.
- Provide continuous input to administering bodies on the adequacy and applicability of codes related to APS' facilities.

To accomplish these goals, APS has a Public Safety Electrical Safety Outreach Program<sup>1</sup> that reaches out to the public to:

- Describe first response initial actions where electrical facilities are present.
- Identify the main components of transmission and distribution electrical systems.
- Describe the precautions for substation emergencies.
- Describe precautions for responding to electrical emergencies related to overhead and underground power lines and equipment.
- Describe the basics of electrical current and associated dangers.
- Describe the electrical precautions for first response in emergency situations.
- Identify the dangers of electrical equipment around trees and aerial equipment.
- Describe photovoltaic systems and safe operating procedures.

#### **PNM Worker Health and Safety Program**

PNM conducts various public safety activities and communications to inform and educate the public about the risks associated with transmission lines. They include annual press releases on topics such as holiday safety, spring safety, and Balloon Fiesta safety. PNM also uses social media sites such as Facebook to distribute their safety information and uses EnergyWorks for outreach to the public regarding safety. Monthly bill inserts are also used to communicate safety messages. In addition, PNM's Engineering Department regularly communicates applicable National Electrical Code (NEC) standards to customers/interconnectors. A link on the PNM.com website called "My Safety" addresses the following topics (PNM 2012)

- If power goes out
- Household appliances
- Cords, outlets, and switches
- Breakers and fuse boxes
- Call before you dig

---

<sup>1</sup> APS Public Safety Electrical Safety Brochures in English can be accessed online at [http://www.aps.com/\\_files/mktg/PublicSafety.pdf](http://www.aps.com/_files/mktg/PublicSafety.pdf) and in Spanish at [http://www.aps.com/\\_files/mktg/PublicSafetySPAN.PDF](http://www.aps.com/_files/mktg/PublicSafetySPAN.PDF)

- Tree trimming and planting
- Power lines
- Kites
- Thunderstorms and lightning

### **3.3 Alternatives Considered But Not Carried Forth for Full Analysis in the Environmental Impact Study**

#### **3.3.1 Conversion of FCPP to Non-Coal Fired Energy Options**

Several comments received during the scoping period requested that OSMRE and BIA consider an alternative that would convert FCPP to a non-coal fired energy generation facility. Five options proposed by commenters during scoping for this alternative include converting FCPP to a natural gas, solar, wind, geothermal, or biomass powered plant.

##### **3.3.1.1 *Navajo Mine***

Under this alternative, OSMRE would approve the Pinabete permit application and renew the Navajo Mine SMCRA permit; however, the demand for Navajo coal would be eliminated. NTEC would either sell its coal to another power plant or shut down. Reclamation of all disturbed lands would occur as described for the Proposed Action, although the timing of reclamation activities would occur no earlier than 2016 and no later than 2041.

##### **3.3.1.2 *FCPP***

Under this alternative, BIA would disapprove the proposed lease amendment for the FCPP, and APS would need to seek a new lease amendment with the Navajo Nation for changes to the plant allowing for generation of non-coal-generated energy. The BIA would have to review and approve the new lease to fulfill its tribal trust responsibilities. FCPP operation following Navajo Nation and BIA approval would be reengineered to generate energy from either renewable energy sources or natural gas.

##### **3.3.1.3 *Transmission Lines***

Under this alternative, BIA and BLM would approve the ROW lease extensions for the subject transmission lines, and these lines would continue to be operated and maintained as described for the Proposed Action.

##### **3.3.1.4 *Comparison to Selection Criteria***

OSMRE and BIA have compared each of these options to the purpose and need for the Proposed Action and the selection criteria and provide a summary of our evaluation below. Based on that evaluation, it has been determined that the conversion of FCPP to a non-coal energy plant does not meet the purpose and need of the Proposed Action, nor is it economically feasible. Therefore, this alternative, although considered, is eliminated from further study in this EIS.

#### **Purpose and Need**

In all five cases, the proposed fuel source would replace the use of Navajo coal at the power plant. As coal would no longer be used at FCPP under all alternative energy options it is assumed that the Navajo Mine would either sell its coal to another power plant or stop production of coal at the end of its current lease (2016) and begin reclamation of all disturbed lands, which is anticipated to be completed for the current lease by 2024. Accordingly, it is anticipated that a loss of employment opportunities for Navajo and Hopi could occur at the Navajo Mine, as early as 2024, if another customer is not identified. In addition, the existing FCPP site lease requires use of Navajo coal; therefore, the Navajo Nation would

have to approve a new lease for the site, which BIA would have to review to fulfill its tribal trust responsibilities. All alternative non-coal energy options would allow for continued operation of the subject transmission lines and potential continued employment of Navajo and Hopi people at the FCPP; however, it is unknown if FCPP would support as many permanent jobs as the current power plant.

Neither the solar nor wind options would provide uninterrupted baseload power to electricity customers. Both solar and wind are intermittent sources and would require a supplemental source (e.g., coal) to substitute for baseload generation. Conversion of FCPP to a natural gas-fired plant, geothermal plant, or a biomass plant could provide uninterrupted baseload power to its customers.

### **Technical Feasibility**

It is technically feasible to convert the FCPP to a natural gas plant. Converting Units 4 and 5 to burn gas rather than coal would require that the combustion gas flow and thermodynamic balance in each heat transfer area of the boiler be evaluated and modified as necessary to keep the system from overheating some zones while maintaining water to steam flashover within the plant design parameters. In addition, the instrumentation controls and valving at the plant would need to be reengineered. APS would also need to secure a larger supply of gas from a nearby transmission pipeline and install a large-diameter distribution pipeline to the existing power plant site.

It is also technically feasible to convert the plant to a biomass energy plant to co-fire in the FCPP, but only in the form of torrefied (dried or roasted) biomass pellets. To maintain the same level of electrical generation, FCPP would require hundreds of tons of pellets per hour. At this time, only about 30 projects use torrefied biomass pellet globally, mostly in Europe. No utility-scale fuel suppliers of torrefied biomass pellets exist anywhere in the world.

Geothermal energy generation has been considered in the Four Corners area and the San Juan Basin in the past but no facilities have been constructed to date because resource maps of geothermal resources in the state of New Mexico indicate there is no geothermal potential in the project area and only negligible potential in southeastern San Juan County. In comparison, geothermal resources are present in the more central and southwestern portions of the state (New Mexico Geothermal Resources 2012). Therefore, conversion of FCPP to geothermal is not considered technically feasible.

FCPP conversion to a solar power plant is feasible. A complete power replacement with 1,540 MW of solar power would require over 25 square miles of collector arrays and would need to be augmented by 1,540 MW of combustion turbines to supplement the low MW-hour availability due to nighttime and cloud cover.

### **Economic Feasibility**

While APS considers FCPP conversion to a natural gas plant economically feasible, it is not cost-effective because more commercially viable sites are available in Arizona that are closer to major load centers, which would reduce the potential for line losses. Similarly, conversion to a solar generating facility is economically feasible; however, average annual solar hours and intensity are less at FCPP than in the Phoenix area, and it would be more cost effective to install a solar power plant in this area that is closer to APS's major load center.

Wind is not considered an economical option because wind resources in the Four Corners region are highly variable and do not provide a reliable source of energy generation, compared to the Proposed Action.

Conversion to biomass is not considered economically feasible because no supplier is available. Conversion of FCPP to a geothermal plant is not considered economically feasible because geothermal resources are not present in this part of the state.

### **3.3.2 Solar Thermal/Coal Hybrid Alternative**

In a solar thermal/coal hybrid facility alternative, the FCPP would be retrofit with the addition of a solar energy facility, which uses solar-thermal arrays for pre-heating steam at coal-fired power plants to increase the electrical output for a given coal input and extend the life of the mine. Depending on the size of the solar thermal system, it could help lower the pounds of CO<sub>2</sub> per megawatt hour of the facility. Although there are no solar thermal/coal hybrid facilities in operation, review of the literature on this application supports the screening-level analysis.

There are two options available for the solar thermal/coal hybrid. One is to use a concentrating solar power (CSP) system. This type of plant can be a stand-alone solar thermal power plant, but in this application the waste heat from the solar thermal energy is also used to preheat water to augment fossil fuel plants such as FCPP. The CSP is co-located with a fossil fuel powered plant and generates electricity in parallel. According to studies by the National Renewable Energy Laboratory (NREL) and the Electric Power Research Institute (EPRI), the option is not currently cost effective; moreover, plants that are older than 30 years (built before 1980) were not even considered for retrofit to a solar thermal hybrid facility by NREL and EPRI based on the assumption that these plants will be closer to retirement and likely have less sophisticated controls than the newer plants, which may make incorporating the control logic of the solar field integration more difficult (NREL and EPRI 2011). In any case, a version of this application is analyzed in Section 3.3.1, Conversion of FCPP to Non-Coal Fired Energy Options, through the consideration of replacing the FCPP with a solar thermal facility.

The second option for a solar thermal/coal hybrid alternative is to use simple flat-plate solar collector technology to pre-heat feed water prior to steam generation at a coal-fired power plant. This option is carried forward for further analysis below.

#### **3.3.2.1 *Navajo Mine***

Under this alternative, OSMRE would approve the Pinabete permit application and renew the SMCRA permit for the Navajo Mine permit. The Navajo Mine would continue to operate, but at a reduced level of mining and employment to reflect the reduced demand for coal from FCPP.

#### **3.3.2.2 *FCPP***

Under this alternative, BIA would approve the amended lease for the FCPP. The plant would be retrofit with a solar thermal facility for feed water preheating. The solar thermal energy would be thermodynamically integrated with the conventional coal-fired steam cycle, assuming this integration is feasible given the existing configuration of FCPP.

#### **3.3.2.3 *Transmission Lines***

Under this alternative, BIA and BLM would extend the ROW leases for the subject transmission lines. The transmission lines would continue to be operated and maintained as described for the Proposed Action.

#### **3.3.2.4 *Comparison to Selection Criteria***

OSMRE have compared this alternative to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that this alternative would partly meet the purpose and need of the Proposed Action but is neither technically nor economically feasible at this time for application at FCPP. Therefore, this alternative is not carried forward for further analysis in this EIS.

#### **Purpose and Need**

Under this alternative, the Navajo Mine would continue to provide coal to the FCPP but at a reduced level to reflect the reduced demand from FCPP. FCPP would operate as a solar thermal/coal hybrid facility. FCPP would be retrofit to include a new solar facility, and solar energy would be used to preheat the

water prior to the steam cycle, thus increasing the electrical output for a given coal input and reducing the quantity of coal required to produce an equivalent energy output. As such, the plant would continue to provide reliable baseload generation to its existing customers. The subject transmission lines would continue to transmit energy produced at the FCPP. As both the FCPP and Navajo Mine would remain in operation, this alternative would provide for continued employment and economic development of the Navajo Nation and Hopi Tribe. However, there would be a reduced level of employment at the Navajo mine to reflect the reduced coal demand at the FCPP. Because of the reduced levels of employment at the Navajo Mine anticipated for this alternative, it would partially meet the purpose and need of the Proposed Action.

### **Technical Feasibility**

There are currently no existing facilities that have integrated solar thermal energy with coal plants, though pilot projects have been proposed. One of the pilot projects, the Colorado Integrated Solar Project by Xcel Energy, featured a solar field that was integrated with the Cameo Generating Plant, an older coal-fired plant. The project was run with only 4 MW thermal output from the solar field of parabolic trough collectors, which were used for feedwater preheating in the steam cycle, heating water up to 200 degrees Celsius. The pilot plant operated for a short time during 2010, until the coal-fired power plant was retired and decommissioned in late 2010. The results of the pilot project indicated that the solar energy produced by the project increased plant efficiency by only approximately one percent (Xcel Energy 2014). Another pilot project has been proposed for the Escalante coal-fired power station in New Mexico, but has not been commissioned. There are two proposed projects in Australia, however both propose to use solar thermal energy for parallel generation rather than preheating the steam cycle water (series generation) as proposed for the FCPP. Moreover, neither Australian project has been commissioned (Petrov et al. 2012). According to Petrov et al. (2012), the solar pre-heating may not be technically feasible in all applications to existing coal fired power plants. The authors conclude that the technology is most appropriate in augmenting combined cycle natural gas fired power plants, if the facility is located in an area with sufficient space.

No large-scale demonstration projects are currently operational, though one small scale pilot project was operational for several months. The studies suggest that this technology is better suited for combined cycle natural gas fired plants with sufficient adjacent space, and for newer coal-fired power plants that are more conducive to integrating the technology. Although theoretically possible, the existing studies indicate that the application of this approach to FCPP is not technically feasible at this time.

### **Economic Feasibility**

There are no large-scale solar thermal/coal hybrid facilities currently operating in the U.S., and there has only been a small, short term pilot study at a coal-fired power plant. The pilot test indicated a one percent increase in efficiency. There are few data available regarding the cost of these types of installations. A review article of the approach, Petrov et al. (2012) cites a cost of \$2,400 per kW, and that approximately 15 percent of the capacity would be related to solar. At FCPP, which has a total capacity of 1,540 mW, the cost based on these estimates would be approximately \$550 million dollars. This figure is consistent with the finding of Petrov et al. (2012), which states that the approach of feedwater preheating may become a viable option, but that the payback period would be prohibitively long.

#### **3.3.3 Carbon Capture and Storage**

Carbon capture and storage is the process of capturing waste CO<sub>2</sub> from a large source, such as a fossil fuel power plant, and transporting it to a storage site where it is deposited so as not to enter the atmosphere. The objective of the capture and storage activity is to prevent the release of large quantities of CO<sub>2</sub> into the atmosphere.

### **3.3.3.1 Navajo Mine**

Under this alternative, OSMRE would approve the Pinabete permit application and renew the SMCRA permit for the Navajo Mine permit. The Navajo Mine would operate as described under the Proposed Action.

### **3.3.3.2 FCPP**

Under this alternative, BIA would approve the amended lease for the FCPP, and the plant would continue to operate as described under the Proposed Action. However, implementation of this alternative would entail capturing CO<sub>2</sub> emissions from the FCPP, identifying a storage location, and depositing the captured CO<sub>2</sub> into an appropriate geologic formation.

### **3.3.3.3 Transmission Lines**

Under this alternative, BIA and BLM would extend the ROW leases for the subject transmission lines. The transmission lines would continue to be operated and maintained as described for the Proposed Action.

### **3.3.3.4 Comparison to Selection Criteria**

OSMRE and BIA have compared this alternative to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that this alternative would meet the purpose and need of the Proposed Action but is not technically feasible. Therefore, this alternative is not carried forward for further analysis in this EIS.

## **Purpose and Need**

Under this alternative, the Navajo Mine would continue to provide coal to the FCPP as described under the Proposed Action. FCPP would continue to operate as described for the Proposed Action with the addition of the carbon capture and storage operations; therefore, the plant would continue to provide reliable baseload generation to its existing customers. The subject transmission lines would continue to transmit energy produced at the FCPP. As both the FCPP and Navajo Mine would remain in operation, this alternative would provide for continued employment and economic development of the Navajo Nation and Hopi Tribe. Therefore, this alternative would meet the purpose and need of the Proposed Action.

## **Technical Feasibility**

The first large-scale industrial carbon capture and storage demonstration project, Archer Daniels Midland Ethanol Plant in Decatur, Illinois, aims to capture and store 1 million tons of CO<sub>2</sub> per year. The project began operations in 2012 and currently capture and stores approximately 300,000 tons of CO<sub>2</sub> and is planned to increase to 1 million tons of CO<sub>2</sub> per year in 2015. In all, the plant plans to capture more than 2.5 million tons of CO<sub>2</sub> with a scheduled conclusion in the third quarter of 2015. The CO<sub>2</sub> source for this plant is ethanol. FutureGen plans to repower a recently idled coal fired power plant in Meredosia, Illinois. CO<sub>2</sub> emissions will be captured and stored. Construction is expected for 2014, and commencement of carbon capture and storage operations is expected to begin in 2017. Both projects are funded primarily by the U.S. Department of Energy. Several other large-scale demonstration projects focus on carbon capture and storage for enhanced oil recovery, which is not applicable in the Four Corners area. As only one demonstration project is recently operational, it is possible but unknown if implementation of similar technology would be technically feasible at the FCPP.

## **Economic Feasibility**

As no large-scale industrial carbon capture and storage plants currently operate in the U.S., it is unknown if implementation of such technology, at such time as it is developed, would be economically feasible at the FCPP.

### **3.3.4 Implement Highwall or Longwall Mining Techniques**

This alternative was identified in the USACE 404 Assessment for the Pre-2016 Mine Plan Revision and the Assessment for the Pinabete Mine Plan. It calls for recovering coal at the Navajo Mine using highwall and longwall mining techniques rather than surface mining with draglines.

#### **3.3.4.1 *Navajo Mine***

The highwall mining technique uses highwall continuous miners or augers to extract the coal by penetrating into the horizontal coal seams exposed by the highwall or vertical walls in an existing pit. Highwall mining would be completed in conjunction with continued strip mining, because strip mining creates the vertical faces required for auger access. Longwall mining is a type of underground mining done by mining along a coal seam and using hydraulic roof supports above the longwall operation to avoid collapse. Mining with these alternate techniques would occur within the existing approved mine plan to mine coal from remaining reserves in Area II and Area III until 2016, under a renewed SMCRA permit NM0003F. Both techniques yield lower recovery rates, reducing the likelihood that the remaining coal reserves at the Navajo Mine would be sufficient to meet contractual obligations with the FCPP.

#### **3.3.4.2 *FCPP***

Under this alternative, the amended lease for the FCPP would not be renewed, and the current lease would expire in 2016 in conjunction with the expiration of the SMCRA permit for the Navajo Mine. More so, under this alternative the Navajo Mine may not be able to meet contractual obligations through 2016. After coal reserves are exhausted and/or the SMCRA permit expires, APS would shut down Units 4 and 5 in 2016 when the current lease expires and EPA BART rules go into effect.

#### **3.3.4.3 *Transmission Lines***

Under this alternative, the ROWs for the four subject transmission lines would not be approved. As the subject lines primarily transmit power from the FCPP, under this alternative the power source for the transmission lines would be removed. The lines would either be decommissioned and dismantled or left in place, as described for the No Action Alternative.

#### **3.3.4.4 *Comparison to Selection Criteria***

OSMRE and BIA have compared this option to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that using alternative mining techniques does not meet the purpose and need of the Proposed Action. Therefore, this alternative, although considered, is eliminated from further study in this EIS.

#### **Purpose and Need**

Highwall mining would only recover 40 to 50 percent of the coal reserve, as compared to 80 to 90 percent recovery for dragline mining. Longwall mining would only result in 60 to 70 percent recovery because it only would recover a portion of the largest seam and would not be able to recover the other seven or eight smaller seams. In addition, longwall mining would sterilize substantial surface recoverable coal reserves due to subsidence and the inability to physically recover the thinner coal seams. The lower coal recovery rate for both mining techniques would reduce the likelihood that remaining coal reserves would be sufficient to meet contractual obligations. The reduced recovery could be in violation of the “maximum economic recovery” requirements of the Navajo Mine Lease and BLM’s R2P2 mandates. Therefore, this alternative does not meet the purpose and need of the project.

## Technical Feasibility

Applying alternate mining techniques would require many plan revisions and regulatory approvals including:

- An addendum to the current Ground Control Plan
- Revisions to the current Mine Plan
- Revision to BLM's R2P2 for Navajo Mine
- BIA approval to use these mining methods and potential changes to mine lease and trust agreements to adjust the maximum recovery terms for Navajo Mine
- Revision to the air emissions permit for Navajo Mine

Longwall mining also would require a new mine plan for underground operation. The new mining techniques would shift Navajo Mine from a surface mine to an underground mine, which would involve a shift in strategy. Converting to an underground longwall mine would require significant recapitalization and business plan revision. NTEC would need to agree to undertake new business and safety risks associated with these mining methods. Detailed geotechnical evaluations and altered mine planning would be required to deal with the change in strategies. The surface subsidence that occurs with auger and longwall mining would also need to be addressed.

## Economic Feasibility

As Navajo Mine was developed as a strip mine, conversion to these alternative mining techniques would require significant investments in redesign, equipment, and employee training. The capital cost for equipment alone is estimated to be \$300 million. This estimate is based on company experience with development of San Juan Mine. In addition, NTEC would be required to subcontract to a third party because it does not own the equipment or employ workers trained for this mining method. This subcontract would substantially increase operating costs. In 2001, a contractor employed at San Juan Mine to conduct highwall mining operations was estimated to cost about \$5 per ton of coal produced, which is substantially more expensive than current operations.

Further, it is unlikely that highwall or longwall mining would meet the "maximum economic recovery" requirements of the Navajo Mine lease and BLM's R2P2 mandates. In this case, NTEC must comply with its obligations under the coal supply contract through 2041, including coal quality, volume, and timing specifications. Some of the constraints that these factors impose on NTEC include:

- FCPP is a "base load" plant designed to operate 24 hours per day, 7 days per week. In essence, the power plant operates at near peak load continuously to supply electricity for millions of customers in Arizona, New Mexico, and Texas. These conditions require NTEC to develop operation plans that include risk management strategies that ensure a steady, continuous coal supply for FCPP.
- FCPP was designed and constructed specifically to burn low rank, low sulfur, subbituminous coal. Therefore, NTEC must meet coal specifications for heating value, sulfur and ash content so it can be burned in FCPP without damaging the power plant. The quality of the coal that NTEC delivers to FCPP cannot deviate from the narrow range of contractual specifications, even though the quality of the coal can vary substantially. The heating value of coals within Navajo Mine typically ranges from 7,800 to 9,500 British thermal units (Btu) per pound. The target heating value of coal delivered to FCPP under the coal supply contract is 8,700 to 8,750 Btu per pound with a contractual minimum of 8,500 Btu per pound. Therefore, to meet contractual specifications, NTEC must blend coal from multiple locations and seams to create a coal blend that meets the target heating value. To meet FCPP contractual obligations, NTEC maintains 1 million tons of coal as working inventory in stockpiles and pits and 100,000 tons available for coal blending. The

combination of the stockpiled coal and coal available for blending represents about a 1.5-month reserve supply of coal.

- The Navajo Mine Lease and applicable regulations require that NTEC maximize economic recovery criteria of the Navajo Mine coal resource. These obligations restrict operations plans that can “sterilize” coal or eliminate opportunities to recover coal. These requirements also constrain mine operations to consider maximum economic recovery, rather than least-cost recovery.

### **3.3.5 Off-site Coal Supply**

This alternative was identified in the USACE 404 Assessment for the Pre-2016 Mine Plan Revision. This alternative considers supplying coal to meet the contract obligations with FCPP from an off-site source, such as San Juan Mine. A related consideration is that the EPA has suggested that mining coal for export be discussed and evaluated in the alternatives analysis, citing press reports that it is being considered by the Navajo Nation. Coal export would require a change to the mine plan to support export, with an associated NEPA review owing to public controversy. Infrastructure upgrades (roads, rail) would likely also require NEPA review. OSMRE has determined that this alternative is speculative at this point, and were the option considered by NTEC, there would be associated NEPA reviews required that would address the consequences of the plan. It is included in this alternative because the consideration of costs is relevant.

#### **3.3.5.1 Navajo Mine**

This alternative involves continuing to mine at the Navajo Mine as proposed in the No Action Alternative and supplementing these reserves to meet contractual obligations with FCPP by supplying coal from an off-site source. It is estimated that production volumes would decline in 2014 and would need to be supplemented by an off-site source(s) for the remaining 2 years prior to the expiration of the SMCRA permit. Options for off-site coal supply include San Juan Coal Mine, located 5 miles to the north and across the San Juan River, Kayenta Mine, located 10 miles southwest of Kayenta, Arizona, and approximately 160 miles from the FCPP (via available public roads), and El Segundo Mine, located 30 miles north of Milan, New Mexico, and approximately 180 miles from FCPP (via available public roads).

Coal from San Juan Mine is similar to that at the Navajo Mine, whereas other local mines are unlikely to have similar coal quality and, thus, it could not be burned at the FCPP. San Juan Mine has a production capacity of approximately 8 to 9 million tons annually. At this rate, coal reserves at San Juan Mine are sufficient until 2022 to provide coal to the FCPP to meet the shortfalls estimated for the No Action Alternative; up to 4 million tons would be need to be supplied to make up for the shortfall.

#### **3.3.5.2 FCPP**

Under this alternative, the amended lease for the FCPP would be renewed. This alternative would require FCPP to negotiate a lease modification to allow delivery of coal from a source other than the Navajo Mine. Furthermore, San Juan Mine would have to negotiate a modification of its contract with San Juan Generating Station to allow for sale of coal to a third party.

#### **3.3.5.3 Transmission Lines**

Under this alternative, the ROWs for the four subject transmission lines would be approved. Power would continue to be transmitted from FCPP to the southwestern energy grid.

#### **3.3.5.4 Comparison to Selection Criteria**

OSMRE and BIA have compared each of these options to the purpose and need for the Proposed Action and the selection criteria and provide a summary of that evaluation below. Based on this evaluation, it has been determined that supplying coal from an off-site source does not meet the purpose and need of the Proposed Action, is not technically feasible, and has undue economic costs. Therefore, this alternative, although considered, is eliminated from further study in this EIS.

### **Purpose and Need**

Under this alternative, the Navajo Mine would not continue to provide coal to the FCPP after the SMCRA permit expires in 2014. As a result, the alternative would not support continued operations of the Navajo Mine. Therefore, this alternative would not meet the purpose and need of the Project.

### **Technical Feasibility**

This alternative would require FCPP to negotiate a lease modification with the Navajo Nation to allow delivery of coal from a source other than the Navajo Mine. Furthermore, San Juan Mine would have to negotiate a modification of its contract with San Juan Generating Station to allow for sale of coal to a third party. Moreover, third-party resources are not within NTEC's control, so the amount of time it would take to secure the required quantity and quality of coal is uncertain. The logistics of transporting coal from an off-site source would increase the likelihood of coal supply disruptions and would require additional stockpiles and coal quality monitoring. The most likely delivery method would be to truck the coal from San Juan Mine to FCPP, which is approximately 15 miles by available public roads. This would require NTEC and MMCo to obtain state and local approvals and permits to operate coal trucks along a proposed public road delivery route. Moreover, transportation costs would increase the cost of coal supplied to FCPP. A conveyor system could potentially be used to deliver coal from San Juan Mine to FCPP, but this option has high costs and the potential to impact endangered fish and designated critical habitat in and along the San Juan River. Similar obstacles would exist for transporting coal from either the Kayenta or El Segundo mines, with additional difficulties associated with obtaining contracts with other coal companies and approximately 12 times the travel distance. Therefore, this alternative is not technically feasible.

### **Economic Feasibility**

To supply the necessary quantity of coal, San Juan Mine would need to increase its production capacity by approximately 50 percent, and new coal-loading facilities, stockpiles, and mixing and storage facilities would need to be installed so that coal could be blended and stored with coal from the Navajo Mine to ensure that it met quality specifications for FCPP. Coal production costs at San Juan Mine are approximately one-third higher than at Navajo Mine. Transporting the coal to the FCPP also would substantially increase costs. Because of cost and permitting restrictions, the coal would likely be delivered by truck, and operating coal trucks on public roadways would require state and local approvals. It is estimated that 700 truck trips would be required daily. The possibility of using a conveyor was rejected due to high costs and potential impact on the San Juan River. In total, the coal production and delivery costs are estimated to increase more than 300 percent under this alternative.

## **3.4 Summary of Impacts and Identification of Preferred Alternative**

Table 3-11 summarizes anticipated temporary and permanent surface disturbance associated with implementation of the action alternatives. Table 3-12 summarizes anticipated short-term, long-term, and permanent impacts as a result of implementation of each alternative identified in Section 3.2.

NEPA requires that a lead agency identify a preferred alternative. Based on the impact analysis, summarized below and described in detail in Section 4, OSMRE has selected Alternative A, the Proposed Action, as the preferred alternative.

**Table 3-11 Summary of Surface Disturbance for Action Alternatives<sup>1</sup>**

	Navajo Mine Alternative A	Navajo Mine Alternative B	Navajo Mine Alternative C	F CPP Alternative A	F CPP Alternative D	Transmission Lines <sup>1</sup>
SMCRA Permit Area (acres)	5,570	5,412.4	10,093.9			
Pinabete Permit Area – mining (acres)	4,103.5	4,998.0	6,492.2			
Proposed relocation of Burnham Road (miles/acres) (24' width, 8' shoulders)	2.8 miles / 13.6 acres	6.2 / 30.1	6.2 / 30.1			
Temporary surface disturbance for Burnham Road relocation (50' on each side of shoulders)	2.8 miles / 33.9 acres	6.2 / 75.2	6.2 / 75.2			
Haul Road (miles/acres) (assume no additional temporary surface disturbance)	5.2 miles / 63.0 acres	12.6 / 152.7	15.1 / 183.0			
Ancillary roads (miles/acres) (assume no additional temporary surface disturbance)	15.6 miles / 22.7 acres	14.1 / 20.5	14.8 / 21.5			
Length of new powerlines (miles)	7.7	15.5	15.5			0
Ash Disposal areas (acres)				385 acres	350 acres	
Borrow areas (acres)				731 acres	731 acres	

Note: There is approximately 32 acres of overlap between the south borrow area and the DFADAs, resulting in a total disturbance acreage of 1,052 acres.

<sup>1</sup>Surface disturbance for F CPP does not change per alternatives B and C. Surface disturbance for Navajo Mine does not change per Alternative D, and the transmission lines does not change per alternative.

**Table 3-12 Summary of Impacts for all Alternatives Carried Forward for Detailed Analysis**

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**AIR QUALITY**

<i>Navajo Mine</i>					
Air emissions impacts would be negligible.	No impacts	No mitigation measures recommended			
<i>FCPP</i>					
Air emissions would not result in exceedances of any NAAQS. Deposition impacts within 50 kilometers of FCPP would be negligible.	Air emissions would not result in exceedances of any NAAQS. Deposition impacts within 50 kilometers of FCPP would be negligible.	Air emissions would not result in exceedances of any NAAQS. Deposition impacts within 50 kilometers of FCPP would be negligible.	Air emissions would not result in exceedances of any NAAQS. Deposition impacts within 50 kilometers of FCPP would be negligible.	No impacts	No mitigation measures are recommended
<i>Transmission Lines</i>					
Air emissions impacts would be negligible.	No impacts	No mitigation measures recommended			

**CLIMATE CHANGE**

<i>Navajo Mine</i>					
Climate Change impacts would be negligible relative to other sources.	Climate Change impacts would be negligible relative to other sources.	Climate Change impacts would be negligible relative to other sources.	Climate Change impacts would be negligible relative to other sources.	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>FCPP</b>					
Climate Change impacts from stationary sources (Units 4 and 5) would be minor relative to other sources. Climate Change impacts from mobile sources (e.g. vehicles and equipment) would be negligible relative to other sources.	Climate Change impacts from stationary sources (Units 4 and 5) would be minor relative to other sources. Climate Change impacts from mobile sources (e.g. vehicles and equipment) would be negligible relative to other sources.	Climate Change impacts from stationary sources (Units 4 and 5) would be minor relative to other sources. Climate Change impacts from mobile sources (e.g. vehicles and equipment) would be negligible relative to other sources.	Climate Change impacts from stationary sources (Units 4 and 5) would be minor relative to other sources. Climate Change impacts from mobile sources (e.g. vehicles and equipment) would be negligible relative to other sources.	No impacts	No mitigation measures recommended
<b>Transmission Lines</b>					
Climate Change impacts would be minor relative to other sources.	Climate Change impacts would be minor relative to other sources.	Climate Change impacts would be minor relative to other sources.	Climate Change impacts would be minor relative to other sources.	No impacts	No mitigation measures recommended

**EARTH RESOURCES**

<b>Navajo Mine</b>					
Impacts to landforms and topography would be extensive for the life of the mine, but would be considered minor after reclamation.	Impacts to landforms and topography would be extensive for the life of the mine, but would be considered minor after reclamation.	Impacts to landforms and topography would be extensive for the life of the mine, but would be considered minor after reclamation.	Impacts to landforms and topography would be extensive for the life of the mine, but would be considered minor after reclamation.	A minor impact due to a slight alternation in topographic relief would occur compared to pre-mining conditions.	No mitigation measures recommended
Impacts to soils would be minor.	No impacts	No mitigation measures recommended			
Impacts to geological resources and minerals are considered negligible.	Impacts to geological resources and minerals are considered negligible.	Impacts to geological resources and minerals are considered negligible.	Impacts to geological resources and minerals are considered negligible.	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
Impacts to paleontological resources would be major and permanent; at least 43 significant paleontological resources would be physically affected by excavation of the pits in Area IV North and construction of the haul roads.	Under Alternative B, two known significant paleontological resources would potentially be affected.	Under Alternative C, 38 known significant paleontological resources would be affected.	Impacts to paleontological resources would be major and permanent; at least 43 significant paleontological resources would be physically affected by excavation of the pits in Area IV North and construction of the haul roads.	Under Alternative D, two known significant paleontological resources would be impacted within the pre-2016 striplines of Area III.	Any significant existing or new paleontological discoveries encountered during mining or road construction would be appropriately evaluated, mitigated, and curated. The development of an inadvertent discovery plan is recommended to establish the procedures to be followed in the event that fossilized remains are encountered during surface mining operations.
<b>FCPP</b>					
Impacts to landforms and topography would be considered minor.	Impacts to landforms and topography would be considered minor.	Impacts to landforms and topography would be considered minor.	Impacts to landforms and topography would be considered minor.	No impacts	No mitigation measures recommended
Impact to soils would be considered minor. Impacts to geology and mineral resources would be negligible.	Impact to soils would be considered minor. Impacts to geology and mineral resources would be negligible.	Impact to soils would be considered minor. Impacts to geology and mineral resources would be negligible.	Impact to soils would be considered minor. Impacts to geology and mineral resources would be negligible.	No impacts	No mitigation measures recommended
Impacts to paleontological resources would be considered negligible given the eroded nature of the deposits in the area of the proposed DFADAs	Impacts to paleontological resources would be considered negligible given the eroded nature of the deposits in the area of the proposed DFADAs	Impacts to paleontological resources would be considered negligible given the eroded nature of the deposits in the area of the proposed DFADAs	Impacts to paleontological resources would be considered negligible given the eroded nature of the deposits in the area of the proposed DFADAs	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>Transmission Lines</b>					
Impacts to landforms, topography, and paleontological resources would be negligible.	Impacts to landforms, topography, and paleontological resources would be negligible.	Impacts to landforms, topography, and paleontological resources would be negligible.	Impacts to landforms, topography, and paleontological resources would be negligible.	No impacts	No mitigation measures recommended

**CULTURAL RESOURCES**

<b>Navajo Mine</b>					
Development of the Pinabete Permit Area could potentially impact 84 archaeological resources and 6 TCPs. OSMRE is consulting with the Navajo Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) for determinations of Project effects.	Development of this alternative could potentially impact 86 archaeological resources and 3 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Development of this alternative could potentially impact 130 archaeological resources and 6 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Development of the Pinabete Permit Area could potentially impact 84 archaeological resources and 6 TCPs. OSMRE is consulting with the Navajo Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) for determinations of Project effects.	No impacts	A PA for the Navajo Mine is being developed that defines mitigation for adverse effects on historic properties. A draft is included in Appendix B. Otherwise, no additional mitigation is required.
<b>FCPP</b>					
Potential impacts to 20 archaeological resources and 7 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to 20 archaeological resources and 7 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to 20 archaeological resources and 7 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to 20 archaeological resources and 7 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to 20 archaeological resources and 7 TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	A PA for the FCPP is being developed that defines mitigation for adverse effects on historic properties. A draft is included in Appendix B. Otherwise, no additional mitigation is required.

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>Transmission Lines</b>					
Potential impacts to two archaeological resources, three historic resources, and seven TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to two archaeological resources, three historic resources, and seven TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to two archaeological resources, three historic resources, and seven TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	Potential impacts to two archaeological resources, three historic resources, and seven TCPs. OSMRE is consulting with the Navajo THPO and SHPO for determinations of Project effects.	If transmission lines are left in place, no impacts. If transmission lines are dismantled, potential impacts to two archaeological resources, three historic resources, and seven TCPs.	A PA is being developed that defines mitigation for adverse effects on historic properties. A draft is included in Appendix B. Otherwise, no additional mitigation is required.

**WATER RESOURCES / HYDROLOGY**

<b>Navajo Mine</b>					
Hydrologic and water quality impacts would be minor.	Hydrologic and water quality impacts would be minor.	Hydrologic and water quality impacts would be minor.	Hydrologic and water quality impacts would be minor.	Short-term impacts to near-surface and surface water quality could occur.	No mitigation measures recommended
Impacts to groundwater flow would be expected to be moderate due to the long rate of groundwater recovery. Impact to groundwater quality due to a potential increase in total dissolved solids in the Cottonwood Arroyo alluvium would be minor.	Impacts to groundwater flow would be expected to be moderate due to the long rate of groundwater recovery. Impact to groundwater quality due to a potential increase in total dissolved solids in the Cottonwood Arroyo alluvium would be minor.	Impacts to groundwater flow would be expected to be moderate due to the long rate of groundwater recovery. Impact to groundwater quality due to a potential increase in total dissolved solids in the Cottonwood Arroyo alluvium would be minor.	Impacts to groundwater flow would be expected to be moderate due to the long rate of groundwater recovery. Impact to groundwater quality due to a potential increase in total dissolved solids in the Cottonwood Arroyo alluvium would be minor.	Long-term groundwater flow would recover following reclamation of the Navajo Mine.	No mitigation measures recommended

<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Mitigation Measures</b>
<b>Proposed Action</b>	<b>Navajo Mine Extension Project</b>	<b>Alternative Pinabete Plan</b>	<b>Ash Disposal Alternative</b>	<b>No Action Alternative</b>	
<p>Direct long-term, yet negligible, impacts would occur because of reduced runoff volumes to Pinabete and Cottonwood arroyos.</p> <p>Impacts of the mine on the geometry, morphology, or location of the natural stream patterns are expected to be negligible.</p>	<p>Direct long-term, yet negligible, impacts would occur because of reduced runoff volumes to Pinabete and Cottonwood arroyos.</p> <p>Mining would occur within Pinabete Arroyo; therefore, flows from the arroyo would be diverted around mining activities into No Name Arroyo for the duration of the mine period (through 2041), resulting in long-term impacts to hydrology.</p>	<p>Direct long-term, yet negligible, impacts would occur because of reduced runoff volumes to Pinabete and Cottonwood arroyos.</p>	<p>Direct long-term, yet negligible, impacts would occur because of reduced runoff volumes to Pinabete and Cottonwood arroyos.</p> <p>Impacts of the mine on the geometry, morphology, or location of the natural stream patterns are expected to be negligible.</p>	No impacts	No mitigation measures recommended
Permanent impacts to 5 acres of waters of the US.	Permanent impacts to 33 acres of waters of the US.	Permanent impacts to 6.6 acres of waters of the US.	Permanent impacts to 5 acres of waters of the US.	No impacts	Compensatory mitigation for unavoidable impacts to waters of the US would be required under the 404 Individual Permit
<b>FCPP</b>					
Impacts would be negligible.	Impacts would be negligible.	Impacts would be negligible.	Impacts would be negligible.	Evaporation of Morgan Lake would potentially result in elevated levels of heavy metals in lakebed sediments.	Under the No Action Alternative, OSMRE recommends APS conduct heavy metal sampling and analysis and conduct remediation activities as needed at Morgan Lake.

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>Transmission Lines</b>					
Impacts to groundwater would be negligible. Short-term impacts to surface water from the operation of transmission lines would occur only during maintenance and repair to the lines.	Impacts to groundwater would be negligible. Short-term impacts to surface water from the operation of transmission lines would occur only during maintenance and repair to the lines.	Impacts to groundwater would be negligible. Short-term impacts to surface water from the operation of transmission lines would occur only during maintenance and repair to the lines.	Impacts to groundwater would be negligible. Short-term impacts to surface water from the operation of transmission lines would occur only during maintenance and repair to the lines.	Decommissioning and dismantling of the powerlines would result in negligible impacts. If transmission lines are left in place, no impacts would occur.	No mitigation measures recommended

**VEGETATION**

<b>Navajo Mine</b>					
Short-term impacts from vegetation removal would occur. Indirect impacts would be minor.	Short-term impacts from vegetation removal would occur. Indirect impacts would be minor.	Short-term impacts from vegetation removal would occur. Indirect impacts would be minor. Short-term impacts would be greater than, but similar to, those under Alternative A.	Short-term impacts from vegetation removal would occur. Indirect impacts would be minor.	No impacts	No mitigation measures recommended
<b>FCPP</b>					
Indirect impacts would be permanent and minor. Direct impacts would occur resulting in a reduction of overall vegetative cover and permanent loss of productivity during facility life.	Indirect impacts would be permanent and minor. Direct impacts would occur resulting in a reduction of overall vegetative cover and permanent loss of productivity during facility life (these impacts would be proportionally greater than those under Alternative A).	Indirect impacts would be permanent and minor. Direct impacts would occur resulting in a reduction of overall vegetative cover and permanent loss of productivity during facility life.	Indirect impacts would be permanent and minor. Direct impacts would occur resulting in a reduction of overall vegetative cover and permanent loss of productivity during facility life.	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>Transmission Lines</b>					
Impacts would be negligible.	Impacts would be negligible.	Impacts would be negligible.	Impacts would be negligible.	If transmission lines are decommissioned and dismantled, short-term direct impacts to vegetation would occur. If transmission lines are left in place, impacts would be negligible.	No mitigation measures recommended

**WILDLIFE & HABITATS**

<b>Navajo Mine</b>					
Impacts from habitat loss and fragmentation would be moderate. Impacts to wildlife would be considered moderate due to the permanent loss of habitat and potential wildlife mortality from long-term traffic on Burnham road. Impacts from the transportation of coal would be moderate and short-term.	Impacts from habitat loss and fragmentation would be moderate. Impacts to wildlife would be considered moderate due to the permanent loss of habitat and potential wildlife mortality from long-term traffic on Burnham road. Impacts from the transportation of coal would be moderate and short-term.	Impacts from habitat loss and fragmentation would be moderate. Impacts to wildlife would be considered moderate due to the permanent loss of habitat and potential wildlife mortality from long-term traffic on Burnham road. Impacts from the transportation of coal would be moderate and short-term.	Impacts from habitat loss and fragmentation would be moderate. Impacts to wildlife would be considered moderate due to the permanent loss of habitat and potential wildlife mortality from long-term traffic on Burnham road. Impacts from the transportation of coal would be moderate and short-term.	No impacts	No mitigation measures recommended
<b>FCPP</b>					
Minor impacts from air and noise pollution would occur. Impacts would be moderate because of the permanent loss of habitat.	Minor impacts from air and noise pollution would occur. Impacts would be moderate because of the permanent loss of habitat.	Minor impacts from air and noise pollution would occur. Impacts would be moderate because of the permanent loss of habitat.	Minor impacts from air and noise pollution would occur. Impacts would be moderate because of the permanent loss of habitat.	Short-term impacts would occur because of the increased noise and dust during demolition.	No mitigation measures recommended

<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Mitigation Measures</b>
<b>Proposed Action</b>	<b>Navajo Mine Extension Project</b>	<b>Alternative Pinabete Plan</b>	<b>Ash Disposal Alternative</b>	<b>No Action Alternative</b>	
<b>Transmission Lines</b>					
Impacts would be long-term and minor.	Impacts would be short-term and minor.	No mitigation measures recommended			

**SPECIAL STATUS SPECIES**

<b>Navajo Mine</b>					
Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible (and potentially greater than those impacts under Alternative A).	Impacts would be long-term and minor to negligible (and potentially greater than those impacts under Alternative A).	Impacts would be long-term and minor to negligible.	No impacts	No mitigation measures recommended
<b>FCPP</b>					
Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	No impacts	No mitigation measures recommended
<b>Transmission Lines</b>					
Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	Impacts would be long-term and minor to negligible.	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**LAND USE & TRANSPORTATION**

<b>Navajo Mine</b>					
Impacts to land use would be long-term but minor.	Impacts to land use would be long-term but minor.	Impacts to land use would be long-term but minor.	Impacts to land use would be long-term but minor.	No impacts	No mitigation measures recommended
Short-term impacts to traffic would occur due to road realignment, and temporary use restrictions would result in minor impacts lasting the duration of mining.	Short-term moderate adverse disturbance to residential land use would occur. Short-term impacts to traffic would occur due to road realignment, and temporary use restrictions would result in minor impacts lasting the duration of mining.	Short-term minor adverse disturbance to residential land use would occur. Short-term impacts to traffic would occur due to road realignment, and temporary use restrictions would result in minor impacts lasting the duration of mining.	Short-term impacts to traffic would occur due to road realignment, and temporary use restrictions would result in minor impacts lasting the duration of mining.	No impacts	No mitigation measures recommended
<b>FCPP</b>					
Minor impacts to the transportation system would result from increased truck trips delivering ammonia to the power plant.	Minor impacts to the transportation system would result from increased truck trips delivering ammonia to the power plant.	Minor impacts to the transportation system would result from increased truck trips delivering ammonia to the power plant.	Minor impacts to the transportation system would result from increased truck trips delivering ammonia to the power plant.	No impacts	No mitigation measures recommended
<b>Transmission Lines</b>					
No impacts	No impacts	No impacts	No impacts	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**SOCIOECONOMICS**

<i>Population and Demographics</i>					
No impacts	No impacts	No impacts	No impacts	No impacts	No mitigation measures recommended
<i>Economic Background</i>					
No impacts	No impacts	No impacts	No impacts	A major impact would occur from the loss of revenue from fiscal contributions derived from FCPP and Navajo Mine.	No mitigation measures recommended
<i>Indicators of Social and Economic Well-Being</i>					
No impacts	No impacts	No impacts	No impacts	The weakened economy could result in adverse impacts.	No mitigation measures recommended
<i>Navajo Public Services</i>					
No impacts	No impacts	No impacts	No impacts	The reduction in revenues from tax royalties from the Navajo Mine and FCPP would negatively impact the quality and quantity of public services.	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**ENVIRONMENTAL JUSTICE**

<i>Navajo Mine/FCPP/Transmission Lines</i>					
If a breach of the ash disposal impoundments occurred, potential impacts to tribal lands would be minor.	If a breach of the ash disposal impoundments occurred, potential impacts to tribal lands would be minor.	If a breach of the ash disposal impoundments occurred, potential impacts to tribal lands would be minor.	If a breach of the ash disposal impoundments occurred, potential impacts to tribal lands would be minor.	Adverse major impacts related to socioeconomics would occur.	No mitigation measures recommended

**INDIAN TRUST ASSETS**

<i>Navajo Mine</i>					
Potential limited impacts to the value of adjacent land held in trust could occur. Minor impacts would occur to cultural resource Indian Trust Assets (ITAs) and grazing, hunting, and gathering resource ITAs. Minor effects are expected to occur to paleontological resources as a result of the development of the Pinabete Permit Area.	Potential limited impacts to the value of adjacent land held in trust could occur. Minor impacts would occur to cultural resource ITAs and grazing, hunting, and gathering resource ITAs. minor effects are expected to occur to paleontological resources as a result of the development of the Pinabete Permit Area.	Potential limited impacts to the value of adjacent land held in trust could occur. Minor impacts would occur to grazing, hunting, and gathering resource ITAs. Minor effects are expected to occur to paleontological resources as a result of the development of the Pinabete mine. Any impacts to cultural resource ITAs would be minor.	Potential limited impacts to the value of adjacent land held in trust could occur. Minor impacts would occur to cultural resource Indian Trust Assets (ITAs) and grazing, hunting, and gathering resource ITAs. Minor effects are expected to occur to paleontological resources as a result of the development of the Pinabete Permit Area.	Adverse impacts to the economic value of mineral trust assets would occur because royalties associated with the operation of the Navajo Mine would be eliminated.	No mitigation measures recommended

<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Mitigation Measures</b>
<b>Proposed Action</b>	<b>Navajo Mine Extension Project</b>	<b>Alternative Pinabete Plan</b>	<b>Ash Disposal Alternative</b>	<b>No Action Alternative</b>	
<b>FCPP</b>					
Any impacts to cultural resource ITAs would be minor. Access restrictions would be expected to result in minor impacts to grazing, hunting, and gathering resources. Impacts to paleontological ITAs would be minor.	Any impacts to cultural resource ITAs would be minor. Access restrictions would be expected to result in minor impacts to grazing, hunting, and gathering resources. Impacts to paleontological ITAs would be minor.	Any impacts to cultural resource ITAs would be minor. Access restrictions would be expected to result in minor impacts to grazing, hunting, and gathering resources. Impacts to paleontological ITAs would be minor.	Any impacts to cultural resource ITAs would be minor. Access restrictions would be expected to result in minor impacts to grazing, hunting, and gathering resources. Impacts to paleontological ITAs would be minor.	No impacts	No mitigation measures recommended
<b>Transmission Lines</b>					
Potential impacts to groundwater would be negligible, and any impacts to cultural resource ITAs would be minor.	Potential impacts to groundwater would be negligible, and any impacts to cultural resource ITAs would be minor.	Potential impacts to groundwater would be negligible, and any impacts to cultural resource ITAs would be minor.	Potential impacts to groundwater would be negligible, and any impacts to cultural resource ITAs would be minor.	No impacts	No mitigation measures recommended

**VISUAL RESOURCES**

<b>Navajo Mine</b>					
Strip mining would cause long-term "moderately to highly" adverse impact from strip mining.	Strip mining would cause long-term "highly" adverse impact from strip mining.	Long-term "highly" adverse impact from strip mining.	Strip mining would cause long-term "moderately to highly" adverse impact from strip mining.	No impacts	No mitigation measures

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	
<b>FCPP</b>					
The overall impacts from changes to the FCPP would be negligible, and the overall impacts from changes to the DFADAs would be moderately adverse. Therefore, the overall impacts from implementation of the new lease agreement at the FCPP would be low adverse.	The overall impacts from implementation of the new lease agreement at the FCPP would be low adverse. (Same impacts as under Alternative A).	The overall impacts from implementation of the new lease agreement at the FCPP would be low adverse. (Same impacts as under Alternative A).	The overall impacts from changes to the FCPP would be negligible, and the overall impacts from changes to the DFADAs would be moderately adverse. Therefore, the overall impacts from implementation of the new lease agreement at the FCPP would be low adverse.	No impacts	No mitigation measures
<b>Transmission Lines</b>					
No impacts	No impacts	No impacts	No impacts	No impacts	No mitigation measures recommended

**NOISE & VIBRATION**

<b>Navajo Mine</b>					
Noise from mining activities would result in short-term adverse impacts at the closest residence for the duration of mining activity in the nearby area. Noise from blasting operations would be minor. Reclamation activities would result in adverse noise impacts to nearby residents for the duration of activity.	Noise from mining activities would result in short-term adverse impacts at the closest residence for the duration of mining activity in the nearby area. Noise from blasting operations would be minor. Reclamation activities would result in adverse noise impacts to nearby residents for the duration of activity.	Noise from mining activities would result in short-term adverse impacts at the closest residence for the duration of mining activity in the nearby area. Noise from blasting operations would be minor. Reclamation activities would result in adverse noise impacts to nearby residents for the duration of activity.	Noise from mining activities would result in short-term adverse impacts at the closest residence for the duration of mining activity in the nearby area. Noise from blasting operations would be minor. Reclamation activities would result in adverse noise impacts to nearby residents for the duration of activity.	No impacts	Implement measures to reduce noise and annoyance when operations are within approximately ½ mile of a receptor.

<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Mitigation Measures</b>
<b>Proposed Action</b>	<b>Navajo Mine Extension Project</b>	<b>Alternative Pinabete Plan</b>	<b>Ash Disposal Alternative</b>	<b>No Action Alternative</b>	
Ground-borne vibration impacts from blasting operations and coal transportation would be minor.	Ground-borne vibration impacts from blasting operations and coal transportation would be minor.	Ground-borne vibration impacts from blasting operations and coal transportation would be minor.	Ground-borne vibration impacts from blasting operations and coal transportation would be minor.	No impacts	No mitigation measures recommended
<b>FCPP</b>					
Noise from continued operation of the power plant would be minor. Short-term increases in noise during installation of SCR would be minor.	Noise from continued operation of the power plant would be minor. Short-term increases in noise during installation of SCR would be minor.	Noise from continued operation of the power plant would be minor. Short-term increases in noise during installation of SCR would be minor.	Noise from continued operation of the power plant would be minor. Short-term increases in noise during installation of SCR would be minor.	No impacts	No mitigation measures recommended
<b>Transmission Lines</b>					
No impacts	No impacts	No impacts	No impacts	No impacts	No mitigation measures recommended

**HAZARDOUS AND SOLID WASTES**

<b>Navajo Mine</b>					
Any impact from an accidental release or spill of hazardous materials would be negligible to minor.	Any impact from an accidental release or spill of hazardous materials would be negligible to minor.	Any impact from an accidental release or spill of hazardous materials would be negligible to minor. These short-term impacts may be slightly greater than those listed under Alternative A.	Any impact from an accidental release or spill of hazardous materials would be negligible to minor.	Short-term impacts would increase due to removal of ancillary buildings, facilities, and hazardous materials.	No mitigation measures are recommended

<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>	<b>Mitigation Measures</b>
<b>Proposed Action</b>	<b>Navajo Mine Extension Project</b>	<b>Alternative Pinabete Plan</b>	<b>Ash Disposal Alternative</b>	<b>No Action Alternative</b>	
<b>FCPP</b>					
<p>The recommended ammonia option (urea) would have negligible impacts. The other two ammonia options (anhydrous and aqueous) would have moderate impacts.</p> <p>Impacts from a potential accidental release from the surface impoundment dam would be minor.</p>	<p>The recommended ammonia option (urea) would have negligible impacts. The other two ammonia options (anhydrous and aqueous) would have moderate impacts.</p> <p>Impacts from a potential accidental release from the surface impoundment dam would be minor.</p>	<p>The recommended ammonia option (urea) would have negligible impacts. The other two ammonia options (anhydrous and aqueous) would have moderate impacts.</p> <p>Impacts from a potential accidental release from the surface impoundment dam would be minor.</p>	<p>The recommended ammonia option (urea) would have negligible impacts. The other two ammonia options (anhydrous and aqueous) would have moderate impacts.</p> <p>Impacts from a potential accidental release from the surface impoundment dam would be minor.</p>	<p>Impacts to hazardous waste and solid waste would be short-term and predominately associated with disposal of demolition materials.</p>	<p>Location restrictions for new disposal units</p> <p>Operating requirements including fugitive dust controls, run-off controls, and inspection requirements</p> <p>Required use of composite liner</p> <p>Groundwater Monitoring and Corrective Action Requirements</p> <p>Develop closure and post-closure management plan for areas where CCRs have been disposed or where they would be disposed.</p>
<b>Transmission Lines</b>					
<p>An accidental release or spill of hazardous materials used for the transmission lines would be local and negligible to minor.</p>	<p>An accidental release or spill of hazardous materials used for the transmission lines would be local and negligible to minor.</p>	<p>An accidental release or spill of hazardous materials used for the transmission lines would be local and negligible to minor.</p>	<p>An accidental release or spill of hazardous materials used for the transmission lines would be local and negligible to minor.</p>	<p>Impacts associated with decommissioning and dismantling activities would be negligible to minimal and short-term.</p>	<p>No mitigation measures are recommended</p>

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**RECREATION**

<i>Navajo Mine</i>					
Mining construction would result in long-term impacts to the visual character of the area, though the resulting impact on recreational resources would be minor. Long-term impacts would occur resulting in displaced dispersed recreational opportunities. Potential impacts to regional recreational resources would be negligible.	Mining construction would result in long-term impacts to the visual character of the area, though the resulting impact on recreational resources would be minor. Long-term impacts would occur resulting in displaced dispersed recreational opportunities. Potential impacts to regional recreational resources would be negligible.	Mining construction would result in long-term impacts to the visual character of the area, though the resulting impact on recreational resources would be minor. Long-term impacts would occur resulting in displaced dispersed recreational opportunities. Potential impacts to regional recreational resources would be negligible.	Mining construction would result in long-term impacts to the visual character of the area, though the resulting impact on recreational resources would be minor. Long-term impacts would occur resulting in displaced dispersed recreational opportunities. Potential impacts to regional recreational resources would be negligible.	No impacts	No mitigation measures recommended
<i>FCPP</i>					
No impacts	No impacts	No impacts	No impacts	Elimination of water to Morgan Lake would have a major, long-term impact.	No mitigation measures recommended
<i>Transmission Lines</i>					
No impacts	No impacts	No impacts	No impacts	No impacts	No mitigation measures recommended

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Mitigation Measures
Proposed Action	Navajo Mine Extension Project	Alternative Pinabete Plan	Ash Disposal Alternative	No Action Alternative	

**HEALTH AND SAFETY**

<i>Navajo Mine</i>					
Impacts would be negligible.	No impacts	No mitigation measures recommended			
<i>F CPP</i>					
Impacts would be negligible.	No impacts	No mitigation measures recommended			
<i>Transmission Lines</i>					
Impacts would be negligible.	No impacts	No mitigation measures recommended			

This Page Intentionally Left Blank