

Appendix A Mining and Reclamation Procedures

A. GENERAL

A.1 AUTHORIZATION TO MINE

Since the 1970s, Peabody Western Coal Company (PWCC) has been surface mining coal in Navajo County, Arizona through coal leases located within the boundaries of the Hopi and Navajo Indian Reservations. In operation since 1973, the Kayenta mine operates under an Office of Surface Mining Reclamation and Enforcement (OSM) Permanent Program Permit AZ-0001D, originally issued as Permit AZ-0001C, on July 6, 1990. Permit AZ-0001D is renewable at up to five-year intervals and currently authorizes mining operations in active coal resource areas N-9, J-19, and J-21, and in reserve coal resource areas N-10 and N-11 Extension under future mining sequences. These five coal resource areas combined contain enough coal to sustain the Kayenta mining operation through 2026 at the current production rate of 8.2 million tons of coal per year. Permit AZ-0001D has been renewed on three occasions: July 6, 1995; July 6, 2000; and July 6, 2005. The proposed action would renew Permit AZ-0001D to allow continued mining in coal resource areas N-9, J-19, and J-21 through July 5, 2015. Future renewals of the permit beyond July 5, 2015 would require additional action by OSM only after subsequent review of environmental effects in accordance with NEPA at the time.

The following table provides a list of permits or approvals for the Kayenta Mine operations issued to PWCC.

Table A-1 Federal and Tribal Entities and Permitting Requirements

Agency	Permit/Authorization/Filing
FEDERAL	
Army Corps of Engineers	Authorization of Dredge and Fill Activities Authorized under Nationwide Permit 21
Bureau of Alcohol, Tobacco, and Firearms	Explosives Use and Storage Permit
Bureau of Indian Affairs	Approval of Coal Lease on Tribal Coal Approval of Surface Use Agreements Grant of Easement for a Right-of-Way
Bureau of Land Management	Approval of Mine Plans
Department of Transportation	Hazardous Waste Shipment Notification
Environmental Protection Agency	National Pollution Discharge Elimination System (NPDES) Spill Prevention Control and Countermeasure (SPCC) Plan Pollution Prevention Plan Toxic Release Inventory (TRI)

Agency	Permit/Authorization/Filing
Fish and Wildlife Service	Compliance with Endangered Species Act
Mine Safety and Health Administration Safety	Permit and Legal ID Ground Control Plan Major Impoundments Explosives Use and Storage Permit
Office of Surface Mining Reclamation and Enforcement	Permit to Mine EA and Record of Decision Mitigation of Historic Properties and Archaeological Sites
TRIBAL ENTITIES	
Navajo Nation	
Environmental Protection Agency (on behalf of the U.S. Environmental Protection Agency)	Title V Air Permit to Operate Hazardous Waste Permit Stormwater Discharge Permit Public Water System Permit Public Water Systems Construction Permit Clean Water Act Section 401 Water Quality Certification Clean Water Act Section 402
Historic Preservation Department	Mitigation of Historic Properties and Archaeological Sites
Resources Committee	Revocable Use Permit
Fish and Wildlife Department	Biological Investigation Permit
National Heritage Program	Biological Investigation Permit
Department of Water Resources	Notice of Intention to Drill and Abandon an Exploration Well Notice of Intention to Drill, Deepen, Replace or Modify a Well Appropriations of Surface Water Withdrawal and Use of Groundwater Individual Aquifer Protection Permit
Minerals Department	SMCRA Oversight
Hopi Tribe	
Department of Natural Resources	SMCRA Oversight Clean Water Act Section 401 Water Quality Certification Clean Water Act Section 402
Cultural Preservation Office	Mitigation of Historic Properties and Archaeological Sites

A.2 COAL MINING LEASES

PWCC holds coal-mining leases with the Hopi Tribe and Navajo Nation, shown on Figure A-1, to produce up to 290 million tons from the exclusive Navajo Lease Areas (Contract 14-20-0603-8580 originally executed on February 1, 1964) and up to 380 million tons from the Hopi and Navajo Joint Minerals Ownership Lease Area (Contracts 14-20-0603-9910 and 14-20-0450-5743 originally executed on June 6, 1966) for a combined total of 670 million tons. While the specified leased coal tonnages are certain, the assignment of coal parcels to a particular buyer of the coal may change, depending upon customer demand and coal-quality needs.

The coal-mining leases also provide PWCC rights to prospect, mine, and strip leased lands for coal and kindred products, including other minerals, except for oil and gas, as may be found. PWCC also is given the right to construct support facilities such as buildings, pipelines, tanks, plants, and other support structures; make excavations, openings, stockpiles, dumps, ditches, drains, roads, spur tracks, transmission lines, and other improvements; and to place machinery and other equipment and fixtures and do all other things upon the leased lands necessary for the efficient operation of mining. PWCC may occupy that portion of the leased lands as is necessary to carry on mining operations, including right of ingress and egress, and may develop and use water for the mining operations.

A.3 RIGHTS-OF-WAY AND EASEMENTS

There are several existing grants of rights-of-way and easements allowing PWCC access and use of lands outside the existing coal lease areas. A grant of right-of-way and easement for an overland conveyor and coal-loading site was issued to the Navajo Generating Station project participants by the Secretary of the Interior with the approval of the Navajo Nation on December 10, 1969, that was ultimately transferred to PWCC. A grant of right-of-way and easement for two parcels of land providing access for utilities, haul roads, maintenance roads, sediment-control ponds, and a rock-borrow area was approved by the Navajo Nation and BIA on August 19 and 28, 1996, respectively. The BIA with the consent of the Navajo Nation issued a grant of right-of-way for an electrical transmission line on September 9, 1984.

A.4 COAL-SUPPLY AGREEMENTS







PWCC has an amended coal-supply agreement with the participants of the Navajo Generating Station containing a term ending in December 2019. This coal supply agreement provides the right to extend the term for a period or periods of time not to exceed 15 years from April 30, 2011.

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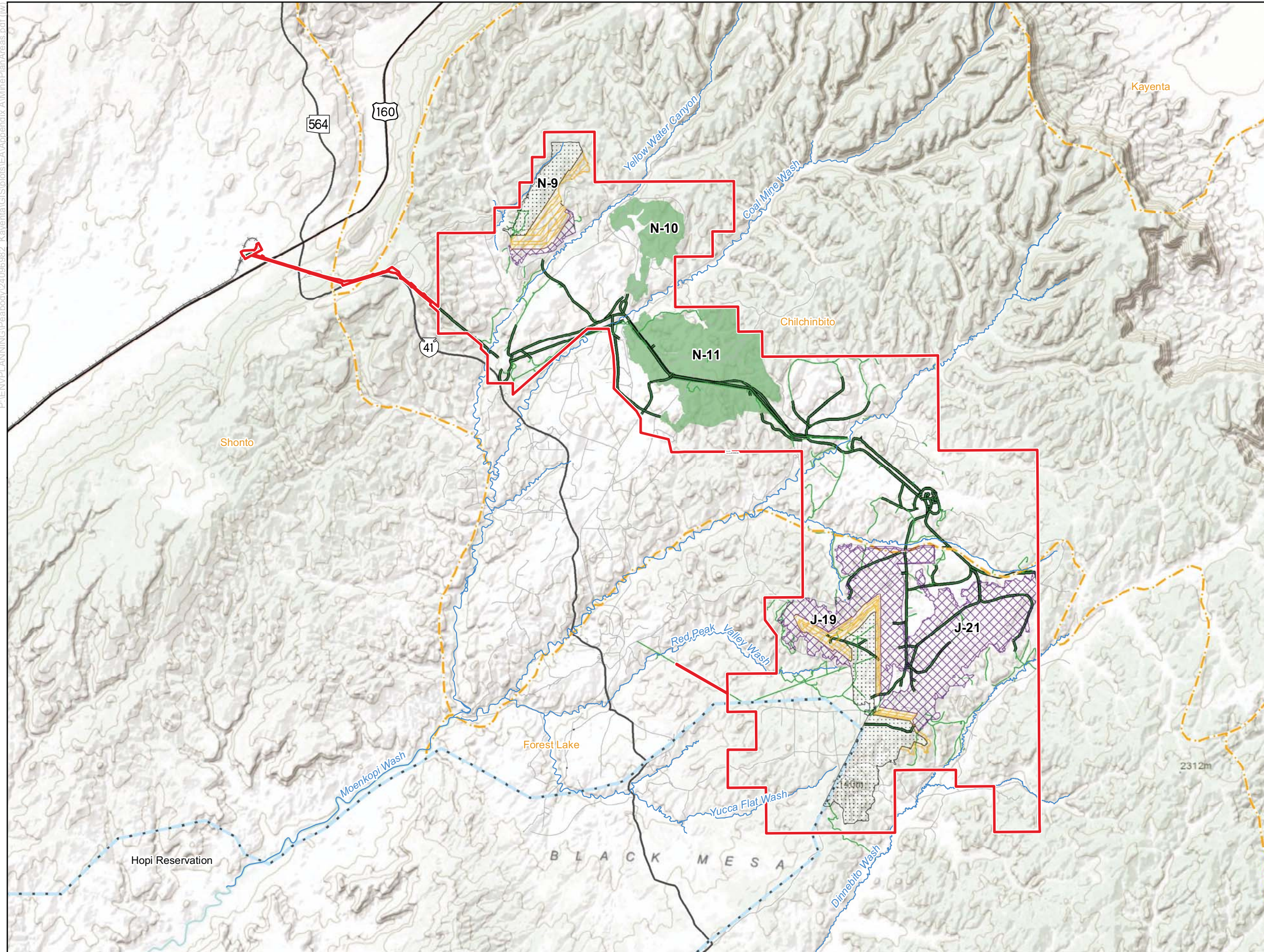
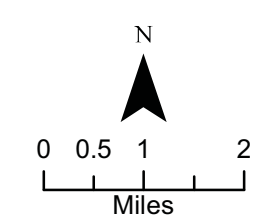
Figure A-1
Mine Plan Areas

Kayenta Mine Permit Renewal EA

Legend

-  Kayenta Mine Permit Area
-  Permit Renewal Period Mine Area
-  Coal Resource Previously Mined Area
-  Future Mine Area
-  Future Project Mining
-  Hopi Reservation
-  Navajo Nation Reservation Chapter Boundary
-  Wash or Ephemeral Stream
-  Highway
-  Rails
- PWCC Mine Road**
-  Primary
-  Ancillary
-  PWCC Mine Road

Source:
Base Map: ADOT 2009, ESRI 2010
Project Data: PWCC 2010, 2011
Imagery: USGS, FAO, NPS, EPA,
ESRI, DeLorme, TANA



B. MINE FACILITIES

This section contains a description of the existing and proposed facilities that do and would support the mining operation. These facilities include water-control facilities, transportation facilities, and other support facilities. The mine facilities within the PWCC lease area but outside the Kayenta Mine permit area have been separately authorized by OSM as part of the Initial Regulatory Program and are authorized for use in Kayenta mining operations in accordance with SMCRA regulations. This Environmental Assessment includes effects from the use of all mine facilities, within and outside the permit area, to the extent such facilities are necessary to the mining operations that would be authorized by the proposed action.

B.1 WATER-CONTROL FACILITIES

B.1.1 Sediment- and Water-Control Facility Plan

PWCC must design, construct, and maintain appropriate sediment-control measures including sediment ponds, diversions, culverts, and other sediment- and water-control structures in accordance with 30 CFR 816.45 in order to prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area due to mining activity, and to minimize erosion. Sediment-control measures include practices used within and adjacent to the mining-disturbance areas. Sediment-control measures consist of the use of proper mining and reclamation methods and sediment-control practices, singly or in combination. Sediment-control methods may include, but are not limited to, the following:

- Disturbing the smallest practicable area at any one time during the mining and construction operation;
- Stabilizing graded material to promote a reduction in the rate and volume of runoff;
- Retaining sediment within disturbed area;
- Diverting runoff away from disturbance areas, including stockpiles, back slopes, and material storage;
- Diverting runoff through disturbed areas using stabilized earth channels, culverts, or pipes so as to prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area;
- Using straw dikes, silt fences, small V-ditches, riprap, mulches, check dams, ripping, contour furrowing, vegetative sediment filters, small depressions, sediment traps, and other measures that would reduce overland flow velocity, reduce runoff volume, or trap sediment; and
- Treating traffic areas with water or dust suppression to reduce the potential for wind and water erosion.

Siltation structures or sedimentation ponds are used primarily for controlling sediment from all disturbed areas, except those permitted areas exempted by the requirements of these regulations. Other alternative sediment-control methods may be used in conjunction with the siltation structures or, in the case of the permitted areas that are exempt (i.e., roads), they may be used individually.

B.2 TEMPORARY SEDIMENTATION PONDS

PWCC constructs sedimentation ponds to control runoff and sediment from disturbed areas pursuant to 30 CFR 816.46, 816.47, 816.49, and 816.56. Sediment ponds generally are recognized in the coal-mining industry as the best available control technology to prevent, to the extent possible, additional contributions of suspended solids sediment to stream flow or runoff outside the permit area due to mining disturbance. All surface drainage from the disturbed areas passes through a siltation structure before leaving the permit area, except in certain small areas that are exempt from these regulations. In the exempt areas, alternative sediment-control methods are used to eliminate additional contributions of sediment off the permit area. Most of the sediment ponds are designed to be temporary, and are reclaimed when they are no longer needed to treat runoff from disturbed areas. Certain temporary ponds may be proposed for permanent retention in the post-mining landscape, but must be upgraded to meet permanent impoundment regulatory requirements.

One hundred fifty six sedimentation structures exist within or adjacent to the Kayenta Mine permit area, and 73 temporary sedimentation structures have been removed and reclaimed as of 2010. During the five-year permit term, PWCC proposes to construct 10 new temporary sedimentation ponds, and plans to reclaim 32 additional temporary sedimentation ponds through 2014.

PWCC plans to construct an additional ten temporary sediment ponds to control runoff from surface coal mining and related activities in the N-9 and J-21 mining areas during the five-year permit term. Seven of these are located in N-9 and within the Moenkopi Wash drainage. Three are in J-21, within the Dinnebito Wash drainage. No additional sediment control ponds are anticipated to be needed in the J-19 mining area during the permit term.

Sedimentation ponds and impoundments are designed to comply with the requirements of 30 CFR 780.11, 780.12, 780.25, 816.46, 816.47, 816.49, and 816.56, and other applicable regulations.

B.3 PERMANENT IMPOUNDMENTS

Fifty-one water sources consisting of three categories of impoundments determined to be needed to provide water for wildlife and livestock have been or are being proposed to exist permanently after mining is completed. These categories include pre-SMCRA internal impoundments, existing and proposed post-SMCRA internal impoundments, and existing and proposed water-control structures (sediment ponds). Nineteen permanent internal impoundments currently exist that are available for wildlife and livestock use as a part of the post-mining landscape. One additional internal permanent impoundment has been approved in the permit application (J-19-RB). It is located in the J-19 coal resource area. In addition, PWCC is proposing 31 existing or proposed temporary sediment-control

structures as permanent impoundments. These include 9 existing Mine Safety and Health Administration structures, 20 existing sediment-control structures, and 2 proposed sediment-control structures. Being multi-purpose structures, these structures are used for sediment control during the life of the mine and reclamation operations and would be converted to permanent structures prior to final bond release.

Mine Safety and Health Administration-Size Impoundment Structures

PWCC uses 11 existing structures that meet the criteria of 30 CFR 77.216(a). Two structures would be temporary and nine structures would be permanent. The primary purpose of these structures, except for the Kayenta mining operation fresh-water pond, is to control sediment from disturbed mining areas. The Kayenta mining operation fresh-water pond's purpose is to hold groundwater pumped from nearby Navajo-aquifer wells used for dust suppression.

B.4 TOPSOIL STOCKPILES

Where prompt replacement of topsoil recovered ahead of mining disturbances is infeasible, numerous topsoil stockpiles are developed throughout the mine areas to store topsoil pursuant to 30 CFR 780.14(b)(5) and 816.22(c) until it is needed for revegetation operations. Stockpiled topsoil remains in place from less than 3 months to more than 10 years, depending on the location with respect to revegetation operations and the revegetation schedule. Stockpile dimensions, slopes, and volumes vary based on total salvage volumes, the configuration of the location site, and proximity to access roads. Using best management practices, stockpiles are placed on a stable site protected from wind and water erosion, and are not disturbed until required for redistribution.

B.5 ROADS

There are four types of roadways inside or crossing PWCC's permit area: primary roads, ancillary roads, non-mining-related roads (i.e., public roads and private roads), and pit ramps or routes of travel that are within the mining and spoil grading areas.

Primary and ancillary roads are located, designed, constructed, used, maintained, and reclaimed in accordance with the regulations and performance standards set forth under 30 CFR 816.150 and 816.151. Appropriate regulatory approval must be obtained for mine-related road crossings of stream buffer zones prior to construction of these crossings.

Within the primary and ancillary road classifications there are five sizes of roads based on use and traffic volume. There are three typical sizes of primary roads: (1) haul roads and mine-vehicle roads; (2) coal-haulage, mine-vehicle, and dragline-deadheading roads; and (3) mine-access roads. Two types of ancillary roads are used by lighter duty vehicles on a less frequent basis to access remote mine-facility sites, such as environmental monitoring sites; the first type is typically a two-lane road where an all-weather road is required to access remote sites, and the second type is usually a single-lane road that follows the natural topography (typically less frequently used than the first type).

All roads used or built by PWCC on or after December 16, 1977, would be reclaimed, unless they have been approved by the regulatory authority as a part of the post-mining land use plan. Because of the size and nature of PWCC's mining activities, very few of the roads in the latter category would be reclaimed until the end of mining activities on the entire leasehold. Exceptions include roads in the immediate vicinity of pits and ramps, which are created in the spoil and reclaimed as the general reclamation activities progress within a specific coal resource area.

B.6 SUPPORT FACILITIES

Support facilities include, but are not limited to, the following: mine buildings, offices and shops, bath houses, storage silos and cap magazines, coal-loading facilities, coal-crushing and -sizing facilities, coal-storage areas, equipment storage areas, water diversions and culverts, sheds constructed on permanent foundations and greater than 100 square feet in size, utilities, permanent fuel-storage and -tank farms, environmental monitoring sites, wells, and railroad and surface-conveyor systems. New support facilities would be approved by OSM prior to construction regardless of their location. All disturbances for construction of facilities to support mining operations are contained within a designated disturbance area. Maintenance of all facilities and reclamation of temporary facilities is in accordance with the approved mining plan.

B.7 PWCC WELL FIELD

Used primarily for mining operations, the PWCC well field consists of eight wells that are located on the PWCC lease area (refer to Map D-2). These previously authorized wells within the PWCC lease area are shown on Map D-2. No new wells are proposed in the current permit renewal application.

C. COAL MINING

This section contains a description of the mining methods, equipment, and coal production rates proposed by PWCC for the Kayenta mining operations for July 2010 through July 2015.

C.1 MINING METHODS AND EQUIPMENT

The mining operation practices a conventional form of strip mining called "area mining" wherein the overburden above the uppermost coal seam and the innerburdens or partings between the lower coal seams are removed in parallel strips across the coalfield until the area is completely mined. The overburden and partings are disposed of behind the active pit in previously mined pits where the bottom seam has been completely removed.

C.1.1 Clearing and Grubbing

Immediately prior to topsoil removal the area to be mined is cleared of large vegetation consisting primarily of piñon and juniper trees to facilitate topsoil recovery. The vegetation debris removed is placed at locations that would not interfere with mining operations. A majority of this material is made available to local residents as firewood and the remainder is either piled at the edges of the mining area to provide cover and nesting habitat for wildlife or buried in the pit during mining operations.

C.1.2 Topsoil Removal

All suitable topsoil is removed from disturbed areas prior to initiating mining or mining-related activities. Prior to the start of removal operations, the proper salvage depth is staked or otherwise identified under the supervision of a soil scientist or other qualified person. Salvage-depth information must be adhered to by equipment operators. Topsoil material is removed throughout the year, weather permitting in 1,000- to 2,000-foot-long by 300-foot-wide sections. It is removed using scrapers or other earth-moving equipment and either hauled directly to recontoured areas for redistribution or transported to topsoil storage areas (stockpiles) located throughout the mine area for storage prior to eventual redistribution. Topsoil materials are removed up to 1,500 to 2,000 feet in advance of the active mining operation (i.e., active pit highwall) for safety and resource protection reasons.

PWCC implements dust control measures for topsoil stripping and redistribution operations. The cut of the topsoil removal areas and the ingress and egress routes to this area are included in watering operations. The ingress and egress routes to the topsoil lay-down area, where the final grading has occurred, also are watered. To reduce compaction, the lay-down area generally is not watered. Similarly, topsoil removal operations that place salvaged soil in stockpiles include watering as described above and often on the stockpile itself. Additional watering operations are conducted in the access routes to and from the equipment parking lot and the equipment parking and support areas.

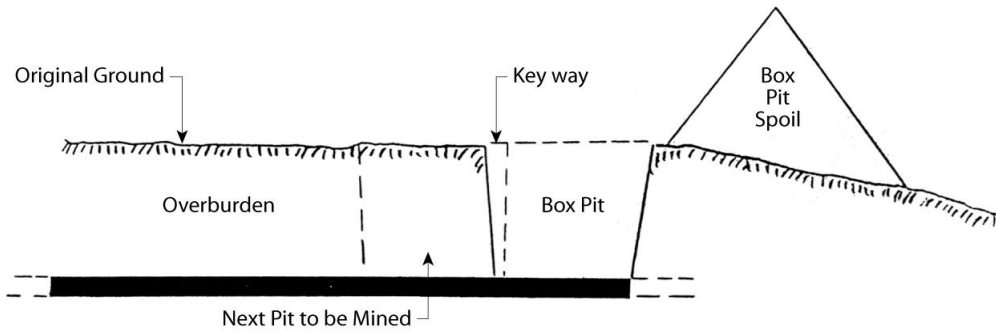
Overburden Removal

After being drilled and blasted, overburden material covering the shallowest coal seam is removed. The overburden is placed in piles in the previously mined pit along the side of the current cut using draglines and auxiliary excavating equipment. This process is repeated in sequential fashion as the pit advances into the coalfield (Figures A-2 and A-3).

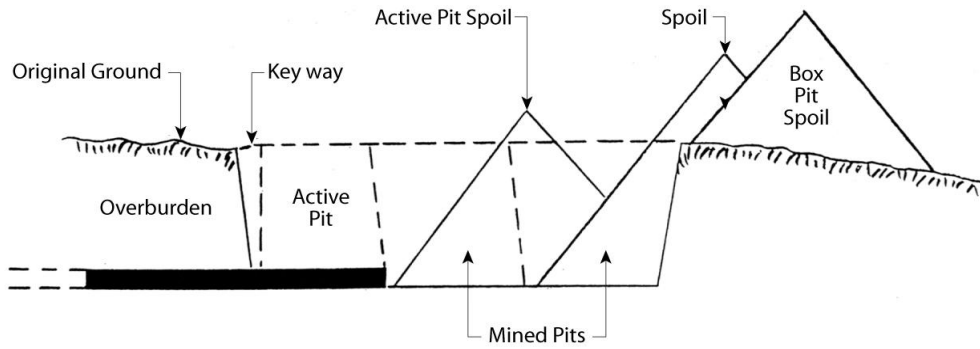
Overburden and spoil material that would be used as topsoil supplements is identified and removed in much the same manner as topsoil material. Topsoil supplements may be handled throughout the year. Topsoil supplements are not stockpiled and therefore are hauled directly to recontoured areas for redistribution.

Draglines are also the primary excavators of partings or innerburdens (material between the coal seams) as thickness and field conditions indicate. Partings may vary in thickness from 6 inches to more than 50 feet in the lateral distance of one cut. After being drilled and blasted, partings are removed and placed within or alongside the cut by draglines, backhoes, bulldozers, and/or truck and backhoe combinations, according to the operational requirements of each pit. Equipment such as trucks and backhoes or loaders and scrapers also may be used to assist with overburden or parting removal. When trucks and backhoes or scrapers are used, excavated material remains in the cut or pit area. A bulldozer is continually assigned to each dragline to perform bench leveling, access road preparation, trailing cable relocation, and miscellaneous duties.

INITIAL BOX PIT (End Cut Method)



SUBSEQUENT PITS



Note: Not to Scale

Figure A-2
Typical Pit Cross Sections

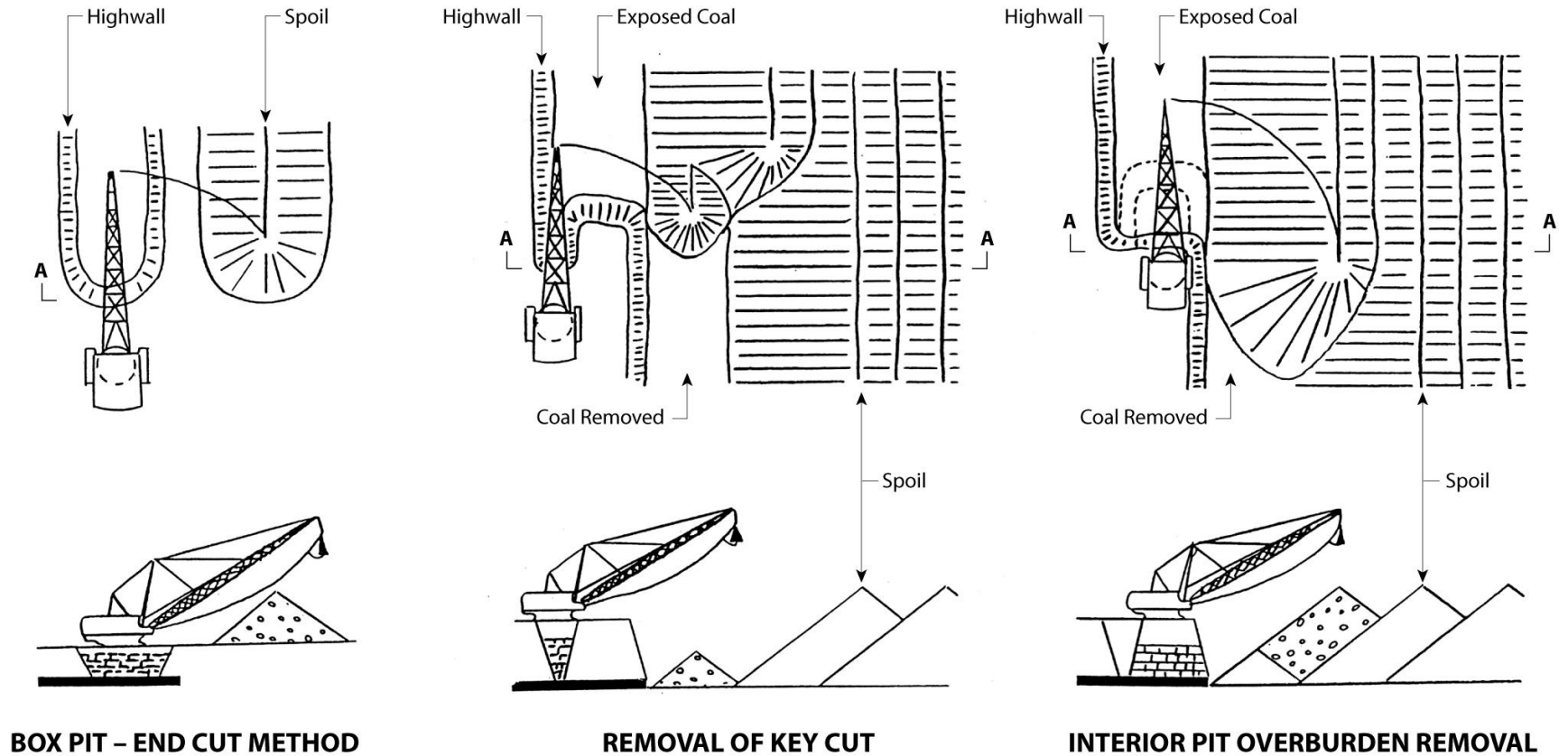


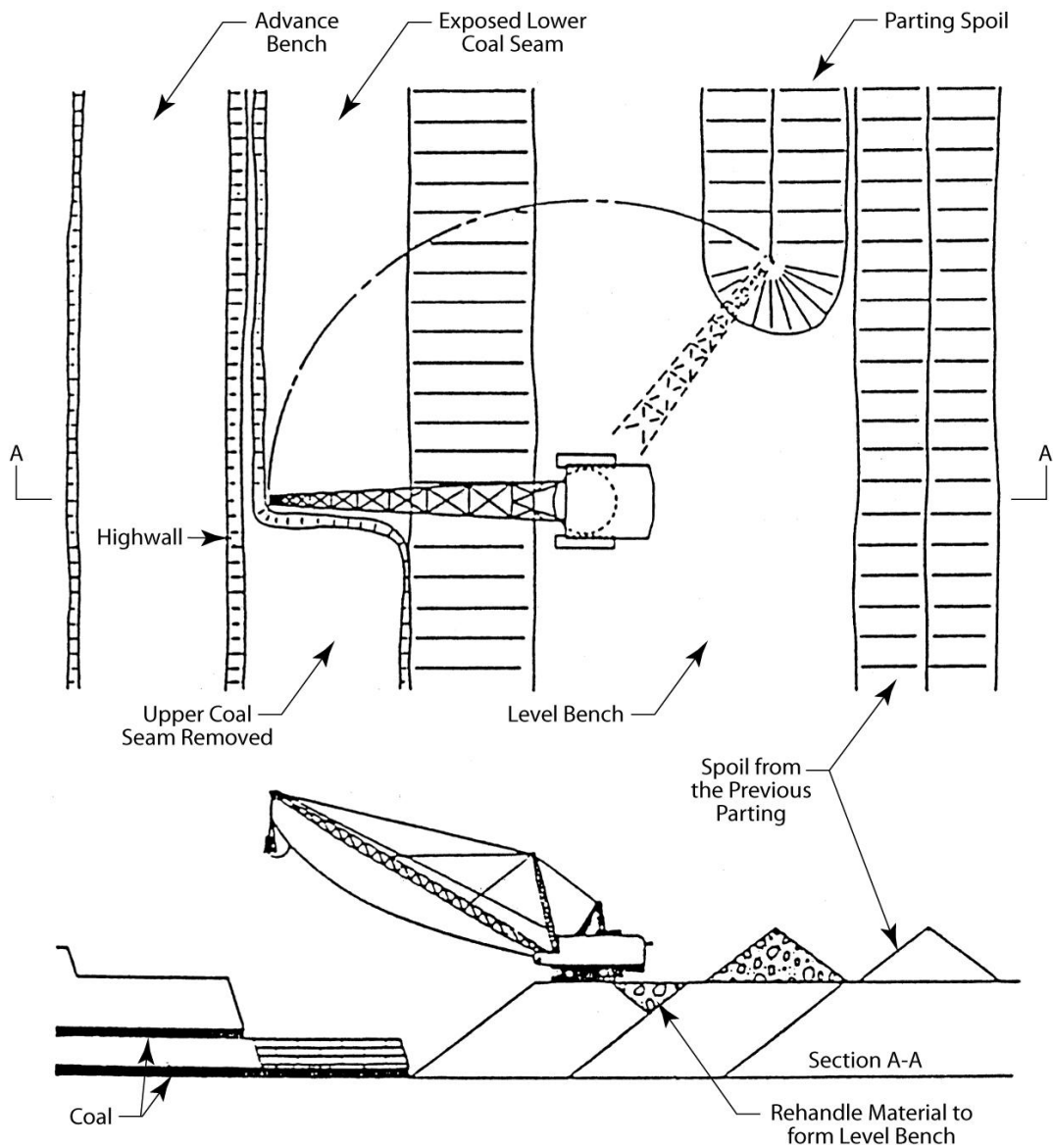
Figure A-3

Typical Pit Cross Section Showing Initial Box Pit and Subsequent Pits

The overburden excavation process begins with the digging of a narrow slot, or key cut, down to the coal seam to establish the highwall (refer to Figure A-3). The location of the key cut and the spoil establishes the width of the pit. The dragline is positioned above the area to be excavated and in line with the direction the cut is progressing. The dragline bucket is lowered to the material to be excavated, drawn toward the dragline, lifted, and swung to the side, at which point it dumps or spoils the excavated material into a previously mined cut or along the side of the cut onto unmined ground. This process is repeated until the entire area in front of the dragline has been excavated. The dragline then is repositioned and begins another key cut and starts the process again. This procedure is followed until the operational limits of the machine are achieved or pit boundaries are reached. At this point, the dragline “walks,” or deadheads, to where the next cut is to begin. The entire process starts again with each successive cut being excavated parallel to the previously mined cut and continues until excavation activities are complete within the pit.

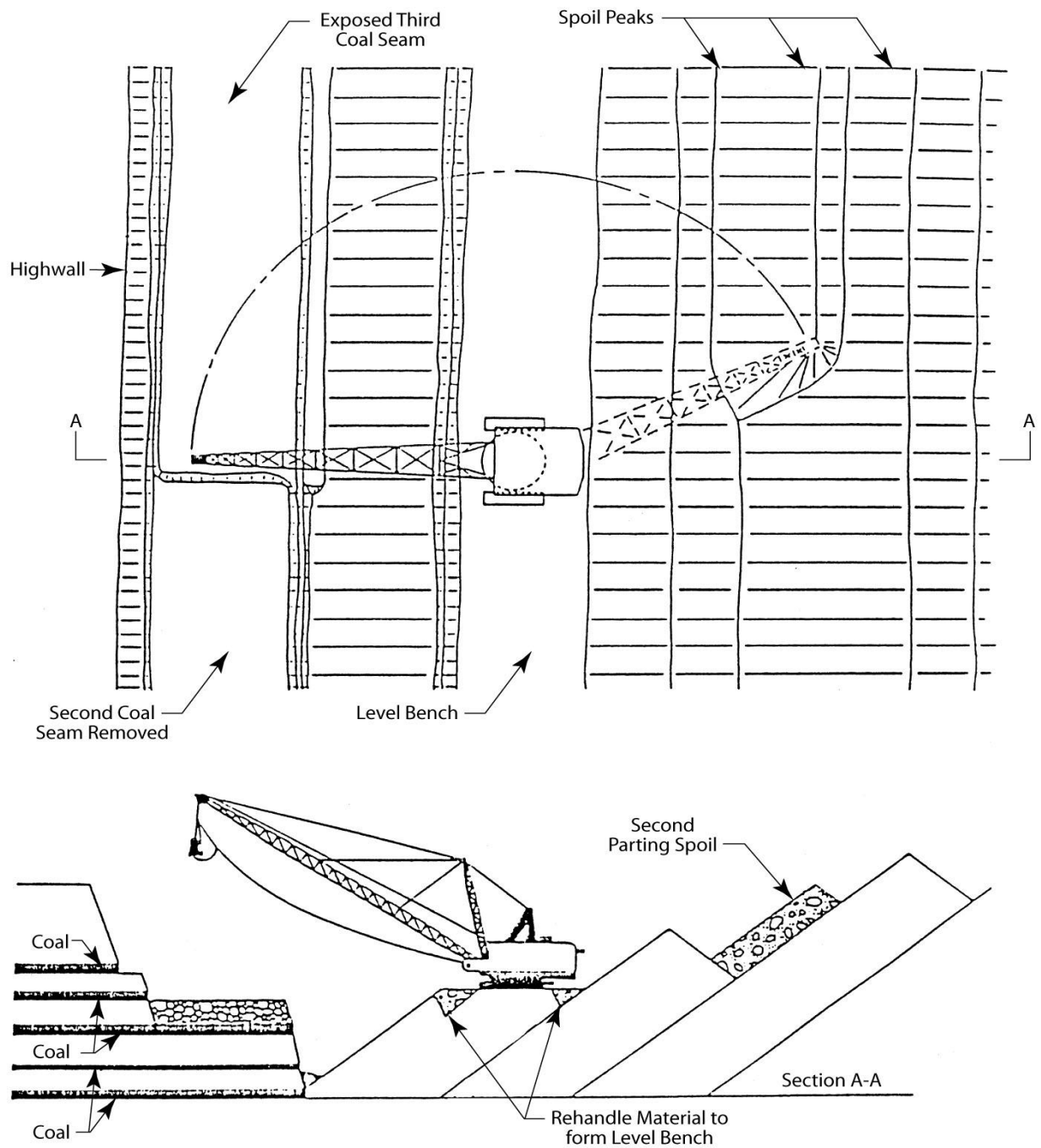
An alternative to the highwall-side overburden excavation process is to level a bench on the spoil side and position the dragline on the spoil side to excavate the overburden and pull back the spoil over the coal seam (Figures A-4 and A-5). The main advantage of this method is to enable the dragline, which has limited operating radius to handle overburden covers of greater depth than would normally be contemplated. Other advantages of this overburden excavation process include better coal recovery in deeper overburden, reduced auxiliary equipment required for overburden excavation, increased spoil stability, reduced material rehandle, and maintaining an adequate pit width. The disadvantages include the need to prepare a spoil-side bench, sequencing the spoil-side benching operation with the pit operations, and increased dragline cycle times.

Typically, in deeper overburden, the upper coal seams may be uncovered on the highwall side and the lower seams uncovered on the spoil side. The positioning of the overburden removal equipment would be determined pit-by-pit to allow the most efficient coal recovery.



PLAN AND CROSS-SECTIONAL VIEW

**Figure A-4
Spoil-Side Overburden Stripping**



PLAN AND CROSS-SECTIONAL VIEW

Figure A-5
Spoil-Side Overburden Stripping

The selection of parting removal equipment is dependent upon the operational requirements within each pit. A dragline generally removes partings in excess of 15 feet; however, it may occasionally remove partings as thin as 5 feet. Backhoes and front-end loaders are used to remove partings that range in thickness from 3 to 15 feet. Occasionally, end-dump trucks are used in conjunction with a backhoe or front-end loader to remove partings within a pit. Bulldozers may remove partings that are less than 3 feet thick by first ripping the parting and afterwards pushing it off the coal seam to be removed.

Once the overburden or parting has been removed from above the coal seam, any remaining overburden material is cleared from the top of the coal seam using rubber-tired or track-type dozers.

The coal seam then is drilled and blasted using the same procedures that are followed to fragment overburden and partings. Rubber-tired front-end loaders and backhoes primarily are used to load the coal into haulage trucks for transportation to preparation areas. Backhoes are used in areas where thicker coal seams are to be loaded and mobility of the loader is not a prime consideration.

Haulage from pits to preparation areas is accomplished by bottom-dump trucks ranging in capacity from 150 to 250 tons. Occasionally, 150-ton end-dump trucks or smaller equipment also may be used. Haulage trucks are routed to pits as necessary to meet production and coal-quality requirements.

C.2 BACKFILLING

When all of the coal has been removed from the pit, overburden from the next parallel cut would be placed in the initial pit for backfilling. This would produce, in effect, an advancing pit that would continue until all the coal has been removed from the given coal resource area.

D. RECLAMATION AND MITIGATION

D.1 SURFACE STABILIZATION

PWCC has developed a plan in the permit application for establishing a reclaimed landscape that would minimize erosion and support post-mining land uses. The plan is currently implemented and is based on 25 years of reclamation operations at the Kayenta Mine. Under this plan, factors such as hill slope gradient and length, soil properties, surface-soil mechanical manipulation techniques, site characteristics, and revegetation practices are evaluated using prescribed criteria to design the surface form, soil placement, and drainage plan. With this plan, soil losses are predicted to be less than soil losses in pre-mining conditions.

D.2 POST-MINING LAND USES

The primary historical land use in the area has been livestock grazing—primarily sheep and goats. In recent years, the numbers of cattle and horses have increased. Other land uses include agriculture (primarily corn production in dry land, small area family plots), gathering of plant materials (for cultural, medicinal, and edible purposes), commercial trapping, various forms of outdoor recreation, and preservation of wildlife habitat. Reclamation efforts at the mine are directed toward restoring the land to be used for livestock grazing, wildlife habitat, and cultural plant use.

D.3 POST-MINING TOPOGRAPHY

Backfilling and grading operations are designed to produce a diverse topography similar to the original premining landform, as discussed above regarding the surface stabilization plan. Overburden that is spoiled in the previously mined pit is graded to eliminate spoil ridges and to produce the approved postmining topography. Material, including highwalls, would be graded to slopes of 3 horizontal:1 vertical or less. Bulldozers, scrapers, and occasionally draglines would perform rough-grading operations. Bulldozers and scrapers are used for final grading.

D.4 MINE-SOIL RECONSTRUCTION

Topsoil and topsoil-supplement redistribution operations ensure the replacement of a minimum of 4 feet of suitable plant growth media for revegetation, of which a minimum of 9 to 12 inches would be topsoil. Coal combustion residuals (byproducts) are not allowed as plant growth media at any permitted surface coal mine including the Kayenta Mine. Graded spoils determined to be suitable as a rooting medium would be covered by a minimum of 9 to 12 inches of topsoil. Graded spoils determined to be unsuitable are covered with a minimum of 4 feet of suitable material (overburden and/or topsoil). Redistribution of plant-growth media is accomplished whenever weather and soil moisture conditions permit, using scrapers, bulldozers, front-end loaders, backhoes, and end-dumps, and miscellaneous support equipment (road graders, water trucks, and farm tractors). This material is obtained from topsoil storage piles or hauled directly from topsoil material removal areas and supplemental sources (highwalls and spoil banks). Scoria or red rock that is suitable for plant growth is used in localized areas for reclamation of cultural plants, woody plants, and wildlife habitat.

Mine spoils are scarified prior to or immediately after topsoil material is distributed, to increase adhesion at the interface between the respective materials and relieve compaction. After redistribution operations are complete, contour furrows are installed perpendicular to the slope, using an offset disk unit with 36-inch disks. Revegetation treatments such as seeding, mulching, and erosion repair are all conducted on the contour to reduce the potential for downslope water flow.

D.5 REVEGETATION PLAN

D.5.1 General

The revegetation plan has been developed to meet the requirements of 30 CFR 816.95, 816.97, 816.111, 816.113, 816.114, 816.116, and 816.133. The plan is currently implemented and is based on 25 years of reclamation operations at the Kayenta Mine. Following topsoil replacement, surface mechanical manipulations, and seedbed preparation, revegetation is completed using a combination of applied seed mixes, mulching, and seedling planting programs. The best technologically available practices are used to accomplish all revegetation activities. The Rangeland Seed Mix, the primary seed mix used for revegetation, is composed of a minimum of 21 species, including warm and cool season grasses, forbs, and shrubs. The predominantly native seed mix is designed to meet the requirements of the above-cited regulations and meet nutritional requirements for livestock and wildlife. The Rangeland Seed Mix is split into drilled and broadcast components based on seedbed ecology needs of the seeded species and physical

seed characteristics. Specialized seeding equipment is used to seed both components at the proper depths in one pass to reduce equipment traffic on the reclaimed surface. Several additional seed mixes are used in revegetating drainages or establishing wildlife habitat and sites for re-establishing cultural plants. The primary seeding season is from May to September, with a secondary seeding season available during spring and fall when ground conditions permit equipment operations.

Immediately following seeding of topsoiled areas, a native grass hay mulch is applied at 2 tons per acre and crimped. Native grass hay is more effective than straw and does not establish volunteer crops. Sites established with suitable plant growth substrates such as red rock or scoria are not mulched because of rough surface configuration and high coarse-fragment content. Following revegetation activities, the reclaimed areas are fenced to exclude livestock and are monitored for establishment. PWCC maintains a twice per year vegetation monitoring and weed program for a minimum of 10 years after reseeding areas. The twice per year vegetation monitoring and weed program identify the measures to control noxious weeds and invasive species establishment.

D.6 CULTURAL PLANT, WOODLAND, AND WILDLIFE HABITAT REVEGETATION

PWCC has developed and implemented a cultural plant restoration program on select reclaimed areas that also serves to reestablish woodland and wildlife habitat. Sites of one to several acres are prepared on north-facing slopes using red rock (scoria) suitable plant growth substrates. These sites are developed to simulate native site requirements of the target species. The sites contain numerous planting microsites due to roughened conditions created during substrate replacement operations. Plant materials are developed from local native seed collections with some regional sourcing as needed to ensure that plants are adapted to environmental conditions at the site and are capable of regeneration. Seedlings from these sources are grown in nurseries specializing in native plants. Specialized nursery cultural practices for the species being grown are used to develop these native plant materials. All seedlings receive mycorrhizal fungi applications for enhanced survivability and growth following planting. This ecological approach considers plant adaptations and symbiotic relationships common to plants in the arid Southwest. Seedlings are specially handled following greenhouse operations and are hand planted in a random distribution in the microsites present in the planting areas. More than 50 grass, forb, shrub, and tree cultural plant species are commonly included in this program.

Piñon/juniper woodland sites are re-established as a part of the cultural plant restoration program. Seedlings of piñon pine, Utah juniper, and to a lesser extent Gambel oak, are included in these planting efforts. Planted tree densities are 250 to 350 stems per acre and the minimum established density is 75 trees per acre. Live piñon transplants from salvage of 3- to 5-foot-tall trees in grubbing areas ahead of mining are transplanted annually to complement tree seedling planting. Approximately 200 trees are transplanted to select reclaimed sites annually during the winter dormant season.

Revegetation practices to restore wildlife habitat include the overall rangeland-seeding program, cultural plant and piñon/juniper woodland restoration, and additional woody species plantings around ponds and small depressions. The revegetation program is designed to establish diverse vegetation capable of

meeting wildlife nutritional needs and other habitat factors such as cover or nesting. High-density shrub areas (greater than 800 stems per acre) are interspersed within the reclaimed landscape. Cultural plant/woodland/wildlife habitat sites also are interspersed within the reclaimed landscape. These features combine to increase edge and habitat diversity.

D.6.1 Revegetation Success

Revegetation success standards and their evaluation are structured to meet the criteria of 30 CFR 816.111 and 816.116. Standards are based on a combination of native reference areas and approved technical standards that reflect environmental site conditions, ecological considerations, and post-mining land uses. The criteria for evaluation follow both 30 CFR 816 requirements and other Federal guidelines and address the parameters of cover, production, woody density, and diversity.

Revegetated areas are included in a spring and fall annual vegetation monitoring program to identify any needed remedial action, document trend and vegetation performance of reclaimed areas, contribute to the database for revegetation success evaluations, and provide data for implementation of post-mining land uses. The vegetation monitoring data are used to establish grazing levels in an approved grazing management program designed to enhance vegetation community characteristics and demonstrate achievable post-mining land uses.

D.7 PROTECTION OF FISH AND WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

D.7.1 General

PWCC's plan for protection of fish, wildlife, and related environmental values addresses the requirements of 30 CFR 816.97. The previous discussion under Revegetation Plan addresses re-establishment, mitigation, and enhancement of vegetative habitat features and needs. Various sections of the approved permit address operations conducted to minimize hazards to raptors from electric power lines and how to design, locate, and operate roads and facilities that avoid or minimize impacts on wildlife and permit passage.

Nonvegetative wildlife-habitat-enhancement-or-replacement features include linear rock features and rock structures established at 1 per 100 acres with specified design criteria in the AZ-0001D permit. Raptor perches are established at a density of 1 per 400 acres. The perches are constructed based on the most appropriate technologically sound design criteria at the time of installation. Permanent impoundments and their numbers have been discussed previously in this appendix. These impoundments significantly enhance habitat, establish wetland vegetation, and provide a critical habitat feature previously not readily available in the pre-mine landscape.

Mine front raptor surveys are conducted adjacent to and within 1/4 mile of active advancing mining operations (currently N-9, J-21, and J-19). These are conducted during the breeding season to minimize and mitigate any impacts to breeding birds and avoidance of activity around nests. Targeted species are

Cooper's hawks and northern goshawks. These surveys have been conducted annually for a number of years and to date none have been observed.

Red-tailed hawk nest monitoring is conducted annually on the PWCC lease area. Additionally, information is gathered throughout the year on the presence of red-tailed hawks. This has been ongoing annually for a number of years.

Gunnison's prairie dog colony assessments are conducted annually on and immediately adjacent to the PWCC lease area. The surveys are conducted to determine the potential habitat suitability for black-footed ferrets and if the minimal requirements present are triggering formal black footed ferret surveys. The annual monitoring has been conducted for a number of years and the colony parameters and requirements for formal black footed ferret surveys have not been detected in the surveys. An added benefit of these surveys is that prairie dog colonies may be a source of mountain plover habitat and the emphasis here and the inclusion of special status monitoring during annual surveys has shown no presence of mountain plover in monitored prairie dog colonies or other areas on the PWCC lease area.

Annual monitoring addresses special status species which include the federal and the Navajo Nation listed endangered, threatened, candidate, and sensitive species of concern. These surveys also look at the presence of suitable habitat, topographic features, and unique areas on the PWCC lease that are or could be important to a variety of wildlife. Mexican spotted owl surveys have been initiated in 2011 in the region on and adjacent to the northeast portion of the PWCC lease area.

Reclaimed area surveys are conducted with the above in mind but with emphasis on reclaimed areas to further broaden the annual wildlife survey base while collecting information to identify species presence and support information as to the success and suitability of the reclaimed areas as habitat for a variety of species.

The annual wildlife monitoring is conducted periodically from February until December with seasonal emphasis based on specific monitoring requirements in the above areas.

D.8 THREATENED AND ENDANGERED SPECIES, AND SPECIES OF SPECIAL CONCERN

Baseline studies and annual wildlife and vegetation monitoring address current species listed as threatened, endangered, or of special concern by Federal, tribal (Hopi or Navajo), or State agencies. PWCC promptly notifies the regulatory authorities of any Federal, tribal, or State listed species occurring on the permit area and would conduct the required mitigation or monitoring following consultation.

Surveys for nesting raptors in advance of active mining operations are conducted annually, and mitigation procedures are implemented as necessary after consultation with the regulatory authority if nesting raptors are located within the survey area. Prairie dog colonies are monitored annually for areal extent and sign of black-footed ferrets. If the size of a prairie dog colony exceeds the minimum acreage requirements in effect at the time, black-footed ferret surveys are conducted in accordance with guidelines specified by

the regulatory authority. Mexican spotted owl surveys and monitoring were conducted over a seven-year period ending in 2000. Consistent with Special Condition 2, Mexican spotted owl surveys would be reinitiated when mining activities are within 2 miles of any known nest site or the mixed-conifer habitat type adjacent to the lease area. Mexican spotted owl surveys have been reinitiated in 2011 as a result of the N-9 mining progression and the requirements of Special Condition 2. Surveys or monitoring have been coordinated with the regulatory authority following approved protocols. Peregrine falcons were delisted in August 1999, and PWCC ended monitoring and breeding surveys in 2000. If listing status for the peregrine falcon changes or if the proximity of mining operations dictates, monitoring would be reinitiated after consultation with the regulatory authority. Mexican spotted owls and peregrine falcons were intensively monitored by PWCC from 1994 to 2000 and 1989 to 2000, respectively, with no apparent impacts on either species.

E. ABANDONMENT OF MINING FACILITIES

Abandonment activities would begin when particular facilities are no longer required to support mining operations. Facilities such as buildings, parking lots, roads, wells, and utilities that are requested to be kept by the tribes would be turned over to them. Other materials having economic value (such as structures and equipment) would be salvaged or recycled. All other materials would be disposed of using approved procedures and in accordance with the Navajo Nation Solid Waste Disposal regulations. All sites would be recontoured to conform to the natural landform, covered with topsoil, and revegetated, using the same post-mining techniques as those proposed for areas disturbed by mining.

In the event that cessation of mining operations was to occur in a coal-resource area with unmined but recoverable coal resources remaining, the following procedures would be implemented. If no further mining operations were to occur in the coal-resource area, final reclamation procedures, including backfilling and grading, topsoil replacement, and revegetation, would be carried out similar to all other areas proposed for mining disturbance as required under 25 CFR 211 and 30 CFR 59 and 132. Accurate survey information at the time of final mining operations would provide the location of final highwalls and coal-recovery limits in case mining is reinitiated at a future date resulting in a minimal loss of the coal resource. These procedures would minimize re-affecting the land in the event of future surface coal-mining operations. In cases where the abandonment is temporary (temporary cessation), the coal seam(s) would be covered, access to the pit area would be blocked, and the highwall would be bermed for safety. Any backfill or cover material that contacts the remaining coal seam(s) would be inert and contain no combustible material. Sediment control and environmental monitoring of the area would be continued. Survey information at the cessation of operations would provide accurate location of the final highwall and coal-recovery limits to facilitate reinitiation of mining operations with minimal loss of the coal resource and minimizing any re-affecting of the land as specified in 30 CFR 59 and 131. The decision to temporarily or permanently abandon operations is dependent on many factors including operational, market, contract, or customer.