SECTION 20

MINING OPERATIONS

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NUMBER

SECTION 20

MINING OPERATIONS

LIST OF TABLES

SECTION 20

MINING OPERATIONS

LIST OF FIGURES

SECTION 20

MINING OPERATIONS

LIST OF EXHIBITS

SECTION 20

MINING OPERATIONS

LIST OF APPENDICES

SECTION 20

MINING OPERATIONS

LIST OF REVISIONS DURING PERMIT TERM

REV. NUMBER	**REVISION DESCRIPTION**	**DATE APPROVED**
14-04	Permit Renewal Update to Text. Page 20-7 and 20-8	

20 MINING OPERATIONS

20.1 Mining Procedures and Techniques

Dragline stripping is the primary mining method used in the Permit Area for multiple coal seam mining. The typical sequence for multiple seam mining is as follows:

1. Vegetation and Topdressing removal (where it exists)
2. Drilling and blasting overburden
3. Overburden removal
4. Drilling and blasting coal
5. Coal removal
6. Drilling and blasting interburden
7. Interburden removal

Steps 6 and 7 are repeated for each additional mineable coal seam.

The coal seams in the Permit Area are exposed in pits ranging in width appropriate for the size of the dragline, in depths from 5 to 240 feet, and in lengths from 1,000 to 15,000 feet. Each pit is stripped by walking draglines in parallel cuts called “strips”.

20.1.1 Vegetation and Topdressing Removal

Past soil investigations have revealed that Navajo Mine has only a negligible topsoil resource within its lease. As such, the material that is suitable for plant growth at Navajo Mine is considered a topsoil substitute. Materials to be used as topsoil substitute at Navajo Mine are denoted based upon their *in situ* location in the soil profile. The material found in the top 60 inches of the soil profile is called “topdressing”, while the material found deeper than 60 inches in the soil profile is called “regolith”.

Navajo Mine will salvage all suitable topdressing for use as topsoil substitute. The maximum extent of allowable disturbance in front of the pit is 1,800 feet beyond the extent of mining (i.e., highwall). Topdressing removal will precede pre-stripping activities where required or to facilitate mining activities where no pre-stripping is required, refer to Overburden Stripping Method in this section. The extent of topdressing removal will fully consider and comply with the applicable hydrology performance standards.

The defined extent of topdressing removal will facilitate the ability to utilize opportunistic direct live haul of topdressing, which may result in increased reclamation success. In addition, the defined extent offers greater flexibility in mining and equipment operations.

Navajo Mine currently has no in situ reserves for Areas 1 and 2. There is in-situ topdressing material remaining in Area 3 and 4 North. This material will be direct hauled to active reclamation areas whenever possible. Topdressing removal activities are conducted in opportunistic blocks that maximize the direct haul and respread of the topdressing into active reclamation plots.

Suitable regolith may be salvaged for use in reclamation as either topsoil substitute or root-zone material, or it may be spoiled if deemed necessary by the operator. Regolith in each resource area (1, 2, and 3) will be salvaged or spoiled depending on the need for topsoil or root-zone material in that specific resource area. Where practical and feasible, regolith that has been found suitable for use as topsoil substitute will be removed for use as topsoil substitute. A large quantity of topdressing and regolith has been salvaged and stockpiled, without segregation in Stockpiles LWR1_RG_N (Lowe Regolith Stockpile #9), LWR4_RG_N (Lowe Regolith Stockpile #10), and DXR1_RG_W (Dixon Regolith Stockpile #3). Regolith stored in these stockpiles has been adequately sampled and consist of materials that are considered suitable for use as topdressing substitute and root-zone material. Therefore, no further sampling and analysis will be required on regolith stored in these specific stockpiles.

If stockpiling of the topdressing and regolith is necessary in the future, the topdressing and regolith will be segregated and stockpiled in separate piles.

20.1.2 Topsoil Substitute - Topdressing Sampling

An intensive pre-salvage soil-sampling program is conducted to identify soil material suitable for topsoil substitute. The methodologies utilized in the sampling program are in part based on the Soil Resources of the Navajo Mine (Part 2 Section 14 – Soil).

Soils are sampled on a square grid basis at 200-foot centers. This spacing results in a sampling density of approximately one sample per acre. The density and location of sampling is based on conditions observed during the development of the detailed soil survey (Part 2 Section 14 – Soil). Badlands and Natrargids, which lack perennial vegetation, are typically unsuitable sources of topsoil substitute at the Navajo Mine; therefore they are not sampled. As personnel at Navajo Mine gain experience with the pre-disturbance sampling and salvage program, efforts will be made to refine the sampling density. Homogeneous mapping units will require less intensive sampling than heterogeneous mapping units. The proposed sampling density is designed to adequately sample the most heterogeneous mapping unit.

At each soil sample site, a pit is excavated to either an observable unsuitable layer (e.g., bedrock, paralithic contact, extreme clay accumulations, rock fragments, or extremely hard consistence) or to a depth of five feet. Five (5) feet is the maximum depth that Navajo Mine will allow personnel to sample within a pit. Depths of greater than 5 feet create a safety hazard because it exposes personnel to the possibility of collapsing walls. Samples for analyses are taken by a soil scientist from representative soil horizons, except A and E horizons, if present, through the 5-foot profile. Each sample is described as to depth, dry consistence, texture, and other physical characteristics that aid in the classification of the material. Field notes for each sample and soil profile are collected and maintained on file at Navajo Mine. If it is not feasible to remove a sample of the unsuitable layer, the characteristics and depth of the layer are included as part of the field notes. Once an unsuitable layer of soil is identified, sampling does not continue below that depth.

Soil samples are sent to a soil analytical laboratory for the following analyses to determine topsoil substitute suitability.

1. pH
2. Electrical Conductivity (EC)
3. Soluble Ca, Mg, Na - Sodium Absorption Ratio (SAR)
4. Saturation percent
5. Texture
6. Extractable Selenium

The suite of parameters used to evaluate topsoil substitute suitability was revised based upon an analysis of historical sample data, conducted in December 2001, from more than 5,000 samples. This analysis provided the justification for eliminating carbonate percentage, acid-base potential, boron, and total selenium from the analytical suite. The justification showed that eliminating these parameters from analysis would not adversely affect the suitability of reconstructed soils or reclamation success.

The soils are analyzed using the methodology outlined in Table 20-1. Determination of topsoil substitute suitability is based on the OSMRE Topsoil And Topsoil Substitute Suitability Criteria For The Southwestern United States as presented in Table 20-2. Soils that have one or more characteristics that are rated unsuitable are not salvaged for use as topsoil substitute.

Each sampling location is identified in the field by survey lath marked with the pit identification number. A 1:6000 scale map is constructed showing the location of each sample point along with the assigned pit identification number.

Soil analyses received on a yearly cycle from 1 through June 30 will July be forwarded annually to the Office of Surface Mining on or before August 31. The analyses are filed with the corresponding pit identification number and sampling depth. A map showing the location of each sampling site and the field descriptions are also submitted.

20.1.3 Topsoil Substitute - Regolith Sampling

When regolith is to be used as topsoil substitute or root-zone material, it will be sampled in situ and must meet the suitability criteria as outlined in Table 20-2. Regolith will be analyzed for the parameters listed in Table 20-2. Sampling will be conducted with a drill rig using a core barrel auger in areas where the baseline soil survey and pre-strip topdressing survey indicate potential sources of suitable regolith below five feet. Soil samples will be collected in continuous five-foot intervals to bedrock, or the desired sampling depth, from drill holes located on 800-foot centers.

Stockpiled regolith located in Stockpiles LWRI RG N, LWR4 RG N, and DXR1 RG W has been adequately characterized and is considered suitable for use as topsoil substitute and root-zone material. No additional sampling and analysis will be required for regolith materials stored in these particular stockpiles.

Sampling and analysis data for *in situ* material will be submitted on or before August 31 of each year and will include information for the period between July 1 and June 30. After submission of sufficient representative data, an application may be made to OSM to reduce sampling density or eliminate it altogether

20.2 Major Mining Equipment

Table 20-3 lists typical major mining equipment used in the Permit Area at Navajo Mine. The pieces of equipment are subject to change during the permit period due to equipment outages and replacement schedules.

20.3 Coal Production

20.3.1 Overburden Drilling and Blasting

After the suitable topdressing material has been removed, rotary drills are used to drill overburden blast holes. Blast hole diameter ranges from 5 inches to 10-5/8 inches. Blast holes are typically drilled to the top of coal. To prevent coal shattering and accompanying coal loss from overburden blasting, blast holes are drilled until coal is encountered and backfilled with 1 to 10 feet of drill hole stemming. On some cast shots holes may be drilled to a specified elevation of three to seven feet above the coal seam and not backfilled to reduce coal loss due to the movement of the overburden over the coal seam.

Once the rotary drill has completed drilling a block of blast holes, the holes are then loaded with bulk explosives. ANFO or a mixture of ANFO and emulsions are the most widely used blasting agents; however, some slurries may be used in wet areas. The explosive column is detonated by a 1/2 to 3 pound primer initiated with either a non-electric detonating cord, an electric blasting cap, or an electronic blasting cap. Normally, to ensure proper blast sequencing, the shots are controlled using in-hole delays and/or surface delays.

20.3.2 Overburden Stripping Methods

Overburden and interburden material is primarily removed with walking draglines to expose the coal seam by taking parallel strips ranging in width appropriate for the size of the dragline. A minimum pit width of 100 feet is required to facilitate the mining equipment. The overburden is removed using the dragline in a series of blocks the length of which depends on the particular pit geometry. The material is spoiled into the previously mined out strip as shown in Figure 20-1.

Generally, two methods of stripping are employed. The first is conventional side casting, which is generally employed on the upper seams. The second is conventional spoil-side stripping, which is used on the lower seams. The geologic conditions, such as depth of coal and the number of coal seams, along with the size of dragline and basic configurations, determine the methods of stripping employed in any given pit.

In addition to the primary dragline stripping, dozers and trucks are utilized in overburden / interburden removal in conjunction with the dragline methods. Dozer and truck stripping is utilized to buffer inventory lows and to remove overburden in isolated areas where dragline stripping is not logistically practical (e.g. mesas, very short pit lengths, short pit extents, etc.). In addition, trucks and dozers are utilized on thin burdens where dragline operations are not effective (within dragline pits).

<u>20.3.2.1</u> <u>Typical Strip Layout</u>

At the Navajo Mine, the pit names are also associated with area names such as; Area 1, Area 2 and Area 3. The progression of uncovered coal is in linear strips as shown on Exhibits 2-1 and 2-2. Pre-stripping is done in the deeper parts of Area 3 and Area 2 to keep the total pit depth for the dragline under 200 feet. Pre-Stripping is accomplished using a fleet of end-dump haul trucks and a front-end loader. Pre-Strip material will be removed in front of the active mining strip and placed in final grading areas. Information compiled from Exhibits 2-1 and 2-1 is on Table 20-4 (Areas Mined by Year). The table summarizes pit locations, mining sequences, start and end dates of mining and approximate acres disturbed.

Refer to Exhibit 2-1 for Area 2. The current active pits in this area are Hosteen/Yazzie and Yazzie Overlook. Pre-Stripping with a truck and loader fleet will occur for the entire area. Exhibit 2-2 provides specific stripping sequence by permit term year. Upon finishing the Hosteen/Yazzie and Yazzie Overlook pits, coal-mining activities in Area 2 will be complete.

For Area 3, refer to Exhibit 2-2. The current active pits in Area 3 are Lowe and Dixon pit. Exhibit 2-2 provides specific stripping sequence by permit term year. Pre-Stripping with a truck and loader fleet in Area 3 will continue 4 strips ahead of the active mining strip. Lowe pit will be mined out ahead of Dixon pit. Upon finishing Dixon pit, coal-mining activities in Area 3 will be completed.

For Area-4 North, refer to Exhibit 2-2. Area 4 North will become active in Pit development in Year 1 and will begin mining in Year 2. Area 4 North will remain active throughout the permit term. Upon finishing Area 4 North pit, coal-mining activities in Area 4 North will be complete.

20.3.3 Coal Removal

After the coal is exposed by the stripping operation it is drilled and blasted for subsequent mining. After a block of blast holes is drilled they are normally primed with a booster and detonating cord or non-electric blasting caps. Surface delays are used to ensure proper blast sequencing. Then the holes are loaded with ANFO, or in wet situations with an emulsion/ANFO blend or bagged slurry product. Thin coal seams are normally ripped with dozers rather than blasted. Once the coal is broken up it is mined by front-end loaders. The entire thickness of the coal seam is mined in one pass except where a major shale parting or coal quality makes a distinct division in the coal seam. In this case, the top part of the seam is mined by the front-end loader, then the parting is ripped by dozers and pushed into the adjoining spoil area. Finally the rest of the seam is mined with the front-end loaders. The face of the coal is generally across the width of the pit and is advanced evenly. The top of the coal is cleaned using small front-end loaders with the diluted coal piled on the spoil side of the pit.

Although operations at the Navajo Mine are engineered and designed to recover the maximum amount of coal, a small percent of coal is lost as coal wedges, coal ribs, and the top and bottom of coal seams. There are a number of operational and safety related conditions which necessitate limited coal losses. In general, two types of wedge losses occur; a wedge left on upper seams in multiple seam pits as a safety berm and a wedge left on spoil encroached seams as a spoil barrier. A small percent of coal may be lost on the top and bottom of the coal seam and as coal ribs due to the geologic condition of the coal and due to the equipment utilized in the stripping and mining sequences.

When mining multiple seams, upper seams are mined from benches where the bottom of coal elevation is higher than the toe of the spoil. When these conditions are encountered, a wedge of coal is typically left as a safety berm which prevents trucks and loaders from accidentally going over the highwall. Once the coal seam has been mined out, front-end loaders are used to recover as much of the wedge as possible.

When a seam is spoil encroached the coal wedge acts as a spoil barrier, contributing to spoil stability and reducing the occurrence of loose material rolling into the active pit. Both spoil slides and loose material rolling into the pit are potentially serious safety hazards. Once the seam has been mined out, front-end loaders are used to recover as much of the spoil-side wedges as safely possible.

A mine railroad system and a fleet of bottom-dump trucks constitute the coal haulage system. In most pits, the coal is loaded into the trucks which travel up the pit ramps to the major haul roads where the coal is stockpiled next to the rail system. Within an approximate 6.5 mile radius of the power plant the coal can be hauled directly from the pits to the processing plant.

At the stockpile front-end loaders are used to load the coal into rail cars for dumping at the processing plant. Normally, one electric locomotive pulls approximately 20 cars from the stockpiles to the processing plant.

Navajo Mine has a contract with the owners of the Four Corners Power Plant to provide coal for the power plant through the year 2031. The tonnage per year is subject to change depending on the Four Corners Plant's demand for power, the availability of the mining equipment and possible additional sales generated through future contracts. The anticipated tonnages to be mined from the Permit Area for the five fiscal years of the permit are discussed in this Section.

20.3.4 Annual Coal Production

Navajo Mine has a contract with the Four Corners Power Plant to provide coal for the power plant through July 2031. Table 20-5 lists the anticipated tonnage to be mined from the entire lease for each fiscal year of the permit term and 5-year blocks beyond that time. The production quantities listed below are estimates based on the current mine plan and are subject to change.

Each year's total tonnage may be subject to change depending on the Four Corners Plant's demand for power and availability of mining equipment. Exhibits 2-1 and 2-2 show the anticipated areas to be mined during the permit period.

20.3.5 Historic Coal Combustion By-Products Disposal

Between 1971 and January 2008 NTEC placed Coal Combustion Byproducts (CCB) from Four Corners Power Plant (FCPP) in mined-out pits or ramps at Navajo Mine. NTEC does not intend to use CCB materials for future reclamation within the permit boundary. The following permit text is maintained for historical context.

Under Navajo Mine's fuel supply contract with Arizona Public Service (APS), Navajo Mine accepted Coal Combustion Byproducts (CCB) or ash, from Four Corners Power Plant units 4 and 5 for disposal in final pits and ramps. CCB disposed of at Navajo Mine included: fly ash, scrubber sludge and bottom ash. In general, the major chemical constituents of CCB disposed of at Navajo Mine include: Silicon Dioxide (SiO_2), Aluminum Oxide (Al_2O_3) and Calcium Sulfite ($CaSO_3$) (see the Leach Study, Appendix 20.A).

Fly ash and bottom ash are generated by the combustion of coal at Four Corners Power Plant. The fly ash is collected in emission control baghouses. Fabric bags in the baghouses act as a filter removing the fly ash from the flue gas stream of units 4 and 5. Ash too large to be carried by the flue gas to the baghouse falls to the bottom of the boiler during the combustion process and is removed as bottom ash. Scrubber sludge is the byproduct of removing SO_2 from the flue gas. The SO_2 reacts with lime to form calcium sulfite and calcium sulfate.

20.3.5.1 Ash Disposal Areas

Historic Ash disposal locations at Navajo Mine through January 2008 on interim and permanent program areas are shown on Exhibit 20-1.

20.3.5.2 Ash Disposal Method

The haulage and disposal of CCB utilized any of the equipment listed in Section 11.4 of the PAP. Typically, ash was hauled in 85-ton end dump trucks and is dumped into the pit. A dozer was used to push ash into the backfilled pit and for dump site maintenance. When equipment or other needs dictate, a single lift or multiple lifts were used to backfill the pits and ramps. A grader and water truck were used to maintain the ash haul road and to control fugitive dust.

20.3.5.3 Ash Regulatory Compliance

In 1993 the United States Environmental Protection Agency (U.S.EPA) made a final regulatory determination that CCB are exempt from regulation as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act (RCRA, 58 FR 42466, August 9, 1993). In its regulatory determination, EPA concluded that the State or Tribal industrial solid waste management programs implemented under Subtitle D of RCRA were adequate regulatory controls for managing the disposal of CCB.

The Navajo Nation codified the Navajo Nation Solid Waste Act on 18 October 1990 (4 N.T.C. 101 as amended by the Navajo Nation Council Resolution No. CJY–51– 97) and finalized their regulations on February 1, 1999. The Navajo Nation Solid Waste Regulations specifically excludes CCB from the definition of a Solid Waste. Based on this exclusion, CCB are not regulated as a solid waste. In accordance with the following documents, NTEC had the right to dump CCB (ash) on leased premises. A mining lease between the Navajo Nation and NTEC (Utah Construction Company) dated July 26, 1957 and the subsequent amendments. Resolution ACAP-43-68 of the Advisory Committee of the Navajo Tribal Council dated April 15, 1968, Approval of Resolution ACAP-43-68 by the Bureau of Indian Affairs dated May 15, 1968. Copies of these documents will be kept on the mine site at all times and may be reviewed by the regulatory authority upon request.

20.3.5.4 Coal Combustion By-Products Characteristics

A description of the physical and chemical properties of the CCB is contained in Appendix 20.A.

20.3.6 Waste Handling, Storage, Transportation, and Disposal

Coal waste materials are routinely cleaned up around the mine and coal plant then disposed of in the mine pit. Disposal of this material performed using end dump trucks with the material placed along the bottom of a pit adjacent to the wedge or spoil side. Coal not meeting contract specifications is disposed of in a mine pit.

20.4 Non-coal Mine Waste Disposal

Municipal trash from Navajo Mine operations is disposed of in the San Juan County Regional landfill (Appendix 20.B). This material is accumulated in dumpsters located around the site and transported to the landfill by a contractor.

Materials classified as hazardous by the Environmental Protection Agency (EPA) are accumulated, managed, and disposed of following applicable U.S. and Navajo Nation EPA (Appendix 20.C), Department of Transportation (DOT), and Office of Safety and Hazard Administration regulations. Non-hazardous materials that can be recycled or reused, are accumulated, managed, and recycled or reused following applicable EPA regulations. The nonhazardous materials that cannot be recycled or reused are accumulated, managed, shipped offsite and disposed of following applicable EPA and DOT regulations. Railroad ties are stored and reused on the mine site or offsite for landscaping. Railroad ties are not disposed of on the mine site. Ties that cannot be reused are disposed of following the applicable environmental standards.

20.5 Blasting Operations

Navajo Mine complies with the following laws governing the use of explosives where applicable:

- 26 CFR Part 181 "Commerce in Explosives",
- 30 CFR Part 77 "Mine Safety and Health Regulations"
- 30 CFR Part 816 "Permanent Program Performance Standards - Surface Mining Activities"

All blasting at the Navajo Mine is conducted under the supervision of OSM certified blasters. The blaster and one other person present at the firing of a blast and all personnel responsible for blasting operations will be familiar with the blasting plan and site specific performance standards.

All drill and blast designs will be approved by a certified blaster. The design will contain drill patterns, delay periods, tie in description, amount and type of explosives used, and pertinent data of the closest structure.

Navajo Mine will prepare and submit a comprehensive blasting plan before blasting within 1,000 feet of any building used as a dwelling, public building, school, church, or community or institutional building outside the Permit Area or within 500 feet of an active or inactive underground mine (see Section 34 – Post-Reclamation Topography). These blasting plans will be submitted to the regulatory authority 45 days prior to the blast occurring. Changes to these plans will be made if required by the regulatory authority.

The location of all the explosives handling and storage areas are shown on Exhibit 23-8.

20.5.1 Preblasting Survey

Navajo Mine notified in writing all known residents located within one-half mile of the Permit Area on how to request a pre-blast survey. All original pre-blast surveys were completed by February 28, 1986. Pre-blast surveys continue to be conducted as requested by new owners or new residents within ½ mile of the Permit Area. A list of all known residences within one-half mile of the Permit Area is included in Appendix 20.D. A map showing the blast areas described in the Public Blast Notice and the location of all known residences can be found on Exhibit 10-2.

20.5.2 Blasting Schedule

All blasting at the Navajo Mine shall conform to the blasting schedule as described in the Public Blast Notice except for emergency situations. Emergency situations warranting detonation outside the specified periods include any situation that constitutes a safety hazard to employees, a safety hazard to non-employees, and/or has the potential to damage equipment, mine or otherwise as a result of blasting.

The Public Blast Notice will be published at regular intervals which will not exceed 12 months, or at least 10 days but not more than 30 days before blasting when the information in the Public Blast Notice changes significantly. Copies of the Public Blast Notice will be distributed to local governments, public utilities, and each residence within one-half mile of the blasting area. A copy of the Public Blast Notice is shown in Appendix 20.E. Proof of publication of the Public Blasting Notice will be kept on the mine site at all times and may be reviewed by the regulatory authority upon request.

20.5.3 Blasting Signs, Warnings and Access Control

Conspicuous signs posted at all entrances to the Navajo Mine contain the following warning "WARNING! EXPLOSIVES IN USE" and lists the audible blast warning and the methods to control blast area access. In addition, signs indicate that "Loaded holes are barricaded and marked with the warning: DANGER-EXPLOSIVES-KEEP OUT".

Ten minutes before a blast, a short siren will be sounded for a period of five seconds. An audible blast warning consisting of a long wail siren is started five minutes before the blast. Thirty seconds before the blast, the siren is changed to a yelp. The all clear signal given after the blast area is cleared consists of a series of three, five second audible pulses, broken by five second intervals of silence between each pulse.

Access to the general area of blasting is controlled by posted signs, normally temporary signs reading "DANGER EXPLOSIVES - LOADED HOLES - NO UNAUTHORIZED ENTRY - CALL BLAST FOREMAN BEFORE ENTERING" or some equivalent message to warn the party reading the sign. Access to the immediate area of the blast is controlled by manned roadblocks that deny access to the area by unauthorized personnel. Access is denied at least five minutes prior to the actual explosion and not allowed until the area is cleared.

20.5.4 Control of Adverse Effects

Blasting at the Navajo Mine is conducted so that air blast does not exceed the prescribed limits listed in 30 CFR 816.67(b)(1)(i) at any dwelling, public building, school, church, or community or institutional building outside the Permit Area. Navajo Mine periodically monitors air blast to insure compliance with the standards. At least once per year a coal, interburden, overburden, pre-strip, and cast blast will be monitored for air blast if that type of blast is conducted within the year. All blasts that are monitored for ground vibration are also monitored for air blast.

All blasts at the Navajo Mine are designed so that fly rock does not travel more than one-half the distance to the nearest building or dwelling, beyond the blast area, or off the Permit Area.

Blasting is conducted so that the maximum ground vibration does not exceed the limits listed in 30 CFR 816.67(d)(2)(i) at the location of any dwelling, public building, school, church, or community or institutional building outside the Permit Area. To ensure that the maximum peak particle velocity for ground vibration is not exceeded, the scale-distance equation as described in 30 CFR 816.67(d)(3) is utilized.

Seismic monitoring will not be required when blasting is performed in accordance with the approved scale-distance equation, except for cast blasts which will all be monitored for ground vibration and air blast. When application of the approved scale-distance equation shows that the allowable peak particle velocity may be exceeded, seismic monitoring will be conducted using a seismograph. The data will be included in the blast report for this particular shot.

When blasting in the vicinity of outside pipelines and/or power lines, the peak particle velocity at that location will not exceed five inches per second (White Industrial Seismology, Inc., 1985). The vicinity of the pipeline and/or power lines is defined as any location that is less than 800 feet from the pipeline and/or power line. One of the following methods will be used to show that the peak particle velocity of five inches per second at the location of the pipelines and/or power lines is not exceeded:

1. A seismograph record will be kept for each blast within the vicinity of pipelines and/or power lines, or
2. A previously approved scale-distance factor for maximum peak particle velocities of less than five inches per second will be used when blasting in the vicinity of pipelines and/or power lines. The modified scale-distance factor is DS = 13. (for backup data please see Appendix 20.F).

It is not anticipated that structures other than those mentioned above will be encountered at the Navajo Mine. In the event that other structures are encountered, such as water towers, tunnels, dams, impoundments, underground mines, or other utilities, a maximum peak particle velocity limit will be developed to use in the vicinity of the structure. After obtaining regulatory authority approval, one of the above mentioned methods will be used to show that the maximum allowable peak particle velocity limit is not exceeded at the location of the structure.

The maximum airblast and ground vibration limits will not apply at structures owned by Navajo Mine and not leased to another person. There are no structures owned by Navajo Mine and leased to another person.

20.5.5 Blasting Records

All blasting data is recorded on blast reports which are retained for three years. Copies of sample blast reports are found in Appendix 20.F. Text discussing blasting report practices are also located in Appendix 20.F.

20.6 Combustibles and Coal Mine Waste Fire Control Plans

The Navajo Mine's mining operations do not generate any coal mine waste; therefore, no coal refuse piles have been constructed. Future plans do not require the construction of refuse piles, therefore, a MSHA coal mine waste fire control plan is not required, per 30 CFR 77.214 through 77.215(4).

Spoil fires caused by stripping sequence and spoiling methodology occasionally occur in the spoil rows and previously mined out areas of the pits. Coal spoil fires are controlled or extinguished by covering the burning spoil with non-coal spoil material to smother the fire. Coal spoil fires that cannot be covered, will be manipulated with a dozer to expose the coal spoil material allowing it to burn itself out.

If a coal stockpile fire occurs, the burning coal is removed from the pile and spread out on the ground away from the pile. The fire is smothered by back dragging the material by mine equipment or is left spread out to burn itself out.

Extinguishing operations will be initiated immediately after a coal spoil/stockpile fire is reported. Coal fires are carefully evaluated and deemed safe before equipment and personnel are allowed to enter the area for extinguishing operations. Only experienced personnel conduct extinguishing operations. Coal fires will be monitored until all evidence indicates that the fire has burned itself out or is extinguished.

To ensure safe working conditions all work areas are inspected each work shift by the supervisor in charge of the work area. An inspection log is maintained with follow-up actions for any unsafe conditions identified. This shift inspection is required by MSHA. Any potential fire hazard is identified and reported during this inspection by the on shift supervisor.

References

White Industrial Seismology, Inc. 1985. Letter report from David S. Bowley, consulting geophysicist, to George Gilfillan, blasting engineer, Navajo Mine, dated April 27, 1985. [Permit NM-0003C, Chapter 23, Appendix 23-D]

Table 20-3 Navajo Mine Typical Major Mining Equipment

Item	Quantity
Draglines	3
Overburden Drills	3
Coal Drills	2
Dozers	12
Rubber Tire Dozers	2
Large Front-end Loaders	7
Small Front-end Loaders	3
Graders	5
Scrapers	3
Coal Haulers	5
End Dumps	7
Mix Trucks	2
Water Trucks	3
Cable Reels	3
Locomotives	3
Rail Road Cars	42
Stemming Truck	1

Table 20-4 Areas Mined by Year

Location Year	Area	Pit Name	Location Strip #	Approximate Acres Disturbed
1	Area 3	Dixon	73-75	49
1	Area 4N	Area 4N	4-5	45
1	Area 3	Corridor	4-5	12
	Sub Total Year 1			**106**
2	Area 3	Lowe	NL68	3
2	Area 3	Dixon	76-78	67
2	Area 4N	Area 4N	6-7	42
2	Area 2	Hosteen/Yazzie	21	3
	Sub Total Year 2			**115**
3	Area 3	Dixon	79-81	65
3	Area 4N	Area 4N	8-9	48
	Sub Total Year 3			**113**
4	Area 3	Dixon	82-83	38
4	Area 4N	Area 4N	10-11	55
4	Area 2	Overlook	22-24	11
	Sub Total Year 4			**104**
5	Area 3	Dixon	84	19
5	Area 4N	Area 4N West	12-13	32
5	Area 4N	Area 4N East	12-13	32
5	Area 2	Overlook	25-27	10
	Sub Total Year 5			**93**
6-10	Area 3	Dixon	85-86, 70L	37
6-10	Area 4N	Area 4N West	14-31	365
6-10	Area 4N	Area 4N East	14-25	297
	Sub Total Years 6-10			**402**

* Table does not include pre-strip disturbance ahead of mining

Year 1 Commences Sept. 1, 2014

Table 20-5 Anticipated Tonnage to be Mined From Lease for Each Fiscal Year of the Permit

Fiscal Year	Estimated Production
2014	6,300,000
2015	5,100,000
2016	5,600,000
2017	6,000,000
2018	4,500,000
2019	5,600,000
2020-2024	28,000,000
2025-2031	39,000,000
Total	100,100,000