

**MINE PLAN  
for  
PERMIT TO MINE NO. 339C – NORTH FORK AMENDMENT AREA**

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**MINE PLAN  
for  
PERMIT TO MINE NO. 339C – NORTH FORK AMENDMENT AREA  
and the associated  
BUREAU OF LAND MANAGEMENT PLAN OF OPERATION**

**INTRODUCTION**

Black Hills Bentonite, LLC (BHB) has prepared this mine plan for the Permit to Mine No. 339C-North Fork Amendment Area (NFAA) in order to meet the mining permit amendment application requirements of the Wyoming Department of Environmental Quality-Land Quality Division (WDEQ/LQD). Additionally, this mine plan has also been written and prepared to meet the requirements set forth by the Bureau of Land Management (BLM) under 43 CFR 3809.401, commonly referred to as a Plan of Operation (POO). It is the intent of BHB to provide one common mine plan which contains information required by both the WDEQ/LQD and the BLM. In review of this mine plan, certain information may be included which is not required by the WDEQ/LQD, and in other instances certain information is included which is not required by the BLM.

BHB is also submitting to the BLM Buffalo Field Office (BFO), as a Plan of Operation under 43 CFR 3809.401, an exact duplicate copy of the complete WDEQ/LQD-NFAA application.

**1.0 GENERAL DESCRIPTION OF THE MINING OPERATION**

The NFAA has been developed in order to expand existing bentonite mining operations located near Mayoworth, Wyoming. Mayoworth is located approximately twelve miles northwest of Kaycee, Wyoming. Prior to developing and submitting the NFAA application, BHB collected baseline environmental data on vegetation, wildlife, soils, overburden, hydrology, climatology and archaeology.

The NFAA would add eighty acres of federal land, eighty acres of state land, and forty acres of private lands under WDEQ/LQD Permit to Mine No. 339C, located in Johnson County, Wyoming. BHB's proposed mining activities would affect approximately eighteen acres of land administered by the BLM/BFO. No private lands or state lands will be affected by proposed mining activities. BHB has secured a mining contract and mineral lease agreement with the claimants, the Cash Family Limited Partnership and Santiago F. Curuchet et. al. for the placer mining claims located within the NFAA. Table MP-1 provides a tabulation of these mining claims.

No existing surface or underground mining activities are located on the NFAA. Bentonite mining activities have been conducted on a continuous basis in the immediate vicinity since the 1950's. The Benton Clay Company, which was acquired by BHB in 1984 was originally issued Permit to Mine No. 339C by the WDEQ/LQD in 1973. The original permit area consisted of 2,893 acres. Since that time, two amendment areas have been approved by the WDEQ/LQD bringing the total permit area to 3,454 acres. To date, of the 3,454 acres within the permit area, approximately 440 acres have been affected by

bentonite surface mining activities. Of these 440 affected acres, 350 acres have been fully reclaimed and seeded, while 170 acres have been granted full bond release by the WDEQ/LQD.

### **1.1 Mine Operator and Contact Information**

The operator of the mining operation is Black Hills Bentonite, LLC, P.O. Box 9, Mills, Wyoming, 82644. The Federal Tax Identification Number for Black Hills Bentonite, LLC is \_\_\_\_\_ Contact information for BHB and this mine is: Bruce Lawson, Mine Development & Reclamation Manager, P.O. Box 9, Mills, Wyoming 82644. Office Phone: 307-234-6470; Cellular Phone: 307-267-7898.

### **1.2 Change of Mine Operator**

The BLM/BFO and the WDEQ/LQD will be notified within thirty days should there be a change in operator for this project. This notification will include the following information: full company name, mailing and physical address, phone number, taxpayer identification number, and contact person (name, title, mailing address, and phone number).

### **1.3 Type of Mining Activities**

The mining method used by BHB is surface mining, whereby a sequence of small excavated areas or pits, typically less than three acres in size, are developed to expose and remove the underlying bentonite deposit. Due to the shallow depth of the bentonite deposit, the deepest portion of the pits will typically not exceed fifty feet. No underground mining techniques will be utilized. No explosives or blasting agents will be used in the mining operation.

Typically, the pits are designed in a sequence where each pit is adjoining, allowing for a multiple-cut, direct-backfill sequence. As the excavation of each pit progresses through the sequence, overburden removed from each advancing pit is directly placed (direct-backfill) in the previous open pit. Mining in this sequence allows for reclamation to occur concurrent with each new pit being developed in the advancing sequence.

### **1.4 Life of Mining Activities**

The life of the mining operation is expected to last for approximately seven years. Mining is anticipated to last four years, while reclamation activities may last another two to three years once the mining and removal of the bentonite is completed. Mining will commence upon approval from the WDEQ/LQD and the BLM-BFO. Table MP-2 lists the proposed mining features which will be developed, including the projected development date and the locations of the proposed mining feature. All of the proposed mining features are located on lands administered by the BLM.

### **1.5 Equipment and Machinery Used for Mining & Reclamation Activities**

Mining and reclamation activities will be conducted using the following equipment:

MP-2

- Caterpillar 627G Push-Pull Scrapers
- Caterpillar D8R & D8T Dozers with three-shank rippers
- Caterpillar 966 Front-End Loaders
- Volvo L120 & L150 Front-End Loaders
- Caterpillar 140 Motor Graders
- Over-the-road trucks with belly-dump trailers
- John Deere 7800 Series Tractors
- John Deere 8000 Series Tractors
- John Deere Chisel Plows
- John Deere V-Rippers
- John Deere Disks
- Wishek Heavy Duty Disks
- Great Plains 1006NT Series No-Till Grain Drill
- Great Plains 1300 Series Grain Drills

## **1.6 Type of Bentonite Mined - Nature of Ore**

The bentonite mined on the amendment area is associated with the Frontier formation. The primary Frontier layer of bentonite is typically twelve feet in thickness. An additional layer of bentonite, defined by BHB as the "2nd Upper" layer, located in strata above the primary layer, will be mined in some areas. The "2nd Upper" bentonite layer averages six feet in thickness.

## **1.7 Existing Underground Mines and other Mining Activities**

No existing surface or underground mining activities are located on the area. Bentonite mining activities have been conducted on a continuous basis in the immediate vicinity since the 1950's. No mining activities for other minerals, other than gravel, are located in the immediate vicinity. Some small gravel deposits located on private lands adjacent to the NFAA have been mined by the landowner for his personal use.

## **1.8 Protection of Other Resources**

No oil, natural gas, or other minerals are known to exist on the NFAA. Due to the shallow mining depths of less than fifty feet, it is not expected that oil or natural gas deposits would be encountered or impacted. Based on the geology of the area and the geologic formations encountered while mining, no other known mineral deposits exist within the strata where bentonite will be mined within these formations.

Exploration drilling on the area did not encounter water due to the relatively shallow depth to which mining will occur (<50 feet). Groundwater will not be impacted by proposed mining activities. As no groundwater is present, no pit dewatering will be required which could potentially impact groundwater, aquifers or existing water wells or springs in the vicinity of the NFAA. Based on information obtained from the Wyoming State Engineers Office and presented in *Appendix D-6, Hydrology*, no permitted

springs are located within three miles of the NFAA. Additional information obtained from the Wyoming State Engineers Office indicates that two permitted water wells, the Cash No. 1 well and the Cash No. 2 well, are located within one-half mile of the NFAA. The Cash No. 1 well is located one-half mile from the nearest pit which will be excavated on the NFAA, while the Cash No. 2 well is located one mile from the nearest pit excavation area. BHB contacted the Cash family concerning the need for a formal BLM water well agreement, and a representative for the Cash family indicated that a water well agreement was not needed (*personal communication between Bruce Lawson, BHB and Tom Cash, Cash Family Limited Partnership*).

No perennial or intermittent streams will be disturbed by the mining operation. Only ephemeral channels which infrequently carry water in direct response to a significant rainfall event or rapid snowmelt will be affected by mining activities. These ephemeral drainages will be reestablished after mining is completed. *Appendix D10, Wetlands*, indicates that no perennial streams or riparian areas exist on the NFAA, and therefore, none of these types of resources or hydrologic features will be impacted by mining activities.

Erosion will be kept at a minimum. If necessary, straw bales, sediment fences, rock check dams, and/or water bars will be used for erosion control.

BHB will conduct all mining activities in such a manner as to reduce the total area of disturbance and to prevent the undue and unnecessary degradation of the environment.

## **1.9 Quality Assurance Plans**

The mine site will be inspected by BHB personnel at regular intervals. The mine foreman, as well as the mine development manager and environmental personnel, visit the site on a frequent basis. During periods when mining and hauling activities are occurring, heavy equipment operators and maintenance personnel visit the mine site on a daily basis. The mine development manager coordinates mining activities with the mine foreman, who is on the mine site on a daily basis when mining and reclamation activities are in progress, to ensure that proper operations and procedures are followed according to the plan and schedule. BHB mine site personnel such as heavy equipment operators and mine equipment maintenance personnel have been trained and educated by the mine development manager and the mine foreman to recognize potential problems, such as erosion problem areas or other unnecessary degradation of the resources. These personnel have been instructed to immediately report any potential problems or signs of undue degradation to the mine development manager, the mine site foreman or the environmental staff so that corrective actions can be implemented as soon as possible.

## **2.0 DESCRIPTION OF THE MINE FACILITIES**

### **2.1 Buildings, Processing Plants, Staging Areas, Fueling Locations & Equipment Areas**

No buildings, processing plants, or other facilities will be constructed in conjunction with mining activities on this amendment area. The bentonite produced from the NFAA will be transported to

existing bentonite processing plants located in Casper, Wyoming for processing, sale, and shipment to customers.

No staging areas, equipment maintenance and parking areas or equipment fueling areas will be developed or located on the NFAA. An existing staging and equipment parking and fueling area located on state lands within Permit to Mine No. 339C-Amendment Area No. 2 will be utilized in conjunction with mining and reclamation activities on the NFAA.

## **2.2 Access and Haul Roads**

Access to the NFAA from Casper, Wyoming is via Interstate Highway 25 and the State Highway 191 located at Kaycee, Wyoming. The amendment area is located approximately twelve miles northwest of the Highway 191 and I-25 interchange. At the end of Highway 191, access via the Johnson County - Mesa Road and an existing mine access road which intersects with the Mesa Road approximately one-half mile from the end of Highway 191.

After leaving the Mesa Road, access is gained by traveling on existing mine access roads located adjacent to the NFAA. These existing roads are located on private and state lands within and adjacent to the Permit to Mine No. 339C-Amendment No. 2 area. The locations of the existing access roads are illustrated on Map MP-1. Several short segments of new access roads will be constructed in conjunction with mine development activities. New mine access roads constructed on the NFAA will conform to the design and construction standards set forth in the *"Buffalo Field Office Oil and Gas Road Guidelines for Applications for Permit to Drill , 2008 - Improved Road Template"*.

New roads constructed on the NFAA will typically have a top width of twenty-five feet and a total width of fifty feet. Road construction will consist of a crowned and ditched road. Typical cross sections for the construction of access roads, as well as drawings depicting typical culvert installations are presented in Figure MP-1 and Figure MP-2, respectively. These typical road construction cross sections and culvert installation drawings have been taken from an early version of the BLM publication referred to as *"The Gold Book - Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development"*.

In some instances, access to certain mining areas will be across proposed pit areas or through open pits or backfilled pits. In these instances, roads which may cross a proposed pit area are not necessarily illustrated or depicted on Map MP-1. Roads will be reclaimed once mining concludes in an area. No newly-developed haul road spurs will remain after mining is completed, unless desired by the landowners or the land managers in the case of state or federally managed property.

Properly sized culverts will be installed, as needed, during the construction of the access roads. Criteria utilized in calculating peak storm water discharges for culvert sizing determinations is presented in *Appendix D-9, Hydrology*.

### **2.3 Power Transmission Lines, Communication Lines, and Pipelines**

No power transmission lines or communication lines (above ground or below ground) or pipelines will be constructed, removed or rerouted in conjunction with bentonite mining activities on the NFAA.

### **2.4 Sedimentation and Treatment Ponds**

No sedimentation or treatment ponds will be constructed, removed or relocated in conjunction with bentonite mining activities. No sedimentation or treatment ponds currently exist on the NFAA.

### **2.5 Mill and Tailings Disposal Sites**

No mill or tailings disposal sites will be constructed or created in conjunction with bentonite mining operations on this amendment area. No mill tailings are generated in the processing or the mining of bentonite.

### **2.6 Hydraulic Diversions, Retention Systems & Mining Hydrology**

No perennial or intermittent streams will be disturbed by the mining activities. Only ephemeral channels which infrequently carry water in direct response to a significant rainfall event or the rapid melting of a significant accumulation of snow will be affected by mining activities. These channels will be re-established during the reclamation phase of the mining operations.

A potential impact of run-off from disturbed areas is sediment loading onto undisturbed lands or surface waters. This can be minimized by diverting storm water flows generated by significant rainfall events or rapid snow melt away from and around disturbed areas associated with the bentonite mining activities. Diversion ditches may be constructed to divert water away from mining activities. Given the small size of the affected watersheds in the NFAA, diversion ditches may be constructed using the blade on a Caterpillar 140 motor grader or a Caterpillar D8R/D8T dozer. The diversion ditch will be cut to create a ditch which is triangular in shape and a minimum of 1.5 feet deep with 2:1 side slopes. Soil derived from the ditch cut will be "thrown" to the down slope side of the ditches, in essence creating a berm that will provide additional protection of the mine area.

If diversion ditches remain in place for a significant period of time where down-cutting of the diversion ditch or sedimentation may become an issue, a Caterpillar 627G scraper may be used to construct the ditch to ensure there is adequate available capacity. The scraper constructed ditch will have a bottom width of approximately ten) feet with approximately 1:1 side slopes. In the event that down-cutting or erosion should develop in the diversion ditch, straw bales, straw logs, rock check dams or other erosion control features may be installed to control down-cutting of the ditch or channel bottom. After mining is completed and as a part of reclamation, all diversion ditches will be graded out and contoured to blend into the surrounding topography, topsoiled and seeded.

Overburden and topsoil stockpiles will be located and constructed so that they will not block drainages. Topsoil and subsoil will be removed from the base of all overburden stockpiles in order to protect the topsoil resources from "sloughing" which may occur on the side slopes of the overburden stockpiles. This topsoil/subsoil removal area, which is commonly referred to as a "topsoil buffer", surrounding the base of the overburden stockpiles also forms a basin which will collect and retain sediments originating from the overburden stockpiles as a result of storm water runoff.

## **2.7 Spill Contingency and Countermeasure Plan**

As previously discussed in Section 2.1 above, no staging areas, equipment maintenance and parking areas or equipment fueling areas will be developed or located on the NFAA. Therefore, there will be no storage of diesel fuel or lubricants on the NFAA.

If a fuel spill were to occur on the NFAA as a result of a mechanical failure or damage to a piece of heavy equipment, mine personnel are instructed to make sure the site is safe, stop additional leakage or spillage, ensure the containment of any spilled fuels or oils, and immediately contact the company's environmental compliance officer and/or mine manager.

Containment of a diesel fuel spill or a lubricating oil spill would most likely be contained utilizing the native earthen materials present at the site. Depending upon the size of the spill and the volume of contaminated earthen materials, the contaminated material would be removed with shovels or with the appropriate size of earth moving equipment. Disposal of the contaminated earthen material would be coordinated by BHB environmental personnel at an approved land farm in accordance with state and federal regulations.

In the event that the volume of a spill is greater than twenty-five gallons, BHB will report the spill to the Wyoming Department of Environmental Quality-Water Quality Division (WDEQ/WQD) and the BLM within twenty-four hours of the spill and a written report will be submitted to the WDEQ/WQD within seven days of the spill.

## **2.8 Solid Waste Disposal**

Waste and trash which may be generated as a result of mining activities will be collected in custom made trash containers which are completely enclosed utilizing expanded metal. These enclosed trash containers prevent trash and waste from blowing in the wind. Trash and waste generated by the mining activities will be collected and stored on a staging area located outside of the NFAA.

Trash and waste generated by the mining operations will be periodically transported to a municipal landfill for proper disposal. Large amounts of trash and other solid waste will not be allowed to accumulate at the site. Used lubricating oil and filters from heavy equipment will also be collected and properly disposed of, or recycled. No used oils will be stored on the NFAA. No hazardous materials will be used, consumed, stored, generated or disposed of on the NFAA.

## **2.9 Human Waste Management (BLM Required Information)**

Self-contained human waste collection receptacles (HWCR's) will be located on or adjacent to the NFAA area for use by BHB employees, contractors and visitors. The HWCR's will be serviced and maintained in an appropriate manner in order to provide a safe and healthy work area for mine site personnel. The use of HWCR's will also serve to reduce or eliminate un-necessary and undue impacts to the local environment.

## **2.10 Railroads and Conveyor Systems**

No railroad lines or conveyor systems will be constructed in conjunction with the bentonite mining activities associated with the NFAA.

## **2.11 Storage and/or Stockpile Sites**

Overburden, bentonite and topsoil stockpiles will be constructed in conjunction with the mining activities conducted on the NFAA.

Overburden stockpiles are typically constructed in conjunction with the excavation and removal of the overburden from the first pit mined in an adjoining series of connected pits (multiple-cut sequence). These are commonly referred to as "out-of-pit" overburden stockpiles. Certain out-of-pit overburden stockpiles, in some instances, may remain as permanent reclamation features.

Bentonite stockpiles will be created and developed through the course of bentonite "field drying" activities. Bentonite stockpiles are normally placed on top of either the out-of-pit overburden stockpile, or on backfilled pits, or both, in order to reduce the surface disturbance area. Due to a limited area for storing and stockpiling field-dried bentonite at the processing plants located in Casper, Wyoming, bentonite stockpiles located on the mine site serve as inventory for the processing plants. Bentonite stockpiles may remain on the mine site for extended periods of time, depending on market conditions and the demand for a particular quality of stockpiled field-dried bentonite.

In order to prevent unnecessary and undue degradation of the environment in situations where bentonite stockpiles remain onsite for extended periods of time, containment berms or basins may be constructed around bentonite stockpiles in order to contain any storm water runoff which may originate from the bentonite stockpiles. Windblown particulates which could impact air quality, generally do not originate from these bentonite stockpiles, due to the coarse size of the stockpiled bentonite, as well as the hydrophilic nature of the bentonite.

## **2.12 Access Control**

Due to the remoteness of the area and limited size of this mining operation, no access control features are planned. Any potential hazards to humans, livestock, or wildlife which may develop will be

addressed on a site specific basis using fencing or other methods determined to be appropriate for the conditions. The mined lands will be completely reclaimed following the completion of mining, which will eliminate potential hazards such as highwalls and open pits.

### **2.13 Auger Mining**

No auger mining will be conducted on the NFAA.

### **2.14 Underground Mining**

No underground mining will be conducted on the NFAA.

## **3.0 MINING METHODS AND SCHEDULE**

Bentonite mining on the amendment area will consist of mining a series of small pits arranged in a multiple-cut, direct backfill or "cut and fill" sequence. Topsoil, where present, will be removed from all affected areas utilizing Caterpillar 627G push-pull scrapers and Caterpillar D8R/D8T dozers. Topsoil will be placed in stockpiles for future use in the reclamation of the mined or disturbed lands. Topsoil stockpiles are generally located in close proximity to the mining feature where the topsoil was removed. Whenever possible or feasible, the topsoil may be spread directly onto previously backfilled areas, instead of being placed in stockpiles.

Following the removal of topsoil, the exposed overburden will be ripped using Caterpillar D8R/D8T dozers equipped with one to three ripper shanks. The overburden will then be removed from the pit using Caterpillar 627G push-pull scrapers. Overburden from the first pit in a multiple-cut series of pits will be placed in an out-of-pit overburden stockpile. Overburden from each subsequent pit will be directly backfilled into the previous open pit using Caterpillar 627G scrapers and/or Caterpillar D8R/D8T dozers. Cross sections illustrating the development and reclamation of a typical multiple-cut, direct-backfill mining sequence are provided on Figure MP-3.

Following the removal of the overburden from the pit, the exposed bentonite seam will be sun-dried or "field-dried" in the pit during the summer and early fall seasons. Field-dried bentonite stockpiles which are constructed on the mine site serve as feedstock for the bentonite processing plants located in Casper, Wyoming.

### **3.1 Topsoil Removal and Handling**

Topsoil from all affected areas will be salvaged prior to disturbance according to the recommended salvage depths presented in *Appendix D-7, Soils*.

The removal of topsoil will typically be accomplished using Caterpillar 627G push-pull scrapers. In some instances where the topography may be too steep for the safe operation of scrapers, topsoil will be

removed and stockpiled using Caterpillar D8R/D8T dozers. In some circumstances, on steep topography, topsoil may be removed with Caterpillar D8R/D8T dozers by dozing the topsoil into a position where it can be safely loaded with a Caterpillar 627G scraper and then transported to a topsoil stockpile.

Ideally, topsoil salvage is conducted in the summer or fall season in order to avoid salvaging topsoil when it could be saturated by spring rains or snowmelt, or frozen during the winter months. Every attempt will be made to salvage topsoil with scrapers, as control of the depth of topsoil removal is greatly improved with the use of scrapers versus dozers. Typically, salvaged topsoil will be placed in stockpiles. If graded and contoured areas exist, the topsoil may be applied directly (haulback) instead of being stockpiled.

Topsoil will also be removed from the edges of all pits in order to create a topsoil "buffer area" ranging in width from ten to approximately thirty feet wide. This buffer is necessary in order to protect the topsoil resources from the possibility of sloughing of high-walls or low-walls on the edges of pits. These buffer areas also facilitate the safe and complete salvage of topsoil along the edges of advancing multiple-cut pit sequences. A wider topsoil buffer approximately thirty feet in width, is typically developed along a pit highwall where the mining will advance. This wider topsoil buffer provides additional protection of the topsoil resources in the event that a highwall should fail. It also creates a greater margin of safety for heavy equipment operators when removing topsoil in conjunction with the development of the next pit to be mined in a multiple-cut pit sequence.

All topsoil stockpiles will be conspicuously identified with signs reading TOPSOIL. BHB utilizes highly visible, flat, flexible fiberglass posts for topsoil signs. These sign posts are typically red in color with black on white lettering. The flexible fiberglass posts are resistant to livestock rubbing on the post and knocking down the topsoil sign posts.

BHB's topsoil stockpile conservation plan requires that all topsoil stockpiles which will remain in place for more than one year be seeded with the approved permanent seed mixture listed in the *Reclamation Plan, Table RP-1*. Seeding of stockpiles will be conducted in the spring or fall, whichever season follows the placement of the stockpile, utilizing a grain drill. Topsoil stockpiles will be constructed in such a manner that the shape of the stockpile will resemble a "dome", which will facilitate the seeding of the entire topsoil stockpile using a tractor and grain drill. Temporary seeding of topsoil stockpiles using an annual sterile small grain such as triticale may also be conducted. The use of a small grain as a "cover crop" will provide for the rapid establishment of temporary vegetation to help hold the soil in place. This will protect the topsoil stockpiles from unnecessary or undue degradation due to wind or water erosion. Seeding of the topsoil stockpiles not only reduces the potential for erosion, it also significantly reduces the establishment of weeds, annual grasses and noxious weeds on the stockpiles.

Topsoil stockpiles will be located and constructed so that they will not block drainages or be impacted by potential storm water runoff from ephemeral drainages. At the discretion of BHB, berms may be constructed around the base of topsoil stockpiles if it is determined that the topsoil stockpile is not adequately protected from erosion due to the poor establishment of vegetation.

### **3.2 Mine Pit Excavation, Backfilling and Contouring**

Overburden thickness in the pit sequence ranges from one to twenty-six feet, with an average depth of twenty-two feet, and pit overburden volumes ranging from approximately 46,000 to 121,000 bank cubic yards. Overburden removal and backfilling will occur almost exclusively during the winter and spring months, as the scrapers are used exclusively during the summer and fall for bentonite field-drying activities, reclamation activities, and topsoil removal.

Overburden will be excavated from the mine pit areas utilizing Caterpillar 627G push-pull scrapers and Caterpillar D8R/D8T dozers equipped with one to three ripper shanks. The majority of the overburden will be excavated and backfilled utilizing the Caterpillar 627G push-pull scrapers. The Caterpillar D8R/D8T dozers will be utilized primarily to rip the overburden and to assist the scrapers.

Overburden removed from the first pit in a multiple-cut pit series will be placed immediately adjacent to the first pit to form an out-of-pit overburden stockpile. Overburden removed from each subsequent pit in the series will be directly backfilled into the previously mined open pit, allowing for reclamation to occur concurrently with mining activities. No materials will be pushed or dumped over any steep escarpments during the mining process. The locations of the proposed pits and overburden stockpile areas are illustrated on Map MP-1.

Replacement of overburden during the course of backfilling open pits will be designed to create the most conducive reclamation substrate for revegetation as possible. Most often the most suitable overburden in terms of plant growth and desirable root zone material is found directly beneath the topsoil/subsoil strata, as demonstrated by the overburden sampling and laboratory analysis data presented in *Appendix D-5, Overburden, Table D5-1 - Overburden Analysis*.

Overburden suitability and rock characterizations, including the analytical protocols and criteria necessary to identify potential acidic and/or reactive conditions, or the generation of deleterious leachate were evaluated for the NFAA. Please refer to *Appendix D-5, Overburden*, for a complete and detailed assessment of the overburden suitability and rock characterizations. BHB has utilized the data presented in *Appendix D-5, Overburden*, in order to develop overburden handling and overburden replacement plans.

Per WDEQ/LQD Guideline No. 1, Topsoil and Overburden, in Appendix I, Table I-4, Criteria to Establish Overburden Suitability, the laboratory analysis data for the overburden zones which were sampled on the NFAA indicated that the entire overburden strata contains suitable to marginal materials. Only two unsuitable values were reported, sodium absorption ratios (SAR) of 22.7 and 30.4, at an overburden depth of thirty-five to forty-five feet. Nearly the entire overburden strata exhibits marginal values for saturation percentage. Three marginal pH values ranging from 8.7 to 9.8 were reported in samples collected between thirty and forty-five feet. Texture was deemed marginal in a number of sample intervals. Based on these results, BHB believes that no special handling of overburden during pit excavation and backfilling is warranted, as a considerable amount of mixing of overburden occurs during the loading and unloading of the overburden using scrapers. This mixing effect should contribute

to a blending of overburden materials, thus improving overall quality of the few zones or intervals of overburden exhibiting unsuitable SAR values.

Waste bentonite, which remains on the bentonite stockpile areas after the stockpiled bentonite has been removed for processing, will be disposed of by placing this material at the base of a highwall prior to backfilling. This is done to prevent this highly bentonitic material from being placed directly on the surface prior to the application of topsoil.

After the bentonite is removed from a pit, and as the mining sequence progresses, the open pit is backfilled and contoured to blend in with the surrounding topography and to restore the area to the approximate original contour (AOC). Post mining slopes will be graded to 4H:1V or flatter, with a straight slope profile, unless the pre-mine slopes were steeper. In those cases, post-mining slopes will approximate the pre-mining slopes in terms of magnitude, aspect and shape. Generally, there is enough "swell" in the volume of overburden being replaced to compensate for the overall volume of the bentonite which was removed from the pit.

In general, most pits are completely backfilled and rough graded in order to establish AOC and the required slope angles utilizing Caterpillar 627G push-pull scrapers. In certain circumstances, both the Caterpillar 627G push-pull scrapers and the Caterpillar D8R/D8T dozers are utilized to backfill, grade and contour a pit in order to create the final surface configuration. At times, overburden may be placed in the pit and against the highwall utilizing the scrapers, to a point where the pit is not completely backfilled. This would create a partially backfilled pit with a section of the highwall remaining above the backfilled overburden. Caterpillar D8R/D8T dozers would then be used to push overburden from above and behind the remaining highwall, into the pit area, thus completing the backfilling of the pit. A schematic diagram of this backfill scenario is illustrated in Figure MP-3.

Any ephemeral drainages which may have existed pre-mining will also be reestablished in the process of rough grading and contouring. In general, the majority of this rough grading and contouring is done with Caterpillar 627G scrapers and Caterpillar D8R/D8T dozers. Final grading will be accomplished using a Caterpillar 140 motor grader. The haulback of topsoil will be conducted whenever possible in the mining process described above.

Out-of-pit overburden stockpiles or portions of these stockpiles which may remain as a final reclamation feature will be graded and contoured to blend with the existing topography. All slopes will be reduced to 4H:1V or less. Overburden stockpiles which will remain as a permanent reclamation feature will have a maximum height of ten feet and will be oriented in the same direction as nearby topographic features and will approximate the pre-mining topography in terms of magnitude, aspect and shape.

The outlines of the pits illustrated on Map MP-1 show the location of the bentonite to be mined. However, because removal of the various grades of bentonite is subject to customer needs, weather conditions and mining efficiency, the mine plan details are subject to revision at the actual time of mining. i.e., one sequence may be mined before another, pit numbering may be changed, or the exact placement of stockpiles may vary.

### **3.3 Disposal of Combustible, Toxic, Acid-Forming or Radioactive Materials**

With the exception of diesel fuel, no other combustible, toxic, acid-forming, hazardous or radioactive materials will be used, consumed, stored, generated or disposed of on the NFAA. Due to the geology of the area, there is no reason to believe that any radioactive minerals or acid-forming materials would be encountered while conducting bentonite mining activities. Should any such substances be encountered or discovered, the appropriate state and federal agencies will be consulted concerning the handling and removal of such materials.

### **3.4 Compaction of Backfilled Material**

Past experience in conducting bentonite mining and reclamation activities over the last forty years has demonstrated that compaction created by passing over backfilled overburden materials with rubber-tired Caterpillar 627G push-pull scrapers is sufficient to provide stability of backfilled material and to prevent subsidence.

### **3.5 Bentonite Removal**

Following the removal of the overburden from the pit, the exposed bentonite seam will be sun-dried or "field-dried" in the pit during the summer and early fall seasons. This drying process is conducted in order to reduce the amount of greenhouse gases produced by the combustion of fossil fuels. The drying process, utilizing the solar energy of the sun and warm air currents, reduces the natural moisture content of the bentonite by approximately ten to fifteen percent. This in turn reduces the amount of diesel fuel which is consumed when the bentonite is transported to Casper, Wyoming for processing. Additionally, reductions in greenhouse gases are achieved when the field-dried bentonite undergoes further drying in the processing plant, as the consumption of coal and/or natural gas is significantly reduced.

The effect of sun-drying the bentonite is further enhanced by tilling the exposed bentonite using John Deere 7800 and 8000 series tractors pulling an assortment of conventional agrarian tillage implements such as v-rippers, chisel plows and disks. Following several days of shallow tillage to a depth of approximately ten inches, the sun-dried layer of bentonite is removed from the exposed bentonite seam using Caterpillar 627G scrapers and transported to a bentonite stockpile area where a field-dried bentonite stockpile is constructed. Depending on climatic conditions, the size of a pit, and the thickness of the bentonite seam, the field-drying process typically lasts for two to three months.

The field-dried bentonite stockpiles which are constructed on the mine site serve as feedstock for the bentonite processing plants located in Casper, Wyoming. The bentonite from these stockpiles is loaded into over-the-road belly-dump trucks using either Caterpillar 966 front-end loaders or Volvo L120/L150 front-end loaders for transport to Casper, Wyoming for processing and sale. The over-the-road belly-dump trucks have a capacity of approximately twenty-five tons. If the over-the-road belly-dump trucks are equipped with a "pup" trailer, the hauling of the trucks capacity may reach approximately thirty-five tons.

### **3.6 Handling and Processing**

Once the bentonite is transported to the processing plants located in Casper, Wyoming, the bentonite is blended on the plant stockpile area by co-mingling different qualities of bentonite delivered by the over-the-road belly-dump trucks. The stockpiled bentonite is "fed" into the processing plant using either Caterpillar 966 front-end loaders or Volvo L120/L150 front-end loaders. After the bentonite enters the plant, additional drying takes place in a horizontal rotary dryer which is heated using coal and/or natural gas. Following the drying process, the bentonite undergoes a sizing process using a series of screens and classifiers. Some of the bentonite is milled into an extremely fine powder for use as drilling fluids, or classified into a granular product for clumping cat litter and other uses. The finished products are either bagged or shipped in bulk railcars or trucks to customers throughout the world.

### **3.7 Mining Sequence and Schedule**

The mining activities proposed for the North Fork Amendment will occur in conjunction with other existing and proposed mining activities associated with both the approved Permit to Mine No. 339C - Amendment No. 2 area, and the Permit to Mine No. 339C - Cash Amendment which is currently under review by the WDEQ/LQD.

Fourteen mining features are planned for development on the NFAA. These proposed mine development features consist of eight pits; one overburden stockpile; four topsoil stockpiles; and one road segment. The total area of these fourteen proposed mining features is 17.9 acres. Map MP-1 illustrates these proposed mine development features. Table MP-3, Volumetric Calculations & Reclamation Costs, provides detailed information for each proposed mine development feature.

The following information describes the sequence for mining activities that are planned for development on the NFAA.

#### **Pit 27 - 1.8 Acres, 2012-2013, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 26, T.45N., R.83W.**

Topsoil from this pit and Pit 26 (on privately owned land) will be salvaged concurrently and will be placed on existing Topsoil Stockpile (TS) #MDA10-1 as illustrated on the Mine Plan Map. Overburden from Pits 26 & 27 will be placed in the previously mined Pit 10-1. Bentonite removed from Pits 26 & 27 will be placed on one of the existing bentonite stockpiles in the SE $\frac{1}{4}$ NE $\frac{1}{4}$  Section 26, T.45N., R.83W.

#### **Pit 60 - 2.9 Acres, 2012-2013, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 22, T.45N., R.83W.**

Topsoil from this pit will be salvaged and stockpiled on TS #22-1. Overburden will be placed on OB Stockpile Area #22-1 which will be constructed on private land in the SE $\frac{1}{4}$ NE $\frac{1}{4}$  Section 22 and the SW $\frac{1}{4}$ NW $\frac{1}{4}$  Section 23, T.45N., R.83W. This area will then be utilized to stockpile bentonite.

#### **Pit 28 - 2.1 Acres, 2013-2014, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 26, T.45N., R.83W.**

Topsoil will be salvaged from Pit 28 and stockpiled on TS #26-11 as illustrated on the Mine Plan Map. Overburden from Pit 28 will be backfilled into Pits 26 & 27. Bentonite from Pits 28 will be placed on one of the existing bentonite stockpile areas as illustrated on the Mine Plan Map.

**Pit 61 - 1.7 Acres, 2013-2014, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> Sec. 22, T.45N., R.83W.**

Topsoil from Pit 61 will be salvaged and stockpiled on TS #22-1. Overburden from Pit 61 will be backfilled into previously mined Pit 60. Bentonite will be stockpiled on OB Stockpile #22-1.

**Pit 29 - 2.0 Acres, 2014-2015, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> Sec. 26, T.45N., R.83W.**

Topsoil salvaged from Pit 29 will either be stockpiled on TS #26-12 or applied directly to the backfilled and contoured area of Pits 26 & 27. Overburden will be placed in the previously mined Pit 28. Bentonite will be stockpiled on one of the existing overburden stockpile areas illustrated on Map MP-1.

**Pit 62 - 1.5 Acres, 2014-2015, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> Sec. 22, T.45N., R.83W.**

Topsoil from Pit 62 will be salvaged and either stockpiled on TS #22-1 or applied directly to the backfilled and contoured area of Pit 60. Overburden from Pit 62 will be backfilled into previously mined Pit 61. Bentonite will be stockpiled on Overburden Stockpile #22-1.

**Pit 63 - 1.7 Acres, 2015-2016, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> Sec. 22, T.45N., R.83W.**

Topsoil from Pit 63 will be salvaged and either stockpiled on TS #22-2 or applied directly to the backfilled and contoured area of Pit 61. Overburden from Pit 63 will be backfilled into previously mined Pit 62. Bentonite may be removed from the pit wet and stockpiled on Overburden Stockpile #22-1.

**Pit 64 - 2.1 Acres, 2015-2016, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> Sec. 22, T.45N., R.83W.**

Topsoil from Pit 64 will be salvaged and either stockpiled on TS #22-2 or applied directly to the backfilled and contoured area of Pit 62. Overburden from Pit 64 will be backfilled into previously mined Pit 63. Bentonite will be stockpiled on Overburden Stockpile #22-1. When all bentonite has been removed from Pit Series 60-64 and all the bentonite has been hauled from Overburden Stockpile #22-1, final reclamation of the pits and the overburden stockpile area will occur.

## **4.0 MINING HYDROLOGY**

### **4.1 Surface Drainage Plan**

No perennial or intermittent streams will be disturbed by the mining activities on the NFAA. Only ephemeral channels which infrequently carry water in direct response to a significant rainfall event or the rapid melting of a significant accumulation of snow, will be affected by mining activities. These channels will be re-established during the reclamation phase of the mining operations.

A potential impact of run-off from disturbed areas is sediment loading onto undisturbed lands or surface waters. This can be minimized by diverting storm water flows generated by significant rainfall events or rapid snow melt away from and around disturbed areas associated with the bentonite mining activities. Diversion ditches may be constructed to divert water away from mining activities. Given the small size

of the affected watersheds in the NFAA, diversion ditches may be constructed using the blade on a Caterpillar 140 motor grader or a Caterpillar D8R/D8T dozer. The diversion ditch will be cut to create a ditch which is triangular in shape and a minimum of 1.5 feet deep with 2:1 side slopes. Soil derived from the ditch cut will be "thrown" to the down slope side of the ditches, in essence creating a berm that will provide additional protection of the mine area.

If interceptor ditches remain in place for a significant period of time where down-cutting of the interceptor ditch or sedimentation may become an issue, a Caterpillar 627G scraper may be used to construct the ditch to ensure there is adequate available capacity. The scraper constructed ditch will have a bottom width of approximately ten feet with approximately 1:1 side slopes. In the event that down-cutting or erosion should develop in the interceptor ditches or diversions, straw bales, straw logs, rock check dams or other erosion control features may be installed to control down-cutting of the ditch or channel bottom. After mining is completed, and as a part of reclamation, all interceptor ditches will be graded out and contoured to blend into the surrounding topography, topsoiled and seeded.

Overburden and topsoil stockpiles will be located and constructed so that they will not block drainages. Topsoil and subsoil will be removed from the base of all overburden stockpiles in order to protect the topsoil resources from "sloughing" which may occur on the side slopes of the overburden stockpiles. This topsoil removal area, which is commonly referred to as a "topsoil buffer", surrounding the base of the overburden stockpiles also forms a "sump" or "moat" which collects and retains sediments originating from the overburden stockpiles as a result of storm water runoff.

#### **4.2 Water Treatments Plans**

No water treatment plan is required. Exploration drilling on the area did not encounter groundwater, and due to the relatively shallow depth to which mining will occur (<50 feet), groundwater will not be impacted. As no groundwater is present, no pit dewatering will be required which could require the development of a water treatment plan.

#### **4.3 Quantity and Quality of Groundwater Discharged into Pits**

No groundwater will be discharged into pits. Exploration drilling on the area did not encounter groundwater, and due to the relatively shallow depth to which mining will occur (<50 feet), it is not anticipated that groundwater will be encountered. BHB has been mining bentonite in the immediate vicinity of the NFAA, for over thirty years and has never encountered groundwater while mining bentonite in the same geological strata and at depths relative to proposed pits on the NFAA.

#### **4.4 Source, Quantity and Quality of Water to be Used**

No water will be used in the mining or reclamation activities on the NFAA. Should it become necessary to use water for dust control on access roads, BHB will utilize storm water which has accumulated in open pits located on other bentonite mining operations in the vicinity of Kaycee, Wyoming.

#### **4.5 Design Details for Sediment Ponds and Treatment Systems**

No sediment ponds or treatment systems will be constructed in conjunction with the NFAA. Therefore, no design details are provided.

## **5.0 REFUSE DISPOSAL**

### **5.1 Plans for Disposal of Waste Materials or Solid Wastes**

Waste and trash which may be generated as a result of mining activities will be collected in custom made trash containers which are completely enclosed utilizing expanded metal. These enclosed trash containers prevent trash and waste from blowing in the wind. Trash and waste generated by the mining activities will be collected and stored on a staging area located outside of the NFAA.

Trash and waste generated by the mining operations will be periodically transported to a municipal landfill for proper disposal. Large amounts of trash and other solid waste will not be allowed to accumulate at the site. Used lubricating oil and filters from heavy equipment will also be collected and properly disposed of, or recycled. No used oils will be stored on the NFAA. No hazardous materials will be used, consumed, stored, generated or disposed of on the NFAA. Under no circumstances will trash or waste be buried on the NFAA.

## **6.0 PUBLIC NUISANCE AND SAFETY**

### **6.1 Procedures to Avoid Public Nuisance and Endangerment**

Due to the relatively small size of the proposed mining operation associated with the NFAA, BHB does not expect that proposed mining activities will result in a public nuisance or endangerment to public safety, human or animal life, or property. BHB has been conducting ongoing bentonite mining operations on Permit to Mine No. 339C in the immediate vicinity since 1984, and has no knowledge of any instances where its mining activities have resulted in a public nuisance or an endangerment to the public, human or animal life, or property. This is primarily due to the rural setting and the remoteness of the site, coupled with the small size and scope of the mining operation. The closest incorporated community or subdivision to the NFAA is the town of Kaycee, Wyoming, located approximately twelve miles southeast of the amendment area.

The development of mining activities on the NFAA will not change the number of workers on the operation, nor will the size of the mining operation increase significantly. The numbers of vehicles entering and exiting the mine site, as well as the amount of machinery operating on the site will not change.

Access is restricted due to private land ownership in the area. The main access road is posted as "No Trespassing" where it intersects with the Johnson County - Mesa Road. The NFAA is enclosed within numerous existing ranch barbed-wire and woven-wire fences, which further restrict public access to the mining area. Where deemed necessary by BHB, fences may be constructed above highwalls in order to protect wildlife or livestock from the dangers of a fall.

No conflicts with grazing are expected to result in conjunction with the development of mining activities. BHB has negotiated a surface use and mining agreement with the Cash Family Limited Partnership and the Curuchets for the NFAA, as well as adjacent lands. Under the terms of this agreement, BHB is restricted from utilizing the access route leading to the NFAA from April 5th until June 15th, the period when John Curuchet utilizes this pasture for lambing.

## **6.2 Occupied Dwellings, Homes, Public Buildings, Churches within 300 Feet of Affected Lands**

No occupied dwellings, homes, public buildings, churches, community or institutional buildings, parks or cemeteries are located within three hundred feet of land which will be affected by proposed mining activities. The nearest occupied dwelling is located 2,688 feet (0.5 miles) west of proposed mining activities on the NFAA. This is the home and ranch of Doug Cash of the Cash Family Limited Partnership.

## **6.3 Hours of Operation, Routes of Haulage, Access Routes, and Estimated Truck Traffic**

Mining and reclamation activities will be conducted Monday through Friday from 7:00 A.M. until 5:00 P.M. for approximately four to five months out of the year. Mining (overburden removal) usually occurs during February and March, and lasts for approximately thirty days. Once the overburden is removed and the bentonite is exposed, the fleet of mining equipment relocates to one of several other bentonite mining operations that BHB operates in other parts of Johnson County, Wyoming.

On or after June 15th, a portion of the heavy equipment fleet will return to the NFAA in order to conduct bentonite field-drying activities. This fleet of equipment generally consisting of two to four Caterpillar 627G push-pull scrapers; a Caterpillar D8R dozer; a Caterpillar 140 motor grader and a John Deere 8000 series tractor with various tillage implements. Field-drying will be conducted for approximately three months, from June 15th until approximately September 15th.

Following the completion of bentonite field-drying activities around the 15th of September, reclamation activities generally begin, lasting approximately one month. During the reclamation phase, areas where the overburden has been previously backfilled will undergo final grading and contouring, ripping or scarification (if required), topsoil application, topsoil tillage, and seeding.

Estimating the potential number of over-the-road, belly-dump trucks which will be transporting field-dried bentonite from the NFAA on a daily basis is somewhat problematic. Customer demands for various grades and quantities of bentonite varies greatly over the course of a year. At any one time, BHB may be hauling various grades of bentonite from at least thirty different bentonite stockpiles located on various bentonite mining operations in southern Johnson County and northern Natrona County, Wyoming.

BHB estimates that approximately 75,000 tons of bentonite will be hauled from the NFAA on an annual basis using over-the-road, belly-dump trucks with a capacity of thirty-five tons. This would result in a

total 2,143 trucks entering and leaving the mine site annually. It is estimated, based on a hauling schedule of six days per week, that approximately seven truckloads per day would be required in order to transport 75,000 tons per year from the NFAA.

The over-the-road, belly-dump trucks typically operate during the daylight hours. The haulage route from the processing plants located in Casper, Wyoming to the NFAA is via Interstate Highway 25 and the State Highway 191 located at Kaycee, Wyoming. The NFAA is located approximately twelve miles northwest of the Highway 191 and I-25 interchange. At the end of Highway 191, access is via the Johnson County - Mesa Road and an existing mine access road which intersects with the Mesa Road approximately one-half mile from the end of Highway 191.

## **7.0 INTERIM MANAGEMENT PLANS**

### **7.1 Management of the NFAA During Periods of Temporary Closure or Temporary Inactivity**

As described in detail in Section 6.3 above, periods of inactivity may occur on the NFAA. BHB's heavy equipment fleet is highly mobile and moves among the various mining operations located in southern Johnson County and northern Natrona County, Wyoming in order to meet the demands of customers for a wide variety of bentonite clay qualities. This results in periods of inactivity on all of BHB's mining operations at various times of the year. Periods of inactivity may also result due to inclement weather, particularly during and immediately following significant rainfall events. Periods of inactivity due to inclement weather rarely last more than a few days. Temporary closure and temporary inactivity is considered to be a period of time lasting more than twelve consecutive months when no mining, hauling or reclamation activities occur.

During periods of temporary inactivity, (12 months or longer) and prior to moving mining equipment from an active mine site, a thorough inspection will be conducted to ensure that all berms and ditches constructed to divert runoff around the active mine area are in place and functional. Containment basins will also be inspected to ensure functionality. Berms would be constructed along pit highwalls, as well as at the entrance to any open pit areas. Additionally, a locked gate would be installed at the entrance to the mine access road at the intersection of the Mesa Road in order to prevent the public from entering the area. These procedures will be implemented in order to prevent unnecessary and undue degradation of the environment, as well as ensuring the safety of the public. The area would be periodically inspected and monitored, generally on a weekly basis, by BHB's mine and environmental personnel. In the event that the mining operation experiences a temporary closure, the BLM/BFO will be notified.

## **8.0 WEED CONTROL**

### **8.1 Weed Management & Control During the Mining Phase**

During the mining phase of the operations, BHB will monitor for and control all noxious weeds which may develop on disturbed areas. On BLM managed lands, a Pesticide Use Permit (PUP) will be obtained

from the Authorized Officer prior to using herbicides to control weeds during the mining phase of the operations.