

APPENDIX N

BLASTING PROCEDURES

BLASTING PROCEDURE

This suggested Blasting Procedure has been developed by Transwestern Pipeline Company, LLC (Company) in accordance with applicable federal, state and local regulations, as well as all applicable safety requirements and Section Five of the Pipeline Construction Specifications. The Blasting Procedure includes Exhibit A that outlines Company requirements for use of blasting by the Contractor.

Blasting could occur for primarily four (4) pipeline construction operations as follows:

1. Establish suitable right-of-way during grade operations
2. Establish acceptable ditch depth for pipeline installation
3. Establish acceptable ditch and work space for fabrication installation
4. Establish acceptable ditch in various creek/river crossings

Blasting will be conducted in accordance with the following rules and regulations:

1. Bureau of Alcohol, Tobacco and Firearms, 27 Code of Federal Regulations (CFR)
2. Occupational Safety and Health Administration, 29 CFR, 1926 Subpart D
3. 18 CFR 2.69 - Guidelines to be followed by Natural Gas Pipeline Companies in the Planning, Locating, Clearing and Maintenance of Rights-of-way and Construction of above ground Facilities.
4. All applicable state regulations
5. Rules and regulations of affected land owners and easements
6. Construction contract documents
7. Environmental concerns denoted in project contract documents
8. Construction Safety Manual

Test shots for establishing the project-specific Blasting Procedure will occur prior to any blasting activities and particularly prior to approaching any structures that could be damaged by blasting in the rock type being excavated. All companies or entities that will or may be affected by blasting will be notified a minimum of 7 days prior to the test shots so representatives can have the opportunity to attend the test shots for verification of the test results and formulation of the blasting procedure.

This blasting procedure will establish the guidelines to be used for the test shots in each type of rock encountered on the pipeline route. An on-site analysis of the seismic results (by a qualified consultant or engineer) of each test shot will result in the recommendation for changes for the next test shot or blasting procedure for the type rock where the test is being performed. The blasting procedure will be confirmed by shooting an additional test shot using the blasting procedure.

The following explosive types are currently being considered for use; however other types of explosives may be used that may be better suited for the conditions encountered in the field.

1. Dyno-Nobel Unigel - semi-gelatin dynamite, specific gravity 1.30 with a denotation rate of 14,100 feet per second. The cartridge size used will generally be 2" X 16" (2.36 lb. /stick).
2. Dyno-Nobel Unimax - semi-gelatin dynamite, specific gravity 1.51 with a denotation rate of 19,700 feet per second. The cartridge size used will generally be 2" X 16" (2.74 lb. /stick).
3. Dyno-Nobel Dynamax Pro - semi-gelatin dynamite, specific gravity 1.45 with a denotation rate of 19,700 feet per second. The cartridge size used will be 2" X 16" (2.60 lb./stick). This product is used on water crossings when propagation could become a factor.

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4. A down hole line and trunk line of primacord with an ignition rate of approximately 23,000 feet per second (Dyno-Nobel or Ensign-Bickford).
5. Delays would be either Dyno-Nobel E Z Dets down hole delay of 25MS/350 millisecond or 25MS/500 millisecond and/or Dyno-Nobel Connector with a 25-millisecond delay.
6. Ignition will be accomplished using a non-electric system consisting of a non-electric detonator ignited with a shock system igniter.

The following guidelines will be used to establish the first test shot:

1. Section 5.0 of the Construction Specifications.
2. Typical rock ditch requires 3.2 pounds or more of explosives to be used per cubic yard of in-place rock (i.e. limestone, sandstone and other rock of this nature).
3. The drilling program will be based on a 2.5" diameter hole drilled approximately 2' to 4' spacing up the ditch line. The drill pattern will be established based on equation, 3.2 pounds more or less per cubic yard, in order to get desired explosive energy reaction to break rock and pull ditch as needed.
4. The MS-25 delays will be used accordingly to control the vibration as well as holding the transmission of energy into the areas below the damaging levels of any existing structure
5. Delay will not be more than 2 holes per delay.
6. Stemming will be 3/8 inch minus crushed rock.

The following safety rules and regulations will be strictly adhered to:

1. Only authorized, qualified and experienced personnel shall handle explosives.
2. Drug testing will be required for all blasting personnel.
3. No person shall be allowed to handle, use, or work in the area while under the influence or suspicion of being under the influence of alcohol or drugs.
4. No flame, heat, or spark-producing device shall be permitted in or near explosives during handling, transport or use.
5. Original containers or class II magazines shall be used for transport of detonators or explosives from magazine storage area to blast site. Detonators and explosives shall be transported in separate vehicles.
6. Every reasonable precaution shall be taken to notify landowners or residents within 1,000 feet of the right-of-way and owners of adjacent facilities (pipelines, cables, power lines, etc.) and both Contractor's and the Company's employees. Warning signs, with lettering a minimum of 4 inches in height on a contrasting background, will be erected and maintained at all approaches to the blast area. Flaggers will be stationed on all roadways passing within 1,000 feet of the blast area to stop all traffic during blasting operations. All personnel not involved in the actual detonation shall stand back at least 1,000 feet and workers involved in the actual detonation shall stand back 650 feet from the time the blast signal is given until the "ALL CLEAR" has been sounded. Audible blasting signals such as an air horn or siren shall be sounded before and after each blast. The following blasting signals will be used during blasting:
 - **WARNING SIGNAL** – A one (1) minute series of long horn or siren blasts five minutes prior to the blast imminent signal.

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- **BLAST SIGNAL** – A series of short horn or siren blasts one minute prior to the shot detonation.
 - **ALL CLEAR SIGNAL** – A prolonged horn or siren blast (15 seconds duration) following the inspection of the blast area
7. Blasting shall be performed during daylight hours only.
 8. Blasting will concur within the environmental guidelines of the project and the site-specific requirements.
 9. Lightning detectors will be located in the blasting area.
 10. Drill holes shall not be left loaded overnight, unless security personnel are left on site and site lighting is provided. Detonators will not be connected to blasting agents and left overnight. This practice is strongly discouraged.
 11. Empty packing material shall not be used again for any purpose and disposal shall be at an approved location.
 12. Damaged or deteriorated blasting supplies shall not be used.
 13. Delivery and issue of explosives shall be made by and to only authorized persons and into authorized magazine or temporary storage or handling areas.
 14. All loading and firing will be directed and supervised by a competent and experienced person.
 15. All blasting by safety fuse or non-electric shall follow standard industry guidelines in regard to use and safety.
 16. Precautions will be taken to minimize the potential hazard of a premature detonation due to induced currents by using only non-electric blasting methods.
 17. Blasting mats or back fill material must be utilized to control fly-rock damage to surrounding structures.

Following are the minimum steps to be taken for the test shots:

1. A tailgate safety meeting will be conducted by the Contractor regarding handling and use of explosives and the safety rules listed above. Each person that intends to attend the test shots shall attend this safety meeting.
2. Erect Blast Warning signs.
3. Set up lightning detectors.
4. The test pattern will be drilled according to that proposed by Contractor.
5. Each drilled hole will be accurately measured for location and depth.
6. Each hole loaded according to the attached sketch and the loading logged on the Test Shot form.
7. Stemming quantities will be entered on Test Shot Form.
8. Seismic measurement instruments will be set up to measure at a minimum of three locations: each end of the test and the test midpoint (the monitors will be positioned on all nearby structures). If the nearby structure is buried, the structure will be excavated and the monitor set on the structure.
9. Distances will be measured to all nearby structures.
10. Give the warning and blast signals.

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EXAMPLE 3 Typical Delay Pattern

1. I-MS-25 delay every 2 holes

2. I-MS-25 delay every 1 hole

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General:

The Company recognizes that the Contractor is an independent contractor and, as such, may elect to use blasting techniques in right-of-way preparation or trenching operations in pipeline construction. If Contractor decides to use blasting as a portion of its execution plan for the project, the following items must be submitted to the Company for approval prior to preparation of Contractor's Blasting Procedure:

- Resume and certifications/licenses of Blasting Supervisor are required. The supervisor must have been regularly employed as a blaster and shall list experience relevant to blasting near high-pressure pipelines.
- The insurance certificates, contractually required, will contain no specific exclusions for work related to blasting or space warranty clause in the General Liability and Property Damage Coverages.

This specification shall be used by the Contractor in the preparation of its Blasting Procedure and its subsequent production blasting operation. The Procedure shall recognize that blasting may be required at locations adjacent to existing high-pressure natural gas pipelines, overhead or underground utilities, farm operations, or public crossings. The Contractor and its blasting supervisor shall be thoroughly familiar with and comply with the rules and regulations of U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) and with all federal, state, county, and local regulations governing blasting operations.

No blasting shall be done without prior approval of the Company. The Contractor shall be liable for any and all damages resulting from blasting operations. Prior to any detonation of explosives in the vicinity of existing facilities such as pipelines, dwellings, structures, overhead or underground utilities, farm operations or public crossings, a minimum of 48 hours notice shall be given to the Company, the appropriate authorities and the owners or operators of any facilities which may be affected by the blasting.

The Contractor shall at all times protect its workers and the public from any injury or harm which might arise from drilling dust and the use of explosives. Only workers thoroughly experienced in handling explosives shall be permitted to supervise, handle, haul load, or shoot explosives. In those jurisdictions where the licensing of blasters is mandatory, the Contractor shall provide the Company, before any crew assignment, with proof of the required certification for every person so required.

Controlled blasting shall be required in the vicinity of powerlines, telephone lines, fiber optic lines, existing pipeline facilities, structures, water wells, springs, or buildings, or where directed by the Company to preclude the possibility of damage due to fly-rock, air blast, or vibrations.

Fly-rock shall be controlled in all areas. Containment of fly-rock shall be accomplished by a combination of blast design, adequate stemming, and matting, including but not limited to fabricated mats, overburden, and sand-pad matting. If fly-rock should occur, that fly-rock shall be collected immediately and disposed of at disposal sites approved by the Company and property owners. This work shall not be left to the clean-up crew.

The Contractor shall retain a qualified blasting consultant or engineer to assist in the preparation of its blasting procedures and to provide an engineering report showing recommended blasting charges and blasting methods to be used at specific locations, all of which shall be approved by the Company and/or its consultant prior to commencement of blasting.

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Use, Storage, and Transportation of Explosives:

Unless specified otherwise, the Contractor shall obtain all necessary permits for, and shall comply with all federal, state, county and local regulations for the use, storage and transportation of explosives. The Contractor shall provide the Company with copies of all permits obtained prior to commencing blasting operations.

Powder magazine(s) must be located on property permitted for use during the construction of the project. Magazines will be kept secure and locked at all times except when in use. Construction of magazines shall be in accordance with federal and/or state regulations and accepted industry practices. If any magazine(s) are located on property jurisdictional to either Kaibab or Prescott National Forests, the location of any magazine(s) shall be provided to the designated representative of the appropriate National Forest for the purposes of proper response in the event of a forest fire.

The Contractor shall maintain an inventory and use record for all explosives and detonating caps which shall be reconciled at the end of each working day, and shall include the number of misfires and their disposition. The inventory and use record shall be available for inspection by the Company and jurisdictional authorities at all times.

All vehicles used for transport of explosives shall comply with Federal and State regulations.

Federal Regulations:

Federal Regulations that apply include, but are not limited to the following:

1. 27 CFR 181 – Commerce in Explosives
2. 49 CFR 177 – Carriage by Public Highway
3. 29 CFR 1926.900 et. Seq. sub-part U – Safety and Health Regulations for Construction – Blasting and use of Explosives
4. 18 CFR 2.69 Guidelines to be Followed by Natural Gas Pipeline Companies in the Planning, Locating, Clearing, and Maintenance of Rights-of-Way and the Construction of Above Ground Facilities.
5. 29 CFR 1910.109 – Explosives and Blasting Agents OSHA

State, County, and Local Regulations:

The Contractor shall determine any state, county, and local regulations regarding blasting and provide the Company with copies of any permits required prior to commencing blasting operations.

Contractor's Blasting Procedure:

The Contractor shall submit to the Company for approval a detailed Blasting Procedure prior to commencing any blasting operations. The Company acceptance of the Blasting Procedure shall not relieve the Contractor for liability or harmful consequences of its blasting operations. The following information shall be included in the Blasting Procedure:

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Scope of the Blasting Procedure:

- a) Typical blasting design criteria, including but not limited to:
 - Description of all blasting products and justification for their selection
 - Delay type, pattern, and interval stemming material
 - Maximum charge per hole and per delay
 - Method for initiation of explosives
 - Maximum shot hole depth and diameter
 - Calculations showing anticipated peak particle velocity and predicted external stress to be imposed upon existing pipeline(s)
 - Blast vibration monitoring and control
- b) Controlled blasting procedures and methods to be employed where the pipeline route:
 - Parallels or crosses an electrical transmission corridor, cable, or pipeline
 - Parallels or crosses a highway or road
 - Is within or adjacent to forested areas
 - Approaches within 100 feet of a water well or spring
 - Approaches within 1,000 feet of any residence, building, or occupied structure
- c) Proposed fly-rock control methods
- d) Proposed safety procedures, including references to federal, state, county and local regulations and requirements.
- e) Environmental mitigation methods and contingency planning with references to federal, state, county and local requirements.

Blasting Procedures Qualification:

The Contractor shall qualify its Blasting Procedure prior to commencing blasting operations. The procedure qualification shall include a minimum of five (5) test shots not more than 30 feet each in length, monitored with three (3) each 3-channel seismographs. Data from the test shots shall be used by the Contractor to establish Standard Shot in terms of pounds of explosive per delay. Production shot procedures and delays shall be dictated by the test shot procedures and delays.

Test shots are required for each major change in geology, change in explosive manufacturer, blast design parameter changes, change in explosive grade, or as determined by the Company. The blast area shall be examined for indications of excessive over break, cracking, or ground displacement (block movement). The Contractor shall immediately suspend blasting operations and review the blasting procedures if over break or ground cracks extending one-half (1/2) the distance to the other structures including the parallel pipeline occurs.

Blasting Safety:

All personnel not involved in the actual detonation shall stand back at least 1,000 feet and workers involved with the detonation shall stand back at least 650 feet from the time the “blast imminent” signal is given until the “all clear” has been sounded. The Contractor shall post flagmen on all roadways passing within 1,000 feet of the blast area to stop all traffic during blasting operations.

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The Contractor shall notify all landowners, residents along the right-of-way within 1,000 feet, and owners of adjacent facilities (pipeline, powerlines, buildings, etc.) prior to blasting operations. The Contractor shall also comply with the “One Call” notification requirements.

The Contractor shall post warning signs at all points of access to the blasting area. The warning signs shall comply with requirements of the jurisdictional authorities and shall have lettering a minimum of four (4) inches in height on a contrasting background. The Contractor shall use an acceptable airhorn/siren in order to give the proper blasting warning and all clear signals.

Where the pipeline route parallels or crosses an electrical transmission corridor, the Contractor shall use appropriate approved blasting procedures and methods to minimize the potential hazard of a premature detonation due to induced currents.

All backhoes used in any operation in all areas that have previously been blasted shall be equipped with both Plexiglas and wire mesh blast shields. The shields will be mounted in front of the operator’s position. The purpose is to protect the operator should any undetonated explosive device be encountered. Swampers, oilers, or signalmen shall remain clear of the machine while in operation and approach only when operation has ceased and waved clear by the operator.

The Company personnel and owners/operators of other facilities in the area should be prepared to perform the following suggested tasks:

- Be knowledgeable of facilities in affected areas and the location of those facilities.
- Be knowledgeable of and empowered to activate appropriate emergency plans.
- Cooperate with Contractor’s personnel. Provide assistance/information as requested.
- Perform pre- and post-blast leakage surveys.
- Observe, document, and retain all records of occurrences, surveys, and inspections.

Lightning Hazard:

The hazard of accidental detonation caused by lightning strikes exists if the work site is experiencing an electrical storm and there are loaded holes on site. If this hazard occurs, the Contractor shall immediately discontinue all operations and move the workers to secure positions away from the loaded holes, when an approaching storm has passed and the closest point of lightning activity has moved at least 15 miles beyond the drilling area.

The Contractor shall have on site Company-approved “lightning detectors” model SD-250-B manufactured by Electronics Div. of S.D.I. International or Model 350 manufactured by Thomas Instruments Inc. or approved equal) capable of measuring the degree of electrical activity, as a storm approaches, and the distance to the storm front from the instrument on the right-of-way.

Environmental Concerns:

The Contractor’s Blasting Procedures shall comply with environmental concerns along the right-of-way including site-specific requirements related to blasting. The Blasting Procedure shall include an environmental review and check list, which shall address the following items:

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a) Land Use

The Construction Line Lists and the Alignment Sheets indicate land use. The Contractor shall define mitigative measures to minimize impacts to local residences, properties, businesses or operations that may be affected by blasting activities.

b) Stream Crossing

The Contractor shall comply with site-specific requirements described in the Contract Documents and with FERC Stream and Wetland Construction and Mitigation Procedures.

c) Risk of Incident

The Contractor shall outline its procedures for limiting the risk of incident by preventing unplanned detonations or the release of hazardous substances.

d) Human Health

The Contractor shall identify any known or potential human health hazards and shall outline proposed mitigation measures such as insuring the safe use of explosives and the control of chemical vapors or dust generated by blasting.

e) Plant and Animal Life

The Contractor shall address concerns and outline procedures to be implemented to protect special status species or a deterioration of existing habitat. Blasting near or within streams requires the approval of the appropriate Federal and State authorities and mitigative procedures to minimize the impact on fish and other aquatic life.

f) Air Quality

The Contractor shall implement a dust abatement program for drilling operations and shall evaluate the effect of blasting operations on ambient air quality.

g) Noise

The Contractor shall review maximum acceptable noise levels and shall include guidelines for limiting both shot size and frequency to control noise levels. The method of warning nearby residents that may be affected by blasting shall also be included.

h) Soils and Geology

The Contractor shall indicate mitigation procedures to reduce or contain any unstable condition that may result from blasting operations. Blasting operations will not result in unstable soil or geological conditions, which could result in hazards to people or property such as landslides, mudslides and ground failure.

Blasting Restrictions:

All blasting shall be subject to the following limitations:

- a) Maximum peak particle velocity of 12.0 in/sec. in any of three mutually perpendicular axes measured at the lesser distance of the nearest facility or the edge of the proposed pipeline's permanent easement.
- b) Maximum drill size shall be 2.5 inches unless approved otherwise by the Company.
- c) Maximum quantity of explosive per delay shall be governed by the recorded measurements as influenced by Work site conditions.

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- d) Explosive agents and ignition method shall be approved by the Company. ANFO and other free flowing explosives and blasting agents are not acceptable and shall not be used.

All blasting operations must have prior approval of the Company, which will not be unjustifiably withheld assuming the full cooperation of Contractor with these specifications and guidelines.

No blasting is permitted within 15 feet of an existing line or structure, except by special approval of the Company.

The Contractor must notify the Company at least 48 hours prior to all impending blasting requirements within a separation distance of 1,000 feet from any of the Company's facilities. Within the 1,000 feet distance the Company in-house policy, procedures, and published guidelines shall be followed. The Company will act on all received notifications in the swiftest possible time to avoid delays to the Contractor and to provide him with the appropriate guidelines to be followed. The overall notification process is intended to provide a safety margin for the Contractor, the Company, and to the neighboring public and buildings.

Controlled blasting (i.e., use of mats, blast design and adequate stemming) shall be required when blasting is performed near overhead or underground facilities or structures, or where directed by the Company, within 1,000 feet separation distance, to preclude the possibility of damage due to fly-rock, air blast, or vibrations.

The Contractor shall retain a qualified blasting consultant or engineer to provide it with advice as to the maximum loading of explosives for all blasting within 200 feet of the pipeline right-of-way and provide an engineering report showing recommended charges and blasting methods at specific locations; all of which shall be approved by the Company's consultant prior to blasting.

Prior to any loading of explosives, a minimum of 48 hours notice shall be given to the Company.

The Company and/or its consultant shall approve drill patterns, explosives and charges per hole, timing of delays, method and use and type of matting, within 200 feet of the pipeline right-of-way. Explosive agents must be, in all instances, acceptable to the Company and its consultant.

Where the pipeline route parallels or crosses an electrical transmission corridor a potential hazard exists whereby premature initiation of blasting could be triggered by stray current from the electrical field, which may exist at these locations. To avoid premature detonation of any blast circuit due to static electricity, only non-electrical detonating systems will be used.

Drilling and blasting operations shall be planned so that blast holes shall not be left loaded for extended periods during working hours or overnight, unless specifically approved by the Company. Where such a variance is approved, the following restrictions shall apply as a minimum and be subject to review by the Company and/or its blasting consultant:

- a) Tying-in of blast holes shall be delayed until immediately prior to the resumption of the day's blasting activity or the start of the following day's activities.
- b) The area loaded shall be marked with pink "Restricted Area" tape and shall be continuously patrolled to prevent unauthorized entry to the area.

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- c) Approval for allowing an area to remain loaded overnight is conditional on compliance with item b above, and the additional requirement of adequate lighting to allow the patrol to observe any intrusion to the loaded area.
- d) Drilling and loading of explosives shall not take place under artificial lighting in any situation.

Drilling:

The Contractor shall ensure that rock drillers, and other personnel exposed to rock dust, wear respirator protection while working in dusty conditions. If the application of water eliminates the dissemination of dust and eliminates the exposure of workers, the Company's representative may excuse the use of respiratory protection equipment.

The Contractor shall take note that extreme hazard exists in all areas along the right-of-way where blasting has taken place either during previous construction, or, where grade blasting precedes ditch blasting. This may be in the form of lost or abandoned explosives and undetonated explosives located in rock rubble or lodged in bootlegs. The centerline of the ditch shall be surveyed by the Company pipeline survey crews prior to laying out the drill pattern for right-of-way blasting, where this operation is required.

Following the drilling, blasting, and mucking of right-of-way grade, the ditch centerline shall be re-surveyed by the Company pipeline survey crew.

The following procedure shall be followed by the Contractor prior to the start of each drilling operation in any area where blasting has previously been conducted in case of misfires.

- a) The rock surface area within a 1,000-foot distance along the right-of-way shall be thoroughly inspected. A thorough examination shall be made of the bedrock to locate previous blast holes or remnants of holes to ensure that no missed holes or cut-offs are encountered.
- b) Should any pre-drilled holes or remnants of holes be found these shall be circled with red/orange fluorescent paint and marked with a like-painted stake and shall be examined by a qualified blaster to determine that they are free from undetonated explosive products.
- c) Drilling shall not start until all holes or hole remnants in the ditch line have been located, circled with paint, marked by a stake, and determined to be free of undetonated explosive products by a qualified blaster;
- d) Should explosives or suspected explosives be encountered:
 - a. The area shall be clearly marked as being hazardous and entry restricted to authorized work personnel only and,
 - b. No attempt shall be made to remove or destroy any powder or detonators and the Company representative shall be notified immediately. The Company representative will discuss with the Company's and Contractor's blasting consultants the procedures for destroying the explosives. The agreed-upon procedure must be approved by the Company before the explosives are destroyed.
- e) In any event, holes shall not be drilled within the prohibited radius adjacent to any loaded holes. The radius or distance should be specified in State Regulations for the state where the work is located. In the unlikely event where the radius or distance is not specified, the

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Company's and Contractor's blasting consultants will agree upon a suitable distance to be used.

Pre-Blast Requirements:

All access roads to blasting sites shall be blocked off and signed while blasting operations are taking place. Pink or yellow "Restricted Area" tape shall be used as a temporary barricade at all roadways, trails, construction roads, or other access points to the blast area, which extends 1,000 feet from the blast site in every direction. Signs shall be labeled as "BLASTING AREA AHEAD" in letters no less than six inches (6") in height.

The Contractor shall advise the local aviation center and the local police (Federal, State, County, Local, etc.) of the location and approximate span of time during which work will take place at job start-up.

Blast Warning Signals:

Prior to initiating the blast warning system, the Blaster shall:

- a) Completed his blast inspection;
- b) Clear all personnel from the blast area for a distance of at least 1,000 feet;
- c) Ensure all right-of-way traffic and, if applicable, road and access road traffic is halted, and
- d) Retreat to a safe firing distance while checking the controlled area and confirming that the guards are posted and the controlled area is secure.

The following audible blast warning system shall be employed for all blasting on Company facilities.

- **WARNING SIGNAL** – A one (1) minute series of long air horn or siren blasts five minutes prior to the blast signal.
- **BLAST SIGNAL** – A series of long air horn or siren blasts (three blasts of 10 seconds duration) immediately prior to the shot detonation.
- **ALL CLEAR SIGNAL** – A prolonged horn or siren blast (15 seconds duration) following the inspection of the blast area

The warning system used for blast signals shall be distinct sounding air horn/siren from any other siren used on construction. Use of vehicle horns as blast signals is not permitted.

Blast Detonation:

Prior to any blast, a controlled area shall be established. All personnel not involved with the actual detonation must stand back at least 1,000 feet and workman involved with the detonation must stand back at least 650 feet from the time the "blast imminent" signal is given until the "all clear" has been sounded.

The blaster shall assume a position at the maximum distance practical from the blast.

Personnel shall vacate and take a position of safety that provides full body cover to protect against possible fly-rock strike when a blast is about to take place. Each person shall take their individual cover

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when the “Blast” signal sounds (i.e., cover should not be shared). The Blaster shall, where practical, direct all personnel to take a position of safety at the back of a blast rather than in front of the face.

Only one person shall be in charge of initiating a blast sequence and blasting. This person shall be a duly qualified and, where required, a certified blaster. This person shall personally supervise and be responsible for all connections and for detonating the blast. No change of responsibility shall take place.

Under no circumstance shall more than one firing line be used on one shot.

After every blasting sequence the Contractor’s blasting foreman or blaster shall conduct a thorough post-blast inspection of the blast area for cut-offs or misfires and shall ensure that any undetonated explosives are properly destroyed by blasting prior to any other work proceeding.

This post-blast inspection shall be performed before the “all clear” signal is sounded.

Should the Company Representative or the Company blasting consultant’s site representative have any reason to suspect that cut-offs or misfires may have occurred, or that undetonated explosives may be present following a blasting operation, the Contractor shall be advised immediately. This advice shall be confirmed in writing, by the Inspector, to the Contractor’s Safety Supervisor as soon as possible thereafter.