SOUTH DAKOTA SCIENCE AND TECHNOLOGY AUTHORITY

REQUEST FOR PROPOSAL
Underground Blasting Contract
Contract #2020-17

The South Dakota Science and Technology Authority (SDSTA) is seeking proposals for blasting services at the Sanford Underground Research Facility (SURF), located in Lead South Dakota.

1.0 SCOPE

A science experiment (Sigma-V) located underground on the 4100L has determined the need for removal of in-situ rock from the rib requiring an experienced blasting contractor. The determined size of excavation to be removed is 7 feet tall by 20 feet long by 4 feet deep. The specified rock geology is amphibolite and is a competent rock structure. The initiated blast will be positioned roughly 500 feet from the Yates shaft conveyance station. Proper ventilation can be maintained to provide an adequate fresh air supply.

A blasting contractor is needed with a certified blasting license to design the blast, bring the explosives onsite, load the round with the desired powder factor, and initiate the blast with monitoring equipment. SDSTA personnel will drill the designed blast pattern and muck the blasted material. The designed blast should minimize vibration to reduce the risk of affecting other science experiments operating throughout the facility and produce the smallest sized fragmentation possible without exceeding blast vibration. The following items are required by the selected contractor:

- One blast pattern will be designed and laid out at the selected blast location
- Selected Contractor will furnish all qualified blasting personnel to transport and handle the explosives and initiate the blast. All certified blasters shall have a minimum of five (5) years' experience in drilling and/or blasting in an underground mine application.
- Furnish all blast design documentation.
- Provide all explosives and supporting materials needed for blasting operations.
- Provide all labor and equipment for loading the explosives for the blast.
- Take seismograph readings at the blast location to monitor and record the blasting vibrations, which should not exceed two inch (2") per second particle velocity, which will be placed near the Yates shaft.
- Follow all blasting procedures attached in the General Requirements.
- Provide SDSTA with a blast plan the will be reviewed/approved by SDSTA Safety Department.

The SURF Underground workings are accessed by a shaft that hoists a cage, or semi-open elevator. The cage is lowered and raised at specific times of the day. Important cage times for this project are: (These cages times are important for scheduling access to the various underground project sites/levels).

Down	UP
6:30 AM	4:00 PM
7:00 AM	4:30 PM
7:30 AM	5:00 PM

The contractor will be escorted 100% of the time by experienced underground facility technicians (certified guides) while underground or one or more crew members will be guide trained, usually a three day process. In addition, SURF will provide necessary logistical transport of all materials, tools, and equipment needed to complete the job to the underground location, as well as all personnel travel to and from the job-site. Listed cage times will not deviate unless there is an emergency or prior approval from the project manager. The selected contractor will be required to have all crew members go through a four-hour safety training prior to going underground and commencement of any work on the property. This training will be provided by SDSTA. SDSTA will provide underground Personal Protective Equipment (PPE) that includes a self-rescuer, lights and a mine belt; all other required PPE will be supplied by the contractor, such as safety toe boots, reflective vest, safety glasses, gloves, and hard hat, along with any specialty items required for blasting operations. Note: personnel underground must not wear shorts or cut-off sleeves.

2.0 PROPOSAL INSTRUCTIONS

The awarded contract will be based on a low price technical acceptable procurement. Your proposal should be provided in digital format, as a pdf file, with standard letter size format. Proposals must contain the following:

2.1 Contact information, including an email address, for the Contractor's designated contact person who can receive and distribute Request for Proposal (RFP) information.

2.2 Contractor description and evidence of qualifications to address the scope described in this document. Provide three examples of projects performed that demonstrate the qualifications and competence for each of the disciplines/requested areas of expertise.

2.3 Resumes for all key project staff to include:

- Experience with similar relevant projects.
- Qualifications, including training and certification.

2.4 Provide a description of your safety program and quality control (QC) programs. Explain how your safety and QC programs will be implemented for this project.

2.5 Safety records for the past three years (incident/injury records, OSHA 300 logs and EMR data)

2.6 Exceptions to the draft contract or other RFP materials. Disclose any existing relationships and previous work with SDSTA/SURF.

2.7 SDSTA requests that the contractor submits the following items for this work:

1. Labor billing rates for employees *who will* perform work.
2. Unit material costs to perform expected work. Assume the contractor will provide all tools and equipment necessary for the project.
3. Estimated project schedule and the availability to perform the blast.

Please direct all questions in writing to Michele Baumann at mbaumann@sanfordlab.org by close of business June 12th , 2020. Questions and answers will be posted as an amendment to this RFP by 5:00 p.m. MT June 17th, 2020.

Submit one electronic copy (.pdf format) of the proposals ~~quotes~~ no later than 2:00 p.m. June 22nd , 2020, to: mbaumann@sanfordlab.org. Late submissions will not be accepted.

The quote period may be extended at the discretion of SDSTA based on the quantity and/or complexity of questions. Any notices of extension of time to respond will be distributed to all prospective offeror by SDSTA.

All communications regarding this procurement between RFP release and contract award shall be directed by email to mbaumann@sanfordlab.org. Communications with other SDSTA staff regarding this procurement in advance of the contract award are not allowed.

3.0 GENERAL REQUREMENTS (Completed by the Contractor)

3.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

• 30 CFR Part 57, Subpart E – *Explosives*
• 27 CFR 555 – *Commerce in Explosives*
• 29 CFR 1926.901 – *Blaster Qualifications*
• 29 CFR 1910, Subpart N – *Materials Handling and Storage*
• 29 CFR 1910.109 – *Explosives and Blasting Agents*
• 29 CFR 1926, Subpart U – *Blasting and the Use of Explosives*
• 29 CFR 1926.800 (p) (1,2) – *Underground Construction*
• State of South Dakota Explosives Permit
• Federal Explosives License/Permit – User of Explosives o (ATF Form 5400.14/5400.15 Part I)
• DOE-STD-1212-2012 (content evaluated for ATF equivalency)
• Notice of Clearance for Responsible Person and Employer Possessor
• Intergovernmental Agreement
• Memorandum of Understanding between the Department of Justice (ATF) and the Department of Labor (MSHA)
• SDSTA Blasting Permit
• SDSTA Explosives Management Chapter- Document 73375 Version 1

3.2 DEFINITIONS

***Actual Possession*:** When a person is in immediate possession or control of *Explosive Materials*.
All-clear: An announcement made following a *Blast* after *Ventilation Controls* have been restored to normal configuration and permissible air quality has been verified.
Ammonium Nitrate/Fuel Oil (ANFO): An explosive material consisting of ammonium nitrate and fuel oil.
Attendant: A person assigned to a specific task or duty.
Attended: The physical presence by a person.
Authorized Escort: A person assigned to guide incoming *Explosive Material* deliveries from access gates to predetermined off-loading location.
Auxiliary Facilities: An underground storage structure that meets the requirements of 30 CFR Part 57, Subpart E – *Explosives,* and holds less than one week's supply of *Explosive Materials*.
Barricade: A physical barrier that separates the *Blasting Area* from personnel, equipment, flying materials, etc.
***Blast(ed/ing)*:** The ignition of an *Explosive* charge for the breaking and displacing of rock.
Blast Area: The area of *Blast* within the influence of flying rock, gasses and concussion.
Blast Door: A door and frame that is engineered to resist the pressure and concussive forces of a nearby *Detonation*; may serve as a *Ventilation Control*.
Blast Firing Location: A designated location outside of the *Blast Area* used for *Blast* firing purposes and provided with a battery powered phone (e.g. FEMCO™) and radio capabilities for announcement of pre-*Blast Warnings.*
***Blast Location*:** The actual area for excavation activities as specified in the *Blast Plan*.
***Blast Monitoring*:** The measuring of air overpressure and ground vibration (concussive force) that occurs during the initiation of *Explosive Materials.*
***Blast Patterns*:** A designed array of drilled holes to be *Loaded* and *Detonated* in a specified sequence.
***Blast Plan*:** An engineered work document designed to manage *Explosive Materials* and optimize their efficiency while minimizing the negative impacts to underground personnel and ongoing research.
Blast Site: The area where explosive material is handled during the loading and detonation of blast holes; it includes at least 15 feet (4.6 meters) of the surrounding solid or broken rock.
***Blast Time*:** The exact time the *Blast* is initiated.
Blast Warning: Three sequential announcements providing *Blast* initiation information; 15 minutes, 5 minutes and immediately prior to the *Blast*.
***Blast Window*:** A preestablished timeframe, not to exceed 60 minutes, for the scheduling of a *Blast*, e.g. 9:00 - 10:00 am. At no time shall a *Blast* occur prior to the scheduled *Blast Window*, e.g. 8:55 am would be unacceptable in the listed example.
***Blast Zone*:** A predetermined area that accounts for dispersal of toxic and asphyxiating gasses associated with *Blasting*.
Blaster: An individual designated by the *Responsible Person* (licensee/permittee) who is *Qualified* in the use, transportation, storage and supervision of *Explosive Materials* and is responsible for the initiation of *Blasts*.
Blasting Agents: *Explosive Materials* have been tested and found to be so insensitive that it is unlikely that they will initiate or *Detonate* in a fire during normal transportation conditions (cannot be detonated by a number 8 test detonator cap).

Blasting Cap: A metallic tube closed at one end containing a charge of one or more *Detonating* compounds and designed for and capable of *Detonation*.
Blasting Circuit: The distribution network utilized to initiate a *Blast*; components may be comprised of *Detonator Leads, Trunkline, Shot Line, Lead Line* and *Initiating Device.*
***Blasting Permit*:** A form utilized to capture *Blast* related information and used to inform personnel of associated hazards and requisite controls.
Cage Attendant: An Infrastructure Technician designated as a person responsible for communication of cage movements to the Hoist Operator.
Cargo Space: An area solely dedicated to storage and transport of *Explosive Materials.*
Competent: A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
Constructive Possession: When a person lacks direct physical control over *Explosive Materials* but knowingly has the power and intention to exercise dominion and control over the *Explosive Materials*, either directly or indirectly through others (e.g., an employee at a construction site who keeps keys for *Magazines* in which *Explosive Materials* are stored, or who directs the use of *Explosive Materials* by others).
Conveyance: Any nonself-powered unit used for transporting personnel or materials, including, but not limited to, trailers, railcars, cages and skips.
Detonate(ed/ing): To cause to explode by the application of sudden force.
Detonating Cord: A flexible cord containing a center core of high *Explosives* which may be used to initiate other *Explosives*.
Detonator: Any device containing a *Detonating* charge used to initiate an *Explosive*. These devices include electric or *Nonelectric* instantaneous or delay *Blasting Caps*, and delay connectors.
Detonator Leads: The wires or shock tube attached to the *Detonator.*
Electric Blasting: The firing of one or more charges using electric igniting or exploding devices.
Employee Possessor: An individual who has *Actual* or *Constructive Possession* of *Explosive Materials*.
Explosive: Any chemical compound, mixture or device that is capable of undergoing a rapid chemical reaction and produces an explosion.
Explosives Manifest: Documentation that accompanies the initial onsite delivery of *Explosive Material*.
Explosive Material: *Explosives, Blasting Agents* and *Detonators*.
Extraneous Electricity: Electrical energy, other than actual firing current or the test current from a galvanometer, that is present at a *Blast Site* and that could enter an electric *Blasting Circuit*. Such electricity can include lightning, current from high tensioned powerlines and static charge carried on a person.
Fly Rock: Rock that is propelled from the *Blast* by the force of an explosion.
Grizzly: A device designed for the sizing or sorting of *Blasted* rock.
Initiating Device: A device independent of facility electrical systems that provides electrical current or concussive force to the *Lead Line* to propagate the initiation of the *Explosive Materials*.
Intrinsically Safe: A protection technique for safe operation of electrical equipment in a hazardous area by eliminating the electrical or thermal energy available for ignition.
Inventory: (n) A listing of all *Explosive Materials* stored in a *Magazine*. (v) The process of accounting for the listing of all *Explosive Materials*.
Lead Line: A primary line intended for repeat use that connects the *Initiating Device* to the *Shot Line.*
Loading: Placement of *Explosive Materials* into *Blast* holes in preparation for a *Blast*.

Magazine: A structure specifically constructed and located for the safe storage of *Explosive Materials*. *Magazines* include the following three types which are categorized based on amount of storage capability:
• Primary: may hold more than a one-week supply of *Explosive Materials*
• Auxiliary: limited to less than a one-week supply of *Explosive Materials*
• Day Box: limited to a one-day supply of *Explosive Materials*

Misfire: (v) The complete or partial failure of *Explosive Material* to *Detonate* as planned. (n) The *Explosive Material* itself that has failed to *Detonate*.
***Nonelectric*:** A system for the firing of one or more charges dependent on *Nonelectric* materials to initiate a *Blasting Cap, e.g. Safety Fuse*, ignitor cord, *Detonating Cord*, shock or gas tubing.
Personnel-trip: A trip in which persons are transported to and from a *Work Place*. This is not inclusive of *Cage Attendants* or equipment operators tasked with the responsibility of transport operations.
Primer: A unit, package or cartridge of *Explosives* that contains a *Detonator* and is used to initiate other *Explosive Materials*.
Purchaser's Representative: An individual appointed by the buyer of *Explosive Materials* who is responsible for receipt and *Inventory* of delivered *Explosive Materials*.
Qualified: A person who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.
Responsible Person: An individual who has the power to direct the management and policies of the applicant pertaining to *Explosive Materials*.
Safety Fuse: A flexible cord containing an internal burning medium by which fire is conveyed at a continuous and uniform rate for the purpose of firing *Blasting Caps*.
Secondary Blasting: The use of *Explosive Materials* to reduce oversized rock to the dimension required for handling, or the *Blasting* of *Misfires*.
Semi-conductive Delivery Hose: A hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels, yet not so high as to prevent drainage of static electric charges to ground; hose of not more than two megohms resistance over its entire length and of not less than 5,000 ohms per foot meets the requirement (e.g. *ANFO* hose).
Shot Line: A single-use line located within the *Blasting Circuit* that connects the *Trunkline* to the *Lead Line* (see Figure 1: *The Blasting Circuit Tie-in Sequence*).
Shunted: Joining two points of a circuit to impede the flow of electrical current.
Signage: An administrative control that communicates workplace information or potential hazards and follows American National Standards Institute (ANSI) formatting.
Tamping: The process of using a non-sparking device to compress the *Explosive Material* within a *Blast Hole*.
Trigger Action Response Plan (TARP): A predetermined list of controls aligned with escalating levels of risk.
Trunkline: The portion of the *Blasting Circuit* located at the *Blast Site* used for the *Tying-in* of all loaded holes within a *Blast Pattern.*
Tying-in: The process of connecting loaded holes to an *Initiation Device.*
Unattended: A *vehicle* with no personnel at the controls.
Vehicle: A self-propelled means of transport that is mechanically or electrically powered, e.g. truck, van, locomotive, bus, etc.
Ventilation Controls: Engineered mechanisms designed and used to control the amount and direction of air flow, e.g. regulators, air locks, personnel doors, curtains, *Blast Doors*.

Without Undue Delay: When unrelated activities do not impede or take precedence of the specified task.
Workplace: Any place where work is being performed.

3.3 REQUIREMENTS

3.3.1 Regulatory Licensing and Permitting

There are federal, state and local licenses and permits that must be obtained prior to receiving and using *Explosive Materials* (see Table 1: *Permit and License Requirements*).

Government Agency	Application Form	Permit/License
Federal (Alcohol Tobacco Firearms and Explosives (ATF))	ATF Form 5400.13/5400.16	Federal Explosives License/Permit-User of Explosives (ATF Form 5400.14/5400.15 Part I)
Federal (ATF)	Employer Possessor Questionnaire – 5400.28	Notice of Clearance for Responsible Person and Employer Possessor
State (South Dakota)	Application for Permit to Purchase, Use, Transport, Sell, or Manufacture Explosives	South Dakota Explosives Permit
Local (City of Lead)	Magazine Inspection	Approval of City Building Inspector

Table 1: Permit and License Requirements

3.3.2 Qualifications for Authorized Personnel

SURF recognizes three qualification levels associated with corresponding *Explosive Materials* management responsibilities (see Table 2: *Qualification Levels for Explosive Materials Related Activities*).

	Responsible Person	Employee Possessor *	Blaster **
Licensee/Permittee	✓		
Qualified to Supervise Use of Explosives			✓
Responsible for *Blasting* Activities			✓
Authority to Direct Management and Policies	✓		
Qualified to have *Constructive Possession*		✓	
Qualified to have *Actual Possession*		✓	

Table 2: Qualification Levels for Explosive Materials Related Activities

* *Employee Possessors* may not necessarily be *Blasters*
** All *Blasters* must be *Employee Possessors*

3.3.2.1 Blaster Requirements

The *Blaster* has direct responsibility for the safe initiation of all *Explosive Materials* and ensures compliance with the *Blast Permit*. The *Blaster* shall:

- Ensure that anyone handling *Explosive Materials* is an *Employee Possessor*
- Be able to understand and give written and oral orders
- Be in good physical condition and not be addicted or under the influence of narcotics, intoxicants or similar types of drugs
- Be required to furnish satisfactory evidence of *Competency* in handling *Explosive Materials* and performing in a safe manner for the type of *Blasting* that will be required
- Be knowledgeable and *Competent* in the use of each type of *Blasting* method used
- Ensure that untrained, inexperienced personnel are always under the immediate and direct supervision of a person trained and experienced in the handling and use of *Explosive Materials*
- Be familiar with and understand the requirements of the *Blast Plan*

3.3.3 Blast Plan

The design and development of the *Blast Plan* shall be performed by an individual who is *Qualified* in all aspects of *Explosive* management and authorized by the *Responsible Person* of the company engaged in the use of *Explosives*. The submission of the *Blast Plan* must take place at least two weeks prior to planned *Blasting* activities.

The *Blast Plan* for self-performing *Blast* activities must be approved by the SDSTA Environment Safety & Health Director and Underground Access Director. The *Blast Plan* shall be provided to the Science Director for review and comment.

At a minimum, the *Blast Plan* shall include:

- Projected date of *Blast* scenario, e.g. July 1, 2020 – December 31, 2020
- Restrictions to primary and secondary access/egress and Refuge Chamber travelways, including time lost to:
    - *Blast*
    - Wetting down
    - Scaling
    - Removal of *Blasted* rock, and
    - Installation of ground support
- Configuration of *Blast/Ventilation Controls*
- Placement of personnel (guard) for access control during a *Blast* and subsequent ventilation activities
- Potential *Fly Rock*
- Gasses and dust produced by a *Blast* and associated ventilation dispersal times that shall be established by a *Qualified* ventilation engineer
- Effects of noise on personnel
- Impacts to normal traffic patterns prior to, during and after *Blasting* activities
- Considerations for potential to adversely impact travel in the shafts
- Detailed diagram of intended *Blasting Circuit* e.g. all electric, all *Nonelectric*, combination electric and *Nonelectric*
- Types and amounts of *Explosive Materials* to be used in a standard round to control fragmentation and overbreak
- Types of *Explosive Materials* to be used
- Copies of all supporting licenses and permits
- Identification of regularly scheduled time-frames greater than four hours without *Blasting* activities taking place
- Signatures
    - *Responsible Person*

o *Blast Plan* author
o SDSTA Project Manager

• Methods of *Blast Monitoring*

include the frequency and amplitude of *Blast* vibrations on the surface and underground, and

o *Blast Monitoring* data to be made available to SDSTA upon request

3.3.4 Work Planning and Control Requirements

A Job Hazard Analysis (JHA) and Standard Operating Procedure (SOP) shall be developed and implemented for each operational task and *Blast*-related activity. Personnel shall be trained in all JHAs and/or SOPs prior to participating in associated work activities.

3.3.4.1 SDSTA Blasting Permit

SURF has stakeholders representing activities not directly associated with *Blasting*. The underground areas are reliant upon consistent ventilation flows and accessible travelways. During *Blasting* operations, ventilation and some travelways may be impeded for brief periods of time during pre/post *Blasting* activities. To ensure the safety and health of personnel, environment and property, communication of *Blasting* activities is necessary. A *Blasting Permit* shall be utilized to serve as a proactive means of communicating *Blasting* details. This permit shall be provided to SDSTA, as per the blast permit procedure, at least three hours prior to a planned *Blast*. At a minimum, the permit shall include:

- **Date issued**
- **Shift**
- **Permit owner**
- **Name of *Blaster***
- ***Blast Window* ***
- **Specific *Blast Location***
- ***Blast Door*/Vent/Curtains/Controls**
- **Amount of *Explosive Materials* in pounds**
- **Minimum ventilation times (time to reduce *Blast* gasses to allowable threshold limit values (TLV) levels)**
- **Signatures**

The completion and submission of the *Blast Permit* shall be performed by an individual(s) who is/are *Competent* in all aspects of *Blast*-related activities and the associated ventilation and blasting controls. This person shall be authorized by the *Responsible Person* of the company engaged in the use of *Explosives*.

3.3.5 Transportation of Explosive Materials – General

There are general requirements that apply to the transportation of *Explosive Materials* without regard to mode of transport.

Explosive Materials shall be transported *Without Undue Delay* to the storage area or *Blast Site*. Unrelated activities shall not impede this task, e.g. other use of the hoist, transporting equipment, etc.

Vehicles or *Conveyances* utilized in the transport of *Explosive Materials* shall:

- Be occupied only by persons necessary for handling the *Explosive Materials*
- Be *Attended* or secured against unauthorized access
- Be strictly dedicated for this purpose until the task is complete
- Contain only properly secured, non-sparking tools required for the task

• Never be combined with *Personnel-trip* activities

Cargo Spaces shall:
• Not be utilized to transport personnel • Have a means of securing *Explosive Materials* and non-sparking equipment
• Be free of exposed sparking material, or
• Have a means of securing and covering *Explosive Materials* to prevent contact with sparking surfaces

3.3.6 Shaft Transportation of Explosive Materials
In preparation for and during the transport of *Explosive Materials* in a shaft, the following shall be adhered to:
• The hoist operator shall be notified prior to placing any *Explosive Materials* on a hoisting *Conveyance*
• Personnel shall not ride with *Explosive Materials*
• Only those activities associated with the hoisting of *Explosive Materials* shall be performed. All other hoist related activities shall cease until all *Explosive Materials* are removed from the *Conveyance* and in the immediate underground level/station area
• *Explosive Materials* transported in hoist *Conveyances* shall be secured in a manner which prevents shifting of the cargo that could cause *Detonation* by impact or by sparks
• *Explosive Materials* may be transported within the manufacturer's packaging and secured to a non-conductive pallet

3.3.7 Non-shaft Transportation of Explosive Materials
Vehicles and *Conveyances* that are being used to transport *Explosive Materials* shall:
• Be inspected prior to use and maintained in sound mechanical and electrical condition
• Have sides and enclosures higher than the *Explosive Materials* being transported, or have the *Explosive Materials* secured to a nonconductive pallet
• Have wheels chocked when parked
• Have 4 inches (10.16 centimeters) of separation, by hardwood or equivalent, when *Explosives* and *Detonators* are transported together

3.3.7.1 Rail Transport
When utilizing locomotives and railcars the following is required:
• *Explosive Materials* shall not be transported on any locomotive
• Proper *Signage* shall be displayed, e.g. "DANGER: EXPLOSIVES"
• The *Conveyance* containing *Explosive Materials* shall be pulled, not pushed, whenever possible.

3.3.7.2 Vehicle Transport
All self-propelled mobile *Vehicles* must:
• Have a current, documented pre-use inspection
• Have a minimum of two multipurpose dry-chemical fire extinguishers each having a rating of at least 10lb–ABC or one such extinguisher and an automatic fire suppression system
• Display the proper *Signage*, e.g. "DANGER: EXPLOSIVES"
When *Explosive Material*-laden *Vehicles*, designed for specific *Loading* applications, are *Unattended* the:
• Brakes must be set and
• The engine must be shut off unless powering a device that is used in the *Loading* operation

3.3.8 Blast Site Requirements
The *Blast Site* shall be made ready to receive *Explosive Materials* prior to transporting *Explosive Materials* from the *Magazine*. Preparations shall include:
• The inspection and securing of face, back and ribs for loose material

• Ensuring that only the equipment necessary for *Loading* of the holes is present

Only the necessary quantity of materials for the *Blast* shall be transported to the *Blast Site*. *Explosive Materials* at the *Blast Site* shall be *Attended,* and the area shall be *Barricaded* and posted with *Signage.*

3.3.9 Preparation for Loading Activities

All *Loading* and *Blasting* activities shall be conducted under the guidance of a *Blaster.*

• All drilling activities on a bench or face shall be completed prior to *Loading* activities
• *Blast* holes shall be checked and wherever possible, cleared of obstructions
• *Explosive Materials* shall be kept separated from *Detonators* until *Loading* begins
• *Primers* shall be made up only at the time of use and as close to the *Blast Site* as conditions allow
• The only activities permitted within the *Blast Site* are those directly related to the *Loading* operation

3.3.10 Loading Activities

During the *Loading* of holes, the following protocols shall be adhered to:

• Only those holes to be *Blasted* in a single shot shall be *Loaded*
• *Tamping* shall be done only with non-sparking materials
• The primed cartridge must have an additional cartridge placed on it before *Tamping* begins
• When *Loading Blasting Agents* pneumatically, *Semi-conductive Delivery Hose* shall be used, and the equipment shall be bonded and grounded
• *Primers* shall be prepared with the *Detonator* contained securely and completely within the *Explosive* or contained securely and appropriately for its design in the tunnel or cap well
• *Loading* and *Blasting* shall be conducted in a manner designed to facilitate a continuous process

3.3.11 Disposal of Used Packaging Materials

Explosive Materials packaging shall be removed from the area and disposed of in the following manner:

• All residual *Explosive Materials* must be removed from packaging
• *Explosive Material* must be characterized to determine its waste classification — regulated or non-regulated
• Packaging shall be burned as per associated permits or be flattened, bundled/packaged and secured in such a manner as to prevent dispersion for disposal as per its classification.

3.3.12 Misfires

• When a *Misfire* is suspected, persons shall not enter the *Blast Area for 30 minutes or per the manufacturer-recommended time, whichever is longer.*

• When a *Misfire* is identified, only work that is absolutely necessary to safely access and address the *Misfire* shall be permitted in the affected area. Necessary work may include:

o Washing and wetting down
o Scaling
o Muck removal
o Ground support installation

Once the location of the *Misfire* can be safely accessed, all other activities are to cease, and the *Misfire* shall be addressed. If it is necessary to *Blast* a *Misfire(s),* the following shall be adhered to:

• If the *Misfire* does not adversely impact travel ways or ventilation, the *Misfire* shall be *Blasted* during the next scheduled *Blast Window*

• If the *Misfire* does impact travel ways or ventilation, a plan shall be developed to address the impacted travel ways or ventilation; it must be communicated to SDSTA and affected stakeholders
• Misfires shall be addressed under the direction of the *Blaster*
• When a *Misfire* cannot be disposed of promptly, each approach to the area affected by the *Misfire* shall be posted with Signage at a conspicuous location to prohibit entry, and the condition shall be reported immediately to supervision
• *Explosives* and *Detonators/Blasting Caps* recovered from *Misfires* shall be returned to a Magazine and separated from the other Inventory
• Misfired *Explosives* and *Blasting Caps* shall be disposed of in the manner recommended by the manufacturer

3.4 SUBMITTALS

The following submittals are required for this project:

~~SD-03~~ Product Data
Safety Data Sheets (SDS) for all chemicals

4.0 EQUIPMENT and Training Requirements

All *Responsible Persons*, *Employee Possessors* and *Blasters* shall be trained in methods, equipment usage and hazard identification in accordance with their respective role(s).

All personnel at SURF attending the General Safety Basic Training shall receive instruction in the:

• Recognition of *Explosive Materials*
• Dangers associated with *Explosive Materials*
• Notification process of unsecured *Explosive Materials*
• Toxic and asphyxiating gasses associated with *Explosive Materials*
• Roles and responsibilities of those authorized to handle *Explosive Materials*
• Placards and *Signage* associated with the use of *Explosive Materials*
• Safeguards for personnel who may be indirectly impacted by *Blasting* activities

4.1 Warning Signs and Labels

Provide warning signs at all approaches to blasting areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide Warning Signs and proper labels for all explosive materials.