

JOB HAZARD ANALYSIS (JHA)

JOB TITLE: Explosives Use and Safety	DATE:	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED
LOCATION OF JOB: Rocky Mountain National Park all ROMO Areas	DIVISION:	BRANCH:
TITLE OF EMPLOYEE(S) INVOLVED IN ANALYSIS: Maintenance Worker Leader, Maintenance Workers, Laborers, Eng Equip. Operators, Maint Mechanics.	SUPERVISOR: Facility Management	DIVISION CHIEF:

REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:	Hard hat, ear & eye protection, non-synthetic clothing (as much as possible...) blasters vest w/ applicable tools, radio, blasting cheat sheets, plans, and required documents, spare batteries
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SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	RECOMMENDED ACTION OR PROCEDURE
Blasting work: preparing for work.	Injuries or property damage resulting from lack of knowledge, communication, equipment, or training.	<p>-Our most important achievement is for every employee to conclude each and every day without personal injury or damage to property.</p> <p>-Employees are provided adequate orientation, equipment and training as per their duties and responsibilities.</p> <p>-Employees participate in and support an environment where all valid safety concerns can be raised and addressed, without judgement or reprisal.</p>
		<p>-BLASTER-IN-CHARGE HAS ABSOLUTE RESPONSIBILITY!</p> <p>-Only authorized and/or certified employees will engage in blasting operations, under the approval and direction of BIC & supervisors.</p> <p>-Explosives are a vital and indispensable tool and need to be treated with extreme caution and respect, and in full compliance with all applicable rules, regulations and policies.</p>
	Injuries or property damage resulting from lack of training.	-Employees trained and/or certified to use, handle, store and transport explosives must maintain their relevant endorsements, licenses, training and field requirements, or inform supervisor of problems or concerns.
	Injuries or property damage resulting from lack of PPE and/or training.	-Crew leaders and supervisors are responsible for providing crewmembers with adequate PPE and related training. Refer to Required personal equipment
	Injuries or property damage resulting from lack of knowledge, communication, equipment, or training.	<p>-Crew leaders and supervisors will conduct and document weekly safety meetings to discuss safety issues, projects, and other work-related topics.</p> <p>-BIC, Crew leaders and supervisors will also conduct a pre-blast briefing with personnel to provide project orientation, assign duties and responsibilities, review blasting procedures, and avoid miscommunication.</p>
Blasting work: communication, planning, and logistics.	Injuries or property damage resulting from lack of communication.	<p>-Good communication between guards and blaster-in-charge is essential and should reinforce individual awareness of real and potential hazards.</p> <p>-Radios, frequencies, and standard operating procedures (SOP's) should be reviewed and clearly understood by all participants before beginning work.</p> <p>-Instructions will come from blaster-in-charge, or a designated radio contact.</p>

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		<ul style="list-style-type: none"> -Positive radio communication is absolutely critical, and radios should be thoroughly inspected and tested prior to leaving the shop.
	Injuries or property damage resulting from lack of communication, equipment, or training.	<ul style="list-style-type: none"> -Each crew will be provided at least one first-aid kit and water-filter. -Crewmembers should be familiar with its location and contents at all times. -Basic first aid/CPR training will be available for all crewmembers.
	General hazards, all hazards.	<ul style="list-style-type: none"> -Safety is everyone’s primary responsibility, and all employees should take an active role in hazard identification, analysis, and mitigation. -If at any point, a job is deemed unsafe, guards and/or blasters should feel entitled to stop until the appropriate PPE, engineering control’s, equipment or conditions are available or exist to make the job safe.
	Injuries or property damage resulting from lack of knowledge, communication, equipment, or training.	<ul style="list-style-type: none"> -Each guard should receive training on basic radio procedures, emergency response plans, and individual duties and responsibilities. -Workers need to stay alert and focused on their surroundings and duties, the location of other guards, and any/all hazards while performing blasting operations. -Crewmembers should report any concerns or breaches of security to the blaster-in-charge immediately.
	Injuries or property damage resulting from work site hazards such as weather.	<ul style="list-style-type: none"> -Blasters need to be continually aware of, and prepared for, dynamic and extreme weather. -Immediately vacate and guard site if lightning approaches. -Be aware of potential desensitizing of product from exposure to elements. -Preferable to use non-electric initiation system.
Blasting work: preparing site/ signage.	Injuries caused by inadequate guarding.	<ul style="list-style-type: none"> -Post appropriate signs and guards around the perimeter of each shot. -Maintain communications with all guards, “positive-response”, using radios if needed.
Blasting work: on site.	Injuries caused by improper handling.	<ul style="list-style-type: none"> -Handle explosives with extreme care, observing all instructions included in each box of explosives and caps. -Follow the “Always and never” instructions contained in each box of explosives and caps. -Be aware of the possibility and hazard of stray Radio Frequency Energy. -Never handle or prepare explosives, load holes, or tie bore-holes together with a radio chest harness on. -Keep radios at least 25’ away from explosives and related equipment. -Place hands on ground for 5 seconds before handling electric detonators. -No smoking within 50’ and use only non-sparking tools.
	Injuries or property damage resulting from improper transportation of explosives.	<ul style="list-style-type: none"> -Obtain and reference the following publication; <i>National Park Service Guide for the Storage, Transportation, Training of Explosives Use, and Handling of Explosives</i>. -Have all required documents readily available when transporting explosives (by vehicle, person, or pack mule). -Explosives should be secured inside backpacks in such a way as to not pose a safety hazard to the person carrying the load or anyone else on the trail. -Never carry caps in the same container as detonation cord or explosive product. -When needed, explosives and supplies will be securely packed on NPS stock, under the direction of a blaster and animal packer.

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	Injuries or property damage resulting from improper initiation	<ul style="list-style-type: none"> -Double check that all holes are tied into shot. -Have spare batteries and/or spare initiators at the job site. -Make sure the initiation site is a safe location. -Give loud verbal warning prior to shot. -Report to guards, “all clear,” and call them in or keep at posts for next shot.
	Injuries caused by drilling operations.	<ul style="list-style-type: none"> -Operators need to find the safest, most effective position for themselves and the machine. -If possible, consider moving materials so that drills can be operated from such a position to allow the driller to maintain good footing and posture. -Drill operators should maintain a relaxed grip on the handles, reducing the conduction of vibrations and impacts to hands, wrists, arms and elbows. -Allow the weight of the drill to drive the bit, while guiding the shank in the middle of the hole, with minimal pressure from the drill operator. -If necessary, a spotter, or an additional operator can help support the machine or guide the bit. -Poinjar operators should take frequent breaks of appropriate length, and stretch often. Machinery is not to be operated within 50’ of explosives. -NEVER DRILL IN AN EXISTING BOREHOLE WHICH MAY CONTAIN EXPLOSIVES! -NEVER DRILL INTO A BOOTLEG!
	Frozen bit, sudden stop, or fatigue/frustration.	<ul style="list-style-type: none"> -When all else fails, take a step back and a big, deep breath, maybe stretch a little, and try again or try something different. -Drillers need to be attentive to the behavior of the drill and conscious of the type of rock they are drilling. -Micro-fractures and unforeseen seeps can jamb a bit, causing a sudden reaction with the drill. -Drillers should monitor the following: <i>Changing tones</i>-often signal a bit is about to break completely through a rock. <i>Fast and slow drilling</i>-often indicates different layers and hardness of rock. <i>Color of the drill fines</i>-a good indicator of the type of rock below.
	Injuries caused by transporting/packing drills.	<ul style="list-style-type: none"> -Frame packs and backboards are available for transporting drills by foot. -Anyone carrying a drill should be extra careful of rough or loose footing and get assistance while loading and unloading. -Packers or other trained staff must lash drills tight and secure to pack stock. -Poinjars should be purged whenever being transported or not in use.
Blasting work: Initiation.	Misfire, Accidental detonation, Exposure to Elements.	<ul style="list-style-type: none"> -Handle explosives with extreme care, <u>observing all instructions</u> included in each box of explosives and caps. -Don’t make up primers next to truck containing explosives. Place hands on ground for 5 seconds before handling electric detonators. -No smoking within 50’ and no sparking tools allowed. -Be aware of potential desensitizing of product from exposure to elements. -Do not tamp primer! -Follow the “Always and never” instructions contained in each box of explosives and caps.

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		<ul style="list-style-type: none"> -Follow manufacturer's instructions. -Double check that all holes are tied into shot.
		<ul style="list-style-type: none"> -Use only approved explosives (no nitroglycerin based products). -Allow no smoking or mechanized equipment within 50 feet of holes.
	Premature firing, misfires, and partial detonation.	<ul style="list-style-type: none"> -The "Blaster-in-Charge" controls the blast initiation device. -Check for proper resistance in EBC series. -Use EBW's or Non-EL blast system when electromagnetic radiation or extraneous electricity is present. (Radio transmitters, radar, high voltage electric lines, blowing dust or snow, etc.) -Immediately vacate and guard site if lightning approaches. -Follow misfire procedures in the event of a misfire or partial detonation

<p align="center">ROMO Blasting Guidelines for Guards</p> <p>Pre-blast briefing: Get your assignment; make sure you understand all specifics of blast plan. If you have any questions at any time, ask them.</p> <p>Radio Check: Set radios to channel 11 (or other channel as assigned by Blaster-in-Charge). We use a "positive response" system. Go to your designated spot and report to Blaster-in-Charge (BIC) when on site. If at <u>any</u> time there is a problem, contact BIC and yell "STOP!"</p> <p>"BLASTING ONE"- (Blaster has checked set-up, wired in cap and is ready to leave site.) Guards respond in order "Guard # __, clear" if area secure. A vocal perimeter should be established.</p> <p>"BLASTING TWO"- (Blaster is at initiation site, doing final checks.) All guards respond to BIC in order.</p> <p>"BLASTING NOW"-All guards respond to BIC. Blaster and all guards yell out "Blasting!" (Shot initiated right after all guards have checked in.) After shot, all guards maintain secure area until notified that blast site is clear.</p> <p>"ALL CLEAR"-Guards respond. Return to blast site.</p> <p align="center">REMEMBER!</p> <p>YOU are responsible for security of the blast area. No unauthorized persons are allowed in the area! If anything is other than what the blast plan calls for, contact the Blaster-In-Charge IMMEDIATELY!</p>	<p>ROMO General Blasting Procedures:</p> <ul style="list-style-type: none"> -Contact ROMO before beginning project -Brief guards, send out and establish security: -positive response system -Prepare explosives, load holes/place charges, tie together, lay-out lead wire, double check system - "BLASTING ONE"; Guards respond -Test Cap (Optional) -Un-shunt and test lead line -Tie/connect cap to non-el or D-cord -Un-shunt cap-tie into lead line or non-el -Inspect set-up - "BLASTING TWO"; Guards respond -Return to Initiation site -Check continuity of circuit -Connect lead wire/non-el to initiator - "BLASTING NOW"; Guards respond and all yell. "blasting now." -Initiate shot; "BOOM" --if misfire, follow misfire procedures -Disconnect & Shunt lead wire -Inspect blast site, if not all clear, follow misfire procedures. - "ALL CLEAR"; Guards respond -Proceed to next shot or clean up. 	<p>-MISFIRE Instructions:</p> <ol style="list-style-type: none"> 1. Retry standard initiation procedure—double check connections 2. Inform guards of situation, continue to securely guard area 3. Remove non-el or lead wires from blasting machine 4. Check unit, replace batteries or entire unit Snip 6 to 12" off non-el and retry or try different initiator 5. Reshoot starting with, "Blasting Two" 6. If nothing, disconnect wires, check continuity, shunt wires 7. Continue to guard scene, wait 30 minutes 8. Cautiously return to blast site, inspect all wires, cap(s), delay(s), d-cord, non-el cord, connections, 'T' joints, and any exposed part of set-up 9. If burning, do not enter site for 12 hours or 1 hour after last smoke 10. Re-assess entire setup. Back-up cap? Options? <p><i>-MISFIRES probably most often occur due to old/weak batteries in initiators.</i></p>
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JSA Instructions

The JSA shall identify the location of the work project or activity, the name of employee(s) writing the JSA, the date(s) of development, and the name of the appropriate line officer approving it. The supervisor acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Blocks 1, 2, 3, 4, 5, and 6: Self-explanatory

Block 7: Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).

Block 8: Identify all known or suspect hazards associated with each respective task/procedure listed in block 7. For example:

- a. Research past accidents/incidents.
- b. Research the Health and Safety Code or other appropriate literature.
- c. Discuss the work project/activity with participants
- d. Observe the work project/activity
- e. A combination of the above

Block 9: Identify appropriate actions to reduce or eliminate the hazards identified in block 8. Abatement measures listed below are in the order of the preferred abatement method:

- a. Engineering Controls (the most desirable method of abatement). For example, ergonomically designed tools, equipment and furniture.
- b. Substitution. For example, switching to high flash point, non-toxic solvents.
- c. Administrative Controls. For example, limiting exposure by reducing the work schedule.
- d. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills, portable water pumps)
- e. A combination of the above.

Block 10: The JSA must be reviewed and approved by a supervisor.

Block 11: List all recommended and required PPE relevant for job/activity

Emergency Evacuation Instructions

Work supervisors and crew members are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a person(s) becomes seriously ill or injured at the work site.

Be prepared to provide the following information:

- a. Nature of the accident or injury (avoid using victim’s name).
- b. Type of assistance needed, if any (ground, air or water evacuation).
- c. Location of accident or injury, best access route into the work site (road name/number), identifiable ground/air landmarks.
- d. Radio frequency(s).
- e. Contact person.
- f. Local hazards to ground vehicles or aviation.
- g. Weather conditions (wind speed & direction, visibility, temp).
- h. Topography.
- i. Number of person(s) to be transported
- j. Estimated weight of passengers for air/water evacuation.

The items listed above serve only as guidelines for the development of emergency evacuation procedures.

JSA and Emergency Evacuation Procedures Acknowledgement

As supervisor I acknowledge that the following employees have participated in the development of this JSA, accompanying evacuation procedures and have also been briefed on the provisions thereof:

Supervisor’s Signature:
