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1.0 Purpose and Scope

The purpose of this section is to outline the purpose and scope pertaining to the implementation of and adherence to the Policy.

Purpose	This policy outlines minimum requirements for surface blasting at all FCX operations. This document provides a set of standards that will be addressed in site SOPs.
Scope	<p>This policy applies to all FCX employees and contractors involved in blasting activities.</p> <p>Sites have varying levels of interaction with Blasting Contractors; these policies apply regardless of the degree of contractor involvement. Ultimately, a Responsible FCX Employee will be accountable for all surface blasts on site including project work.</p>

2.0 General Requirements

The purpose of this section is to outline the general requirements pertaining to the implementation of and adherence to the Policy.

General Requirements	<ul style="list-style-type: none">• Each site will clearly designate a Responsible FCX Employee (Exempt Employee)• Blasting ensure locations and expected blast time will be communicated to affected work groups daily• Blast initiation devices will be serviced annually or more frequently if specified by the manufacturer• Each site will have a lightning detection system and safety procedures in the event of an approaching electrical storm• All blasting processes will be carried out in a safe and efficient manner.• There will be no implied haste
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3.0 Responsibilities and Duties

3.1 Responsible FCX Employee

Responsible FCX Employee (Exempt Employee) will:	
Blasting Process	Provide field oversight of the entire blasting process. (Ensure delivery of the blasting plan to the crew and monitors work to ensure SOPs are followed).
Blast Design	Ensure the blast design has been reviewed by a qualified person to verify that the initiation plan and hole timing are reasonable. If more than one shot is planned, the initiation plan and delay between shots will be evaluated to ensure that the shots do not interfere with each other. Timing software will be used to design timing.
Compliance	Be knowledgeable in ATF, MSHA and/or other local blasting related regulations. Understand and comply with the policies (this document).

3.2 FCX and Contractor Supervisors

Supervisors for both FCX and Contract companies will be in charge of the pre-shift meeting and:	
Allocation of resources	Assess the workload for crew members and allocate resources as appropriate to minimize distractions and decision making errors.
Accountability	Supervisors will ensure that employees comply with this Policy and all site SOPs and procedures.
Contractor Safety Manual	Contractors will also comply with the H&S requirements in the FCX Contractor Safety Manual located here: http://fcx.com/company/policies.htm

3.3 Mine Managers

Be knowledgeable in and abide by the policies (this document) and champion safe blasting processes.

Leadership	Provide leadership that minimizes perceived haste.
Audits	Ensure internal audits are performed and action items are addressed (see Appendix B). Audits are required to be posted on the Blasting Safety Steering Team Sharepoint Site .
Staffing	Ensure that sufficient and capable staff are available to oversee blasting processes. Ensure that where contract personnel are utilized, an FCX employee is assigned as the FCX representative to oversee blasting operations.
Resources	Ensure that sufficient resources (people, equipment, etc) are available to safely facilitate blasting processes.

3.4 Blockers and Sweepers

Blockers and Sweepers will be FCX employees (for production blasts and secondary blasts) whose assignment begins at the pre-blast meeting.

Blocker Responsibilities	Blockers are responsible for: <ul style="list-style-type: none">• Blocking traffic at the assigned area• Understanding and repeating back the assignment• Following instructions without deviation• Stopping the initiation process if a deviation to the blocking plan is detected
Sweeper Responsibilities	Sweepers are responsible for: <ul style="list-style-type: none">• Proceeding from the blast site and clearing the area assigned• Understands and repeats back instructions• Help close "back doors" (see section 7.0 for definition) for other sweepers• Clear all equipment of personnel in the assigned area• Physically get on mine equipment to ensure there are no people on board (best practice); especially on shovels on PM. If there is concern about the sweeper not being familiar with the inside of a shovel then the Maintenance Supervisor responsible for that shovel PM will be contacted and he will confirm that all of his people are clear.• To ensure that all benches that have access to main haul roads are clear by physically driving into work sites
Training	All blockers and sweepers must have documented training prior to being assigned these responsibilities.

Contractor Blasters	All sites utilizing contractors for blasting will ensure that contractors understand and comply with this policy.
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3.5 FCX Blasting Safety Steering Team (BSST) Requirements

The FCX Blasting Safety Steering Team (BSST) will evaluate existing standards, set new policies, and monitor site performance through audits

Required Members	<ul style="list-style-type: none"> • Sponsor, GM level or Director Level • Lead • Site champions representing all business units • A health and safety representative
Audit Requirements	<p>The BSST will conduct annual audits at mine sites to monitor compliance, look for best practices, and provide feedback for continuous improvement.</p> <p>Audits will include review of compliance with FCX policies, training, site SOPs, and field practices. Follow-up audits may be conducted depending on site performance.</p> <p>A standard format will be used for the audits.</p>
Annual Meeting	An annual meeting will be held with all core members to review practices and make recommendations for change where needed.

3.6 Site Blasting Safety Steering Team (BSST) Requirements

Each site will have a Blasting Safety Steering Team to ensure that the site is following FCX blasting policies and monitor site performance. Internal audits will be posted on the BSST share point.

Required Members	<p>Sites will establish the site BSST consists of these members:</p> <ul style="list-style-type: none"> • Sponsor-Mine Manager • The site champion • A geotechnical engineer • A health and safety representative • A member of the site blasting crew • Contractor representative (if contractors are utilized)
Blasting Operations	Sites will include blasting operations as part of the risk assessments, ISO, and OHSAS processes as applicable. Records will be maintained according to the FCX – Records Retention Policy.
Audit Requirements	<p>Sites will complete regular internal audits of blasting practices to ensure compliance with this Policy. Action items will be tracked to ensure completion and follow-through.</p> <p>A standard question audit form is to be used. This form is found on the DOHS teamsite in the folder with this policy and also on the BSST Sharepoint page.</p>

Audit Frequency	<p>Site quarterly audits will include: the pre- blast meeting, clearing, securing (blocking), sweeping, initiation, post blast inspection.</p> <p>Other areas will be audited at least twice per year and more frequently to follow-up on negative findings.</p>
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4.0 Procedures

4.1 Identification of Blastholes - Drilling and Sampling

The purpose of this section is to ensure that holes are properly identified.	
Numbered Stakes	<p>Numbered Stakes must be numbered consistently with the SOP of the site.</p> <p>Drillers will place a numbered stake at each cuttings pile and verify that the stakes are numbered correctly.</p>
Extra Holes/Holes Not to be Loaded	<p>Extra holes or holes determined to not be loaded (drilled for maintenance or any other reason) will be properly identified with a stake that reads "Do Not Load" or similar language or instructions that indicate that the hole should not be loaded. These holes will be filled prior to throwing out accessories (see section 7.0 for definition) whenever possible.</p>
Site Procedures	<p>Each site will develop a Safe Operating Procedure (SOP) to inspect the pattern for unlabeled holes and unsafe conditions and this will include steps to properly notify the Responsible FCX Employee should something not be completed properly.</p>

4.2 Pre-shift Team Meeting

A pre-shift meeting will be held by blasting crews each shift.	
Requirements	<p>The pre-shift meeting shall include the following:</p> <ul style="list-style-type: none"> • Work locations • Unique or continuing hazards/risks and the controls to mitigate • Equipment needed for assigned work • Hole specific loading instructions for a pattern (water, hardness, product, etc.) • Identification of parties for communication and unique work being done in areas adjacent to the blast site • Preliminary blocking locations • The anticipated time of the blast • Identification of the Responsible FCX Employee • Other pertinent information

4.3 Pre-loading Work Place Inspection and Blast Site Conditions

The purpose of this section is to ensure that the risks associated with the blast are identified and controlled.

Blast map and area	<p>A Responsible FCX Employee will verify that the blast plan map accurately represents the blast pattern in the field (i.e. number of holes, hole locations, problem holes). A map with the actual hole locations is to be used.</p> <p>The Responsible FCX Employee will determine the boundaries of the blast area. The distance for equipment and personnel clearance will be determined by each site based on site blast specifics (500' for equipment (150mtrs) and 1,500' for personnel (450 mtrs) are typical horizontal distances but may need to be greater based on blasting practices and fly rock potential). Vertical distance components may reduce the horizontal distance.</p>
Inspection requirements	<p>Blast site inspections shall be performed before any blasting process starts. This will be documented on the blast summary sheet or other appropriate form.</p> <p>During the inspection, blast site access and egress routes will be evaluated and appropriate actions taken to ensure safety prior to blast initiation.</p>
Blasting Notifications	<p>All potentially affected personnel must be informed of blast times and locations. This includes crews and personnel in potentially hazardous situations outside of the blast area. This will be done by an "all channel call" on the radio or other site specific method approximately 30 minutes before blast.</p>
Determining Boundaries	<p>The following items shall be considered when determining the boundaries of the blast area:</p> <ul style="list-style-type: none">• Concussion of the blast• Potential fly rock distance• Fumes, ventilation and prevailing wind conditions• Air blast (see section 7.0)• Subsidence (see section 7.0)• Adjacent infrastructure• Equipment locations including maintenance activities• Noise and vibration• Geological features• Adjacent underground or surface workings• Hazards associated with the loading pattern• Weather conditions
Unlabeled Holes	<p>Unlabeled holes that are discovered will be accurately identified by the Responsible FCX Employee using the blast plan map, and labeled with a numbered stake before loading.</p>
Unloadable	<p>Blastholes not intended to be loaded will be labeled "Do Not Load", "Bad Order (BO)", or similar language, and filled in as soon as possible. Access to</p>

Holes/Holes Not to be Loaded	these holes will be restricted until safely backfilled which will be done before accessory distribution.
Addressing Questions or Concerns	Questions or concerns that arise from the blast site inspection will be resolved through consultation with the Responsible FCX Employee before the blasting process starts.

4.4 Explosives Storage

The purpose of this section is to ensure that explosives are stored in compliance with all regulations

Responsible Person	A person or persons will be assigned responsibility for managing the magazines for explosive storage.
Fire Extinguishers	The location of all fire extinguishers will be clearly marked.
Construction of Magazines	<p>All outdoor magazines will be built to the Bureau of Alcohol, Tobacco, Firearms (BATF) standards and sited to the American Table of Distances. If a countries laws or standards differ from those in the US, the more stringent standard will be enforced.</p> <p>ATF Website MSHA Website</p>
Lightning Protection	<p>All magazines will be fitted with a lightning protection system with a sufficient grounding.</p> <p>Yearly records of grounding checks are required and must be documented.</p>
Signage	<p>All magazines will be properly signed from each approach indicating contents and have warnings such as:</p> <ul style="list-style-type: none"> • "No Smoking" • "Explosives Stored Here" • "Authorized Personnel Only" • "No cell phones inside magazine " • "Radios will be turned off if taken into magazine" <p>Signs will be placed so bullets fired at the signs will not impact the magazines. These signs will be in the primary language of the country as well as English.</p>
Sparking Devices and Cell Phones	<p>Smoking, matches, open flames, and spark-producing devices are not permitted within 50' of a magazine.</p> <p>Only essential non-sparking equipment used for the operation of the magazine may be stored with explosives.</p> <p>Smart phones, cellular phones or other transmitting devices are not permitted in the magazines.</p>

Records	<p>All magazines will contain a book or similar method for the recording of all explosives movements in and out of the magazine and current inventories. These books must remain inside the magazines.</p> <p>All magazines will contain an updated copy of authorization, permits or licenses.</p>
Magazine Location	<p>All magazines must be:</p> <ul style="list-style-type: none"> • located outside the corridors of power lines • made secure with either a lockable gate and fence or lockable storage box for explosives, meeting the requirements of the applicable agency • in areas configured to prevent vehicle impact to the magazine • located in a proper manner to control surface drainage
Magazine Locks and Keys	<p>The locks on magazines will be rotated per regulatory standards (once per year). If there is a change of personnel the locks should be re-keyed at this time.</p> <p>Locks will comply to BATF standards. Locks on magazines and day boxes must have a minimum of a 3/8 inch shackle and be hooded.</p> <p>Keys must be secured on-site with restricted access by use of a locking storage system. Possession of keys must be tracked by documentation.</p>
Bills of Lading	<p>Bills of Lading (BOL's) and packing lists shall be kept in a secure location for the specified minimum period of 5 years or per the FCX – Records Retention Policy.</p>
Accurate Case Counts	<p>The contents of all boxes of explosives will be verified for accurate case counts before distribution in the field. Any boxes that are found to be inaccurate (under or over) will be isolated in the magazine for further investigation.</p>
Partial Boxes of Explosives	<p>If partial boxes are returned to the magazine they must be re-issued as partials.</p> <p>Partials from different boxes may not be combined. Unused explosives must always be stored in the original packaging.</p>
Shortages	<p>A Responsible FCX Employee ("the discoverer") will notify the manufacturer, supplier, ATF, and local law enforcement within 24 hours of the discovery of accessory shortages whether related to the manufacturer/supplier or due to a site issue. Shortages will be reported to supervisor or management.</p>
Overages	<p>In the case of overages only the manufacturer and supplier need notification. These notifications must be documented. The appropriate people (management) on site must also be notified.</p>

4.5 Explosives Transportation

The purpose of this section is to ensure that explosives are transported safely and in accordance with regulations.

Transporting Explosives	<p>All explosives, detonators, and accessories will be transported in accordance with statutory regulations ("day boxes", Type 3 magazines).</p> <p>Day boxes with explosives must be locked in transit.</p> <p>Day boxes holding explosives will be used exclusively for explosive material.</p> <p>If other types of material needs to be stored in a box the box must not contain any explosive material.</p>
Signage	<p>Explosives transport vehicles will have the proper placards, visible in all four directions.</p> <p>Explosives trucks will display red or orange flags while transporting explosives.</p>
Fire Extinguishers	<p>Vehicles must be equipped with two multipurpose dry fire extinguishers.</p>
Day Boxes	<p>Day boxes must be securely fastened to the vehicle or confined within the vehicle body to prevent spillage.</p> <p>Must be made of non-sparking materials for container lining and fasteners and must comply to all ATF standards for Type 3 magazines.</p> <p>Detonators and boosters transported on the same vehicle must be stored in separate, compliant day boxes.</p> <p>No other materials will be transported in day boxes with explosives.</p> <p>Day boxes must be locked on the pattern when products are not being loaded or unloaded. Day boxes with explosives must be locked when unattended. This means when there is no one by the truck it will be considered unattended.</p>
Capacities	<p>The volume and quantity of explosives will not exceed the limits established by regulatory authorities.</p> <p>Vehicle loads must be within the rated vehicle carrying capacity.</p>
Inventory	<p>Means to control of inventory of explosives in the field must be established.</p>
Disposal	<p>Explosives refuse (empty boxes) must be inspected, broken down, and disposed of properly on site.</p>

4.6 Priming

The purpose of this section is to ensure that detonators and primers are handled safely and usage matches blast design. This will allow for proper accounting of detonators and primers prior to loading.

Preparation	All holes will be measured for depth and water level before priming. The Responsible FCX Employee will be notified of any significant variance from expected measurements before the hole is primed.
	Explosives products will be laid out in a careful, efficient and well-coordinated manner (between holes, on the outside of the cuttings pile and out of the flow of traffic).
	Canvas stake bags will be used to carry explosives accessories while laying out the accessories on the blast patterns.
Securing the Blast Site	The blast site will be secured with yellow cones or yellow tape (or a combination of both) and warning signs will be used to block all accesses to the blast pattern to be primed and loaded. Permission for entry must be given by the person in charge of the pattern.
Inventory	A physical inventory of boosters and detonators used for the blast will be done in the field at each blast pattern and verified against the blast plan map count. This inventory will be taken before moving to the loading process.
	The Responsible FCX Employee will verify the detonator and booster inventory after the products are laid out to ensure that the amount used matches the number of holes being loaded for each pattern. Documentation of this check is required. If there is a discrepancy, it must be resolved before loading starts. This inventory will be done before the accessory truck leaves the pattern and loading is started.
Detonators and Boosters	All detonators will be fully enclosed within the booster according to the manufacturer's recommended procedures.
	An acceptable, standardized weight system must be used to ensure proper placement of the booster in the explosives column when loading wet hole products (pumped products). The use of as rocks tied directly to a booster is not acceptable. A mesh bag containing a rock or other type of (non-sparking) weight along with the booster is recommended for wet holes.
	When down hole detonators are used a redundant non-electric down line will be required. At least one of the detonators will be an electronic type capable of having its integrity verified from the surface.
Securing Downlines	Downlines must be anchored securely into position at the surface in the cutting piles. Wooden stakes or poles will be used.
Primers	Primers will be assembled only at the hole collar and will immediately be carefully lowered into the hole. Priming will be done in a manner to facilitate efficient advancement of the bulk loading trucks.

4.7 Loading

The purpose of this section is to ensure that holes are loaded per the blast design and that problems that arise during loading are dealt with appropriately.

Before Loading Holes	<p>All holes will be measured for depth and water levels before loading.</p> <p>Loading personnel will know the upper weight limit of product to be loaded and the planned stemming height of each hole.</p>
Interruptions	<p>Interruptions in the loading process will be documented and communicated to the Responsible FCX Employee.</p>
Loading	<p>The powder column rise of each hole will be monitored until the stem height is achieved or the maximum load is reached.</p> <p>Any deviation from expected column rise over a set amount during loading will be immediately brought to the attention of the Responsible FCX Employee. Each site is required to include this process in operating procedures.</p>
After Loading Holes	<p>After loading, downlines must be checked to ensure that the booster and detonator are properly embedded in the powder column.</p> <p>Upon completion of the loading process, the hole count must be verified against the blast plan and documented by the Responsible FCX Employee</p>
Trucks	<p>Loading trucks will wait to load holes until there are enough holes primed to keep the loading process continuous. If required, guides will be used to maneuver loading trucks around tight spots on the patterns.</p> <p>All loading trucks will be parked off the pattern after loading is finished.</p> <p>Explosives transport trucks (accessory trucks) will be locked when unattended. Explosives transport trucks will not be left overnight with explosives on board.</p>
Recordkeeping	<p>The required records must be kept for every hole loaded.</p>

4.8 Stemming

The purpose of this section is to ensure that stemming activities are done in such a way to eliminate cut downlines, “bridge overs” (see section 7.0 for definition) and help identify problem holes.

Material and Equipment	<p>Clean material (minimum fines), crushed gravel, as specified in the definition of stemming, and sized for the diameter of the hole being loaded is required; cuttings will not be used.</p> <p>A side-dump articulating loader is the recommended equipment to load the material. This loader will be used with the proper side dump bucket.</p>
Stemming Operators	<p>Stemming operators shall:</p> <ul style="list-style-type: none">• safeguard against oversized material being accidentally introduced down blastholes• Stemming operators must be properly trained in procedures used in case of a lost, cut or damaged down lineStemming operators shall inform the Responsible FCX Employee of any problem holes
Before Stemming	<p>The stemming process will not begin until after all the holes are primed and the loading is far enough ahead so that stemming activities will not interfere with the loading process.</p> <p>Stemming material shall be strategically placed at the blast site using a spotter.</p>
Downlines	<p>Detonator downlines will be positioned to minimize damage.</p> <p>Downlines will be secured prior to stemming.</p> <p>Stemming material shall be carefully poured down blastholes to minimize downline damage and control dust. Stemming piles should be wetted down to prevent dust.</p>
Problem Holes	<p>The Responsible FCX Employee must address and ensure that any and all “problem holes” are reported on the Blast Summary paperwork. Unloaded or “bad” hole information should be included as well.</p>

4.9 Tie-in

The purpose of this section is to ensure detonation of all holes in the blast pattern and proper timing of all holes.

Before Beginning Tie-In	Tie-in of pattern will begin only if it will not interfere with other blasting unit processes and the blast site is free of distractions to those doing the tying-in.
Detonator Count Check	Detonator count will be obtained from the data logger and a check made against the field inventory of detonators and boosters recorded on the Blast Summary (adjusted for “bad” or extra det’s used if necessary). Any discrepancy must be reported to The Responsible FCX Employee and rectified before moving into the blast initiation stage.
Blocker Notification	A shift supervisor and/or shot blockers and sweepers should be notified at least 30 minutes prior to completing tie-in so that shot blockers and sweepers can prepare for the pre-blast meeting.
Blasthole Diagram	<p>The Responsible FCX Employee shall generate a tie-in sequence diagram of every blasthole.</p> <p>This diagram will be included with the other blasting documentation required from the daily blasting activities.</p> <p>The Responsible FCX Employee shall review the sequence diagram with personnel doing the tie-in.</p>
Pre-splits or Secondary Blasting	<p>After tie-in is complete, the pattern must be independently checked by two individuals, verifying completeness and matching to the blast map.</p> <p>Both shall initial the check on the Blast Summary.</p>
Equipment Required	Programmable electronic detonators with accompanying software and hardware are required. Alternate methods may be used for pre-split and secondaries if proper tie-in and timing are assured (see paragraph above: Pre-splits or Secondary Blasting).
Using Programmable delays	When using programmable delays, the blast crew will use the logger tests to verify hook up reliability. If a “bad” detonator is encountered the back-up non-electric detonator will be utilized. (See section 4.6 Priming: Detonators and Boosters) Documentation of the situation and extra product usage on the Blast Summary is required.

4.10 Pre-blast Meeting

The purpose of this section is to ensure that all personnel involved in the clearing and initiation of a blast are clear about assignments, properly equipped and knowledgeable of responsibilities.

Prior to Pre-blast Meeting	Prior to the pre-blast meeting numbered blue cones will be placed to MARK the blocking position.
Attendance	<p>The Responsible FCX Employee will conduct the meeting.</p> <p>This meeting will be a face-to-face meeting and will include all blockers and sweepers.</p> <p>NOTE: In special cases where equipment operators are used for blockers and they are restricted by long distances from attending, it is permissible for them to be told about assignments on a one-on-one basis by the responsible FCX employee.</p> <p>All blockers will remain at the meeting until the meeting is over.</p>
Receiving Assignments	Each blocker and sweeper will receive assignment in the meeting and the Responsible FCX Employee will ask them to repeat back the assignment and responsibilities.
Document	Blockers\Sweepers and their assignments must be documented.
Equipment	Yellow cones will be provided for each blocking position to block the full width of the road.
Vehicles for Clearing and Blocking	<p>All vehicles used for clearing and blocking will be equipped with a functional two-way radio and functioning beacons and /or flashers.</p> <p>If vehicles are not used for blocking, a person with a flag, radio and yellow cones is acceptable.</p>

4.11 Clearing\Sweeping the Blast Area

The purpose of this section is to ensure that the blast is properly cleared and that all affected personnel are notified.

Employee Requirements	<p>Clearing for a shot will be directed\supervised by a Responsible FCX Employee who is an exempt employee.</p> <p>Those clearing\sweeping for a shot must be qualified FCX employees who have been properly trained. This training must be documented.</p>
Direction for Clearing	<p>Clearing an area for a blast will begin at the blast site and proceed outward.</p>
Notification Required	<p>All affected personnel will be notified prior to clearing to allow for orderly preparation and evacuation of the blast area.</p>
Equipment	<p>All affected equipment will be positioned or relocated to a safe position to prevent damage from fly rock or blast vibration.</p> <p>All equipment in the blast area will be cleared of personnel following site specific procedures or SOPs.</p>
Guarding Entries	<p>During clearing, all entries previously cleared will be guarded to prevent re-entry into the cleared area ("back doors" will be held).</p>

4.12 Securing and Holding Blocking Position

The purpose of this section is to ensure that blocking positions are never compromised and clear, concise communication is maintained between the Responsible FCX Employee and each blocker.

Duties of Responsible FCX Employee

Securing and holding of blocking positions will be directed by the Responsible FCX Employee (exempt). Duties include:

- Prior to pre-blast meeting determine blocking locations and place a uniquely numbered blue cone at each location. This is to mark the blocking location NOT to block the road.
- Maintain a blocker check list and use it to verify completion of assignments.
- Complete a redundant check with each blocker prior to the last blast warning.
- Instruct each blocker to hold their position if a delay occurs.
- At the end of the delay, check with each blocker before continuing with the last blast warning.
- Maintain a blocker checklist and use it to verify completion of assignments.

Duties for Blockers (also see Section 3.4 Blockers and Sweepers)

Blockers will:

- Be trained to FCX standards and the training documented
- Drive to assigned blocking location identified by the corresponding numbered blue cone
- Turn vehicles or equipment used for blocking perpendicular to the flow of traffic (if vehicles are used)
- Use yellow blast cones to block all of the road
- Have contact with the Responsible FCX Employee via radio
- Communicate to the Responsible FCX Employee, in detail, actions taken to clear the area (if sweeping) and that the blocking position is secure
- Not permit entry to the secured area by anyone without permission of person in charge of the blast

Duties for Sweepers (also see Section 3.4 Blockers and Sweepers)

Sweepers will:

- Sweep and clear equipment and pick up personnel in assigned area
- Assist other sweepers with "holding back doors" while benches are cleared
- Clear all the way out to the assigned blocking location
- Communicate to the Responsible FCX Employee, in detail, actions taken to clear the area and that the blocking position is secure (if blocking)

4.13 Blast Initiation

The purpose of this section is to ensure all detonators are communicating, the blast area is clear and that all blocking positions are secure.

Direction/Supervision	Blast initiation will be directed/supervised by a Responsible FCX Employee (Exempt Employee).
Blast Initiation Location	<p>Blast initiation will take place from a location safe from hazards resulting from blasting and where the blast can be viewed.</p> <p>The blast initiation location will be a safe distance from electrical interference (e.g. power lines, power cables, radios).</p> <p>Radio must be kept a minimum of 10' from blasting equipment during the initiation process.</p>
Firing/Initiation System	<p>The firing/initiation system will be enabled AFTER all clearing and blocking activities are finalized.</p> <p>The firing/initiation system will be in the possession of the blasters and under control of the Responsible FCX Employee at all times.</p> <p>The firing/initiation system will be connected by the Responsible FCX Employee (exempt) or a person under his/her direct control. The Responsible FCX Employee overseeing the blasting process must be at the firing location.</p>
Radio Communication	Two-way radio communication between the Responsible FCX Employee and all blockers will be maintained throughout the clearing, blocking and initiation processes.
Communication Devices/Errors	<p>The Responsible FCX Employee will ensure that all electronic detonators used in a blast continue to "communicate" with the blast initiation device throughout the blast initiation process.</p> <p>The "communicating detonator count" will be checked against the "detonator used count", verified during priming and loading.</p> <p>Shooting "through errors" or "with errors" (see section 7.0 for definitions) is strictly forbidden.</p> <p>All blasts must be videoed if possible.</p>
Failure to Detonate Procedures	<p>Blasting personnel will be competent in safe practices in the event that a blast fails to detonate.</p> <p>If the pattern must be "re-entered", the blasting equipment must be "safed" (dongle removed and in the possession of the person re-entering the pattern). Site procedures or SOPs must be address this procedure and be followed.</p> <p>The waiting period for electronic detonators is 30 minutes (15 min for pyro's).</p>

4.14 Post-Blast Inspection

The purpose of this section is to ensure that the blastholes have been detonated and the area is safe for re-entry.

Requirements	<p>A post-blast inspection will be performed under the supervision of a Responsible FCX Employee and documented.</p> <p>Secondaries and pre-split patterns will be walked.</p> <p>If the inspection involves walking on the blasted material a "spotter" must be in close proximity.</p> <p>If the post blast inspection can't be done by walking the blast a visual inspection will be done by other means. This includes using:</p> <ul style="list-style-type: none">• binoculars,• looking over the high wall• zoom cameras• other acceptable means
Electrical Storm	<p>In the event of an electrical storm wait until it is safe to enter the area.</p>
Electronic Detonators	<p>Production blasts with electronic detonators may be inspected by walking or driving the perimeter if the blasting equipment indicates that all electronic detonators have fired.</p>
Blockers	<p>All blockers will remain in place during the post-blast inspection.</p>
Completing the Inspection	<p>Yellow cones will demarcate the blast site until the post-blast inspection is complete and the Responsible FCX Employee gives the "all clear".</p>
Re-Entering Blast Site	<p>A minimum of 5 minutes must elapse before re-entry into the blast site.</p> <p>Do not re-enter if noxious fumes or excessive dust clouds are present.</p> <p>Care should be taken not to endanger personnel.</p>

4.15 Blast Monitoring

The purpose of this section is to ensure that blast vibration data is recorded and utilized to manage slope stability.

Viewing	Blasts will be viewed from above if possible.
Monitoring system	A blast vibration monitoring system utilizing seismographs must be instituted and actively managed and utilized by both Blasting and Slope Stability personnel.

4.16 Misfired Hole Procedure (CFR 56.6311)

The purpose of this section is to ensure that personnel involved in blasting and operations processes are trained to recognize a misfire and are familiar with the procedures for dealing with a misfire.

Blasting Personnel Duties	<p>Blasting personnel must:</p> <ul style="list-style-type: none">• Know the definition of a misfire.• Be familiar with the blasting products used.• Be familiar with what a misfire looks like.• Know how to determine if there is a misfire.• Be familiar with the waiting period for a suspected misfire.
Process for Misfire	<p>If there is a misfire, blasting personnel will:</p> <ul style="list-style-type: none">• Restrict access to a misfire• Document misfires and handle them properly• Mark misfires in the field in an easily recognizable manner• Enter the misfire into shovel/loader computer GPS systems (if used) to alert shovel and loader operators of the location• Inspect bench floors for evidence of any misfired product remaining after mining through• Safely dispose of misfired (recovered) products• Offset future drilling locations to prevent from drilling into explosives possibly remaining in the bench floor
Training and Annual Refreshers	A safety session on unfired powder, column and blasting component recognition will be part of shovel, loader and RTD training including annual refreshers.
Reporting Misfires	<p>Misfires occurring during the shift shall be reported to mine management no later than the end of the shift.</p> <p>If a misfire is uncovered while loading shot material, the loading equipment should be moved to a safe loading location until the misfire can be properly investigated.</p>
Investigation/ Documentation	Root Cause Analysis (RCA's) will be performed for all misfires. Action plans will be developed and implemented.

Barricading	Misfires will be barricaded 30 feet away from the misfire. All access points must have signage (blasting, explosives, etc.) restricting access.
Muck Piles	Faces of muck piles shall be examined for misfires after each blasting operation.
Work in Affected Area	Only work necessary to remove a misfire and protect the safety of miners engaged in the removal shall be permitted in the affected area until the misfire is disposed of in a safe manner.
No Safe Disposal Possible	When a misfire cannot be disposed of safely, each approach to the area affected shall be posted with a warning sign at a conspicuous location to prohibit entry, and the condition shall be reported immediately to mine management.
Checking for Firing Ability	<p>All misfires will be checked for the ability to fire and the pyrotechnic backup shall be tried by firing another electronic detonator attached to it.</p> <p>If it can be safely fired, all equipment and personnel must be moved out further than the normal clearance limits. Clearance limits are site specific and are determined by the responsible FCX employee.</p> <p>In most cases it is much safer to dig out a misfired powder column following site procedures or SOPs. Also ensure site procedures when removing any boosters or detonators from a misfire.</p>

4.17 Sleeping / Guarding Shots, Lightning Storms

The purpose of this section is to ensure shots slept overnight are safely managed. Each site will have a procedure for sleeping shots.

Overnight	<p>Shots can only be slept overnight for these reasons:</p> <ul style="list-style-type: none"> • breakdowns rendering equipment immovable • weather • darkness • shots slept will be signed off on by the Division Manager using the Surface Blasting Exemption Request Form (Appendix A) and the General Manager will be notified. <p>Shots slept overnight will be guarded by at least one person and barricaded to prevent unauthorized access to the blast pattern.</p>
Harness wire	If a shot is slept all harness wires will be disconnected.
Electrical Storm	In the event of an approaching electrical storm, The Responsible FCX Employee or a designated shift supervisor will be responsible for clearing the blast area in the same manner as clearing for a shot.

IF...	THEN...
There is a storm moving in during the process of loading,	people will be cleared to the boundary of the blast area.
	the designated shift supervisor must be informed of the situation (face- to -face) and given a site map along with a clearing and blocking plan (documented).
	the Responsible FCX Employee or a designated shift supervisor will determine when activities may resume within the blast area.
A storm moves in after a shot has been made safe to sleep,	the entire blast area will be cleared if there is lightning in the area. (Burial of the downlines is acceptable as an extra safety precaution.)

5.0 Records

The purpose of this section is to ensure accurate records are kept as required by regulation.

The following records must be retained according to the FCX-Records Retention Policy

- Employee training records
- Annual program review
- Equipment inspection records
- Exemption documents
- Daily FCX magazine inventories transactions shall be recorded for all blasting products checked out and unused product checked back in (FCX verification required).
- Magazine physical inventories shall be checked for accuracy at least once per month and verified by FCX supervision quarterly. Any discrepancy shall be immediately investigated.
- A yearly close out and starting inventory will be taken and maintained as part of the permanent records required by the regulatory agencies (FCX verification required).
- Each site shall maintain daily blasting documentation (Blast Summaries) that contain information such as load amounts, blast diagrams, timing configurations, post-blast data uploads, "bad" or "problem" holes, and other "out of the ordinary" or pertinent information.
- Licensees and permit holders must keep all records pertaining to explosives, in permanent form, for not less than 5 years (Corporate rules may dictate a longer retention period).
- License and permit documentation shall be kept current and displayed in conspicuous areas.
- Records of Employee Possessors and Responsible Persons must also be maintained and updated as needed.
- Falsification of explosives records or documentation is a crime and may be punishable by fine and possible jail sentence.

6.0 Recommended Equipment and Software

The purpose of this section is to aid in standardizing the types of stemming equipment, blast timing, and seismic tools used at our various sites.

Stemming Process	For the stemming process it is recommended to use rubber tired or track loaders equipped with a side-dump bucket, small enough to easily maneuver through the holes on blast patterns. CAT 906 and 908 Loaders fit this category. Oversized buckets should be modified for the hole size(s) used at the site. Larger equipment may be used if wider hole spacing permits.
Seismic and Slope Monitoring	For seismic and slope monitoring it is recommended to use the "Mini-Seis Digital Seismograph" from White Industrial seismology, Inc., purchased with the "AlphaBlast" software for data analysis as the standard package to be used at all FCX operations.
Blasting	For blasting, an electronic, programmable detonator system is mandatory at all FCX sites. The IKON products from Orica are most commonly used.

7.0 Training and Competency (Future Development)

All employees and contractors who participate in drilling, sampling, blasting or support blasting activities shall be trained to effectively perform expected duties. This training shall be documented.

Required Skills	<p>Sites will develop a list of required skills and evaluate individuals to verify competency prior to participating in or support blasting activities without direct supervision. The skills shall include:</p> <ul style="list-style-type: none">• Staking drill holes• Duties of Responsible FCX Employee• Duties of a Lead Blaster and magazine manager• Duties of a sampler• Conducting a pre-loading site inspection• The identification of unique hazards for blast patterns• Hole loading practices for routine and non-routine holes• Magazine inventory control• Safe transport of explosives• Field inventory control• Inventory reconciliation• Guarding a shot overnight• Establishing evacuation areas for blocking• Effective blocking for a blast• Post blast inspections• Managing misfires or discovered explosives• Lightning storm precautions \ actions
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8.0 Exemptions

If any part of this policy cannot be followed, an approved exemption is required (Appendix A).

Exemptions	<p>It is expected that all sites will follow this FCX policy. However, periodically there may be special circumstances due to site-specific issues that do not allow all aspects of this policy to be completely followed.</p> <p>If any part of this policy cannot be followed an exemption form per the FCX – Global Significant Risk Exemption Process.</p>
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9.0 Definitions

Definitions	
Air Blast	The noise produced by a blast that travels through the air and is scaled by decibels
Back Door	Phrase used to describe access to a bench connected to a haul road. This “Back Door” will be guarded by a sweeper until another sweeper has gone onto the bench and ensured that it is clear of personnel
Blast Area	The area in which concussion, flying material or gases from an explosion may cause injury to persons or damage to property.
Blast Site	The area where explosive materials are handled during loading including the perimeter formed by the loaded blastholes and 50 feet (15.3 meters) in all directions from loaded holes. A minimum distance of 30 feet (9.1 meters) may replace the 50 foot requirement if the perimeter of loaded holes is marked with a barrier.
Clearance Limits	These can't be standardized for all of the mines as there are so many variables at each mine it has to be the responsibility of the Responsible FCX Person to decide the distance, as the vertical distances increases the horizontal distance may decrease. Again this is the responsibility of the Person in charge to determine.
Direct Control	Having face-to-face contact to ensure clear and concise communication.
Explosives Transport Truck	The vehicle that carries blasting accessories (powder truck).
Misfire	Complete or partial failure of explosive material to detonate.
Problem hole	A “problem hole” is a blasthole that: <ul style="list-style-type: none">a) has a “bridge over” conditionb) takes too much or too little stemmingc) has lost, cut or damaged downlines

	<ul style="list-style-type: none"> d) is too close to the crest e) is too close to an adjacent hole f) is not identified in the blast plan g) is too short or too deep h) has column subsidence i) has other inconsistencies
Responsible FCX Employee	Blasting Supervisor, Blasting Engineer, Lead Blaster or other “qualified” person who is a employee of FCX. The person in charge of the clearing process will in all cases be an exempt employee. Contract personnel may not be the responsible FCX employee.
Stemming	Rock crushed to 80% 1 inch to 1 ¼ inch with a maximum size of 2 inch (based on 10 5/8” hole diameter, varies according to hole size). There should be no fines.
Subsidence	The downward movement of the earth from blasting, earthquakes or other causes
Sweeping/Clearing/Blocking	The process of ensuring all personnel are removed from the blast area and restricting entry prior to detonation of the blast(s).
Distributing Accessories	The process of distributing Primers, and Detonators to each hole to be loaded and shot
With Errors	This is to continue with the initiation process even though the blasting box presents a message that says “with Errors” the box will also display a code that shows where the error is. It is forbidden to fire with errors.

10.0 Revision History

Rev 1	11/30/2011	Initial Release
Rev 2	1/29/2013	Updated
Rev 3	11/6/2014	This update includes: <ul style="list-style-type: none">1. References to a Blasting "Guideline" have been replaced with "Policy"2. General language and formatting changes3. Appendices have been removed and re-added to the document as sections4. Some wording additions that do not change the policy but add clarification5. Section 3.1; Blast Design: Timing software will be used to design timing6. Section 3.3; Audits: Are to be posted on BSST SharePoint site7. Section 3.4: Blocker and Sweeper Responsibilities Added8. Section 3.7 Requirements: Audits are to be posted on BSST SharePoint site9. Section 4.3<ul style="list-style-type: none">a. Responsible FCX Employee; Blast plan map will have actual hole locationsb. Responsible FCX Employee: The distance for equipment and personnel clearance will be determined by each site (500' for equipment and 1,500' for personnel are typical horizontal distances). Vertical distance components may reduce the horizontal distance.c. Inspection Requirements: Blast site inspections shall be performed before any blasting process starts. This will be documented on the blast summary sheet or other appropriate form.d. Blasting Notifications: All potentially affected persons must be informed of blast times and locations. This includes crews and personnel in potentially hazardous situations outside of the blast area. This may be done by an "all channel call" on the radio approximately 30 minutes before blast.e. Unloadable Holes: Access to these holes will be restricted until safely backfilled.10. Section 4.4<ul style="list-style-type: none">a. Signage:<ul style="list-style-type: none">i. "No cell phones inside magazine area". Signs will be placed so bullets fired at the signs will not impact the magazines.ii. These signs will be in the language of the country as well as English.b. Magazine Locks and Keys:<ul style="list-style-type: none">i. Locks will comply to BATF standards. Keys must be secured on-site with restricted access by use of a locking storage system. Possession of keys must be tracked by documentation.ii. Locks must have minimum of 3/8 in shacklec. Sparking Devices: Cell phones are not permitted in the magazinesd. Explosives:<ul style="list-style-type: none">i. After distribution of accessories on each blast pattern, a field inventory will be performed and signed by the Responsible FCX Person for each pattern.ii. If partial boxes are returned to the magazine they must be re-issued as partials. Partial from different boxes may not be combined. Unused explosives must always be stored in the original packaging.iii. If shortages not related to the manufacturer or supplier are discovered, ATF and local law enforcement must be notified within 24 hours. In the case of overages only the manufacturer and supplier need notification. These notifications must be

documented. The appropriate people (management) on site must also be notified.

11. Section 4.5
 - a. **Signage:**
 - i. Explosives trucks will display red or orange flags and flashing beacons while transporting explosives.
 - ii. **Day Boxes:** must be locked when unattended
 12. Section 4.6
 - a. **Priming:** Canvas stake bags will be used to carry explosives accessories while laying out the accessories on the blast patterns.
 - b. **Detonators and Boosters:** An acceptable, standardized weight system must be used to ensure proper placement of the booster in the explosives column when loading wet hole products (pumped products). The use of as rocks tied directly to a booster is not acceptable. A mesh bag containing a rock or other type of (non-sparking) weight along with the booster is recommended for wet holes.
 13. Section 4.7 **Loading :** Explosives transport trucks will be locked when unattended. Explosives transport trucks will not be left overnight with explosives on board.
 14. Section 4.8 **Material and Equipment:** gravel sized for the diameter of the hole
 15. Section 4.12 Changes to **Duties for Sweepers**
 16. Section 4.13 **Firing/Initiation System:** The Responsible FCX Employee overseeing the blasting process must be at the firing location.
 17. Section 4.14 **Inspection Requirements:**
 - a. Added info about electronic detonators
 - b. If the inspection involves walking on the blasted material a "spotter" must be in close proximity.
 - c. Secondaries and pre-split patterns need to be walked
 18. Section 4.16
 - a. **During Shift:** some changes and additions
 - b. **Checking for Firing Ability:** some changes and additions
 19. Section 4.17 **Overnight:**
 - a. shots can only be slept overnight for these reasons; breakdowns rendering equipment immovable, weather, and darkness.
 - b. Shots slept overnight will be guarded by at least one person and barricaded to prevent unauthorized access to the blast pattern.
 20. Section 6.0 **Recommended Equipment and Software** is an addition that must be read in its entirety.
-

Appendix

Forms and Example Documents

BLASTING REPORT

8/8/12

Safford

SOUTHWEST ENERGY LLC
2040 W GARDNER LANE
TUCSON, ARIZONA 85705-2208
(520) 696-9455

Pit: San Juan
Level: 4000
Shot: 2034
Note: ORE

Total Holes
90

Average Depth: 54 FT
Average Stem: 21 FT

EXPLOSIVES:

Product	Quantity
260-4	117,320 Lbs.

DELAYS:

Delay	Quantity
MS 350ms 18m	90
RX Delonator 15m	90
RX Delonator 20m	90

GAS BAGS

Quantity
7

CORD / BOOST / INIT:

Product	Quantity
DUO 454	90 Ea
D 12 (340)	90 Ea

LOADS: See attached load sheet

TIMING: 31ms RR and 17ms HH

Wednesday, August 08, 2012

Prepared By: Art Montoya

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Freeport-McMoRan - Safford, Arizona
BLAST SUMMARY - NO ASSUMPTIONS

Date: <u>August 8, 2012</u>		Blast Number: <u>2034</u>	
<u>Primary</u>	Secondary	<u>Electronic</u>	Pyro
Level: <u>4000</u>	Pit Name: <u>San Juan</u>	Shovel: <u>1</u>	
Hole Count: <u>90</u>	Hole Size: <u>9 7/8</u>	Holes Dewatered: <u>0</u>	
Time of Blast: <u>1230</u>		Clearing Time: Start <u>1220</u>	Finish: <u>1240</u>
Stemming Method:	Truck	Backhoe	<u>Loader</u> Other
Delay Configuration:	Echelon	Chevron	Row X Row
Weather:	<u>Clear</u>	Overcast	Precipitation
Wind Direction:	N NE E SE S SW W NW		
Wind Speed:	Calm	<u>Breezy</u>	Gusty
Preloading Inspection done by:	Joshua Marin - <u>[Signature]</u>		
Field Inventory Audit	Christopher Tilton - <u>[Signature]</u>		
Person(s) Logging: Logger # <u>3</u>	<u>Anthony Villalba</u> - <u>[Signature]</u>		
Logger # <u>5</u>	<u>James Rios</u> - <u>[Signature]</u>		
Logger # _____	_____ Name: _____ Signature Required		
Logger # _____	_____ Name: _____ Signature Required		
Person(s) Checking Tie-In:	<u>Isabel Aliso</u> - <u>[Signature]</u>		
	<u>James Rios</u> - <u>[Signature]</u>		
Blast Box Firing:	<u>Josh Marin</u> - <u>[Signature]</u>		
Post Blast Inspection:	<u>Isabel Aliso</u> - <u>[Signature]</u>		
	<u>James Rios</u> - <u>[Signature]</u>		
Person In Charge of Magazine	<u>Anthony Villalba</u> - <u>[Signature]</u>		
# of Dets on Logger: <u>180</u>			
# of Dets Issued: I-kons <u>180</u>	Nonels	<u>90</u>	
Person In Charge:	<u>Joshua Marin</u> - <u>[Signature]</u>		

Freeport- McMoran - Safford, Arizona Blast Summary - No Assumptions: Page 2

Date: 8-Aug-12

Blast Number:

Bulk Products		Initiation System		Accessories	
SE 400X		Excel 350ms 18m	90	Gas Bags:	7
SE 458X		Ikon RX 15m	90	Sleeves x 17"	
SE 462X		Ikon RX 20m	90	E-Cord	
SE 470X				Noiseless TL	
				35MSC	
SE 260-4	117,320	Harness Wire: 400m		Detagel	
SE 290-4				2" Continous	
		Pentex D 12 (340)	90	2" x 6"	
		Pentex DUO 454	90	2.5" x 8"	

Comments:

Pre - Loading Inspections

Safety Berms:

Safe

Unsafe

If unsafe, state why and how it was corrected:

Crest Conditions:

Safe

Unsafe

If unsafe, state why and how it was corrected:

Highwall Conditions:

Safe

Unsafe

If unsafe, state why and how it was corrected:

Other hazardous conditions and actions taken to correct situation:

Environmental Audit (Trash Pick-Up):

Done

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Hole Details

Mine: Safford
Pit: San Juan
Level: 4000
Shot: 2034

Date: 8/8/12

Hole #	Diameter	Depth	Stem	Water	Sleeve	Type	Prod 1	Lbs	Prod 2	Lbs
255494	9.875	54	34	25	0	Buffer	260-4	800	None	0
255495	9.875	55	20	20	0	Prod	260-4	1,400	None	0
255496	9.875	51	20	20	0	Prod	260-4	1,240	None	0
255497	9.875	53	20	40	0	Prod	260-4	1,320	None	0
255498	9.875	52	20	30	0	Prod	260-4	1,280	None	0
255500	9.875	50	20	27	0	Prod	260-4	1,200	None	0
257001	9.875	53	20	20	0	Prod	260-4	1,320	None	0
257002	9.875	53	20	30	0	Prod	260-4	1,320	None	0
257003	9.875	54	20	35	0	Prod	260-4	1,360	None	0
257004	9.875	55	20	45	0	Prod	260-4	1,400	None	0
257005	9.875	55	35	40	0	Buffer	260-4	800	None	0
257006	9.875	53	20	30	0	Prod	260-4	1,320	None	0
257007	9.875	50	20	30	0	Prod	260-4	1,200	None	0
257008	9.875	53	20	30	0	Prod	260-4	1,320	None	0
257009	9.875	53	20	35	0	Prod	260-4	1,320	None	0
257010	9.875	53	20	34	0	Prod	260-4	1,320	None	0
257011	9.875	55	20	28	0	Prod	260-4	1,400	None	0
257012	9.875	54	20	25	0	Prod	260-4	1,360	None	0
257013	9.875	54	20	30	0	Prod	260-4	1,360	None	0
257014	9.875	54	20	40	0	Prod	260-4	1,360	None	0
257015	9.875	55	20	45	0	Prod	260-4	1,400	None	0
257016	9.875	50	20	40	0	Prod	260-4	1,200	None	0
257017	9.875	51	20	35	0	Prod	260-4	1,240	None	0
257018	9.875	52	20	23	0	Prod	260-4	1,280	None	0
257019	9.875	54	20	40	0	Prod	260-4	1,360	None	0
257020	9.875	56	20	6	0	Prod	260-4	1,440	None	0
257021	9.875	56	20	30	0	Prod	260-4	1,440	None	0
257022	9.875	53	20	30	0	Prod	260-4	1,320	None	0
257023	9.875	55	20	40	0	Prod	260-4	1,400	None	0
257024	9.875	54	20	36	0	Prod	260-4	1,360	None	0
257025	9.875	52	20	20	0	Prod	260-4	1,280	None	0
257026	9.875	52	32	30	0	Buffer	260-4	800	None	0
257027	9.875	50	30	15	0	Buffer	260-4	800	None	0
257028	9.875	54	34	20	0	Buffer	260-4	800	None	0
257029	9.875	55	20	36	0	Crest	260-4	1,400	None	0
257030	9.875	55	20	20	0	Prod	260-4	1,400	None	0
257031	9.875	45	20	30	0	Crest	260-4	1,000	None	0
257032	9.875	55	20	30	0	Prod	260-4	1,400	None	0
257033	9.875	53	20	5	0	Prod	260-4	1,320	None	0
257034	9.875	54	20	12	0	Prod	260-4	1,360	None	0
257035	9.875	49	20	16	0	Crest	260-4	1,160	None	0
257036	9.875	53	20	5	0	Prod	260-4	1,320	None	0
257037	9.875	53	20	11	0	Prod	260-4	1,320	None	0
257038	9.875	53	20	15	0	Prod	260-4	1,320	None	0
257039	9.875	38	20	3	0	Prod	260-4	720	None	0
257040	9.875	52	20	14	0	Prod	260-4	1,280	None	0
257041	9.875	55	20	17	0	Crest	260-4	1,400	None	0
257042	9.875	56	20	18	0	Prod	260-4	1,440	None	0
257043	9.875	52	20	30	0	Prod	260-4	1,280	None	0
257044	9.875	54	20	15	0	Prod	260-4	1,360	None	0
257045	9.875	53	20	10	0	Prod	260-4	1,320	None	0
257046	9.875	55	20	20	0	Prod	260-4	1,400	None	0
257047	9.875	55	20	20	0	Prod	260-4	1,400	None	0

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Prepared By: Anthony Vilalba

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Hole Details

Mine: Safford
Pit: San Juan
Level: 4000
Shot: 2034

Date: 8/8/12

Hole #	Diameter	Depth	Stem	Water	Sleeve	Type	Prod 1	Lbs	Prod 2	Lbs
257048	9.875	54	20	3	0	Prod	260-4	1,360	None	0
257049	9.875	54	20	20	0	Prod	260-4	1,360	None	0
257050	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257051	9.875	55	20	1	0	Crest	260-4	1,400	None	0
257052	9.875	52	20	15	0	Prod	260-4	1,280	None	0
257053	9.875	55	20	0	0	Prod	260-4	1,400	None	0
257054	9.875	54	20	3	0	Crest	260-4	1,360	None	0
257055	9.875	56	20	1	0	Prod	260-4	1,440	None	0
257056	9.875	56	20	0	0	Prod	260-4	1,440	None	0
257057	9.875	55	35	10	0	Buffer	260-4	800	None	0
257058	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257059	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257060	9.875	55	20	20	0	Prod	260-4	1,400	None	0
257061	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257062	9.875	54	20	10	0	Prod	260-4	1,360	None	0
257063	9.875	53	20	20	0	Prod	260-4	1,320	None	0
257064	9.875	55	20	22	0	Prod	260-4	1,400	None	0
257065	9.875	45	20	10	0	Prod	260-4	1,000	None	0
257066	9.875	55	20	25	0	Prod	260-4	1,400	None	0
257067	9.875	55	20	8	0	Prod	260-4	1,400	None	0
257068	9.875	56	20	3	0	Prod	260-4	1,440	None	0
257069	9.875	55	20	0	0	Prod	260-4	1,400	None	0
257070	9.875	56	20	0	0	Prod	260-4	1,440	None	0
257071	9.875	54	34	15	0	Buffer	260-4	800	None	0
257072	9.875	54	20	12	0	Prod	260-4	1,400	None	0
257073	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257074	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257075	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257076	9.875	56	20	10	0	Prod	260-4	1,440	None	0
257077	9.875	55	20	20	0	Prod	260-4	1,400	None	0
257078	9.875	55	20	20	0	Prod	260-4	1,400	None	0
257079	9.875	55	20	5	0	Prod	260-4	1,400	None	0
257080	9.875	55	20	30	0	Prod	260-4	1,400	None	0
257081	9.875	56	20	22	0	Prod	260-4	1,440	None	0
257082	9.875	56	20	5	0	Prod	260-4	1,440	None	0
257083	9.875	56	20	0	0	Prod	260-4	1,440	None	0
257084	9.875	56	20	0	0	Prod	260-4	1,440	None	0
90		54			0					
							Total 260-4	117,320		
							Total Pounds	117,320		

Shot: #2034
Level: 4000
Pattern: 20x20
Holes: Approx. 100

Date: .08 Aug 2012
Type: PO
Geology: Andesite

Production:

- Soft: 458X to 20ft stem
- Med: 462X to 20ft stem
- Hard: 470X to 20ft stem

Wet Production:

- Soft: 260-4 to 20ft stem
- Med: 260-4 to 20ft stem
- Hard: 260-4 to 20ft stem

Perimeter:

- Soft: 750# 458X and air to 20ft stem
- Med: 800# 462X and air to 20ft stem
- Hard: 800# 470X and air to 20ft stem

Wet Perimeter:

- Soft: 750# 260-4 and air/water to 20ft stem
- Med: 800# 260-4 and air/water to 20ft stem
- Hard: 850# 260-4 and air/water to 20ft stem

Comments: Double prime all holes.

