Company Name:	**Equipment/Job Identification: Shaft Worker** **Type of Equipment:** **Make:** **Model:** **Year:** **Use:**
Mine Name:	
Date of Analysis: March 22-24, 2006	

Pre-Assessment

- **List pre-requisites here**
  - Part 48 Miner Training
  - Bell Signals
  - Company Policy

Duty 1: Start-of-Shift Activities

Learner will demonstrate how to conduct safe and thorough start-of-shift activities. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and thorough start-of-shift activities include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Sign in at mailbox		1		
Proceed to dry house to change cloths		1		
Check in at lamp house or dry house		1		
Obtain PPE	Prevent long-term hearing loss; prevent eye injuries; prevent foot injuries; prevent hand injuries; PPE is for your protection – wear it and wear it properly at all times	2		Hard hat with hearing muffs and/or ear plugs, safety glasses, metatarsal boots, leg bands, metacarpal gloves, florescent and reflective vest, respirators (when needed), rain suits (when needed), rubber knee boots (when needed)
Obtain belt with tag		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Obtain cap lamp		1		Do not smoke in charging area; cap lamps give off hydrogen gas while charging
• Check water level		1		
○ Fill to line with cap lamp fully charged		1		
○ Do not over fill	Overfilling could cause loss of acid and result in chemical burns	2		
• Check for charge		1		
• Check the beams		1		
• Check lens lock		1		
• Check cord for damage		1		
Obtain crew phone		1		
• Check battery posts for tightness		1		
• Check phone by blowing into receiver and push button - listen for sound		1		
• Check terminal posts for wire connections		1		
Attend crew meeting		1		
• Discuss conditions		1		
• Discuss assignments		1		

Duty 2: Enter shaft

Learner will demonstrate how to safely and efficiently enter the shaft. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Entering the shaft safety and efficiently will include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Ensure W-65's are in bucket with crew or worn	Protects you from carbon monoxide in case of a fire	2		
Enter bucket		1		No more than 6 persons
• Step on counter-weight and put your leg over the rim		1		
Check ears on bucket	If ears are not latched, the bucket will dump	2		
Watch for slippery bottoms in bucket		1		
Top man signals hoist operator to lower bucket		1		
Hold on to the bail	Could prevent injury in case bucket stops suddenly; prevents persons from holding onto rim of bucket (prevent hand injuries)	2		
Keep all body parts inside of bucket		1		
Do not ride/sit on rim of bucket	Prevent person from falling out of bucket	2		
Keep knees bent		1		In case of sudden stop
Don't ride with supplies in bucket – personnel only		1		
Observe for rocks on service line and vent tube brackets	Small pieces falling from a distance can do a lot of damage	2		No one can work on bottom if rocks need cleaned from brackets
Observe ribs below the concrete and behind the panning tin for loose material and make plans to scale down loose materials after reaching bottom	Rocks falling resulting in personal injuries (crushing injuries, contusions, etc.) – have had accidents due to falling rocks	2		
Be prepared for stop at bottom limit		1		About 40 feet from bottom
Exit bucket when it reaches the bottom		1		
• Be prepared for bucket landing on uneven surface		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Don't exit the bucket until all motion is stopped	If you get out too soon, you could slip and fall, the bucket could hit you/land on you	2		
• Watch your footing		1		Wet bottom, uneven ground, loose material, water depth
Scale down loose material from bucket	Rocks falling resulting in personal injuries (crushing injuries, contusions, etc.) – have had accidents due to falling rocks	2		
• Obtain scale bar and picks		1		
• Bucket up to location		1		
• Don't attempt to pry down materials above your head	You could pull the rock down on yourself	2		
• Don't over-reach	You could fall out of the bucket	2		
• Scale loose material with pick or bar		1		
Crew meeting		1		
• Talk to on-shift crew		1		
• Discuss rib conditions		1		
• Discuss equipment problems		1		

Duty 3: Drilling

Learner will demonstrate how to conduct safe and efficient drilling operations. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and efficient drilling operations include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Hook up drill rig		1		
Have drill put in shaft on center		1		Hoist operator will swing drill off center at bottom
Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Observe for adequate clearance when re-entering shaft after drill rig is set (drill rig is on center)		1		
Hook up air hoses		1		
• Install whip checks	If hose comes loose, you could be struck by the hose	2		Air pressure averages 120 psi
Hook up water lines		1		
• Install whip checks	If line comes loose, you could be struck by the line	2		
Bell/call out for air/water		1		Refer to bell signal card
Crib under suspended drill rig		1		
• Use cribbing and wedges		1		
• Install wedges until snug under drill	Improper installation of the wedges could make the rig un-level causing hammers not to swing properly	2		Don't beat the wedges in
Bell hoist down		1		Should be a slight amount of slack in the rope Refer to bell signal card
Discuss drill pattern		1		Marked on drill hammer Refer to drill pattern drawing
Turn on air valve on drill rig		1		Discuss location of air valve shut off
Install drill steels on hammers		1		
• Raise hammer		1		
• Put steel straight up and down underneath hammer		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Let hammer down gently onto the steel		1		
• Use rotation lever to slowly rotate hammer		1		Rotation lever is labeled
• Raise the hammer		1		
• Pull swing locking pin		1		
Drill center hole		1		Boss will drill center hole
• Lower hammer		1		
• Turn water on		1		
• Turn on rotation and percussion		1		Varies by rock types
○ Adjust pressure accordingly		1		Comes with experience
Begin drilling (center holes)		1		
• Keep hands off of rotating drill steel	Could cause personal injury from moving parts	2		Never hold onto the steel
• Keep clothing away from rotating drill steel	Clothing could become entangled in the drill steel resulting in broken bones, bruises, stretched ligament	2		Never wear loose clothing
• Observe bottom for old holes/gun holes	These may contain live explosives	3		Never drill into an old hole/gun hole
• Drill approximately 18”		1		
• Shut hammer off	Failure to shut hammer off could result in damage to hammer and could loosen the drill rig	2		Never run hammer outside of hole
• Shut off water		1		
• Pick up hammer		1		
• Insert collar pipe in hole		1		
• Remove collar pipe bit		1		
○ Lower hammer		1		
○ Turn percussion on		1		
○ Raise hammer		1		
○ Unscrew collar pipe bit by hand		1		Left-hand thread
• Install powder bit		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
○ Screw on by hand		1		Left-hand thread
• Turn water on	Failure to use water could cause steel to stick resulting in loss of the steel, could result in crushing injury from hammer; and could result in down-time	2		Water must be seen while drilling
• Lower bit into collar pipe maintaining same angle as installed collar pipe		1		
• Turn percussion and rotation on		1		
• Adjust down pressure	Too much pressure could shove the rig off blocks; the steel could stick; could result in personal injury (sprains, strains, crushing injuries) and could result in down-time	2		
• Continue drilling until reaching pre-determined depth		1		Never drill into the centralizer
• Shut hammer off once you get to depth		1		
• Turn on the air valve and blow the hole out		1		
• Raise hammer		1		
• Put swing locking pin back in	Rig could swing wide damaging rig; could possible result in crushing injury	2		
Raise drill rig back up		1		Refer to bell signal card
Re-stack cribbing on drill rig		1		
Put drill rig back on center		1		
Crib under suspended drill rig		1		
• Use cribbing and wedges		1		
• Install wedges until snug under drill	Improper installation of the wedges could make the rig un-level causing hammers not to swing properly	2		Don't beat the wedges in
Bell hoist down		1		Should be a slight amount of slack in the rope Refer to bell signal card
Discuss drill pattern		1		Marked on drill hammer Refer to drill pattern drawing
Turn on air valve on drill rig		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Install drill steels on hammers		1		
• Raise hammer		1		
• Put steel straight up and down underneath hammer		1		
• Let hammer down gently onto the steel		1		
• Use rotation lever to slowly rotate hammer		1		Rotation lever is labeled
• Raise the hammer		1		
• Pull swing locking pin		1		
Drill production hole		1		
• Tram drill to rib holes		1		
○ Turn lever on		1		
○ Walk and guide hammer to desired location		1		
○ Turn lever off before drilling	Failing to turn lever off could result in damage to rig or pushing rig	2		Never leave valves turned on or leave hammer unattended
• Observe rib conditions	Noise and vibration from hammer could affect rib conditions	2		Never drill with your back to the rib
• Scale ribs if necessary	Rocks falling resulting in personal injuries (crushing injuries, contusions, etc.) – have had accidents due to falling rocks	2		
• Tilt hammer vertically until indicator shows hammer is plumb	Serves as a guide for production holes; If not drilled at proper angle, shot will be irregular and difficult to muck	2		
• Lower hammer		1		Never drill into an old hole/gun hole
• Turn water on	Failure to use water could cause steel to stick resulting in loss of the steel, could result in crushing injury from hammer; and could result in down-time	2		Water must be seen while drilling
• Turn on rotation and percussion		1		Varies by rock types
○ Adjust pressure accordingly		1		Comes with experience
• Drill at specified angle for each row	If not drilled at proper angle, shot will be irregular and difficult to muck	2		Refer to indicator for proper angle Refer to drill pattern diagram

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Begin drilling (production holes)		1		
• Keep hands off of rotating drill steel	Could cause personal injury from moving parts	2		Never hold onto the steel
• Keep clothing away from rotating drill steel	Clothing could become entangled in the drill steel resulting in broken bones, bruises, stretched ligament	2		Never wear loose clothing
• Observe bottom for old holes/gun holes	These may contain live explosives	3		Never drill into an old hole/gun hole
• Drill approximately 18”		1		
• Shut hammer off		1		Never run hammer outside of hole
• Shut off water		1		
• Pick up hammer		1		
• Lay out outside row of drill pattern	Could effect concrete pouring, panning, rib problems, shooting pops	2		Refer to drill pattern diagram Keep drill hammers evenly spaced while drilling – don’t crowd hammers all to one side to prevent tipping over
o Mark outside row of drill pattern with orange paint	Could effect concrete pouring, panning, rib problems, shooting pops	2		
• Insert collar pipe		1		
• Tram hammer to next row		1		Refer to drill pattern diagram
• Tilt hammer until indicator shows correct angle		1		Angles change with each row
• Repeat collar pipe procedure until pattern is finished		1		
• Remove collar pipe bit		1		
o Lower hammer		1		
o Turn percussion on		1		
o Raise hammer		1		
o Unscrew collar pipe bit by hand		1		Left-hand thread
• Install powder bit		1		
o Screw on by hand		1		Left-hand thread

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Turn water on	Failure to use water could cause steel to stick resulting in loss of the steel, could result in crushing injury from hammer; and could result in down-time	2		Water must be seen while drilling
• Lower bit into collar pipe maintaining same angle as installed collar pipe		1		
• Turn percussion and rotation on		1		
• Adjust down pressure	Too much pressure could shove the rig off blocks; the steel could stick; could result in personal injury (sprains, strains, crushing injuries) and could result in down-time	2		
• Continue drilling until reaching pre-determined depth		1		Never drill into the centralizer
• Shut hammer off once you get to depth		1		
• Turn on the air valve and blow the hole out		1		
• Raise hammer		1		
• Repeat drilling procedures until finished		1		
• Put swing locking pin back in	Rig could swing wide damaging rig; could possible result in crushing injury	2		
• Remove drill steel		1		
• Fold hammer up	Over-traming hammers could cause damage to hammer screws and motor. Will also cause hammer to stick in the folded position	2		
• Turn water and air off		1		
• Remove air/water hoses		1		
Raise drill rig back up		1		Refer to bell signal card
Re-stack cribbing on drill rig		1		
Exit shaft		1		
Pull rig out of shaft		1		

Duty 4: Blasting

Learner will demonstrate how to conduct safe and thorough blasting operations. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and thorough blasting operations include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
Remove hose from shaft		1		
Remove water regulator		1		
Re-couple the 1 ¼" hose to the service line where the water regulator was originally connected		1		
Go back to the bottom		1		
Bring explosive magazine down		1		
Unload the magazine, loading poles, and blow pipe		1		Except for electric cap
Send magazine back to the top		1		
Make up powder	Forcing cap into the booster preformed well when an obstruction is encountered could cause premature detonation	3		Done under the supervision of licensed blaster only Do not force caps into booster if obstruction is encountered
Lay out powder		1		Refer to drill pattern diagram
Bring down stemming bucket		1		
Send empty hook back up		1		
Load the rib holes		1		
• Place powder in hole with wooden tamping pole	Never tamp primer by itself – could cause premature detonation	3		Tamping pole must be wooden or brass
• Drop in split powder		1		
• Fill to top of hole with stemming (pea gravel)		1		Shock tube and collar pipe should be exposed
Bring in bulk loader		1		
Blow water out of the water line		1		
Attach line to bulk loader		1		
Raise bulk loader to overhead position		1		
Bell out to have air turned on		1		Refer to bell signal card

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Load center holes		1		
• Lay out powder for each center hole	Failure to lay out delays per blast diagram could result in a bad shot	2		
• Place non-el in 90 gram booster and place in all center holes	Forcing cap into the booster preformed well when an obstruction is encountered could cause premature detonation	3		Do not force caps into booster if obstruction is encountered
• Load center holes with bulk loader		1		Never let bucket touch bottom to protect from stray current
• Stem the holes		1		Being done while other crew members are loading center holes
○ Fill to top of hole with stemming (pea gravel)	Could result in a bad shot, louder air blast	2		Shock tube and collar pipe should be exposed
• Repeat until all center holes are loaded		1		
Lower bulk loader		1		
Shut the air off		1		
Send out bulk loader		1		
Send out stemming bucket		1		
Pull collar pipes		1		If under water – collar pipes stay in place
Remove 1 1/4 “ hose		1		
Send out collar pipe and 1 ¼” hose		1		
Run detonation cord	If cord overlaps, causes cut-offs, bad shot, misfire	2		
Clip on non-electric caps in groups of 10	If not clipped 90 degrees to detonation cord, could result in misfire; if not connected, may not be accounted for	2		
Get cap count	If right amount of caps are not found, will cause misfire and a bad shot	2		Ensure that all caps are hooked up/accounted for
Lower shooting cable		1		
Check shooting cable	If there is a break in the cable, it won’t shoot	2		Must wait at least 15 minutes before re-entering the shaft
• Conduct continuity test	If there is a break in the cable, it won’t shoot	2		
• Open and close circuit to check	If there is a break in the cable, it won’t shoot	2		
• Re-shunt	Prevent stray current	2		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Lower sand and cover detonation cord	Reduces the effects air blast	2		Enough sand to cover
Lower blasting mats (when applicable) to cover blast	Reduces the effects air blast, prevents flyrock	2		
Send phone out	12v battery in phone could cause unintentional detonation	3		Phone line needs to be pulled out of shaft before electric cap is brought down
Bring electric cap in		1		Never let bucket touch bottom to protect from stray current
Check electric cap	If there is a break in the leg wires, it won't shoot	2		
• Conduct continuity test	If there is a break in the leg wires, it won't shoot	2		
• Open and close circuit to check	If there is a break in the leg wires, it won't shoot	2		
Wire cap to shooting cable	If wires touch, will short-circuit the cap and result in misfire	2		Make sure wires are separated
Attach electric cap to detonation cord	Improper connection will result in a misfire	2		
• Place electric cap between the ends of the two detonation cords	Improper connection will result in a misfire	2		
• Tape detonation cord ends to cap	Improper connection will result in a misfire	2		
Make methane test		1		Always made by a qualified person
Exit shaft		1		Ensure bell rope is pulled up
Check shooting cable	If there is a break in the cable, it won't shoot	2		Must wait at least 15 minutes before re-entering the shaft
• Conduct continuity test	If there is a break in the cable, it won't shoot	2		
• Open and close circuit to check	If there is a break in the cable, it won't shoot	2		
Connect shooting cable to shot box	Improper connection will result in misfire	2		
Turn the fan off	Failure to turn fan off could result in damage to fan	2		
Sound blast signals	Failure to signal could result in serious/fatal injury	3		Refer to blast signals
Retreat to dry house		1		
Shoot		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Turn fan back on		1		
Sound all clear signal		1		
Ensure fire boss had completed run (minimum of 15 minutes)	Re-entry into shaft too soon could result in exposure to carbon monoxide and/or other gases, and misfires	2		

Duty 5: Mucking

Learner will demonstrate how to conduct safe and efficient mucking operations. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and efficient mucking operations include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Enter shaft riding on scaffold		1		Wait until fire boss run has been completed
Clean brackets		1		
Hang hoses		1		
Scale rib (if necessary)	Improper scaling could result in personal injury due to falling rocks	2		
Exit shaft riding on scaffold		1		
Set hoe in hole		1		Ensure pre-op had been done
Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
Hook air hose to hoe		1		
Level muck pile with hoe		1		Wet muck pile down as needed while mucking Exposure to this dust can cause long-term health hazards
Set the hoe in level area		1		
Unhook hoe from hoist		1		Never put your hand inside the hook
Dig/level place to set first bucket		1		
Bell for bucket down		1		Bucket will stop at hang-up mark initially
Push bucket to area hoe operator prepared		1		Weights should be facing you
Remove hook from bucket		1		Never put your hand inside the hook
Steady hook and bell the hook out		1		
Flip the bail stop	Failure to flip the bail stop could result in personal injury when lowering the bail	2		
Flip the ears		1		
Lower bail		1		
Flip the ears back out		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Move out of the way of hoe	Avoid pinch points, could cause crushing injuries	2		Be aware of location of out-riggers
• Stay behind the out-riggers (if possible)	Avoid pinch points, could cause crushing injuries	2		Staying behind the out-riggers will keep you out of the boom swinging radius – still have to stay clear of out-riggers
• Never go behind/reach behind the hoe while it is in operation	Avoid pinch points, could cause crushing injuries	2		
Observe the bucket being loaded		1		Hoe loads bucket
Observe hoe boom being swung out of the way		1		
Flip the ears in		1		
Push the bail up	Failure to properly push the bail up could result in personal injury	2		Keep area clean under weights
Flip the ears back out to latch bail		1		
Flip bail stop back up		1		
Trim top of the bucket	Failure to trim top of bucket could result in personal injury due to falling rock	2		
• Clean counter weights	Failure to clean counter weights could result in personal injury due to falling rock	2		
• Clean rim	Failure to clean rim of bucket could result in personal injury due to falling rock	2		
Bell another bucket down		1		
Push bucket to area hoe operator prepared		1		Weights should be facing you Avoid pinch-points
Remove hook from empty bucket		1		Never put your hand inside the hook Watch your fingers when latch closes
Place hook on loaded bucket	Placing you hand inside the hook will result in crushing injuries to hand and fingers	2		Never put your hand inside the hook Watch your fingers when latch closes
Lift loaded bucket to steady mark while guiding bucket to natural center	Possible crushing injuries due to pinch-points; damage to bucket	2		Bucket will naturally swing toward muck center Avoid catching other bucket, starting ring or rib when lifting loaded bucket

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Stay out of pinch-points between buckets, hoe, and muck pile while lifting bucket	Possible crushing injuries due to pinch-points	2		
• Position yourself between center of bucket weights	Possible crushing injuries due to pinch-points	2		
• Make sure bucket has stopped swinging before belling up	Possible crushing injuries due to pinch-points	2		
Check bottom of loaded bucket for rocks, mud, debris	Prevent personal injury due to falling rock	2		Clean as needed
Muck down 3 feet		1		
Turn hoe	Failure to stay clear of hoe while turning could result in crushing injuries	2		
Shut off air to hoe prior to servicing	Zero potential for movement	2		
Check oil	Prevent motor damage to hoe	2		Address HazCom requirements
Grease hoe	Prevent damage to pins and bushings on hoe	2		
Turn air back on to hoe		1		
Scale ribs when needed	Failure to scale ribs could result in personal injury due to falling rocks	2		
Repeat mucking procedures to bottom		1		
Clean bottom		1		
• Bolt scrapper on the hoe bucket		1		
• Scrape muck up on one side		1		
• Use blow pipe to blow material on the bottom towards the sides of the hoe and check for misfires/old holes/gun holes	Failure to clean bottom could prevent you from seeing misfires, old holes and gun holes. You are using very high pressure that could knock you off balance or injury someone else with flying rock	2		Maintain good footing Never blow towards another person Don't blow towards the equipment
• Turn hoe and repeat	Failure to stay clear of hoe while turning could result in crushing injuries	2		Service the hoe every time it is turned
• Blow material into a pile and shovel into bucket		1		
Laying out				
• Hang strings on two centers		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Measure from strings to find center		1		
• Drill hole on center with bench hammer		1		
• Insert wooden plug in hole		1		
• Measure from strings and put nail on center of plug		1		
• Measure from plug to rib		1		
• Paint the line		1		
• Shut air off of the hoe		1		
• Hoist up hoe		1		
• Take air line off of the hoe		1		
• Finish laying out		1		
• Paint 18” spacing		1		
• Exit the shaft		1		Hoe is pulled after exiting shaft

Duty 6: Concrete Work

Learner will demonstrate how to conduct safe and efficient concrete work. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and efficient concrete work includes the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Pan ribs				
• Load the scaffold outside with materials and tools		1		Tin sections, panning boards, nail guns, male dowel rods, tin bars, string, paint, 50' tape measure
• Lower scaffold with materials, tools, and crew		1		
• Check to ensure water regulator is removed		1		
• Stop at end of service line		1		
• Blow water line out		1		
• Hook air line to air regulator		1		
• Reduce pressure to 80 psi		1		Too much air pressure could damage nail gun or screw gun
• Hook up ¾" line and nail gun		1		
• Turn air on		1		
• Use nail gun to nail panning boards to back side of existing tin	Nail guns can be as dangerous as a low caliber pistol – many injuries have occurred because people have shot themselves or others	2		Keep fingers out of the way Keep nail gun square with tin (avoid ricocheting) Nail as many panning boards as you can reach comfortably
• Position tin sections from scaffolding	Sharp edges on tin sections can cause lacerations; body parts can be pinched while positioning sections	2		
• Use nail gun to nail tin sections to panning boards	Nail guns can be as dangerous as a low caliber pistol – many injuries have occurred because people have shot themselves or others	2		Keep fingers out of the way Keep nail gun square with tin (avoid ricocheting)
• Screw male dowels into female rods after installing each section		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Reposition scaffold and repeat until top row is complete		1		
• Drop bottom boot off of scaffold onto the bottom		1		
• Use nail gun to nail panning boards to bottom of top row	Nail guns can be as dangerous as a low caliber pistol – many injuries have occurred because people have shot themselves or others	2		
• Position tin sections from scaffolding	Sharp edges on tin sections can cause lacerations; body parts can be pinched while positioning sections	2		
• Use nail gun to nail tin sections to panning boards	Nail guns can be as dangerous as a low caliber pistol – many injuries have occurred because people have shot themselves or others	2		
• Repeat until bottom row is complete		1		
• Hang strings and tape measure from centers		1		
• Measure pad elevations		1		
• Paint marks		1		
• Exit shaft with scaffold		1		
Level up				
• Send hoe in		1		
• Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Hook up the hose on hoe		1		
• Turn the air on		1		
• Level the muck and push against the tin with the backhoe and tamp it with hoe bucket		1		
• Turn air off		1		
• Lift hoe to center		1		
• Exit the shaft		1		
• Pull hoe out		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Install required pipes		1		Discharge lines, communication lines, water/drain lines, French drain lines, compressed air line
Set pads				
• Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Bell for pad bucket		1		
• Unload bucket		1		
• Get gravel bucket		1		
• Spread gravel where pads are to be set		1		
• Set first pad under tape measure	Improperly setting the first pad could affect the whole pour	2		
• Level pad and beat into gravel	Improperly leveling the pad could affect the whole pour	2		
• Place leveling transit on first pad		1		
• Hang plumb bobs from strings		1		
• Set remaining pads to same elevation under the plumb strings	Improperly leveling the pad could affect the whole pour	2		
• Double-check pad elevations	Improperly leveling the pad could affect the whole pour	2		
• Clean off surface of pads		1		
• Call for starting ring		1		
• Set starting ring on pads and align and measure		1		
• Place gravel behind starting ring and tamp down		1		
• Install water stop		1		Splice on return side – don't overlap
• Nail female dowel rods on rebar centers		1		
• Call for radius rebar		1		
• Tie two rings of radius behind dowels		1		
• Exit shaft		1		
Hanging steel				

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Re-enter shaft with scaffold and straight steel, twisters and tie wire		1		Follow all safety precautions outlined in entering shaft
• Tie steel to male dowels under existing concrete		1		One person holds steel – another person ties
• Exit the shaft		1		
Tying steel				
• Re-enter shaft with tie wire and twisters		1		Follow all safety precautions outlined in entering shaft
• Tie vertical steel to female dowels on starting ring		1		
• Finish tying radius bars		1		
Setting forms				
• Clean pads		1		
• Set and align first form	Improperly setting and aligning the first form could affect the whole pour	2		
• Set and align rest of the forms	Improperly setting and aligning the forms could affect the whole pour	2		
• Install key plates		1		
• Bolt forms together		1		
• Exit the shaft		1		
Setting forms with scaffold				
• Re-enter shaft with forms scaffold		1		Follow all safety precautions outlined in entering shaft
• Set scaffold on forms		1		
• Align forms to plumb bobs		1		Jack forms (where needed)
• Clean up scaffold	Prevent slipping/tripping injuries; 3rd leading cause of lost time injuries in the industry 2nd leading cause of fatal accidents in surface mining	2		
• Hook up vibrator		1		
• Call for concrete		1		
Pouring concrete				Avoid contact with concrete; preferably wash off with Orange Go-Jo

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Pour two feet of concrete evenly behind form		1		
• Vibrate concrete		1		
• Repeat until form is full		1		
• Tie more radius steel		1		
• Set next ring of forms		1		
• Move scaffold up		1		
• Align and level forms	Improperly setting and aligning the forms could affect the whole pour	2		
• Repeat pouring concrete		1		
• Place enclosure ring		1		
• Place scaffold on enclosure ring		1		
• Fill enclosure ring with concrete		1		
• Place doors on enclosure ring		1		
• Clean/shovel out		1		
• Place in bucket and send out		1		
• Exit the shaft		1		
Prepare for next pour		1		
Pull forms				
• Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Unbolt forms		1		
• Pull key plates		1		
• Knock pins out		1		
• Pry forms loose		1		Enclosure form only Other forms have built-in jacks for loosening
• Clean, steady and send forms out of shaft	Objects could fall from forms back into shaft; forms could catch service line brackets or vent tube going back out of the shaft	2		
• Lower scaffold to next ring		1		
• Repeat pulling form procedures to No. 1 ring		1		
• Exit the shaft with forms scaffold		1		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Pull the No. 1 ring		1		
• Exit the shaft		1		

Duty 7: End-of-Shift Activities

Learner will demonstrate how to conduct safe and thorough end-of-shift activities. Learner will also explain the job duties, why they are conducted, any associated risk, and how to implement appropriate controls. Thorough end-of-shift activities include the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Return cap lamp		1		
• Place on charger	You need your light for the next shift	2		Ensure charging light is on
Return crew phone		1		
Return PPE		1		
Hang up belt with tag		1		
Proceed to dry house to change cloths		1		
Check out at lamp house or dry house		1		
Sign out at mailbox		1		

Duty 8: Non-Routine Activities, Emergency/Unusual Situations

Learner will demonstrate how to perform non-routine activities safely and efficiently, and explain procedures for responding to emergency or unusual situations. Learner will also explain the duties, why they are conducted, any associated risk, and how to implement appropriate controls. Safe and efficient performance of non-routine activities and response to emergency or unusual situations includes the following job steps:

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
Prepare to pour concrete				
• Removing starting ring after level-up shot		2		
○ unbolt		1		
○ position scaffold to catch starting ring	Ring section could fall off of scaffold or fall into the scaffold and result in crushing injuries	2		
○ pry down	Ring section could fall off of scaffold or fall into the scaffold and result in crushing injuries	2		Avoid pinch points (finger injuries)
○ strap to scaffold	Ring section could fall off of scaffold or fall into the scaffold and result in crushing injuries	2		
○ Reposition scaffold and repeat process for each section		1		
• Send hoe in		1		
• Re-enter shaft		1		Follow all safety precautions outlined in entering shaft
• Muck to pad elevation		1		
• Level the muck and dig ditch		1		
• Exit shaft		1		
Medical emergencies				
• Call 911	Failure to know how to dial for emergency service could cause delays when time is critical	2		Varies by area, phone system may required prefix, i.e. 9, 8, etc.
• Review bell signal for emergencies (3 long bells)	This is emergency signal in the shaft; this is how you get help if you need medical assistance or other help	2		

Job Steps	Importance Narrative (Consider Safety, Production, Maintenance)	Importance Ranking 1=Important 2=Very Important 3=Critical	Satisfactory or Needs Work	Procedures/Risk Resolution/ Notes/Comments
• Location of first aid supplies		1		Office, dry house/lamp house, eye wash station, EMT's
Weather Conditions	Lighting is the major concern	2		If lightening is imminent; remove all persons from shaft
Un-detonated explosives		1		Notify state inspector
• If found on bottom		1		
o Place in shaft magazine		1		
o Send outside		1		
o Return to explosive magazine		1		
o Return to powder company		1		
• If found in gun hole/old hole		1		
o Wash out hole		1		
o Place in shaft magazine		1		
o Send outside		1		
o Return to explosive magazine		1		
o Return to powder company		1		