



STANDARD OPERATING PROCEDURE

FORM NO.HSE/CORP/4

	ACTIVITY	Charging, stemming & blasting		SITE	SMC	DEPARTMENT	Mining	
	SOP NO.	IMFA/SOP/SMC/MINING/05	REVISION	00	EFF DATE:	19.6.14	NO. OF PAGES	Page 1 of 4

Step No.	Activity (WHAT)	Associated Requirements/ Hazards/ Impact	Process / tools / PPEs (HOW)	Responsibility (WHO)	Remarks / Reference
1	Guarding & Signaling before Charging	Quality – i)Attending the explosives at charging place ii)Caution the people regarding blasting event. iii)Send blasting information to neighbor mines. iv)Communicate and make guarding before blasting of M/S Balasore Alloys Ltd.	i)Do not leave the explosives unattended. ii)Caution employees, visitors and neighbors about a scheduled blasting event. iii)Send Blasting Intimation to M/S Balasore Alloys Ltd. iv)Communicate and take same precaution when you receive intimation about blasting at M/S Balasore Alloys Ltd.	Blasting Foreman Blasting Foreman Blasting Foreman Blasting Foreman	DOC NO.WI/OPRN/03
		OH&S – i)Inadvertent access	i)Prohibit the charging area by caution tape and red flags. Take effective care to prevent unauthorised entry or plying of vehicle.	Blasting Foreman	DOC NO. HIRA/MINING/05
		Environment - Nil			Aspect No.7
2	Charging of explosives	Quality – i)Charging will be started after unloading of explosives at face. ii)Clean the holes before charging iii)One hole will be charged at a time.	i)The hole shall be charged as soon as possible after the explosives is transported to the site of blasting. ii)No shot hole shall be charged, unless it is thoroughly cleaned. iii)Not more than one hole shall be in the process of being charged at any point of time.	Blaster Blaster Blasting Foreman	DOC NO.WI/OPRN/03



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		<p>iv) Do not deform explosive</p> <p>v) Same type of explosives to be used in a hole.</p> <p>vi) Blaster will supervise the whole operation</p> <p>vii) Lowering of explosives in the hole</p> <p>viii) Lower the explosives carefully.</p> <p>ix) Charging will be proper as per calculation.</p>	<p>iv) Explosive cartridge shall not be slit or deformed.</p> <p>v) Use only same dia. and same type of explosives in a hole.</p> <p>vi) Preparation of charges shall be carried out under the personal supervision of blaster.</p> <p>vii) Lower the explosive carefully- avoid sticking of cartridges in the shot holes. Avoid air space in the explosive column. After charging of such hole with explosives, measure the length of the remaining portion of the hole to confirm that the cartridges are in closed contact with each other and there is no air gap between the explosives column. In case uncharged portion of the hole is not as per calculation, thereby indicating air space. So attempt may be made to push down the charge in case of slurry explosive only.</p> <p>viii) No explosive cartridge shall be forcibly pressed into a hole of insufficient size.</p> <p>ix) Ensure that no charge in a shot hole is over charged or under charged.</p>	<p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p>	
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		<p>OH&S –</p> <p>i) Skin Infection</p> <p>ii) Explosion</p> <p>iii) Explosion due to shock</p> <p>iv) Sparking hazard</p> <p>v) Sparking hazard</p>	<p>i) Use hand gloves while handling of explosives.</p> <p>ii) Smoking, naked light or open flame shall not be allowed within 300m from charging area.</p> <p>iii) During charging process do not drop explosives in the hole. Anchor the explosive cartridge with proper tool and lowered carefully into the shot hole.</p> <p>iv) Use a pricker made of wood or of a nonferrous metal, for priming cartridges.</p> <p>v) No steel knife will be used to cut the cordtex or explosive case.</p>	<p>Blasting Foreman</p> <p>Blasting Foreman</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p>	<p>DOC NO. HIRA/MINING/05</p>
		<p>Environment-</p> <p>i) Blast vibration & Noise</p>	<p>i) Obey the followings: a) maxm. explosive charge per delay-120kg. b) maxm. explosives charge per round-400kg. c) maxm. no. of holes in a round-20 d) maxm. no. of rows-3 e) total time of blast duration from the initiation of 1st hole to last hole is not more than 600ms.</p>	<p>Blasting Foreman</p>	<p>Aspect No.7</p>
3	Stemming the holes	<p>Quality –</p> <p>i) Stemming will be carried</p>	<p>i) Use drill cuttings or proper stemming</p>		



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		<p>manually.</p> <p>ii) Take proper lead care during stemming</p>	<p>material for stemming purpose. Use spade with care for manual filling of the hole.</p> <p>ii) Stemming carefully to avoid cutting of lead.</p>	<p>Blasting Helper</p> <p>Blaster</p>	<p>DOC NO.WI/OPRN/03</p>
		<p>OH&S –</p> <p>i) Chances of explosion due to use of spark material</p> <p>ii) Hitting & ignition</p>	<p>i) During charging or stemming a blast hole, do not use iron or steel tools for tamping. A tamping rod made entirely of wood shall be used.</p> <p>ii) Do not force the explosives into a hole.</p>	<p>Blaster</p> <p>Blaster</p>	<p>DOC NO. HIRA/MINING/05</p>
		<p>Environment -</p> <p>i) Noise</p>	<p>Keep stemming column proper to avoid blown out shots and subsequent noise,</p>	<p>Blasting Foreman</p>	<p>Aspect No.7</p>
4	Return of Explosives & Issue of Detonator	<p>Quality –</p> <p>i) Fall of explosives from open case will be avoided.</p> <p>ii) Return of explosives and issue of detonator.</p> <p>iii) Detonator will be kept in locked box.</p> <p>iv) Detonator will be kept in secured condition.</p> <p>v) Detonator will not be kept in explosive box.</p>	<p>i) Remove all surplus explosives from the face, keep in case, secure properly and shift to the explosive van.</p> <p>ii) Return the surplus explosive to the Magazine and issue detonator.</p> <p>iii) Detonator will not be issued in a box without lock & key.</p> <p>iv) No detonator shall be taken out from box unless it is required for immediate use.</p> <p>v) Do not keep detonators in a container which contains other explosives, materials or tools.</p>	<p>Magazine Incharge</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p>	<p>DOC NO.WI/OPRN/03</p>



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		OH&S - i) Fall & probable explosion	i) Always carry the detonators in a wooden box. Do not shift the detonators in hand.	Blasting Foreman		DOC NO. HIRA/MINING/05	
		Environment- Nil					
5	Guarding & Signaling before Firing	Quality- i) Posting of guards at access points.	i) To prevent entry of people in the danger zone, guards/competent personnel shall be posted at all access points leading to the blast area.	Blasting Foreman/ Blaster		DOC NO.WI/OPRN/03	
		ii) Warning siren	ii) Warning siren shall be given at least 15 minutes before the holes are fired. Obey the followings: a) three sirens – 15 minutes before the firing b) two sirens – just before firing c) one siren – All Clear after the inspection of blasting face	Blasting Foreman			
		OH&S- i) Injury due to fly rock	i) The danger zone shall be distinctly marked (by means of red flags or caution tape) at least 30 minutes before firing of holes.	Blasting Foreman			DOC NO. HIRA/MINING/05
		Environment- Nil					
6	Taking Shelter	Quality- i) After lighting the safety fuse	i) Run to the blasting shelter. Never use the vehicle as a means to escape from danger	Blasting Foreman/		DOC NO.WI/OPRN/03	



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		blaster will immediately move to blasting shelter.	zone.	Blaster	
		OH&S- i)Hit by fly rock	i)Before the holes are to be fired, blaster/blasting foreman shall ensure that all persons have either left the danger zone or have taken adequate shelter.	Blasting Foreman/ Blaster	DOC NO. HIRA/MINING/05
		ii)Hit by fly rock	ii)The blaster and blasting crew will use blasting shelter that will provide complete protection from fly rock that may be projected from a blast.	Blasting Foreman/ Blaster	
		Environment- Nil			
7	Firing the shot	Quality- i)Firing on the same day	i)All holes charged on any one day shall be fired on the same day.	Blasting Foreman	DOC NO.WI/OPRN/03
		ii)Blasting must be carried within fixed timings.	ii)Blasting operations will be carried out only in between the shifts, the timings as fixed by the Mines Manager.	Blasting Foreman	
		iii)Firing consideration	iii)No shot shall be fired except in properly drilled, charged and stemmed blast hole.	Blasting Foreman	
		iv)Equipment damage due to fly rock	iv)All equipments in the blast area will be removed or protected from fly rock damage.	Blasting Foreman	
		v)Connection of cordtex	v)Make connections with the help of cordtex and relay or shock-tubes.	Blasting Foreman	
		<u>Incase of ordinary blasting:</u>		Blaster	
		vi)Crimping of detonator to safety fuse	vi)Crimp the detonator to one end of the safety fuse.	Blaster	



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		<p><u>Incase of electric blasting:</u> vii) Connection to the shot firing apparatus</p> <p>viii) Initiation of fire</p> <p>ix) Precautions during approach of thunder storm.</p>	<p>vii-a) Tie up the electric detonator to the cordex. b) Connect the lead wire of detonator to the shot firing cable. c) Connect the cable to the exploder.</p> <p>viii) Firing of charges shall be done by the blaster himself. Blaster will initiate fire after getting confirmation for all clear signal from Blasting Foreman.</p> <p>ix) During approach of an electric storm, following precautions shall be taken-</p> <p>a) No explosives, particularly detonators shall be handled. b) If charging operations have begun, work shall be discontinued till the storm has passed. c) If connection is made then that will be buried under soil. d) In bad weather condition blasting will not be planned.</p>	<p>Blasting Foreman/ Blaster</p>	
		<p>OH&S - <u>Incase of ordinary blasting:</u> i) Burn injury during lighting</p> <p>ii) Preblast before taking shelter</p>	<p>i) Do not use open flame to light safety fuse-use a kai-piece to ignite.</p> <p>ii) No blast hole shall be fired by a safety fuse less than 1.5 meters in length. Increase in length may be optioned so as to accommodate the escape timing.</p>	<p>Blaster</p> <p>Blaster</p>	<p>DOC NO. HIRA/MINING/05</p>



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		Environment- Nil					
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8	Electric shotfiring	<p>Quality –</p> <p>i) Priming of cartridge</p> <p>ii) Firing by an exploder</p> <p>iii) Use of exploder key</p> <p>(iv) Overhauling of exploder</p> <p>iv(a) If the apparatus fails to fire-</p>	<p>i) No detonator shall be inserted into a priming cartridge until immediately before it is to be used.</p> <p>ii) No shot shall be fired except by means of a suitable shotfiring apparatus and number of shots fired at any one time by the apparatus shall not exceed the number for which it is designed.</p> <p>iii) The key of exploder shall not be placed in position until a shot is about to be fired and shall be removed as soon as a shot has been fired.</p> <p>iv) No apparatus shall be used which is defective; and every apparatus shall, once at least in every three months, be cleaned and thoroughly overhauled by a competent person.</p> <p>iv(a) If the apparatus fails to fire all the shots in a properly connected circuit, the blaster shall return the apparatus to the Manager or Asst. Manager as soon as possible, and it shall not be used again unless it has been tested and found to be in safe working order.</p> <p>iv(b) The result of every overhaul, test or</p>	<p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blasting Foreman</p> <p>Blaster</p>	DOC NO.WI/OPRN/03
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		<p>iv(b)Recording of overhaul/test/repair</p> <p>v)coupling of cable to the firing apparatus</p> <p>vi)Caring for the shotfiring cable and exploder.</p> <p>vii)Connection of cable to the exploder.</p> <p>viii)Connection and testing of continuity</p> <p>ix)Immediate disconnection of the cable after firing</p>	<p>repair, as aforesaid shall be recorded in a bound- paged book and shall be signed and dated by the person making the overhaul, test or repair.</p> <p>v)before coupling the cable to the firing apparatus, couple up the cable himself to the detonator leads.</p> <p>vi)take adequate precautions to protect electrical conductors and apparatus from injury.</p> <p>vii)himself couple the cable to the firing apparatus; and before doing so, see that all persons in the vicinity have taken proper shelter as provided under Reg.164; and</p> <p>viii-a)The circuit shall be tested either for electrical resistance or for continuity before connecting it to the firing apparatus. Such a test shall be made with an ohm meter.</p> <p>(b)the cable to the shotfiring apparatus shall be connected last.</p> <p>ix)after firing the shots and before entering the place of firing, disconnect the cable from the firing apparatus.</p>	<p>Blasting Foreman</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p> <p>Blasting Foreman</p> <p>Blaster</p>	
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		<p>OH&S –</p> <p>i)Chances of explosion</p> <p>ii)Chances of unauthorised firing</p> <p>iii)Chances of unauthorised firing</p> <p>iv)Hitting of fly rock</p> <p>v)Premature blast or misfire</p>	<p>i)Detonators once inserted into a cartridge shall not be taken out.</p> <p>ii)No current from a signalling, lighting or power circuit shall be used for firing shots.</p> <p>iii)The blaster shall retain key of the firing apparatus in his possession throughout his shift.</p> <p>iv)The blaster shall use a well-insulated cable of sufficient length to permit him to take proper shelter.</p> <p>v)The blaster shall take care to prevent the cable from coming into contact with any power or lighting cable or other electrical apparatus.</p>	<p>Blasting Foreman</p> <p>Blasting Foreman</p> <p>Blaster</p> <p>Blaster</p> <p>Blaster</p>			<p>DOC NO. HIRA/MINING/05</p>
		Environment - Nil					

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Name Designation Signature: Date:	Prepared by M.K. Samal Mines Manager	Approved by S. Patni Sr. GM-SCM
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NOTE :**SIX DIRECTIONAL HAZARD IDENTIFICATION DURING JOB :**

In addition to the above SOP, a 6-directional hazard identification sheet shall be used before start of the job. While executing the job at site, any hazards from six directions (**NORTH, SOUTH, EAST, WEST, TOP, BUTTOM**) to be assessed based on physical observation, common sense & experience. Controls shall be taken for any hazards thus identified.

TRAINING RECORD OF SOP :

The Training on this SOP with six directional hazards is to be imparted to concerned employee and contract workers by Shift In-Charge / Deptt. Head as applicable. The Training Record to be maintained in a register with signature of the individual employees before starting of the job.