सीएमडी सचिवालय
संदर्भ सं.- E-4743
दिनांक 26-9-11
सीएमपीडीआई, राँची

सी एम पी डी आई (मुख्या)
विज्ञान एवं प्रौद्योगिकी प्रभाग
(विस्फोटन विभाग)

पत्रांक : सीएमपीडीआई/विसफोटन/2011-12/ 261 दिनांक: 22.09.2011

Placed below is the standard operating procedures (SOPs) in respect of testing methodologies to be followed during trial blasting of new explosives and accessories products for seeking entry into Coal India Limited. The proposed SOPs deals with all steps, activities of the testing procedures which needs to be strictly followed during trial blasting of new explosives and accessories products.

Submitted for kind approval of CMD, CMPDI.

22/9/2011
(डा$_0$ ए. के. झा)
वरीय प्रबन्धक (खनन)

मुख्य प्रबन्धक (खनन/ विस्फोटन) 22.9.2011

महाप्रबन्धक(सीटी)/ वि0 एवं प्रौ0/विस्फोटन 22/9/11

अध्यक्ष सह प्रबन्ध निदेशक

(1) pl discuss. Pl include a Check List and Observation Sheet (samples) of trial blast including loading sheet, drill pattern, delay pattern etc.
(2) Weight of explosive charged should be checked by weighment of pump truck also apart from counter reading.
PTO. 27.9.11

GM(S&T)

As desired, The SOPs have been modified for your kind perusal and approval, please.

Sd/-
28.10.11
CM (M)

GM (SET) → on leave

CMD / DET/SET

28/10.11

Standard Operating Procedures (SOPs) of New Explosives and Accessories Products

Standing Operating Procedures (SOPs) for evaluating the performance of CORD RELAY during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of Cord Relay supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable.

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where Cord Relay is already in use so that the performance of new cord relay product can be comparatively assessed with the performance of existing cord relay used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where cord relay is already in use and testing should be carried out in all possible scenarios viz. dry face condition, watery face condition containing mud and broken rock.

iii) **Quantity to be tested**

A minimum of 300 nos. is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 6-7 rounds of blast are required for evaluation of cord relay.

iv) The following technical parameters should be examined on the surface before putting it to actual blasting to ascertain the quality of the new product. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

Dr. A. K. ... Sr. Mgr (Mining) 24/10/11

SCKar 24.10.11 SCKar CM (M)

महाप्रबन्धक (सीटी ...) General Man... (T/Blasting)

a) **Verification of physical condition** by visual inspection of cord relay.

b) **Series firing test:** Under this test, 25 nos. of cord relay should be connected in series using detonating fuse/cord and fired. All the 25 nos. of Cord Relay should be fired without any misfire.

c) **Sensitivity:** The sensitivity test should be determined by firing the cord relays in different (either in the main line or in the branch line) with detonating fuse.

d) **Delay timing:** The delay timing should be determined by firing the cord relay after connecting it with Delay timer to precisely determine the delay time.

v) There should not be <u>any misfire</u> during trial blasting. If there takes place <u>any misfire</u> during trial blasting, the product should <u>not</u> be recommended for use in the mines of Coal India Limited.

vi) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

महाप्रबंधक
General Manager (... Blasting)
CMPDI

Check List to be followed during the Trial Blasting of Cord Relay

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry face condition, wet face condition containing mud and broken rock.	☐	☐
3.	A minimum of 300 nos. were supplied free of cost by the manufacturer for trial blasting.	☐	☐
4.	A minimum of 6 – 7 rounds of blast was taken.	☐	☐
5.	Physical condition of the cord relay was examined at the time of trial blasting.	☐	☐
6.	Series firing test was carried out without any misfire.	☐	☐
7.	Cap Sensitivity of the cord relay was examined.	☐	☐
8.	Scattering in delay time was measured.	☐	☐
9.	Was there any misfire observed during trial blasting?	☐	☐
10.	Trial blast record was properly documented along with observations.	☐	☐

24/10/11
Dr. A.K. Jha
Sr. Mgr (Mining)

SCK 24.10.11
S.C. Kar
CM (M)

महाप्रबन्धक
(सीटी ... विस्फोटन)
सीएमपीडीआई
General Manager (... SBT/Blasting)

OBSERVATION SHEET
RECORD OF TRIAL BLASTING OF NEW CORD RELAY

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. EXPLOSIVES

1. NAME & TYPE OF COLUMN CHARGE :
2. BATCH NO / CASE NO :
3. DATE OF MANUFACTURING :
4. SAMPLE NO. :
5. TYPE OF BOOSTER :
6. CHARGE PER HOLE (Kg) :
7. PERCENTAGE OF BOOSTER :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11
Dy. A.K. Jha
Sr. Mgr (Mining)

SCK 24.10.11
SC Tar
CM (M)

महाप्रबन्धक
(सीटी एवं ओ ब्लास्टिंग)
सीएमपीडीआई
General Manager (City/Blasting)

8. CHARGE PER ROUND (Kg) :

9. CAP – SENSITIVE (Kg) :

10. NON CAP SENSITIVE (Kg) :

11. TYPE OF CORD RELAY :

12. DELAY INTERVAL OF CORD RELAY (ms):

13. NOS. OF CORD RELAY USED :

D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :

2. MUCK PILE PROFILE :

3. THROW :

E. REMARKS (IF ANY) :

F. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11
Dr. A. K. Jha
Sr. Mgr (Mining)

24.10.11
S C Kar
GM (M)

महाप्रबन्धक
(सीटी/... विस्फोटन)
सीएमपीडीआई ...
General Man... T/Blasting)

Standing Operating Procedures (SOPs) for evaluating the performance of BULK explosives during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of Bulk explosives supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable.

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where Bulk explosives are already in use so that the performance of new Bulk explosives can be comparatively assessed with the performance of existing Bulk explosives used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where Bulk explosives are already in use and testing should be carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock. The Bulk explosives should be used in mine having bench height more than 15m so that the explosive can be loaded in blast hole as top and bottom charge column to investigate the impact of pressure sensitization and desensitization of explosive column during blasting. The emulsion cast boosters should be preferably used during trial blasting, if available in mine.

iii) Quantity to be tested

A minimum of 30 Te.is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 6-7 rounds of blast are required for evaluation of Bulk explosives.

24/10/2011
Dr. A.K. Jha
Sr. Manager (Mining)

24.10.11
SCKAR
CM (M)

महाप्रबन्धक
(सीटी/वि एवं प्रो ब्लास्टिंग)
सीएमपीडीआई, राँची ४
General Manager (CT/S&T/Blasting)
CMPDI, Ranchi-8

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

a) **Verification of Physical Condition** by visual inspection of bulk explosives

b) **Velocity of detonation (VOD)**

- Fresh
- After 24 hrs. sleepage.

Velocity of detonation should be determined by Dautriche method under unconfined condition in accordance with requirements as laid down in IS: 6609 of 1973 and by using the high frequency Data Acquisition System. The in-the-hole VOD should also be determined under confined condition.

c) **Density of explosive**

- Fresh
- After 24 hrs. sleepage

Density of explosive should be determined by Water Displacement method.

d) **Booster/Cap sensitivity (BS)**

- Fresh
- After 24 hrs. sleepage

The sensitivity of the explosive should be checked by employing 100g cast booster along with the bulk explosive encapsulated in cartridge form to perform the test.

e) **Viscosity:** The viscosity of the matrix should be determined by viscometer and it should be within the limit as claimed by the manufacturer in the technical brochure submitted to CMPDIL/CIL.

24/10/11

24.10.11 S C Kar CM (M)

महाप्रबन्धक (सीटी/टि एवं ब्लास्टिंग) सीएमपीडीआई, रांची
General Manager (CT,S&T/Blasting) CMPDI

v) Performance evaluation of new explosive should be ascertained on the basis of blast performance achieved during the trial blasting by observing powder factor (insitu), fragmentation, throw, muck pile profile, percentage of oversized boulders w.r.t loading equipment deployed at the bench. A new explosive must meet the bench mark powder factor criterion set by Coal India Limited. Drilling, Blasting and Initiation patterns should be technically suggested by the technical representatives of the manufacturer.

After each blast the mucking operation should be observed and analyzed using Digital Image Analysis technique. There should not be <u>any misfire</u> during trial blasting. If there takes place <u>any misfire</u> during trial blasting, the product should not be recommended for use in the mines of Coal India Limited. During the trial period the electronic counter, which is an integral part of the BMD system must function accurately and reliably. Any malfunctioning in the electronic counter will lead to termination of the trial blasting and the product should not be recommended for use in the mines of Coal India limited.

In order to determine the actual/exact quantity of explosives loaded/poured into all the blast holes during charging operation, the following methodology should be practised during trial blasting.

a) The pump truck/BMD vehicle should be weighed at weigh bridge of the respective mine before charging operation and after completion of charging operation in presence of the representatives of mine officials, respective manufacturer's representative and CMPDI representative to ascertain the quantity of the explosives consumed during charging operation. The difference of the weighment before charging operation and after completion of charging operation will indicate the explosives quantity used during the charging operation.

b) The counter fitted in the body of the BMD vehicle should be checked before start of the charging operation and at the end of charging operation during trial blasting. The difference in the counter reading showing the cumulative quantity discharged

SC Kar 24.10.11
CM (M)

from pump truck/loaded into all the blast holes should be computed accurately.

c) The total quantity of explosives consumed during the charging operation will be the higher value obtained by observing the methodology mentioned at point no. a) and b) and should be used for determination of the powder factor. This methodology will be applicable only during introduction of new bulk explosives product.

In order to record the explosives quantity along with the accessories consumed during charging operation during trial blasting, the loading sheet appearing at Annexure–I should be used.

vi) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

महाप्रबन्धक
(सीटी/वि एवं डी हिस्कोटन)
सीएमपीडीआई राँची &
General Manager (CT/Blasting)

Check List to be followed during Trial Blasting of Bulk Explosives

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.	☐	☐
3.	Bulk explosive was used at bench height more than 15 meter.	☐	☐
4.	A minimum of 30 Te. of the bulk explosive was supplied free of cost by the manufacturer for trial blasting.	☐	☐
5.	A minimum of 6 – 7 rounds of blast was taken.	☐	☐
6.	Physical condition of the bulk explosive was examined at the time of trial blasting.	☐	☐
7.	VODs of both the fresh sample and after sleepage sample of the bulk explosive were measured under confined and unconfined conditions.	☐	☐
8.	Densities of both the fresh sample and after sleepage sample of the explosive were measured.	☐	☐
9.	Cap sensitivities of both the fresh sample and after sleepage sample of the explosive were examined.	☐	☐
10.	Viscosity was measured.	☐	☐
11.	Powder Factor, Fragmentation, Throw, Muck Pile profile and Percentage of oversized boulder w.r.t. loading equipment were observed during mucking operation.	☐	☐
12.	Was there any misfire observed during trial blasting?	☐	☐
13.	Was the counter of the BMD vehicle /pump truck working satisfactorily?	☐	☐
14.	Trial blast record was properly documented along with observations	☐	☐

24/10/11 Dy. A.K. (Tech) Dy. Mgr (Mining)

SC 24.10.11 SC (Tech) CM/M)

महाप्रबन्धक (सीटी/वि एवं प्रो/ब्लास्टिंग) सीएमपीडीआई रैंची 8 General M... (Blasting)

Annexure–I

LOADING SHEET

Manufacturer Name: Product Name:
Project Name:
Location of Blast:
Pump Truck No: Date: Hole Dia:
Total no of holes: Length of Block: Width of Block: Block volume:
Total Quantity of SME: Cup Density: Date of Blast:

Sl. No	Hole no.	Depth of hole(m)	Charging height of hole (m)	SME used in kg	C/B	Deck (m)	Extra Charged (kg)	Final stem. ht. (m)	Water column (m)	Remarks

SIGN. OF CMPDI REPRESENTATIVE | SIGN. OF MINE REPRESENTATIVE | SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11
Dr. A.K. Jha
Sr Mgr(mining)

SC Kar 24.10.11
CM(M)

महाप्रबन्धक
(सीटी/वि ... विस्फोटन)
General M... Blasting)

OBSERVATION SHEET

RECORD OF TRIAL BLASTING OF NEW BULK EXPLOSIVE

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :
5. BENCH HEIGHT :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. VOLUME OF BLOCK

1. HEIGHT (m) :
2. WIDTH (m) :
3. LENGTH (m) :
4. TOTAL VOLUME OF BLOCK BLASTED INSITU (Cu. m) :
5. POWDER FACTOR (IN-SITU) (m^3/ kg) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11 Dr. A.K. Jha Sr. Mgr (Min'g)

SC Kar 24.10.11 CM (M)

महाप्रबंधक (सीटी/... विस्फोटन) सीएमपीडीआई ... General Manager (...T/Blasting)

D. EXPLOSIVES

1. TYPE OF COLUMN CHARGE :
2. TYPE OF BOOSTER :
3. CHARGE PER HOLE (kg) :
4. WT. OF COLUMN CHARGE (kg) :
5. WT. OF BOOSTER (kg) :
6. CHARGE PER ROUND (kg) :
7. CAP – SENSITIVE (kg) :
8. NON CAP SENSITIVE (kg) :
9. LENGTH OF STEMMING COLUMN (m) :
10. STEMMING MATERIAL USED :
11. LENGTH OF DETONATING FUSE USED :
12. TYPE OF DETONATOR/RELAY USED AND THEIR NO :

E. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :
2. PERCENTAGE OF BOULDERS :
3. VOLUME OF TOE (Cu. m) :
4. MUCK PILE PROFILE :
5. THROW :
6. BACK BREAK (m) :
7. MUCK PILE TIGHTNESS :
8. EASE OF DIGGING :

SIGN. OF CMPDI REPRESENTATIVE | SIGN. OF MINE REPRESENTATIVE | SIGN.OF EXPLOSIVE MANUFACTURE

महाप्रबन्धक
(सीटी [illegible] कोटन)
सीएमपीडीआई [illegible]
General Manager (T/Blasting)

24/10/11
Dr. A.K. Jha
Sr. Mgr (mining)

24.10.11
S C Kar
CM(M)

F. REMARKS (IF ANY) :

G. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

a) **Verification of Physical Condition** by visual inspection of the NPLD explosives

b) **Velocity of Detonation (VOD):** Velocity of detonation should be determined by Dautriche method under unconfined condition in accordance with requirements as laid down in IS: 6609 of 1973 and by using the high frequency Data Acquisition System. The in-the-hole VOD should also be determined under confined condition.

c) **Density of explosive:** Density of the explosives should be determined by Water Displacement method.

d) **Air gap sensitivity (AGS):** Air gap sensitivity is checked by maintaining a gap of 2 cm between the donor and receiver cartridge. In order to pass the AGS the receiver cartridge should be initiated in the specified gap of 2 cm from the donor cartridge.

e) **Cap Sensitivity:** Cap sensitivity should be ascertained by firing the cartridge with No.6 strength detonator.

v) Performance evaluation of the new explosives should be ascertained on the basis of blast performance achieved during the trial blasting by observing powder factor (insitu), fragmentation, throw, muck pile profile, percentage of oversized boulders w.r.t loading equipment deployed at the bench. A new explosive must meet the bench mark powder factor criterion set by Coal India Limited.

After each blast the mucking operation should be observed and analyzed using Digital Image Analysis technique. There should not be any misfire during trial blasting. If there takes place any misfire during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

vi) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

महाप्रबन्धक
(सीटी एंड टी/ब्लास्टिंग)
सीएमपीडीआई, रांची-8
General Manager (CT&T/Blasting)

24/10/11
Dr. A.K. Jha
Sr. Mgr (Mining)

SC Kar 24.10.11
CM (M)

Check List to be followed during Trial Blasting of NPLD Explosive

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.	☐	☐
3.	NPLD explosive was used at bench height more than 15 meter.	☐	☐
4.	Was the cartridge containing the weight as claimed by the manufacturer?	☐	☐
5.	A minimum of 30 Te. was supplied free of cost by the manufacturer.	☐	☐
6.	A minimum of 6 – 7 rounds of blast was carried out.	☐	☐
7.	Physical condition of the cartridge was examined at the time of trial blasting.	☐	☐
8.	Velocity of Detonation of the cartridge was measured.	☐	☐
9.	Density of the cartridge was measured.	☐	☐
10.	Air gap sensitivity of the cartridge was examined.	☐	☐
11.	Cap sensitivity of the cartridge was examined.	☐	☐
12.	Powder Factor, Fragmentation, Throw, Muck Pile profile and Percentage of oversized boulder w.r.t. loading equipment were observed during mucking operation.	☐	☐
13.	Was there any misfire observed during trial blasting?	☐	☐
14.	Trial blast record was properly documented along with observations.	☐	☐

OBSERVATION SHEET
RESULTS OF TRIAL BLASTING OF NEW NPLD EXPLOSIVE

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :
5. BENCH HEIGHT :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. VOLUME OF BLOCK

1. HEIGHT (m) :
2. WIDTH (m) :
3. LENGTH (m) :
4. TOTAL VOLUME OF BLOCK BLASTED INSITU (Cu. m) :
5. POWDER FACTOR (IN-SITU) (m^3/ kg) :

SIGN. OF CMPDI REPRESENTATIVE | SIGN. OF MINE REPRESENTATIVE | SIGN.OF EXPLOSIVE MANUFACTURE

General Manager (CT, SBT/Blasting)

D. EXPLOSIVES

1. TYPE OF COLUMN CHARGE :
2. BATCH NO :
3. DATE OF MANUFACTURING :
4. SAMPLE NO. :
5. TYPE OF BOOSTER :
6. CHARGE PER HOLE (kg) :
7. WT. OF COLUMN CHARGE (kg) :
8. WT. OF BOOSTER (kg) :
9. CHARGE PER ROUND (kg) :
10. CAP – SENSITIVE (kg) :
11. NON CAP SENSITIVE (kg) :
12. LENGTH OF STEMMING COLUMN (m):
13. STEMMING MATERIAL USED :
14. LENGTH OF DETONATING FUSE USED (m) :
15. TYPE OF DETONATOR/RELAY USED AND THEIR NO :

E. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :
2. PERCENTAGE OF BOULDERS :
3. MUCK PILE PROFILE :
4. THROW :
5. BACK BREAK (m) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

महाप्रबन्धक
(सीटी [illegible] स्फोटन)
सीएमपीडीआई
General Manager (T/Blasting)

6. **MUCK PILE TIGHTNESS** :

7. **EASE OF DIGGING** :

F. REMARKS (IF ANY)

G. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

महाप्रबन्धक
(सीटीवि एवं वो /विस्फोटन)
सीएमपीडीआई रांची 8
General Manager (... S&T/Blasting)

Dr. A.K. Jha
Sr. Mgr (Mining)

SC Kar
CM (M)

Standing Operating Procedures (SOPs) for evaluating the performance of Permitted small Dia. (PSD) explosives during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of PSD explosives supplied by any manufacturer during trial blasting are enumerated below

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable.

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where PSD explosives are already in use so that the performance of new PSD explosives can be comparatively assessed with the performance of existing PSD explosives used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where PSD explosives are already in use and testing should be carried in all possible scenarios viz. dry face condition, wet face condition containing mud and broken rock The cartridge should contain the weight as claimed by the manufacturer.

iii) **Quantity to be tested**

A minimum of 175Kg is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 15-16 rounds of blast are required for evaluation of PSD explosives.

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the

महाप्रबन्धक
(सीटी वि एवं डी विस्फोटन)
सीएमपीडीआई
General Manager (Blasting)

test results fall outside the range, the product should not be recommended for use in mines of Coal India Limited.

a) **Verification of Physical Condition** by visual inspection of PSD explosives.

b) **Velocity of Detonation (VOD):** Velocity of detonation should be determined by Dautriche method under unconfined condition in accordance with requirements as laid down in IS: 6609 of 1973 and by using the high frequency Data Acquisition System.

c) **Density of explosive:** Density of PSD explosives should be determined by Water Displacement method.

d) **Air gap sensitivity (AGS):** Air gap sensitivity should be checked by maintaining a gap of 2 cm between the donor and receiver cartridge. In order to pass the AGS the receiver cartridge should be initiated in the specified gap of 2 cm from the donor cartridge.

e) **Continuity of Detonation (COD):** Continuity of detonation should be checked by rolling the cartridge inside a manila paper and a train of 1m length of explosive column is fired with No. 6 strength detonator. For passing the Continuity of Detonation (COD) the entire explosive column should get fired.

f) **Cap Sensitivity:** Cap sensitivity should be ascertained by firing the cartridge with No.6 strength detonator.

v) **Post detonation fume characteristics**

After blasting, the post detonation fumes like CO and NO should be measured in term of PPM. As per DGMS safety standards, PPM of CO and NO should not exceed 50 and 5 respectively after 5 minutes of blasts at the working place.

vi) Performance evaluation of new PSD explosives should be ascertained on the basis of blast performance achieved during the trial blasting by observing Powder Factor. A new PSD explosive must meet the bench mark powder factor criterion set by Coal India Limited. There should not be any misfire during trial blasting. If there takes place any misfire during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

24/10/11 (Dr. A.K. Jha) Sr. Mgr (Mining)

24.10.11 S C Kar CM(M)

महाप्रबंधक (सीटी/वि एण्ड टी/ विस्फोटन) सीएमपीडीआई

General Manager (.../Blasting)

vii) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

Dr. A.K. Jha
Sr. Mgr (Mining)
24/10/11

SCKay 24.10.11
S C Kay
CM (M)

महाप्रबन्धक
General Manager
CMPDI, R

Check List to be followed during Trial Blasting of PSD Explosive

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry face condition, wet face condition containing mud and broken rock.	☐	☐
3.	Was the cartridge containing the weight as claimed by manufacturer?	☐	☐
4.	A minimum of 175 kg was supplied free of cost by the manufacturer for trial blasting.	☐	☐
5.	A minimum of 15-16 rounds of blast was taken.	☐	☐
6.	Physical condition of the cartridge was examined at the time of trial blasting.	☐	☐
7.	Velocity of Detonation of the cartridge was measured.	☐	☐
8.	Density of the cartridge was measured.	☐	☐
9.	Air gap sensitivity of the cartridge was examined.	☐	☐
10.	Continuity of detonation of the cartridge was examined.	☐	☐
11.	Cap sensitivity of the cartridge was examined.	☐	☐
12.	Post detonation fume characteristics of the cartridge were examined.	☐	☐
13.	Was the performance evaluated during the trial blasting by observing the Powder Factor?	☐	☐
14.	Was there any misfire observed during trial blasting?	☐	☐
15.	Trial blast record was properly documented along with observations.	☐	☐

Dr. A.K. Jha Sr. Manager (Mining) 24/10/11

24.10.11 S C Kar CM (M)

महाप्रबंधक (सीटी/ड्रिल एवं विस्फोटन) सीएमपीडीआई ... 8
General Manager (.../Blasting)

OBSERVATION SHEET
RECORD OF TRIAL BLASTING OF NEW PERMITTED SMALL DIA. EXPLOSIVE

A. DETAILS OF MINE & FACE

1. DATE :
2. TRIAL NO. :
3. NAME AND THICKNESS OF SEAM :
4. NATURE OF STRATA :
5. DEGREE OF GASSINESS :
6. NATURE OF COAL :
7. FACE CONDITION :
8. SIZE OF FACE (W X H) (in m) :
9. TYPE OF WORKING :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. PLACE OF BLASTING :
3. DIA OF HOLES(mm) :
4. LENGTH OF HOLES (m) :
5. AVERAGE DEPTH OF HOLES(m) :
6. BURDEN (m) :
7. SPACING (m) :
8. NO. OF HOLES :
9. NO OF ROWS :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

C. EXPLOSIVES

1. NAME & TYPE OF PERMITTED EXPLOSIVE :
2. BATCH NO :
3. DATE OF MANUFACTURING :
4. TYPE OF DETONATOR USED :
5. CHARGE PER HOLE (kg) :
6. CHARGE PER ROUND (kg) :
7. CAP – SENSITIVE (kg) :
8. YIELD PER ROUND (Te) :
9. YIELD PER DETONATOR (D.F.) :
10. PULL OBTAINED :
11. TOTAL VOLUME OF FACE BLASTED INSITU (Cu/ kg) :
12. POWDER FACTOR (IN-SITU) (te/ kg) :
13. DETONATING FACTOR (IN-SITU) (te/det) :
14. CO (PPM) :
15. NO (PPM) :

D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :
2. MUCK PILE PROFILE :
3. THROW :

E. REMARKS (IF ANY) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

महाप्रबंधक
(सीटी एंड एस डिस्कोटेन)
सीएमपीडीआई, रांची-8
General Manager (CT & S&T/Blasting)

Standing Operating Procedures (SOPs) for evaluating the performance of CAST BOOSTER during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of Cast Booster supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable

i) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where Cast Booster is already in use so that the performance of new Cast Booster product can be comparatively assessed with the performance of existing Cast Booster used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where Cast Booster is already in use and the testing should be carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock. The cast booster should contain the weight as claimed by the manufacturer.

ii) **Quantity to be tested**

A minimum of 60 kg is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 6-7 rounds of blast are required for evaluation of the cast booster.

iii) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

महाप्रबन्धक
(सीटी वि एवं डी/ब्लास्टिंग)
सीएमपीडी
General Manager (CT/Blasting)

a) **Verification of Physical Condition** by visual inspection of Cast Booster.

b) **Velocity of detonation (VOD):** Velocity of detonation should be determined by Dautriche method as well as using high frequency Data Acquisition System under unconfined condition. The test procedure followed should be in accordance with the requirements as laid down in IS: 6609 of 1973.

c) **Density of Cast Booster:** Density of the cast booster should be determined by Water Displacement method.

d) **Cap sensitivity (CS)**: The sensitivity of the cast booster should be checked by employing cast booster along with the bulk explosive encapsulated in cartridge form to perform the test.

e) **Water Resistance**: Water resistance should be ascertained by firing the cast booster with No.6 strength detonator after immersing it in water for atleast 24 hours.

iv) There should not be <u>any misfire</u> during trial blasting. If there takes place <u>any misfire</u> during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

v) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

SCKar 24.10.11
S.C. Kar
CM (M)

General M... (T/Blasting)

Check List to be followed during Trial Blasting of Cast Booster

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.	☐	☐
3.	Was the cast booster containing the weight as claimed by the manufacturer?	☐	☐
4.	A minimum of 60 kg was supplied free of cost by the manufacturer for trial blasting.	☐	☐
5.	A minimum of 6 – 7 rounds of blast was taken.	☐	☐
6.	Physical condition of the Cast Booster was examined at the time of trial blasting.	☐	☐
7.	Velocity of Detonation of the cast booster was measured.	☐	☐
8.	Density of the cast booster was measured.	☐	☐
9.	Cap sensitivity of the cast booster was examined.	☐	☐
10.	Water resistance of the cast booster was measured.	☐	☐
11.	Was there any misfire observed during trial blasting?	☐	☐
12.	Trial blast record was properly documented along with observations.	☐	☐

24/10/11

24.10.11

General Manager (Blasting)

OBSERVATION SHEET

RECORD OF TRIAL BLASTING OF NEW CAST BOOSTER

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :
5. BENCH HEIGHT :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. EXPLOSIVES

1. NAME & TYPE OF COLUMN CHARGE :
2. CASE NO :
3. DATE OF MANUFACTURING :
4. SAMPLE NO :
5. TYPE OF BOOSTER :
6. CHARGE PER HOLE (Kg) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11 Dr. A.K. Jha Sr. Manager (Mining)

S C Kar CM (M) 24.10.11

महाप्रबंधक (सीटी/वि ... विस्फोटन) सीएमपीडीआई ... General M... /Blasting)

7. PERCENTAGE OF BOOSTER :

8. CHARGE PER ROUND (Kg) :

9. CAP – SENSITIVE (Kg) :

10. NON CAP SENSITIVE (Kg) :

11. TYPE OF INITIATION SYSTEM USED :

D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :

2. MUCK PILE PROFILE :

3. THROW :

E. REMARKS (IF ANY) :

F. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

Dr. A. K. Jha
Sr. Mgr (mining)
24/10/11

SCK 24.10.11
S C Kar
CM(M)

महाप्रबन्धक
(सीटी एंड एस टेक्नोटेन)
सीएमपीडीआई रांची 8
General M... T/Blasting)

Standing Operating Procedures (SOPs) for evaluating the performance of DETONATING FUSE during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of Detonating Fuse supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable.

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where Detonating Fuse is already in use so that the performance of new Detonating Fuse product can be comparatively assessed with the performance of existing Detonating Fuse used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where Detonating Fuse is already in use and testing should be carried out in all possible scenarios viz. dry face/hole condition, wet face/hole condition containing mud and broken rock.

iii) **Quantity to be tested**

A minimum of 5000m is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 6-7 rounds of blast are required for evaluation of detonating fuse.

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

Dr. A.K. Jha
Sr Mgr (Mining)
24/10/11

SCKar 24.10.11
SC Kar
CM (M)

महाप्रबंधक
(सीटी ... विस्फोटन)
सीएमपीडीआई
General Manager (CT/Blasting)

a) **Verification of Physical Condition** by visual inspection of Detonating Fuse

b) **Diameter:** The nominal diameter of the detonating fuse when measured as prescribed in 3.2 of IS-6609 should be within 4.5 to 5.5 mm.

c) **Velocity of Detonation (VOD):** Velocity of detonation should be determined by Dautriche method and by using high frequency Data Acquisition System under unconfined and confined conditions.

d) **Transmission of Detonation:** When tested as prescribed in 3.7 of IS-6609 there shall be no failure of detonating fuse either in the main line or in the branch line.

v) There should not be any misfire during trial blasting. If there takes place any misfire during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

vi) Trial blast records should be properly documented along with the observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

24/10/11
Dr. A.K. Jha
Sr. Mgr (Mining)

SC Kar 24.10.11
SC Kar
CM (Min)

महाप्रबंधक
(सीटी [illegible] खोटन)
सीएमपीडीआई
General Manager (S&T/Blasting)
CMPDI

Check List to be followed during Trial Blasting of Detonating Fuse

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry face/hole condition, wet face/ hole condition containing mud and broken rock.	☐	☐
3.	A minimum of 5000 m was supplied free of cost by the manufacturer for trial blasting	☐	☐
4.	A minimum of 6 – 7 rounds of blast was taken.	☐	☐
5.	Physical condition of the detonating fuse was examined at the time of trial blasting.	☐	☐
6.	Diameter of the detonating fuse was measured.	☐	☐
7.	Velocity of Detonation of the detonating fuse was measured.	☐	☐
8.	Transmission of Detonation of the detonating fuse was examined.	☐	☐
9.	Was there any misfire observed during trial blasting?	☐	☐
10.	Trial blast record was properly documented along with observations.	☐	☐

Dr. A.K. Jha 24/10/11
Sr. Mgr (Mining)

SC Kar 24.10.11
CM(M)

महाप्रबन्धक (विस्फोटन)
General Manager (Blasting)

OBSERVATION SHEET
RECORD OF TRIAL BLASTING OF NEW DETONATING FUSE

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. TOTAL NO. OF HOLES BLASTED :
7. NO OF ROWS :

C. EXPLOSIVES

1. NAME & TYPE OF COLUMN CHARGE :
2. CASE NO :
3. DATE OF MANUFACTURING :
4. TYPE OF BOOSTER :
5. TOTAL QTY. OF EXPLOSIVE USED (Kg) :
6. CHARGE PER HOLE (Kg) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

Dr. A.K. ... 24/10/11 Sr. Mgr (Mining)

SCK 24.10.11 S.C. Kar CM(M)

महाप्रबंधक (सीएमपीडीआई) General M... (Blasting)

7. PERCENTAGE OF BOOSTER :
8. CHARGE PER ROUND (Kg) :
9. CAP – SENSITIVE (Kg) :
10. NON CAP SENSITIVE (Kg) :
11. TYPE OF DETONATING FUSE USED :
12. TYPE OF INITIATION SYSTEM USED (ms) :
13. LENGTH (m) OF DETONATING FUSE USED :

D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :
2. MUCK PILE PROFILE :
3. THROW :
4. MISFIRE, IF ANY :

E. REMARKS (IF ANY) :

F. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTER

Dr. P. K. Jha Sr. Mgr (Mining) 24/10/11

SC Kar 24.10.11 CM (M)

महाप्रबन्धक (सीटी/वि एवं वो विस्फोटन) सीएमपीडीआई General Manager (... Blasting)

Standing Operating Procedures (SOPs) for evaluating the performance of NONEL during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of NONEL supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where NONEL is already in use so that the performance of new NONEL product can be comparatively assessed with the performance of existing NONEL used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where NONEL is already in use and testing should be carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock. NONEL should be used to provide designed delay time as Inter-Deck delay, Inter hole delay and Inter row delay during trial blasting.

iii) **Quantity to be tested**

A minimum of 2000 m or 300 nos., whichever is larger, is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 6 - 7 rounds of blast are required for evaluation of NONEL.

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing ". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

Dr. A.K. Jha
S C Kar
महाप्रबंधक
General M... T/Blasting)
CMPDI, Ranchi-8

a) **Verification of Physical condition** by visual inspection of NONEL

b) **Strength Test:** The strength test should be determined by the Lead Plate method. The test procedure followed should be in accordance with requirements as laid down in IS 6609 of 1973. After the blast the dent/crater produced on the lead plate should correspond to at least C.3 class.

c) **Series Firing Test:** In series firing test 10 nos. of NONEL should be subjected to firing current. The test procedure should be in accordance with requirements as laid down in IS: 6609 of 1973. To pass the test, all the NONEL should be fired successfully.

d) **Delay timing:** The delay timing should be determined by firing the NONEL after connecting it with Delay timer.

e) **Load test:** Load test should be carried out to determine the capability of the shock tube to withstand dynamic load while charging explosives in a shot hole. Two 125mm cartridges weighing 12.5 kg should be tied along with shock tube and kept on hanging for 15 minutes. It should be then brought out and the shock tube should be examined for any physical deformity such as cracks, elongation etc. If it is found in order then above tested shock tube should be fired on the surface.

v) There should not be any misfire during trial blasting. If there takes place any misfire during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

vi) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

SCK 24.10.11
SC Kar
GM (M)

महाप्रबंधक
General Manager

Check List to be followed during the Trial Blasting of NONEL

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.	☐	☐
3.	A minimum of 2000 m or 300 nos. were supplied free of cost by the manufacturer for trial blasting.	☐	☐
4.	A minimum of 6 – 7 rounds of blast was taken.	☐	☐
5.	Physical condition of the NONEL was examined at the time of trial blasting.	☐	☐
6.	Strength test of the NONEL was carried out.	☐	☐
7.	Series firing test of the NONEL was carried out.	☐	☐
8.	Scattering in delay time of the NONEL was measured.	☐	☐
9.	Load test of the NONEL was measured.	☐	☐
10.	Was there any misfire observed during trial blasting?	☐	☐
11.	Trial blast record was properly documented along with observations.	☐	☐

Dr. A. K. Jha 24/1/11
Sr. Manager (Mining)

S C Ray
(M/M)

महाप्रबंधक
(सीटी ... विस्फोटन)
General Manager (... T/Blasting)

OBSERVATION SHEET
RESULTS OF TRIAL BLASTING OF NONEL

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. EXPLOSIVES

1. NAME & TYPE OF COLUMN CHARGE :
2. BATCH NO / CASE NO :
3. DATE OF MANUFACTURING :
4. SAMPLE NO. :
5. TYPE OF BOOSTER :
6. CHARGE PER HOLE (kg) :
7. PERCENTAGE OF BOOSTER :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

8. **CHARGE PER ROUND (kg)** :

9. **CAP – SENSITIVE (kg)** :

10. **NON CAP SENSITIVE (kg)** :

11. **TYPE OF NONEL USED** :

12. **DELAY INTERVALS OF DTH USED (ms):**

13. **DELAY INTERVALS OF TLD USED (ms):**

14. **NOS. & LENGTH (m) OF NONEL USED:**

D. EVALUATION OF BLASTING PERFORMANCE

1. **FRAGMENTATION** :
2. **MUCK PILE PROFILE** :
3. **THROW** :
4. **MISFIRE IF ANY** :

E. REMARKS (IF ANY) :

F. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11

महाप्रबन्धक

General

Standing Operating Procedures (SOPs) for evaluating the performance of DETONATOR during trial blasting as a New Product in mines of Coal India Limited by CMPDIL

The steps to be followed during performance evaluation of Detonator supplied by any manufacturer during trial blasting are enumerated below.

i) Verification of the necessary documents submitted by the manufacturer pertaining to

- Valid manufacturing license of the product granted by PESO
- DGMS permission, if applicable.

ii) Taking up the matter with the concerned subsidiary requesting to provide suitable mine/mines for carrying out the field trial where Detonator is already in use so that the performance of new Detonator product can be comparatively assessed with the performance of existing Detonator used by the mines where trial blasting will be conducted. The subsidiary should be requested to allocate the mine for trial blasting where Detonator is already in use and testing should be carried out in all possible scenarios viz. dry face/hole condition, wet face/hole condition containing mud and broken rock (debris).

iii) **Quantity to be tested**
A minimum of 350 nos. is to be supplied free of cost by the manufacturer for carrying out trial blasting. A minimum of 15-16 rounds of blast are required for evaluation of the detonator.

iv) The following technical parameters should be examined on the surface under unconfined condition before putting it to actual blasting to ascertain the quality. The test results of the new product must lie within the limiting range in respect of all technical parameters specified in Running Contract under the head "Technical parameters for Random Testing". If any of the test results fall outside the range, the product should not be recommended for use in the mines of Coal India Limited.

a) **Verification of Physical condition** by visual inspection of the detonator.

b) **Strength Test:** The strength test should be determined by the Lead Plate method. The test procedure followed should be in accordance with requirements as laid down in IS 6609 of 1973. After the blast the dent/crater produced on the lead plate should correspond to at least C.3 class.

c) **Series Firing Test:** In series firing test 10 nos. of detonators should be subjected to firing current. The test procedure should be in accordance with requirements as laid down in IS: 6609 of 1973. To pass the test, all the detonators should be fired successfully.

d) **Electric Resistance:** The electric resistance should be determined by stretching the lead wire and connecting an ohmmeter across the base lead wires.

e) **Delay timing:** The delay timing should be determined by firing the Detonator after connecting it with Delay timer.

f) **Test of water proofness:** This test is carried by keeping the delay detonator (0-6) in a bucket of water for 24 hours.

v) There should not be <u>any misfire</u> during trial blasting. If there takes place <u>any misfire</u> during trial blasting, the product should not be recommended for use in the mines of Coal India Limited.

vi) Trial blast records should be properly documented along with observations, if any and should be duly signed by representatives of mine officials, respective manufacturer's representatives and CMPDI representatives and should be enclosed in the Final Report as Annexure.

SC Kar 24.10.11
CM (M)

General Manager (... T/Blasting)

Check List to be followed during the Trial Blasting of Detonator

Sl. No.	Particulars	Yes	No
1.	Necessary documents i.e. License of the product granted by PESO and DGMS permission, if applicable, were available and examined at the time of trial blasting.	☐	☐
2.	Trial blasting was carried out in all possible scenarios viz. dry face/hole condition, wet face/hole condition containing mud and broken rock.	☐	☐
3.	A minimum of 350 nos. was supplied free of cost by the manufacturer for trial blasting.	☐	☐
4.	A minimum of 15 – 16 rounds of blast were taken.	☐	☐
5.	Physical condition of the detonator was examined at the time of trial blasting.	☐	☐
6.	Strength test of the detonator was carried out.	☐	☐
7.	Series firing test of the detonator was carried out.	☐	☐
8.	Electrical resistance of the detonator was measured.	☐	☐
9.	Scattering in delay time was measured.	☐	☐
10.	Water proofness test was carried out.	☐	☐
11.	Was there any misfire observed during trial blasting?	☐	☐
12.	Trial blast record was properly documented along with observations.	☐	☐

24/10/11
Dr. A.K Jha, Sr. Mgr
Blasting cell

SCK 24.10.11
SCK
CM(M)

महाप्रबन्धक
(सीटी ... विस्फोटन)
सीएमपीडीआई
General Manager (CT, S&T/Blasting)
CMPDI, Ranchi

OBSERVATION SHEET
RECORD OF TRIAL BLASTING OF NEW DETONATOR

A. DETAILS OF MINE

1. DATE :
2. TRIAL NO. :
3. NATURE OF STRATA :
4. FACE CONDITION :

B. BLAST GEOMETRY

1. PATTERN OF HOLES :
2. DIA OF HOLES (mm) :
3. DEPTH OF HOLES (m) :
4. BURDEN (m) :
5. SPACING (m) :
6. NO. OF HOLES :
7. NO OF ROWS :

C. EXPLOSIVES

1. NAME & TYPE OF COLUMN CHARGE :
2. BATCH NO :
3. DATE OF MANUFACTURING :
4. TYPE & NO OF DETONATOR :
5. CHARGE PER HOLE (kg) :

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

महाप्रबन्धक
(सीटी ई एव वो /विस्फोटन)
सीएमपीडी आई ची 8
General Manager (CT/Blasting)

6. CHARGE PER ROUND (kg) :

7. DELAY NO. OF DETONATOR USED :

D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION :

2. MUCK PILE PROFILE :

3. THROW :

E. REMARKS (IF ANY) :

F. DRILLING AND BLASTING PATTERN PRACTISED DURING TRIAL BLASTING

PLAN SHOWING BLAST HOLES ALONG WITH INITIATION PATTERN

SIGN. OF CMPDI REPRESENTATIVE	SIGN. OF MINE REPRESENTATIVE	SIGN.OF EXPLOSIVE MANUFACTURE

24/10/11
Dr. A. K. Jha, Sr. Mgr
Blasting cell

24.10.11
SC Kar
CM(M)

महाप्रबन्धक
(सीटी एंड एस/ब्लास्टिंग)
सीएमपीडीआई, रांची-8
General Manager (CT/S&T/Blasting)