

सीएमडी संचिवालय  
संदर्भ सं.-E-4743  
दिनांक 26-9-11  
सीएमपीडीआई, रौची

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

पत्रांक : सीएमपीडीआई/विस्फोटन/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. ए. के. झा)

वरीय प्रबन्धक (खनन)

मुख्य प्रबन्धक (खनन/ विस्फोटन) सुमित्रा दाता 22.9.2011

महाप्रबन्धक(सीटी) / विभ. एवं प्रौद्योगिकी/विस्फोटन

M 22/9/11

अध्यक्ष सह प्रबन्ध निदेशक

(1) pl discuss. to include a Check List  
and Observations sheet (sample) of trial  
blast including loading sheet, drill pattern,  
delay pattern etc.

(2) Weight of explosive charged should be checked  
by weight of pump truck also apart from counter  
reading.

Autograph  
M. S. G. (S&T)

PTO. 27.9.11

As desired, The S.O.s have been modified for  
your kind perusal and approval, please.

6. M (SL+) → on leave

5cts

28. 10. 11  
CM (m)

~~CMD / DFT S&T~~

38 28.10.11

~~1000.00~~ 1000.00

# **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.**

CR-1

महापद्म-एक  
(सीटी) स्ट्राइकर्स एंड ब्लॉटन  
सीएमवीजीसी एंड सीटी ब्लॉटन  
General Manager (Blasting) (Blasting)

Mr. A. V. T. H. (मानिनी)  
S. C. K. (मानिनी)  
cm (m)  
24/10/11

well 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 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.

CR-2

সহায়ক-পক্ষ

(স্বাক্ষর করা হয়েছে) ১০/১১/১১  
সামগ্রিক প্রক্রিয়া বিভাগ  
General Manager (Cord/Blasting)  
CMPDI Ranchi (8)

SCK 224.10.11  
SCK 224.10.11  
cm (m)

22/10/11  
S. M. R. (Mining)  
Sr. Manager (Mining)

### 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry face condition, wet face condition containing mud and broken rock.                           | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | A minimum of 300 nos. were supplied free of cost by the manufacturer for trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 6 – 7 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | Physical condition of the cord relay was examined at the time of trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Series firing test was carried out without any misfire.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Cap Sensitivity of the cord relay was examined.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Scattering in delay time was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

CR-3

10/10/11  
Mr. A. K. The  
General Manager  
on behalf of  
S. K. Kar  
cm (m)

S. K. Kar  
cm (m)

महाराष्ट्र राज्य  
(सीटी एन एस ट्रिस्टोन)  
सीएमपीडी अर्थ  
General Manager (IT SUT/Blasting)

**OBSERVATION SHEET**  
**RECORD OF TRIAL BLASTING OF NEW CORD RELAY**

|                                  |                                 |                                 |                                   |
|----------------------------------|---------------------------------|---------------------------------|-----------------------------------|
| <b>A. DETAILS OF MINE</b>        |                                 | प्रकाशन का नाम                  | प्रकाशन का नाम                    |
| <input type="checkbox"/>         | 1. DATE                         | 2011 में ब्रेस्टिंग की तिथि     |                                   |
| <input type="checkbox"/>         | 2. TRIAL NO.                    | 1                               |                                   |
| <input type="checkbox"/>         | 3. NATURE OF STRATA             | मुख्य अवयव का वर्गीकरण          |                                   |
| <input type="checkbox"/>         | 4. FACE CONDITION               | मुख का अवयवीकरण                 |                                   |
| <b>B. BLAST GEOMETRY</b>         |                                 | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 1. PATTERN OF HOLES             | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 2. DIA OF HOLES (mm)            | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 3. DEPTH OF HOLES (m)           | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 4. BURDEN (m)                   | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 5. SPACING (m)                  | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 6. NO. OF HOLES                 | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 7. NO OF ROWS                   | प्रकाशन का आवृत्ति विवरण        |                                   |
| <b>C. EXPLOSIVES</b>             |                                 | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 1. NAME & TYPE OF COLUMN CHARGE | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 2. BATCH NO / CASE NO           | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 3. DATE OF MANUFACTURING        | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 4. SAMPLE NO.                   | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 5. TYPE OF BOOSTER              | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 6. CHARGE PER HOLE (Kg)         | प्रकाशन का आवृत्ति विवरण        |                                   |
| <input type="checkbox"/>         | 7. PERCENTAGE OF BOOSTER        | प्रकाशन का आवृत्ति विवरण        |                                   |
| SIGN. OF CMPDI<br>REPRESENTATIVE |                                 | SIGN. OF MINE<br>REPRESENTATIVE | SIGN. OF EXPLOSIVE<br>MANUFACTURE |

CR-4

24/10/11  
Mr. A. K. T. H.  
S. M. M. Interne

SCK 24.10.11  
SC T. H.  
cm (m)

महाप्रबन्धक  
(सीटी वे एन रो ट्रिस्टोटन)  
सीएमपीडी ब्राइनिंग विधि 8  
General Manager (Blasting)  
C. (Blasting) 8

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

CR-5

24/10/11  
Dr. A. K. The  
so. mgr (mining)

SCK 224.10.11  
SC Rat  
CM (m)

*M*  
महाराष्ट्र राज्यक  
(सीटी/वा एवं वो लिस्फौटन)  
सीएमकॉर्पोरेशन  
General Manager (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.

1) Verification of the necessary documents submitted by the manufacturer pertaining to:

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

2) 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.

BULK - 1

24/10/2011  
Dr. A.K.Jha  
Sr. Manager (mining)  
GMDI Ranchi

SCKAR  
CM (CM)  
24.10.11  
(N)

महाप्रबन्धक  
(स्टी/वि एवं ब्रो इस्कोटन)  
सीएमपीडीआई, राँची ८  
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.

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 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. 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.

- 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.
- 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

ert no benishcas from pump truck/loaded into all the blast holes should be  
gnivesado yd gnilesq computed accurately.

**c)** The total quantity of explosives consumed during the charging  
A roned ed is oev operation will be the higher value obtained by observing the  
yd les nohefis no methodology mentioned at point no. a) and b) and should be  
ed bluora emetisq used for determination of the powder factor. This methodology  
ert to sevitsneq will be applicable only during introduction of new bulk  
explosives product.

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

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

bejimif sibni isoQ to sevitsneq ent ni seu tal bejimif sibni

zvleolixe to yilnup bpxelisqos ent entmefab of tsbro ni  
ert noisiseqo gnigteris gnhub celor fasil ent ille oini bejimif sibni  
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rglow ts berigew ed bluora sibniqv QM&B lshu gnnub beitqenq ed  
bns noisiseqo gnigteris ented anim evitseges ent to egbhd  
ert to eoneesiq ni noisiseqo gnigteris to noisiseqos tsbro  
e'lemtobalism evitseges elasiffo anim to sevitsneqas  
ert nichcas or evitseges IQSMO bns evitseges  
noisiseqo gnigteris gnhub beruanco esviralqxe ent to yilnup  
bns noisiseqo gnigteris ented inemrigew ent to eoneesiq ent  
ert etsebni lliw noisiseqo gnigteris to noisiseqos tsbro  
noisiseqo gnigteris ent gnnub beitqenq zvleolixe  
ed bluora sibniqv QM&B ent to ybod ent ni beitqenq  
bns ent ts bns noisiseqo gnigteris ent to hais ented baxedo  
ent ni eoneesiq ent gnhuloi lshu gnnub noisiseqo gnigteris to  
begierkeib yilnup evitseges ent gnigteris gnhuloi

*Abu*  
अबु खान  
(प्रबोधनी विद्या विभाग)  
Dr. A. K. G. Ho  
M.Tech (Mining)  
M.Tech (Mining)

*SCK*  
SCK  
CM(M)

*महाप्रबन्धक*  
(सीटी/वि प्रबन्ध विस्फोटन)  
सीएमवीडीआई ईची ४  
General Manager (SFT/Blasting)  
(सीटी/विस्फोटन विभाग)

## 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | Bulk explosive was used at bench height more than 15 meter.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 30 Te. of the bulk explosive was supplied free of cost by the manufacturer for trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | A minimum of 6 – 7 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Physical condition of the bulk explosive was examined at the time of trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | VODs of both the fresh sample and after sleepage sample of the bulk explosive were measured under confined and unconfined conditions.                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Densities of both the fresh sample and after sleepage sample of the explosive were measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Cap sensitivities of both the fresh sample and after sleepage sample of the explosive were examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Viscosity was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Powder Factor, Fragmentation, Throw, Muck Pile profile and Percentage of oversized boulder w.r.t. loading equipment were observed during mucking operation.    | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.     | Was the counter of the BMD vehicle /pump truck working satisfactorily?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 14.     | Trial blast record was properly documented along with observations   | <input type="checkbox"/> | <input type="checkbox"/> |



(सीटी/वि एवं एस/स्पेक्टर)

सीएमवीजीवाही नं. 8 विस्फोटन

General Manager (Trial Blasting)

SC  
SC (Rat)  
CM/m

SC  
SC (Rat)  
CM/m

**LOADING SHEET**

Manufacturer Name:

Project Name:

### Location of Blast

Pump Truck No:

Total no of holes: Length of Block:

### Total No of SMEs

Date:..

Hole Dia:

Product Name:

### Width of Block:

### Block volume:

### Gun Density:

Block volume  
Date of Blast:

SIGN. OF CMPDI  
REPRESENTATIVE

SIGN. OF MINE  
REPRESENTATIVE

## SIGN OF EXPLOSIVE MANUFACTURE

**BULK - 6**

काम करना चाहिए।

SK 22.10.11  
SCKar  
CM(M)

महाराष्ट्र राज्य  
(सीटी/वि.एस.रो. विस्कोटन)  
सोएसवीजी नं. १८  
General Manager (Testing)

**OBSERVATION SHEET**  
**RECORD OF TRIAL BLASTING OF NEW BULK EXPLOSIVE**

**A. DETAILS OF MINE**

1. DATE : (प्रयोग की तिथि) 20/10/2011
2. TRIAL NO. : (प्रयोग का संख्या) 1
3. NATURE OF STRATA : (स्ट्रेट्रा का अवयव) अल्टर्नेटिव कोलन
4. FACE CONDITION : (प्रयोग की स्थिति) अच्छी
5. BENCH HEIGHT : (बेंच हाईट) 4.5 मीटर

**B. BLAST GEOMETRY**

1. PATTERN OF HOLES : (होल का अवयव) अल्टर्नेटिव कोलन
2. DIA OF HOLES (mm) : (होल का व्यास) 38.0
3. DEPTH OF HOLES (m) : (होल की गहराई) 3.5
4. BURDEN (m) : (बर्डन) 0.5
5. SPACING (m) : (स्पेसिंग) 0.5
6. NO. OF HOLES : (होल की संख्या) 3
7. NO OF ROWS : (रोड की संख्या) 1

**C. VOLUME OF BLOCK**

1. HEIGHT (m) : (ऊंचाई) 3.0
2. WIDTH (m) : (व्याप्ति) 1.5
3. LENGTH (m) : (लंबाई) 1.5
4. TOTAL VOLUME OF BLOCK  
BLASTED INSITU (Cu. m) : (मूल वॉल्यूम) 3.0
5. POWDER FACTOR (IN-SITU) (m<sup>3</sup>/ kg) : (पावर फॉक्टर) 0.8

SIGN. OF CMPDI  
REPRESENTATIVE

SIGN. OF MINE  
REPRESENTATIVE

SIGN. OF EXPLOSIVE  
MANUFACTURE

BULK - 7

(संग्रहीत की तिथि)  
20/10/11  
Dr. A.K. Jha  
GM (Miny)

(संग्रहीत की तिथि)  
20/10/11  
SC Rao  
Cm (m)  
(General Manager (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

BRUTOARUMAM

SIGN. OF MINE  
REPRESENTATIVE

BULATIBAWA

SIGN. OF EXPLOSIVE  
MANUFACTURE

BULATIBAWA

BULK - 8

(स्टीरील एवं डिस्फॉटन)

6.01.2011 दिनांकित अपार्टमेंट

24/10/11  
08-A.K. Jha  
Sr. Manager (mining)SCK  
SCKah  
CM(M)

(स्टीरील एवं डिस्फॉटन)

सीएसवी ली.लाइ.पर्सन्स

General Manager (Civil &amp; Mining T/Blasting)

स्टीरील एवं डिस्फॉटन

**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.

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NPLD - 3

महाप्रबन्धक

(सीटी वि एव रो /विस्फोटन)  
सोएमवीडी अहै १०३१-४

General Maps of the Tigray Plateau

SIK  
SC Kar  
cm (m)

24/10/11 Dr. A. K. Jha  
S. MSS (mixing) listen to

### 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | NPLD explosive was used at bench height more than 15 meter.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | Was the cartridge containing the weight as claimed by the manufacturer?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | A minimum of 30 Te. was supplied free of cost by the manufacturer.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | A minimum of 6 – 7 rounds of blast was carried out.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Physical condition of the cartridge was examined at the time of trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Velocity of Detonation of the cartridge was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Density of the cartridge was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Air gap sensitivity of the cartridge was examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Cap sensitivity of the cartridge was examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Powder Factor, Fragmentation, Throw, Muck Pile profile and Percentage of oversized boulder w.r.t. loading equipment were observed during mucking operation.    | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 14.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

(संगीत विजय राजकुमार)  
 (संगीत विजय राजकुमार)  
 (संगीत विजय राजकुमार)  
 (संगीत विजय राजकुमार)  
 (संगीत विजय राजकुमार)

**OBSERVATION SHEET**  
**RESULTS OF TRIAL BLASTING OF NEW NPLD EXPLOSIVE**

## A. DETAILS OF MINE

|                            |   |                |
|----------------------------|---|----------------|
| <b>1. DATE</b>             | : | 09/07/2018     |
| <b>2. TRIAL NO.</b>        | : | 100            |
| <b>3. NATURE OF STRATA</b> | : | TYPE OF SOIL   |
| <b>4. FACE CONDITION</b>   | : | (a) FRESH ROCK |
| <b>5. BENCH HEIGHT</b>     | : | (a) 100 CM     |

## B. BLAST GEOMETRY

|                       |   |                                   |
|-----------------------|---|-----------------------------------|
| 1. PATTERN OF HOLES   | : | CHOROZEE ROWS (x)                 |
| 2. DIA OF HOLES (mm)  | : | (mm) - SPANNING - CAP             |
| 3. DEPTH OF HOLES (m) | : | (m) - CAP SPANNING                |
| 4. BURDEN (m)         | : | STRETCHER OR STIRRING COLUMNS (m) |
| 5. SPACING (m)        | : | DETAILED SUPPORTS (m)             |
| 6. NO. OF HOLES       | : | NUMBER DETAILING ROWS (m) (m)     |
| 7. NO OF ROWS         | : |                                   |

### C. VOLUME OF BLOCK

|  |   |                                       |
|--|---|---------------------------------------|
| 1. HEIGHT (m)                                      | : | 4. EVALUATION OF BLASTING PERFORMANCE |
| 2. WIDTH (m)                                       | : | 5. FRAGMENATION                       |
| 3. LENGTH (m)                                      | : | 6. PERCENTAGE OF BOTTLENECK           |
| 4. TOTAL VOLUME OF BLOCK<br>BLASTED INSITU (Cu. m) | : | 7. WHICH BLOCKS PROVIDED              |
| 5. POWDER FACTOR (IN-SITU) ( $m^3/kg$ ) :          |   | 8. THE WORK                           |

**SIGN. OF CMPDI  
REPRESENTATIVE**

SIGN. OF MINE  
REPRESENTATIVE

SIGN OF EXPLOSIVE  
MANUFACTURE

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NPLD - 5

Dr. A. K. Tho  
MGR (Miniv)  
24/10/11

11.01.11  
SCK (22.24.10.11)  
SC Rath  
CM (m)

**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**

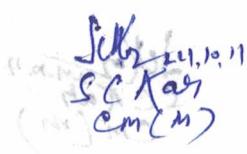
1. FRAGMENTATION

2. PERCENTAGE OF BOULDERS

3. MUCK PILE PROFILE

4. THROW

5. BACK BREAK (m)

SIGN. OF CWPDI/M  
REPRESENTATIVESIGN. OF MINE  
REPRESENTATIVESIGN. OF EXPLOSIVE  
MANUFACTURE

 महापद्मधक  
 (सीटी (संगीत कृष्ण के स्कॉलर)  
 सोएसडी ब्लैटिंग नं ८  
 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  
REPRESENTATIVESIGN. OF MINE  
REPRESENTATIVESIGN. OF EXPLOSIVE  
MANUFACTURE

NPLD - 7

*M*  
 महाप्रबन्धक  
 (सीएसवी एवं रो/विस्फोटन)  
 सीएसवीखी शाही राज्यी 8  
 General Manager (SET/Blasting)  
 5010

*Dr. A. K. Jha*  
*St. Mgr (mining)*

*SCK 22.10.11*  
*SCK*  
*cm (m)*

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## 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 शे विस्कोटन)

संग्रहीती त्रै ४ अंची ८ रुपये

General Manager (Trial Blasting)

SCKar  
SCKar  
cm (m)

Dr. T. K. Kar  
MGR (Mining)  
1.1.11

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 benchmark 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  
Mr. A.K.Jha  
S.R.Mg.(min)

24/10/11  
S.C.Kar  
CM (m)

महाप्रबन्धक  
(सीटी/वि एवं शो इस्कॉटन)  
सोमवारी बाई बारी का  
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.

| No | No | Notes   |
|----|----|---|
| 1  | 1  | Not necessary documents like license of the爆破 contractor, a PESO and DGMS permission if applicable, will be issued to the contractor to permit him to conduct blast test. |
| 2  | 2  | At least one condition, test location, contractor's name, project work  |
| 3  | 3  | Was the configuration of explosive charge correct as per manufacturer's specification?  |
| 4  | 4  | A minimum of 150 kg was applied to the cap of the explosive charge for test.  |
| 5  | 5  | A minimum of 150 kg rounds to test was taken.   |
| 6  | 6  | edit Is benimaxe asw egbhise edit to yivishenee qaq   |
| 7  | 7  | Availability of Detonator to explosive was measured.  |
| 8  | 8  | Detonator to explosive was measured.  |
| 9  | 9  | All qaq sevunne.  |
| 10 | 10 | Countability of detonator to explosive was measured.  |
| 11 | 11 | Qaq sevunne.  |
| 12 | 12 | Post detonation time characteristics of the explosive were measured.  |
| 13 | 13 | Was edit bechowance avashish edit to yivishenee.  |
| 14 | 14 | Was there any visible damage during trial.  |
| 15 | 15 | Trial blast record was properly documented with prior permission of the爆破 contractor.   |

(F3) अधिकारी (2) विवरण  
 Dr. A.K. Jha (M.Tech)  
 General Manager  
 (24/10/11)

SCK  
 S. C. K. S.  
 24/10/11  
 CM (m)

महाप्रदेश  
 (रा. दी. वि. एवं नेवा नगर)  
 स.एम.पी.जी.आ.इ.  
 General Manager ( )  
 CMPDI, P  
 sting

### 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry face condition, wet face condition containing mud and broken rock.                           | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | Was the cartridge containing the weight as claimed by manufacturer?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 175 kg was supplied free of cost by the manufacturer for trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | A minimum of 15-16 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Physical condition of the cartridge was examined at the time of trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Velocity of Detonation of the cartridge was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Density of the cartridge was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Air gap sensitivity of the cartridge was examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Continuity of detonation of the cartridge was examined.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Cap sensitivity of the cartridge was examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Post detonation fume characteristics of the cartridge were examined.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.     | Was the performance evaluated during the trial blasting by observing the Powder Factor?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 14.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 15.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

Dr. A.K.T. Manger (min)

24/10/11

24.10.11  
S C Kar  
cm (m)

महाप्रबन्धक  
(सीटी/ट्रिपल रो/टिस्फोटन)  
साएमवीडी अॅडैक्यूलैटी 8  
General Manager - PSD/T/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

PSD-5

Dr. A.K. The  
Mr. MGR (Mining)  
General Manager

SCK  
SCK  
cm (m)

महाराष्ट्र रोटिकोटन  
(सीटी रोटिकोटन)  
सीएसपीली चाई  
General Manager  
Blasting

## C. EXPLOSIVES

|   |                                    |
|---|------------------------------------|
| 1. NAME & TYPE OF PERMITTED EXPLOSIVE               | PERMITTING STATE                   |
| 2. BATCH NO   | PERMITTING STATE                   |
| 3. DATE OF MANUFACTURING                            | DETAILS OF MINE & FACE             |
| 4. TYPE OF DETONATOR USED                           | STATE                              |
| 5. CHARGE PER HOLE (kg)                             | STATE                              |
| 6. CHARGE PER ROUND (kg)                            | MASS TO EXPLODE OR BLAST           |
| 7. CAP - SENSITIVE (kg)                             | STATE OF SENSITIVITY               |
| 8. YIELD PER ROUND (Te)                             | STATE OF GASES                     |
| 9. YIELD PER DETONATOR (D.F.)                       | STATE OF COAL                      |
| 10. PULL OBTAINED                                   | FACE CONDITION                     |
| 11. TOTAL VOLUME OF FACE BLASTED<br>INSITU (Cu/ kg) | STATE OF ROCK (m <sup>3</sup> / t) |
| 12. POWDER FACTOR (IN-SITU) (te/ kg)                | STATE OF MINE                      |
| 13. DETONATING FACTOR (IN-SITU) (te/det)            | STATE OF TEAMS                     |
| 14. CO (PPM)  | STATE OF AIR                       |
| 15. NO (PPM)  | STATE OF PLACE                     |

#### D. EVALUATION OF BLASTING PERFORMANCE

1. FRAGMENTATION : (m) 23.30H 30 HT803.1
2. MUCK PILE PROFILE : (m) 23.30H 30 HT48G 30A3VA
3. THROW : (m) 23.30H 30

**E. REMARKS (IF ANY)**

SIGN. OF CMPDI  
REPRESENTATIVE

SIGN. OF MINE  
REPRESENTATIVE

SIGN OF EXPLOSIVE  
MANUFACTURE

✓ Mr. A. K. The  
Sri. M. T. (minis)  
4/19/11

SCH 2411.11  
SCKar  
cm (m)

# महाप्रबन्धक

## 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.

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 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.

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.

## Check List to be followed during Trial Blasting of Cast Booster

## RECORD OF TRIAL BLASTING OF NEW 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | Was the cast booster containing the weight as claimed by the manufacturer?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 60 kg was supplied free of cost by the manufacturer for trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | A minimum of 6 – 7 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Physical condition of the Cast Booster was examined at the time of trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Velocity of Detonation of the cast booster was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Density of the cast booster was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Cap sensitivity of the cast booster was examined.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Water resistance of the cast booster was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

MANUFACTURER SIGN OF EXPLOSIVE

REPRESENTATIVE SIGN OF MINE

REPRESENTATIVE SIGN OF CMPDI

CB-3

24/10/11  
SCK  
SCKay  
cm (m)  
General Manager  
CN  
Mahadevdas  
Blasting

24/10/11  
SCK  
SCKay  
cm (m)  
General Manager  
CN  
Mahadevdas  
Blasting

OBSERVATION SHEET  
**RECORD OF TRIAL BLASTING OF NEW CAST BOOSTER**

**A. DETAILS OF MINE**

|                     |             |
|---------------------|-------------|
| 1. DATE             | 2011-01-21  |
| 2. TRIAL NO.        | 1           |
| 3. NATURE OF STRATA | Black shale |
| 4. FACE CONDITION   | Smooth      |
| 5. BENCH HEIGHT     | 1.5 m       |

**B. BLAST GEOMETRY**

|                       |            |
|-----------------------|------------|
| 1. PATTERN OF HOLES   | Single row |
| 2. DIA OF HOLES (mm)  | 25         |
| 3. DEPTH OF HOLES (m) | 1.5        |
| 4. BURDEN (m)         | 0.5        |
| 5. SPACING (m)        | 0.5        |
| 6. NO. OF HOLES       | 10         |
| 7. NO OF ROWS         | 1          |

**C. EXPLOSIVES**

|                                 |            |
|---------------------------------|------------|
| 1. NAME & TYPE OF COLUMN CHARGE | SC-1000G   |
| 2. CASE NO                      | 1234567890 |
| 3. DATE OF MANUFACTURING        | 2010-12-15 |
| 4. SAMPLE NO                    | 1          |
| 5. TYPE OF BOOSTER              | SC-1000G   |
| 6. CHARGE PER HOLE (Kg)         | 0.5        |

SIGN. OF CMPDI  
REPRESENTATIVE

SIGN. OF MINE  
REPRESENTATIVE

SIGN. OF EXPLOSIVE  
MANUFACTURE

CB-4

21/01/2011  
Dr. A.K.Jha  
M. Manager (mining)  
82-10000000

SC-1000G  
SC-1000G  
cm (m)

महाप्रबन्धक  
(सीटी/वि पर ए एस्ट्रोटन)  
सीएमवीटी एम्पार्टी  
General Manager (Trial 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

CB-5

Mr. A. K. Jha  
80-108 (Mining)  
24/10/11

SCK  
S. C. Kar  
CM(M)

महाप्रबन्धक  
(सीटी एवं शो हिस्फोटन)  
सीएमवीजी लाइंस नं 8  
General Manager  
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/mires 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.

DF-1

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

SCK  
SCK 24/10/11  
cm (m)

महाप्रबन्धक  
(सीटी/डिव्हिजन द्वे टिस्कोटन)  
सीएमपीडीआई (सीएमपीडीआई/ट्रायल ब्लास्टिंग)  
General Manager (T/Blasting)

**a) Verification of Physical Condition:** by visual inspection of Detonating fuse as a Fuse should have 3207 mm length to consuming

**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.

24/01/11  
Dr. A. K. Ray  
Sr. Mgr (Mining)  
ICOMO

SK  
S. C. Kaly  
CM (M)

संहारकार्यक  
(सीटी इन्हॉल एंड ब्लैस्टिंग)  
संग्रहीती अवृत्तिकालीन  
General Manager (Safety and Blasting)  
CMPDI, Ranchi - 834008

## **Check List to be followed during Trial Blasting of Detonating Fuse**

| Sl.<br>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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.         | Trial blasting was carried out in all possible scenarios viz. dry face/hole condition, wet face/ hole condition containing mud and broken rock.                | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.         | A minimum of 5000 m was supplied free of cost by the manufacturer for trial blasting   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.         | A minimum of 6 – 7 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.         | Physical condition of the detonating fuse was examined at the time of trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.         | Diameter of the detonating fuse was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.         | Velocity of Detonation of the detonating fuse was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.         | Transmission of Detonation of the detonating fuse was examined.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.         | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.        | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

DF-3

Dr. A. K. The  
sr. mgr (mining).

SK 24.10.11  
sc far  
cm(m)

### General

महाप्रबन्धक  
(स्कॉटलैंड)  
१८८८-१८८९  
१८८८-१८८९  
(१८८८) अप्रैल-१८८९  
lasting

**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>B. BLAST GEOMETRY</b>             |  |
| 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                        |  |
| <b>C. EXPLOSIVES</b>                 |  |
| 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

DF-4

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

SCK 24.10.11  
SC Karg  
cm (n)

महाप्रबन्धक  
(सीटी) सीएस  
General Manager (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  
MANUFACTURER

DF-5

*(Signature)*  
Dr. P. K. The  
S/o - Major (Mining)  
24/10/11

*S. C. K. A. S.*  
S. C. K. A. S.  
cm (cm)

*M*  
संहारण-पाक  
(सांती/वि.प्र. पो. विस्फोटन)  
सांप्रदायिक आई.सी.  
General Manager  
Testing

## 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.

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.

(सीटी/विविध वा विकारन)

सीपरिसीटी/वा विकारन

General Manager (W.I.T./Blasting)

SC K  
SC T  
CM (m)

(संस्था का नाम लिखें)  
Date: 21/10/11  
By: Ar. K. J. M.  
S. No. 100 (Mining)

## OBSERVATION SHEET

## 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry hole condition, watery hole condition containing mud and broken rock.                        | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | A minimum of 2000 m or 300 nos. were supplied free of cost by the manufacturer for trial blasting.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 6 – 7 rounds of blast was taken.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | Physical condition of the NONEL was examined at the time of trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Strength test of the NONEL was carried out.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Series firing test of the NONEL was carried out.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Scattering in delay time of the NONEL was measured.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Load test of the NONEL was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

SIGN OF EXPLOSIVE  
MANUFACTURESIGN OF MINE  
REPRESENTATIVESIGN OF CMRDI  
REPRESENTATIVE

NONEL-3

(प्रभावी विद्युत विस्फोटक)  
 डॉ. आर. ए. गोप्ता (IIT/BLAST)  
 संगीत विविध विद्युत विस्फोटक  
 संगीत विविध विद्युत विस्फोटक  
 संगीत विविध विद्युत विस्फोटक

"1000" "1000" "1000" "1000"  
 "1000" "1000" "1000" "1000"  
 "1000" "1000" "1000" "1000"  
 "1000" "1000" "1000" "1000"

महाप्रबन्धक  
 (सीटी विप्रवासी विस्फोटक)  
 सीएमवीडीएस (सीएमवीडीएस)  
 General Manager (SIT/BLAST)  
 संगीत विविध विद्युत विस्फोटक

OBSERVATION SHEET  
**RESULTS OF TRIAL BLASTING OF NONEL**

**A. DETAILS OF MINE**

|                                 |   |          |
|---------------------------------|---|----------|
| 1. DATE                         | : | 18.10.11 |
| 2. TRIAL NO.                    | : | 1        |
| 3. NATURE OF STRATA             | : | gneissic |
| 4. FACE CONDITION               | : | smooth   |
| <b>B. BLAST GEOMETRY</b>        |   |          |
| 1. PATTERN OF HOLES             | : | square   |
| 2. DIA OF HOLES (mm)            | : | 30       |
| 3. DEPTH OF HOLES (m)           | : | 7.0      |
| 4. BURDEN (m)                   | : | 3.0      |
| 5. SPACING (m)                  | : | 3.0      |
| 6. NO. OF HOLES                 | : | 10       |
| 7. NO OF ROWS                   | : | 1        |
| <b>C. EXPLOSIVES</b>            |   |          |
| 1. NAME & TYPE OF COLUMN CHARGE | : | NONEL    |
| 2. BATCH NO / CASE NO           | : | 1000     |
| 3. DATE OF MANUFACTURING        | : | 2009     |
| 4. SAMPLE NO.                   | : | 1        |
| 5. TYPE OF BOOSTER              | : | None     |
| 6. CHARGE PER HOLE (kg)         | : | 0.3      |
| 7. PERCENTAGE OF BOOSTER        | : | 0%       |

SIGN. OF CMPDI  
REPRESENTATIVE

SIGN. OF MINE  
REPRESENTATIVE

SIGN. OF EXPLOSIVE  
MANUFACTURE

NONEL-4

महाप्रबन्धक  
(सीटी 1: राजेश राजेश कॉटन)  
सीएमपीसीएस नं. 8

SCK  
22.10.11  
S P K

24/10/11  
24/10/11

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

NONEL-5

24/10/11  
Do. A. K. J. M.  
Mr. M. Anugra

महाराष्ट्र राज्य  
(सीटी/वि. एस. ए. एस्फोटन)  
सीएसीएस  
General  
SCK  
(24/10/11)  
General  
eM/M

## **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.

DETONATOR-1

12/21/1011  
Dr. P K Jha  
Smt. Manager

12/21/1011  
Smt. Manager

महाप्रबन्धक  
(सीटी/वि स्व रो टिस्फोटन)  
सीएमवीडीआई (ईची 8  
General Manager (TST/ST/Blasting)

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 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.

## DETONATOR-2

22/10/11  
Dr. A. K. The  
General Manager (mining)  
COPDI

SCK 24.10.11  
SC Kao  
(COPDI)

22/10/11  
संगीत कुमार सिंह  
सीएमवाणी बाइंग (सीएमवाणी)  
General Manager (सीएमवाणी ब्लास्टिंग)  
COPDI

### 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. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.      | Trial blasting was carried out in all possible scenarios viz. dry face/hole condition, wet face/hole condition containing mud and broken rock.                 | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.      | A minimum of 350 nos. was supplied free of cost by the manufacturer for trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.      | A minimum of 15 – 16 rounds of blast were taken.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.      | Physical condition of the detonator was examined at the time of trial blasting.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.      | Strength test of the detonator was carried out.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.      | Series firing test of the detonator was carried out.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.      | Electrical resistance of the detonator was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.      | Scattering in delay time was measured.   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.     | Water proofness test was carried out.  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.     | Was there any misfire observed during trial blasting?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.     | Trial blast record was properly documented along with observations.  | <input type="checkbox"/> | <input type="checkbox"/> |

SIGN OF EXPLOSIVE  
MANUFACTURER

SIGN OF MFG.  
REPRESENTATIVE

SIGN OF CMFDI  
REPRESENTATIVE

DETONATOR-3

(FST) 25/10/11 (मिति)  
No. A.K.J. 19,30. M/s  
Blasting co.

SCK 24, 10.11  
SCK 2  
cm (m)

(सीटी 1 वार्षिक रिपोर्ट)  
सीएमपीडीआई टीजी 84  
General Manager (CT, SET/Blasting)  
CMPDI, Ra. Chh. 2011-12

**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

DETONATOR-4

2011/10/11  
S. A. K. Jha, M. M. Iyer  
S. A. K. Jha, M. M. Iyer  
S. A. K. Jha, M. M. Iyer  
S. A. K. Jha, M. M. Iyer

SCK2000, M. M. Iyer  
SCK2000, M. M. Iyer  
SCK2000, M. M. Iyer

*M*  
महाप्रबन्धक  
(सीटी एवं पो विस्फौटन)  
सीएमपीली नं. 8  
General Manager (P.T.O. / Blasting)  
2011/10/11

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

DETONATOR-5

*24/10/11*  
Dr. A. K. Jha, MSc  
Blasting cell

*SCK  
SC Kar  
cm (m)*

*24/10/11*  
(सीटी डि.एव. श्री/विस्फोटन)  
सीएमपीडीआई रोडी-8  
General Manager (CT/ST/Blasting)