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North Eastern Railway

CEN's P.WAY CIRCULAR NO. 77 OF 1993.

(Case No. W/TRO/400/02/1/W-4A)

Subj:- Analysis of Record of CMS-2000 Run By PWI, AEN & DEN and Documentation of Results.

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In supersession of all previous instructions issued on maintenance and analysis of record of CMS-2000 runs, it has been decided that henceforth the following records shall be maintained at various levels in bound registers :

<u>Name of Record</u>	<u>To Be Maintained By</u>
i) Action Taken Register	PWI - Incharge
ii) Gangs Comparative Performance Register	PWI - Incharge
iii) Gangs Performance Rating Register	PWI - Incharge
iv) PWI's Comparative Performance Register	AEN
v) PWI's Performance Rating Register	DEN/Sr.DEN

2. Action Taken Register, CMS-2000

- 2.1 The basic objective of maintaining this record is to see at a glance after the run of CMS-2000, the spots requiring urgent attention.
- 2.2 All spots having acceleration peak greater than 0.2g (vertical/lateral), or, Ride Index peak greater than 3.5 should be extracted from the CMS-2000 tape at the end of the run and entered in the register alongwith the location of the spot as per proforma at Annexure-I.
- 2.3 The identified bad spot in the CMS run should be correlated with the physical features of the track, such as, curve, approach of level crossing, points and crossings, etc. This information should also be included in the appropriate column in the Action Taken Register alongwith the probable cause of the peak occurring at the recorded spots.
- 2.4 All such spots should be attended to within one week and PWI shall record in the register the date on which the identified bad spot has been attended to.
- 2.5 Normally the same spot should not appear in successive runs. If, however, a spot recurs in the successive run, it should be highlighted by a star suggesting more detailed examination. Such spots have to be carefully inspected at site to determine if there is a structural problem requiring inputs which cannot be provided during routine track maintenance by the gangs. These spots should invariably be inspected by AEN/DEN during their routine inspection to provide guidance for their remedial action and to prevent their recurrence. The result of their inspections should also be recorded in the register.

2.6 Senior Officers on their inspections should invariably check the Action Taken Register of the PWI and they may also take time to inspect the identified bad spots in the QMS run. They may also initial it with their observation/remarks.

2.7 The original tape should also be pasted on two pages of the register just after the analysis as per proforma at Annexure-I.

3. Gangs Comparative Performance Register, QMS-2000

3.1 The lowest Administrative Unit in the hierarchy of Engineering Department for carrying out prescribed track maintenance operations is a gang. The objective of this register is to see the improvement/deterioration that may have occurred between two successive QMS runs in the beat of each gang. QMS-2000 run provides an objective picture about the condition of the track and its standard of maintenance, as distinct from other means of inspection which are rather qualitative in nature.

3.2 It will be observed from the proforma at Annexure-2 prescribed for the maintenance of this record that key parameters for judging the comparative performance of a gang are -

- Percentage of total blocks in the beat of the gang having RI value greater than 2.5.
- Total number of peaks (vertical/lateral) having value greater than 2g, and the summation value of all such peaks.

3.3 It should be the endeavour of each gang to reduce the acceleration peaks (vertical/lateral) to nil and to ensure that the ride index value in the 200m blocks picked up by QMS is below 2.5 in as many blocks in his gang beat as possible.

4. Gangs Performance Rating Register, QMS-2000

4.1 The purpose of this record is to rate the relative performance of the gangs under each PWI after an QMS run according to some objective yardstick. As the value of 2 g for acceleration peaks is quite high, it is observed from the record of QMS run that the number of peaks recorded in a gang beat is quite small. This may, therefore, not provide a reliable yardstick for rating the performance of the gang.

4.2 It is further observed from QMS record that at an average speed of about 75 kmph, the QMS divides the kilometer into 5 blocks of 200 m each and records the value of Ride Index for each 200 m block. The number of blocks having RI values more than 2.5 is seen to be quite large in most gangs beats. This may thus provide a reasonable and reliable yardstick for rating the relative performance of the gangs.

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- 4.3 In order to reduce the impact of variation in the gang lengths, it has been decided to reduce the total number of blocks having RI values greater than 2.5 to a percentage of the total number of blocks in the gang boat (eg., gang length X5). This will eliminate the impact of variation in the gang length.
- 4.4 In addition to the ride index criteria, the rating will also be based on the number of peaks (vertical/lateral) and their total values recorded by QIS. The proforma in which this record is to be maintained is enclosed as Annexure 3. It is also to be ensured while rating the gangs that there has been no deterioration in the R.I. values with respect to the previous run.
5. PWI's Comparative Performance Register, QMS-2000
- 5.1 This register is to be maintained by AEN as per proforma in Annexure-4, for all the PWIs Incharge in his section having BG route. The proforma of this record is exactly similar to Annexure-2 for Gangs Comparative Performance Register. This will provide some indication of the personal contribution of the PWI in improving the standard of maintenance of his section as recorded by QMS in the successive runs.
6. PWI's Performance Rating Register, QMS-2000
- 6.1 This register is to be maintained by DEN/Sr.DEN and will rate the comparative performance of all the PWI's under his administrative jurisdiction. PWI Incharge of MG sections may not be mixed up with BG PWIs when working out relative performance rating.
- 6.2 The proforma of this record is exactly the same as for Gangs Performance Rating Register, Annexure 3.
- 6.3 PWI's performance rating registers of all the PWIs Incharge of the BG route shall also be maintained in the HQ by XEN/IM in the same proforma as Annexure - 4.
7. QIS As A Management Tool
- 7.1 It may please be appreciated that QIS is a very powerful and sophisticated measuring device whose potential should be fully exploited for motivating gangs and senior subordinates in achieving higher standard of excellence in the maintenance of track.
- 7.2 It is suggested that at the end of each QMS run, a Group Award of Rs. 250/- may be given to the gang whose performance is adjudged the best. The amount could be doubled if the same gang achieves the distinction in the successive run.

7.3

A letter of commendation may be issued to a PWI under each Division whose performance is adjudged the best in 4 out of 6 runs by the Headquarters (CTE). The PWI whose performance is adjudged the best in 8 out of 12 QIS runs in a year may be given a personal award amounting to Rs. 1000/- for achieving excellence in maintenance of track. At the end of the year two more prizes of Rs. 500/- and Rs. 250/- may be awarded to the two next best PWIs based on the QIS performance rating as adjudged in the Headquarters.

8.

The guidelines suggested in this circular can be further refined on receiving feed back from the field Engineers and they are encouraged to furnish their suggestions on making the results of QIS run more meaningful, useful and better fulfilling the desired management objective.

Sd/- (H.M. GOYAL)
CHIEF ENGINEER

Annexure-1

"ACTION TAKEN" PWI'S REGISTER, QMS-2000
(To be maintained by PWI)

Train No. & Name	PVI jurisdiction from Km	Temp. Speed Restrictions (1) From	To	T. Km	To	KMPH	(2) From	To	Date of Run	Remarks of inspection official.
(Enter Both Acceleration peaks > 0.2g or RI > 3.5)										
Km/TP	Gang No.	Speed	Magnitude of Acceleration	Physical feature	Probable cause	Date of attention & PWI's initial				
		peaks > 0.2g	RI peaks > 3.5							
1		V	L	V	L					
2		4	5	6	7	8	9	10		

Note: (1) Enter RI values corresponding to all acceleration peaks irrespective of their magnitude.

(2) Enter all spots (km/TP) having RI > 3.5 even if no acceleration peak occurs.

(3) Normally, two page in the register should be sufficient for one run.

(4) Record of successive runs should be entered in serial order in the register

and sufficient pages in the register may be assigned to record the results of a copulo of

years. The original tape of the QMS-2000 run should also be pasted on the following pages in the

(5) register just after the record of the "Action Taken".

GANG'S COMPARATIVE PERFORMANCE REGISTER, OMS-2'00
(To be maintained by P.T.I)

Gang No. _____ Strength _____
 (1) Beat of Gang : From Km _____ to Km _____ (2) Route Km _____
 (3) Track Structure : Rail _____ Sleeper _____ Cushion _____
 (4) LMR/SWR _____ (5) Name of Mate _____ (6) Name of APWI _____
 (7) Total Blocks (RM x 5) _____ (8) Total Blocks RI blocks printed on the tape _____

Date of runs.	Train No.	Average speed.	Temp. friction	speed Res.	No. of blocks having RIDE INDEX Greater than 2.5	% of Total blocks having RIDE INDEX Greater than 2.5	%age of Total blocks having RIDE INDEX Greater than 0.2G	Acceleration peaks greater than 0.2G	Highest Magnitude of Vertical, Lateral, Acon. peak	Rido Index
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16

Note : (1) For column (7), % of Total Blocks having Vertical RIDE Index Greater than 2.5 = $\frac{\text{Col. (7)}}{(\text{Route Km} \times 5)} \times 100$
 (2) For column (8), % of Total blocks having Lateral RIDE Index Greater than 2.5 = $\frac{\text{Col. (8)}}{(\text{Route Km} \times 5)} \times 100$

(3) Normally two pages of the "Gang Performance" Register should suffice for 20--24 O/S runs.

(4) Performance of all the gangs under the PWT should be entered serially in the register.

(5) Half the register should be utilised for Gang's Comparative Performance and the other half for Gangs Performance Rating as per Annexure-3.

ANNEXURE-3

GANGS PERFORMANCE RATING REGISTER, OMS-2000

(To be maintained by PWI)

(3) Average speed for PWI's Best

(2) Train No.

(1) Date of Run

(1) Date of Run		(2) Train No.															
Gang Details		From Km.	To Km.	Track Structure		Route Km.	No. of Blocks having RI > 2.5		% age of total blocks having RI > 2.5		Accn. peaks > 0.20				Rating		
No.	Strength			Name of Mate	Rail		Sleeper	LWR/SWR	V	L	V	L	No	Σ		V	No
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Note : 1. This should indicate summarised performance of all the gangs in the beat of a PWI.

P's COMPARATIVE PERFORMANCE, OMS-2000
(To be maintained by AEN)

- (1) Beat of PWI : From Km _____ to Km _____ (2) Route Km _____
(3) Track structure: Rail _____ Sleeper _____ Cushion _____
(4) LWR/SWR _____ (5) Name of PWI _____ (6) Name of API _____
(7) Total Blocks (RKM x 5) _____ (8) Total Blocks RI blocks printed on the tape _____

Date of Successive runs.	Train No.	Average speed.	Temp. speed Res- triction		No. of blocks having RIDE INDEX Greater than 2.5	%age of total blocks having RI > 2.5	Acceleration peaks greater than 0.2G				Highest Magnitude of				
			From	To			Vertical	Lateral	No	Σ V		No	Σ L		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
								V*	L*					Accn. peak	Ride Index

* Note : (1) For column (9), % of Total Blocks having vertical RIDE Index Greater than 2.5

$$= \frac{\text{Col. (7)}}{(\text{Route Km} \times 5)} \times 100$$

(2) For column (10), % of total blocks having lateral RIDE Index Greater than 2.5

$$= \frac{\text{Col. (8)}}{(\text{Route Km} \times 5)} \times 100$$

(3) Normally two pages of the PWI's performance " Register should suffice for 20-24 OMS runs.

(4) Performance of all the PWIs under the AEN should be entered serially in the register.

(5) Half the register should be utilised for PWI's Comparative Performance and the other half for PWI's Performance Rating as per Annexure-3.

(6) This proforma is on the pattern of proforma in Annexure-2.

(7) There will be as many pages in the register as there are PWI-incharge under an AEN.

(To be maintained by DEN)

Train No.:

Note ; For each OMS rub, this will present the comparative performance of all the PWIs under the DEN. However, P WI in-charge of MG sections may not be mixed up with BG PWIs when working out the relative performance rating.