



GOVERNMENT OF INDIA  
MINISTRY OF TOURISM AND CIVIL AVIATION  
(COMMISSION OF RAILWAY SAFETY)

# **RAILWAY ACCIDENT INVESTIGATION REPORT**

on

**Collision of 6 Up Saurashtra Mail with the derailed wagons  
of BTD Down Goods Train at Km. 369/9-5 between  
Itola and Miyagam Karjan Stations on the  
Vadodara-Surat Double Line Broad Gauge  
Electrified Section of Vadodara Division  
of Western Railway at 01.08 hours**

on

**27th October, 1980**

### SUMMARY

Date . . . . .	27th October, 1980.
Time . . . . .	At 01.08 hours.
Railway . . . . .	Western.
Gauge . . . . .	1676 mm (Broad Gauge).
Location . . . . .	Km. 369/9-5 between Itola and Miyagam Karjan stations on Baroda Division.
Nature of Accident . . . . .	Collision of 6 Up Mail with the derailed wagons of IBTD Down Goods train.
Trains involved . . . . .	(i) 6 Up Saurashtra Mail. (ii) IBTD Down Goods train.
Consisting of . . . . .	(i) 6 Up—18 bogie-coaches hauled by Electric Locomotive No. 21837 WCAM1. (ii) IBTD Down Goods—58 wagons hauled by Electric Locomotive No. 20550 WAM4.
Speed . . . . .	(i) 6 Up—About 75 km/h. (ii) IBTD Down—Stationary.
Operation . . . . .	Absolute Block System.
No. of Tracks . . . . .	Two (Electrified).
Gradient . . . . .	1 in 620 rising towards Miyagam Karjan.
Alignment . . . . .	Straight.
Weather . . . . .	Clear.
Visibility . . . . .	Normal in the engine headlight.
Casualties . . . . .	Killed—11 Injured—24 (Grievous—14) (Simple—10)
Cost of damage . . . . .	Rs. 38,30,000.00
Cause . . . . .	6 Up running into an obstruction caused by some derailed wagons of IBTD Down Goods fouling the Up track.
Responsibility . . . . .	(i) Shri Bhikhubhai Ukhabhai, 'C' Grade Driver of IBTD Down Goods. (ii) Shri Baliram Kashiram, C & W Fitter, Central Railway, Bhusaval. (iii) Shri Sudhakar K. Ayre, HTXR, Bandra Marshalling Yard. (iv) Shri S. Suryakant, TXR, Bandra Marshalling Yard. (v) Fitters of Intensive Examination Gang nominated for checking axle boxes with Vaidyanathan Gauge. (vi) Neutral Train Examiners who certified Wagon No. 17196 ER fit after repacking at Bhusaval on 23-8-80 and after intensive examination and repair at Bandra Marshalling Yard on 25/26-10-80.
Recommendations in brief . . . . .	(i) Quicker ways and means to be adopted on the heavily worked electrified and double line sections for the Driver and Guards of trains running in one direction to communicate warnings to adjoining stations and Drivers of trains in the opposite direction in addition to placing of

(i)

(ii)

detonators and displaying danger singals e.g. by providing mobile radio communication equipment on trains, fitting yellow flashing lights on engines and extending the supply of fuses to the Drivers and Guards of all trains.

- (ii) The instructions in the Rules for working of electric trains on electrified sections and Traction Manuals should emphasise the over-riding necessity, on failure of power supply, of a Driver protecting the adjacent line or lines before carrying out any other trouble shooting or other checks in the locomotive.
- (iii) In the event of any serious OHE breakdown on electrified double line sections, the cause of which is not known, the Track Power Controller, after isolating the section, should advise the concerned Traffic Controller to immediately impose a speed restriction of 20 km/h by day and 10 km/h by night, with cautious driving by the Driver of the first train on the adjacent line if a train has entered the faulty section before the OHE breakdown and has not reached the station in advance. If a train had already entered the adjacent line of the affected section, the Traction Power Controller, after isolating the faulty section shall "SWITCH ON and SWITCH OFF" the supply in a pre-determined manner to serve as a warning to the Driver to keep a sharp look out for any obstruction and for cautious driving to the next station.
- (iv) End-to-end running of Goods trains without an examination en-route, recently introduced on all Railways, should be held in abeyance till action is taken to enforce Railway Board's standards of intensive examination at the originating station, to improve the specifications of materials used in Goods Rolling stock and to ensure the integrity of fittings in the wagons over the extended runs.
- (v) Maximum speeds of through Goods trains should be reduced from 72 km/h to 60 km/h after a run of about 400 Kms. to cater for 20% brake fade. For runs in excess of 800 Kms., there should be a further reduction pro rata to the average brake fade taking place.
- (vi) Clear executive orders should be issued clarifying the extent of responsibility of TXRs after intensive examination and of the Operating Branch when trains are not offered for examination en route.
- (vii) All Goods trains, which have been intensively examined, should be given a nomenclature prefixed with the letter 'I' for all concerned en-route to be aware of this fact.
- (viii) The Goods Working Time Table should be reprinted at intervals of 6 months along with the Working Time Table for Passenger trains and should show the inter-station and inter-section I running time for varying maximum speeds.

### Abbreviations used in this Report

GM	.	.	.	General Manager.
CEE	.	.	.	Chief Electrical Engineer.
CTE	.	.	.	Chief Track Engineer.
CTSS	.	.	.	Chief Traffic Safety Superintendent.
CRSE	.	.	.	Chief Rolling Stock Engineer.
DRM	.	.	.	Divisional Railway Manager.
MS	.	.	.	Medical Superintendent.
Sr. DEN	.	.	.	Senior Divisional Engineer.
Sr. DME	.	.	.	Senior Divisional Mechanical Engineer.
DEE	.	.	.	Divisional Electrical Engineer.
AEN	.	.	.	Assistant Engineer.
SM	.	.	.	Station Master.
ASM	.	.	.	Assistant Station Master.
TXR	.	.	.	Train Examiner.
HTXR	.	.	.	Head Train Examiner.
OHE	.	.	.	Overhead Equipment.
DSTÉ	.	.	.	Divisional Signal & Telecom. Engineer.
ACS	.	.	.	Assistant Commercial Superintendent.
SS	.	.	.	Station Superintendent.
RDSO	.	.	.	Research Designs & Standards Organisation.
ATNL	.	.	.	Assistant Controller.
Dy. TNL	.	.	.	Deputy Train Controller.
BAMY	.	.	.	Bandra Marshalling Yard.
C & W	.	.	.	Carriage and Wagon.
PWI	.	.	.	Permanent Way Inspector.
APWI	.	.	.	Assistant Permanent Way Inspector.
CWS	.	.	.	Chief Wagon Supervisor.
TI	.	.	.	Traffic Inspector.
AME	.	.	.	Assistant Mechanical Engineer.
TPC	.	.	.	Traction Power Controller.
ACTM & O	.	.	.	AC Traction Maintenance and Operation.
DTM	.	.	.	Directed Track Maintenance.

Note :—For Codes of Coaching Stock refer to Conference Rules—Part-IV, Appendix-B.

Government of India  
Ministry of Tourism & Civil Aviation  
(Commission of Railway Safety)

No.

From : The Commissioner of Railway Safety,  
Western Circle, 2nd Floor,  
Churchgate Station Building Annexe,  
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BOMBAY-400 020.

To : The Secretary to the Government of  
India,  
Ministry of Tourism & Civil Aviation,  
Sardar Patel Bhavan,  
NEW DELHI.

Through : The Chief Commissioner of Railway  
Safety,  
LUCKNOW.

Sir,

In accordance with Rule 4 of the Statutory Investigation into Railway Accidents Rules, 1973 issued under the Ministry of Tourism and Civil Aviation's Notification No. RS. 13-T(8)/71, dated 19-4-1973, I have the honour to report the results of my Inquiry on the Collision of 6 Up Saurashtra Mail with the derailed wagons of IBTD Down Goods train at Km. 369/9-5 between Itola and Miyagam Karjan stations on the Vadodara-Surat double line broad gauge electrified section of Vadodara Division of Western Railway at 01-08 hours on the clear and moon-lit night of 27th October, 1980.

### 1.2. Inspection of Site and Inquiry

1.2.1. I received first information of the accident from the Headquarters Office at about 07-05 hours on 27-10-80 and went to the site by a Special Train which left Bombay Central at 10-50 hours and reached the site of accident at about 17-15 hours; by this time, restoration operations were already in progress. I stayed at site till the evening of 28-10-80. During my visit, I inspected—

- (i) the site of accident,
- (ii) the derailed and damaged electric locomotive and first 6 coaches of 6 Up Saurashtra Mail, and
- (iii) the 31 derailed and damaged wagons of the rear portion of the parted IBTD Down Goods train, some of which had already been thrown off the Down track and others rorailed and taken back with the 6 undamaged and underailed wagon in rear to Miyagam Karjan.

1.2.2. A sketch of the site of accident and 4 photographs of the accident are appended (Not printed).

1.2.3. On the afternoon of 28-10-80, accompanied by the CTSS, DRM and MS, I visited the Shri Sayajirao General (SSG) Hospital at Vadodara where some of the injured persons were still under treatment and recorded their statements.

1.2.4. On the 30th and 31st October 1980, along with the CEE, CTE, CTSS, CRSE, DRM and other Divisional Officers of Vadodara Division, I again inspected the site after both tracks had been cleared. I also inspected the undamaged and underailed electric locomotive and 21 wagons of the front portion of the IBTD Down Goods train, which had been taken to Vadodara.

1.2.5. On the night of 30-10-80, while travelling on the front cab of electric locomotive WCAM1 No. 21835 hauling 28 Up Vadodara Express from Vadodara to Miyagam Karjan, I carried out a visibility test of a Red Hand Signal lamp prominently displayed near Km. 309/27 just before the site of collision and of a wagon kept on an adjoining line in Miyagam Karjan station yard.

1.2.6. A Press Notification concerning the Inquiry appeared in several local daily newspapers published from Ahmadabad inviting members of the public, having knowledge relating to the accident, to give evidence at the Inquiry or to communicate with me by post.

1.2.7. The Civil and Police authorities including the Government Railway Police were duly notified of the Inquiry which I commenced at Miyagam Karjan station on 30-10-80 and continued at Vadodara on 31-10-80, 1-11-80, 17-11-80 and 18-11-80.

1.2.8. The Administrative Officers of the Railway and other Officers present at the Inquiry were—

1. Shri K. P. Ramalingam Chief Electrical Engineer, Bombay.
2. „ S. M. Joglekar Chief track Engineer, Bombay.
3. „ S. Krishnaswamy Chief Traffic Safety Superintendent, Bombay.

4. Shri R. N. Gupta      . Chief Rolling Stock Engineer, Bombay.
5. „ A. K. Pant          . Divisional Railway Manager, Vadodara.

The District Magistrate deputed his Mamlatdar and the Superintendent, Railway Police his Sub-Inspector for the first two days of the Inquiry. The Divisional Officers were called in as and when required.

1.2.9. The evidence of 63 witnesses was recorded during the Inquiry.

Note :—In this Report—

- (i) the terms 'right/left', 'leading/trailing' and 'front/rear' wherever used are in reference to the direction of travel of IBTD Down Through Goods Train and 6 Up Saurashtra Mail unless the context indicates otherwise;
- (ii) the terms 'in advance of'/'ahead of' and 'in rear of'/'behind' in relation to a location are used to define a position on the line beyond and before reaching the location respectively, as seen from the approaching trains;
- (iii) The following abbreviations are used :
- |               |   |
|---------------|---|
| IBTD Down for | IBTD Down Through Goods Train involved in the accident.         |
| 6 UP for      | 6 Up Saurashtra Mail of 27-10-80 also involved in the accident. |

CEE, CTE, CTSS, CRSE, DRM, MS, Sr. DEN, Sr. DME, DEE, AEN, SM, ASM, TXR are for designations of officials in common usage on the Indian Railways.

### 1.3. The Accident

1.3.1. On the clear and moon-lit night of 27-10-80, while No. IBTD Down Goods Train (load 58-73/2190 tonnes), hauled by electric loco No. WAM4 20550, was running on the Down line between Miyagam Karjan and Itola stations, two wheel sets of two wagons (22nd and 23rd from the locomotive) derailed between Electric Masts at Km. (EM Nos.) 369/2-4. These two pairs of wheels travelled in a derailed condition damaging the CST9 plates and tie bars of the track ahead, traversed a small 1×3.06 m girder bridge between EM Nos. 369/4-6, with the right wheels in between the guard rails and the left wheels in the gap beyond the left extremity of the sleepers on the bridge and continued in like manner thereafter, when a parting took place in the rear of the 21st wagon of the train. The locomotive with the front portion of 21 wagons went ahead on the rails till they stopped with the locomotive just ahead of EM No. 370/14. The rear portion

of the parted load travelled further ahead in a derailed condition till it stopped 12.4 m. short of EM No. 369/10. During this travel of the rear portion beyond the girder bridge, bunching took place of the wagons in rear of the 22nd wagon resulting in several wagons derailing and piling up in a short length on both sides of the Down line between EM Nos. 369/6-8.

1.3.2. In the process, the down line electric mast No. 369/8 was damaged, a circuit breaker on the Down OHE tripped at 00.45 hours and some derailed wagons of the Down Goods train fouled the Up Main line. The gap between the parted loads was approximately 947 metres when they came to a halt.

1.3.3. This tripping caused a power supply failure of the Down Main line in the section Lakodra—Makarpura and a simultaneous tripping and power supply failure of the Up Main line in the same section. As a result, 6 Up Saurashtra Mail hauled by electric loco No. WCAM1 21837 with 18 coaches came to a halt at Km. 382/9-11, about 5 Kms. in rear of Itola station. The fault was located and power supply restored on the Up Main Line at 00.52 hrs., i.e. within seven minutes. 6 Up then resumed its journey, and ran through Itola station at 01.02 hrs. before entering Itola-Miyagam Karjan block section.

1.3.4. At 01.08 hrs., the Up line OHE again tripped. This happened when the locomotive of 6 Up and first 6 coaches behind it collided with the infringing and derailed wagons of IBTD Down Goods train and damaged the nearby Up line electric mast No. 369/7. Seconds before the crash took place, the Driver of 6 Up had jammed the emergency brake and the Assistant Driver did likewise. The collision apparently caused the locomotive of 6 Up to derail and swerve to the left when the underframe of a wagon came right across its path; it then rolled down the embankment and came to rest a little short of EM No. 369/5. The 6 coaches behind the locomotive in turn side-collided with the other derailed wagons of the Down Goods train, swerved to the left, derailed except for the trailing trolley of the 6th coach and 2 of them (2nd and 5th coach) capsized.

1.3.5. The weather was clear and visibility was normal in the headlight of the electric locomotives, both of which shut off automatically when their respective DJs tripped when the derailments took place on the Down and Up lines respectively.

### 1.3.6. Casualties.

As a result of the accident, 11 persons were killed (9 of them on the spot), 14 were grievously injured, 10 received simple injuries and 43 trivial.

## II. RELIEF MEASURES

### 2.1. First intimation.

Shri F. Sashivadan, Fireman of Vadodara Yard, who was travelling on the ill-fated 6 Up train, conveyed to the Vadodara Control at 01.52 hrs. the first information of the accident including the occurrence of injuries to passengers, from Miyagam Karjan 'C' Cabin. At 02.10 hrs., some more details were furnished to the Control from the same 'C' Cabin by Shri O. P. Khanna, Station Superintendent, Bombay Central, who was also travelling by 6 Up.

### 2.2. Medical attention.

2.2.1. The Guard of 6 Up, 4 railway officers and other railway staff, who were travelling by 6 Up, went round and helped passengers to come out from the derailed and capsized coaches. The first aid box of the Guard of 6 Up was initially used by him and two Doctors travelling on the train to give medical aid to the injured passengers. ASM/Miyagam Karjan sent word to the Medical Officer of the Public Health Centre, Miyagam Karjan and 2 other Doctors at Miyagam at 02.25 hrs. and within half an hour, they came to the station and rendered medical aid. They then went to the site by a Tower wagon at 04.05 hrs. and rendered further medical aid.

2.2.2. Medical Vans ordered from Vadodara, Udhna and Valsad arrived at site at 03.15, 05.55 and 06.00 hrs. respectively with Doctors and para-medical staff. Two Doctors with para-medical staff arrived in the Medical Van from Vadodara. The Medical Superintendent, Vadodara, 3 other Doctors and other para-medical staff reached the site at 04.40 hrs. Civil Ambulances with Doctors of Shri Sayajirao General Hospital and the City Fire Brigade Ambulance Vadodara reached the site at 06.45 hrs. All these Doctors on arrival rendered medical aid to the injured passengers, most of whom were brought by the Vadodara Medical Van, which left the site at 06.08 hrs. and reached Vadodara at 07.25 hrs. A few injured passengers were also brought by the Civil Ambulances. In all, 24 injured persons were admitted to Shri Sayajirao General Hospital Vadodara by 08.30 hrs.

2.2.3. 7 dead bodies of passengers were extricated and after Panchanama were kept under the custody of the Railway and Civil Police at site. The dead bodies of the Driver and Assistant Driver of 6 Up were trapped inside the twisted front cab of the locomotive because the underframe of a wagon was lying on top of the cab. With the help of the Loco Breakdown staff and the Fire Brigade, attempts were made to remove these 2 bodies but without success, even though cranes were used. Because the locomotive was drenched with oil, which had leaked out from one of the tankers on the Goods train, gas cutting equipment could not be used. Ultimately, with the help of Tifor equipment from

the Breakdown train and Lucas jacks, the body of the Assistant Driver was extricated at 12.30 hrs. and that of the Driver at 21.30 hrs. 8 bodies were sent to the mortuary of the Shri Sayajirao General Hospital by 13.00 hrs. and the last body, that of the Driver, by 23.30 hrs.

### 2.3. Restoration.

2.3.1. The Police did not come in the way of restoration operations and gave clearance at 09.45 hrs. since the possibility of sabotage was ruled out.

2.3.2. Five Breakdown trains were ordered from Vadodara, Kankaria, Udhna, Valsad and Bandra. Marshalling Yard and clearance operations commenced at 10.50 hrs. and progressed from 4 ends i.e. both ends of Up and Down Main lines. The Up line was cleared at 16.00 hrs. on 29-10-80 and through running after energisation of OHE restored at 17.45 hrs. The Down line was cleared at 23.15 hrs. and through running restored at 23.20 hrs. on 29-10-80.

2.3.3. As a result of this accident extensive cancellation/regulation of passenger services had to be resorted to from 27-10-80 to 29-10-80. In all 17 long distance Mail/Express and 2 Passenger trains were cancelled, 42 long distance Mail/Express and 19 Passenger trains were regulated on either side and 6 long distance Mail/Express trains were diverted via the Central Railway.

2.3.4. The underailed rear 12 coaches of 6 UP left site at 07.45 hrs. and were brought back to Vadodara at 09.20 hrs. The uninjured passengers were then transhipped with other stranded passengers from other trains in ST Buses from Vadodara to Miyagam Karjan for their onward journey to Bombay in 2 Special Trains, which left Miyagam Karjan at 15.30 hrs. and 19.15 hrs. respectively for Bombay Central. In the reverse direction as well, the passengers of 15 Down were transhipped from Miyagam Karjan to Vadodara in ST Buses. Some passengers preferred to walk from the site of accident to Miyagam Karjan and later left by these 2 Special Trains for Bombay Central. The unclaimed and damaged luggage and other parcels in the luggage van were dealt with under Panchanamas and disposed off as usual by the Commercial Branch.

2.3.5. 6 Up Saurashtra Mail was running to full capacity; it was estimated that there were about 1200 passengers travelling in this train at the time of the accident.

## III. COMPOSITION OF TRAINS AND DAMAGE

### 3.1. IBTD Down Goods train.

(i) The train consisted of 58 wagons equivalent to 73 units and was hauled by an electric Locomotive.

(ii) The Locomotive—Electric Locomotive WAM4 No. 20550 was manufactured at Chittaranjan in 1975 and was commissioned in July 1975. It was fitted with a vacuum brake and air brake, headlight, speedometer and speed recorder. The speed recorder was not in use as it was hauling a Goods train. Its length was 19.974 m over buffers and its weight was 117.612 tonnes. The braking force on the locomotive was 85.806 tonnes. It was fitted with the usual Emergency Brake Valve on the Assistant Driver's side for emergency use.

(iii) The load of 58 wagons was equivalent to 73 units and consisted of 44 Numbers of 4 wheelers, 10 bogie wagons, 3 tank wagon and a brakevan. The total length of the load over buffers was 542.8 metres and its gross weight excluding the locomotive was 2190 tonnes. There were 68 cylinders on the load of which 62 were effective when the train left Bandra giving an effective brake-power of 91%. The braking force on the train excluding the locomotive was 593.5 tonnes.

(iv) IBTD Down was a through goods train marshalled at Bandra Marshalling Yard after intensive examination and repairs and was booked to run through to Tugalakabad with

a safe-to-run TXR examination scheduled only at Kota, which is 908 Kms. away from Bandra. The locomotive was changed at Valsad. The train consisted of fully loaded wagons except for 2 empty CRTs, 24th and 26th from the engine (3rd and 5th in the rear portion of the parted load). The parting took place after the 21st wagon.

### 3.2. 6 Up Saurashtra Mail

(i) 6 Up Saurashtra Mail consisted of 18 coaches hauled by an electric locomotive.

(ii) The locomotive—Electric locomotive WCAM1 No. 21837 was manufactured at Chittaranjan in 1978 and was commissioned in December, 1978. It was fitted with a vacuum brake and air brake, headlight, speedometer and speed recorder, all in working order. It did not have a Vigilance Control Device. Its length was 20.950 m over buffers and its weight was 115.912 tonnes. The braking force on the locomotive was 85.806 tonnes. It was also provided with the usual Emergency Brake valve on the Assistant Driver's side for emergency use.

(iii) The coaches—The 18 coaches on the train were marshalled from the locomotive as under :

Sl. No. from the engine	Coach No.	Body/Type	Year built	Date of last POH	Date of Return
1	2	3	4	5	6
1.	LR 3774	BEML—AT	1975	30-9-80	10/81
2.	WGSCNY 7216	ICF—AT	1979	1-6-79	7/80
3.	WGSCNY 7202	ICF—AT	1979	24-7-80	8/81
4.	WGSCNY 7203	ICF—AT	1979	14-7-80	8/81
5.	WGSCNY 7213	ICF—AT	1979	15-7-80	8/81
6.	WFC 3157	ICF—AT	1961	23-7-80	8/81
7.	WFC 6108	ICF—AT	1967	17-12-79	12/81
8.	WFC 6121	ICF—AT	1967	31-12-79	9/81
9.	FCS 6237	ICF—AT	1970	31-3-80	10/81
10.	PP 1685	IRS-Non-AT	1957	12-7-80	8/81
11.	WGS 5174	ICF—AT	1972	3-7-80	8/81
12.	GS 4226	BEML—AT	1961	20-3-80	3/82
13.	GS 4291	BEML—AT	1963	30-9-80	4/82
14.	WGSCNY 7208	ICF—AT	1979	15-7-80	8/81
15.	WGSCG 5939	BEML—AT	1973	20-6-79	1/81
16.	WFC 6157	ICF—AT	1972	27-8-79	8/80
17.	WGSCW 5544	BEML—AT	1970	8-7-80	2/82
18.	LR 3776	BEML—AT	1975	9-7-80	8/81

(iv) The total length of the train was 401.3 metres and its weight 685 tonnes, both exclusive of the loco. The train was fully vacuum braked with 100% brake-power. The braking force on the train excluding the locomotive was 699 tonnes.

### 3.3. Disposition and Damages.

3.3.1. The ultimate position of the locomotive and 6 coaches of 6 Up was as given below :

Locomotive No. 21837 WCAM-1	The locomotive was lying below the embankment with Wagon No. 59858
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NR/C entangled with the front portion.

- 3774 LR 1st The coach had capsized and was lying on the embankment parallel to the track with its rear end resting on the Electric Loco.
- 7216 WGSCNY 2nd This coach was thrown off the track and was lying in the ditch below the embankment just adjacent to the Electric Loco.
- 7202 WGSCNY 3rd The coach was thrown off the track and was lying almost perpendicular to the Up track with the rear end on Wagon No. 49493 NR/C and the front end entangled with Coach No. 7216 WGSCNY.
- 7203 WGSCNY 4th This coach was also resting on Wagon No. 49493 at one end with the other end touching the capsized Coach No. 7213 WGSCNY on the embankment of Up line.
- 7213 WGSCNY 5th This coach had capsized and was lying on the embankment of the Up track. Wagon No. 61730 SE/BRHT was under it.
- 3157 WFC 6th The rear trolley of this coach had not derailed and was on the Up track. The front trolley had derailed and the front portion of this coach had crumpled due to the rear portion of Coach No. 7213 WGSCNY telescoping into it.

3.3.2. (i) The locomotive of 6 Up suffered extensive damage and is expected to be condemned after salvaging the major and costly equipment on the locomotive like 6 traction motors, main transformer, motor alternator set, rectifier blocks, copper bus bars, auxiliaries, underframe equipment etc. and one bogie.

(ii) Of the 6 coaches of 6 Up that derailed, the luggage van, which was the 1st coach behind the locomotive, suffered extensive damage and the other 5 coaches suffered comparatively lesser damages.

3.3.3. (i) Of the rear portion of 37 wagons of the parted Goods train, the ultimate position was that its front 31 wagons derailed and the rear 6 wagons including the brakevan remained on the rails. Some of the wagons, which derailed and capsized, were loaded with bitumen drums, a few of which got damaged and leaked on to both tracks between EM No. 369/6-8.

(ii) Of the 31 wagons that derailed, 7 were completely damaged, 17 suffered extensive damages and 4 minor damages.

3.3.4. 500 metres length of track on both lines were affected by the derailment of which 300 metres length of track rails and sleepers were badly damaged. The superstructure masonry of a 1×3.05 metre girder bridge was also damaged.

3.3.5. (i) Two electric traction masts and about 400 metres of OHE catenary and contact wire were damaged.

(ii) Train lighting equipment, lights and fans in 6 coaches of 6 Up were also damaged.

3.3.6. The total cost of damage to railway assets is estimated as under :

	Rs.
(a) Locomotive of 6 Up . . . . .	25,00,000-00
(b) Rolling Stock	
(i) Coaching . . . . .	2,00,000-00
(ii) Goods . . . . .	1,50,000-00
(c) Permanent Way including bridge	8,00,000-00
(d) Electrical	
(i) Overhead Equipment . . . . .	70,000-00
(ii) Train lighting equipment	1,10,000-00
Total . . . . .	38,30,000-00

i.e. Rs. 38.30 lakhs

#### IV. LOCAL FEATURES

##### 4.1. Section and site

4.1.1. The IBTD Down Goods train derailed between Electric Masts Nos. 369/2-4 on the Down Main line and the collision of 6 Up with the derailed wagons of this Goods train took place near Electric Mast No. 369/7 on the Up Main line. The direction is from North to South with reference to the Up line. The country is open, plain and cultivated on either side. The line is straight on both Up and Down tracks right from Miyagam Karjan (Km. 366-00) to Itola (Km. 377-65), the 2 stations on either side of the accident site.

4.1.2. The track on the Down line consists of 90R rails of 5-rail panels (5 × 12.8 m) on CST9 sleepers to M+4 density. The rails and sleepers were laid in 1960-61. The track on the Up line consists of 90R rails of 5-rail panels of similar structure as on the Down line except that the sleepers are steel trough

sleepers to M+6 density. The rails and sleepers were laid in the year 1955-56. Both lines are fully ballasted with an average cushion of 250 mm below sleepers with 225 mm of clean ballast on the Down line and 200 mm of clean ballast on the Up line. The formation is in bank of varying height of 3 to 5 metres and is made up of black cotton soil. The section lies on the main trunk route from Bombay Central to Delhi, which is also the Rajdhani route.

#### 4.2. System of Train Working, Signalling and Interlocking and Traction.

4.2.1. The section where the accident occurred is controlled from Vadodara, which is also the Divisional Headquarters. The System of Working is the Absolute Block System by means of Siemen's Double line Lock and Block Instruments located in the Block Cabins at both ends of each Block section.

4.2.2. (a) Miyagam Karjan is equipped with Multiple Aspect Colour Light Signalling and Standard III Inter-locking. The points and signals are operated by Cabins 'A', 'B' and 'C'. The reception and despatch signals are controlled through SM's slide control. The block instruments controlling the entry into the block section Miyagam Karjan—Itola 'A' Cabin is located at Miyagam Karjan 'C' Cabin and down last stop signal No. C29 is controlled by SM's slide No. 12.

(b) Similarly, Itola is provided with Multiple Aspect Colour Light signalling and Standard III Inter-locking having 2 Cabins 'A' and 'B'. The double line block instruments for Itola—Miyagam Karjan block section is located at 'A' Cabin and the last stop signal No. 48 is controlled by SM's slide No. 1.

4.2.3. (a) On Bombay Central—Ahmadabad Section, AC and AC/DC locos are working. Mostly AC locos are working between Ahmadabad—Valsad section and AC/DC locos on Ahmadabad—Valsad—Bombay Central section. AC/DC locos work on 25 KV AC traction between Ahmadabad and Virar (Neutral section Km. 63) and thereafter onwards to BCT on 1500 V DC traction.

(b) Seven substations feeding 25 KV AC are situated along the track between Ahmadabad & Virar section. 25 KV AC is obtained by stepping down voltage from 132 KV. These sub-stations are located at Mehmedabad, Makarpura, Bharuch, Bhestan, Atul, Gholvad and Palghar.

(c) Since the OHE is fed on 25 KV AC single phase system, neutral sections have been provided between the two adjoining sub-stations. The loco has to travel on its own momentum in the neutral section as no power will be available in the neutral section.

#### 4.3. Headquarters of Officials and Control etc.

The accident occurred within the jurisdiction of the Vadodara Division of Western Railway. The Headquarters of the Divisional Railway Manager and the Divisional Officers are at Vadodara. The Control Office both for train and traction working is also at Vadodara.

#### 4.4. Speed.

The maximum speed on the section is 100 km/h except for Rajdhani Express which runs at 120 km/h and Jammu-Tawi Express which runs at 110 km/h. There were no speed restrictions in the section between Miyagam Karjan and Itola in the vicinity of the accident site.

4.5. The General Manager, along with the Chief Mechanical Engineer and the Chief Workshop Engineer, who were travelling on 1 Down Gujarat Mail, were among the first Officers to reach the site of accident. The Chief Mechanical Engineer was in charge of the clearing operations till restoration.

4.6. The kilometrage of stations referred to in the report, reckoned from Churchgate, Bombay, is as under :

Churchgate	. . .	00-00
Bombay Central	. . .	4-50
Bandra Marshalling Yard	. . .	14-68
Valsad	. . .	198-30
Surat	. . .	266-62
Lakodra	. . .	357-88
Miyagam Karjan	. . .	366-00
Site of Accident	. . .	369/7-5
Itola	. . .	377-65
Makarpura	. . .	387-15
Vadodara	. . .	395-68
Kota	. . .	920-95
Tuglakabad	. . .	1,365-00
Delhi	. . .	1,388-00

Note :— There are 15 pairs of electric masts on an average per Km. in the section. The masts are given even numbers 2—30 on the Down side and odd numbers 1—29 on the Up side

### V. SUMMARY OF EVIDENCE

5.1. (a) Shri H. K. Sheikh, Guard of BTD Down Goods train took over charge from his predecessor at Valsad while the electric engine was being changed. The train left Valsad at 19.15 hrs. on 26-10-80 and ran through Miyagam Karjan at 00.40 hrs. on 27-10-80. At about 00.45 hrs., he felt a sudden jerk at Km. 369/2-4 and his train stopped suddenly within about 20 metres. He saw in the moon-light that there was a derailment and the Up line was infringed. He therefore ran with his hand signal lamp and detonators showing red towards the Itola side. At one place, the passage was blocked by the derailed wagons and he had to make his way down the cess and up again on the other side. He then saw some portion of his

train standing without the engine and he realised that a parting had taken place. While approaching the level crossing No. 214, he saw the burning headlight of the approaching 6 Up. He placed one detonator at Km. 369/19-21 and the second at Km. 369/27 when he saw 6 Up approaching about 5 to 6 masts away. He ran about 8 metres ahead showing the danger signal when 6 Up passed by at normal speed after exploding the detonators at 01.05 hrs.

(b) Answering questions, he stated that—

- (i) he experienced only one jerk, a sudden and severe one when his goods train derailed;
- (ii) the weather was clear; it was a moon-lit night and visibility was normal;
- (iii) he had a full complement of equipment including one hand signal lamp, 12 detonators and a 3-cell torch; he also had one fusee in his box as this is part of his equipment when he works trains in the Automatic Signalling Territory on the Bombay side;
- (iv) he did not hear his Driver whistling after the jerk;
- (v) the vacuum suddenly dropped down to zero after the derailment;
- (vi) his train ran through Miyagam Karjan at the maximum speed of 72 km/h;
- (vii) at Valsad, he was given his predecessor's vacuum brake certificate pertaining to the earlier AC/DC engine and he had no knowledge of the vacuum reading on the AC engine that was attached at Valsad;
- (viii) he confirmed that he had 10 detonators of 1977 manufacture and he maintained that he had used 6 of them when his stock was checked by the T1 at 08.00 hrs. on 27-10-89. He denied that the T1 found 10 detonators during this check.
- (ix) his side lamps were in broken condition; therefore he could not use them.

5.2. (a) Shri Bhikhubhai Ukhbbhai Driver worked BTD Down Goods train ex-Valsad with AC engine No. 20550 WAM/4. After attachment, he created vacuum and got 52 cms on the locomotive. He was handed over the Vacuum Brake Certificate of the previous locomotive before departure at 19.25 hrs. on 26-10-80. His train ran through Miyagam Karjan at 00.40 hrs. on 27-10-80. At about 00.45 hrs., the DJ tripped on his locomotive and his train came to a halt. He then raised his pantograph and finding no tension, he asked his Assistant Driver to check if there was anything wrong with the relays in the rear cab. After sometime, he too went to the rear cab to check this up. Then he came back and raised and dropped his pantograph and checked his target relay and on confirming that there was tension, he sent his Assistant Driver to the rear to see what had happened. He (Assistant)

had hardly gone 2 wagons in rear when 6 Up passed by on the Up Main line. After sometime his Assistant came running back and informed him that their train had parted and there were only 22 to 25 wagons on the train. Leaving his Assistant on the cab, he went back to see that what had happened and met the Guard of 6 Up who told him what had happened. He then returned to his engine and instructed his Assistant to protect his train in the front and then, along with his Guard, he proceeded to Miyagam Karjan 'C' cabin to inform the Control of the accident.

(b) Answering questions, he stated that—

- (i) when the DJ tripped, his speed was about 70 km/h and the vacuum dropped gradually from 52 cms to 40 cms and suddenly thereafter from —40/cms to 0;
- (ii) he saw the burning headlight of the approaching 6 Up locomotive about 2 to 3 minutes before it passed his engine;
- (iii) he did not feel any jerk when his DJ tripped nor did he hear the sound of the crash after 6 Up passed by at normal speed;
- (iv) he did not look back after the DJ tripped and did not realise that there was anything wrong with his train in the rear;
- (v) it was a moon-lit and foggy night;
- (vi) he had a full complement of emergency equipment but no fusee or emergency telephone as these were not supplied to him;
- (vii) he did not protect his train in the front on the Up line after his locomotive came to a halt;
- (viii) in his experience when tripping takes place, the vacuum drops slowly and it takes about 7 to 8 minutes to drop from 52 cms to 0;
- (ix) he did not infer anything from the vacuum drop i.e. gradual from 52 cms. to 40 cms. and sudden from 40 cms to 0;
- (x) he did not feel any drag on the locomotive before or after the DJ tripped;
- (xi) he did not see the side-lights of his breakdown in rear;
- (xii) when his train came to a halt, he could see only about 10—15 wagons behind his locomotive.

(b) Asked why he did not give the whistle code or protect the train as required under GR 166(g), he stated that when the OHE fails, he does not have the facility to sound the whistle. As per rules, he has to wait for 10 minutes to check up what is wrong and for power to be restored and only thereafter is he required to contact the Traction Power Controller through field telephone or send information to the nearest station. In his opinion he is required to protect the train in front only after he has ascertained if there was an obstruction on his track or on the other track.

5.3. (a) Shri V. Chhagan Assistant Driver of IBTD Down Goods corroborated what his Driver had said. He added that he heard the sound of the crash after he had hardly walked a few wagons towards the rear between the 2 tracks and when he went further back he noticed the parting. He therefore ran and informed the Driver what had happened. He did not see any danger signal while walking in rear nor did he hear the sound of detonators exploding. He only heard the sound of the collision.

(b) Answering questions, he stated that—

- (i) it was a moon-lit but misty night and he could see only a few wagons in the rear;
- (ii) he was not asked by his Driver at any stage to protect the Up line;
- (iii) he did not realise anything was wrong with his train when the DJ tripped and did not take the initiative of protecting the Up line;
- (iv) there were no side-lights on the brakevan in rear.

5.4. (a) Shri E. S. Reuben was the Guard of 6 Up Saurashtra Mail ex Viramgam to Surat on 26/27-10-80. At Ahmadabad, 4 coaches were attached inside the rear LR and the steam engine was replaced by an electric engine. 6 Up left Vadodara at 0.43 hrs. on 27-10-80, passed through Makarpura at 00.50 hrs. and then stopped at Km. 382/9-11 for sometime for reasons not known to him. On this account, it lost 8 minutes on the run and passed through Itola at 01.04 hrs. i.e. 16 minutes late. At 01.10 hrs. his train dashed against some derailed goods wagons which were fouling the Up Main line and his brakevan came to a stop at Km. 369/15. After noting what had happened, he picked up his field telephone and went to the emergency telephone socket near Km. 370/1 at 01.45 hrs. Finding no key in the tel phone box, he had to go back to his brakevan and bring a tool to break open the lock of the telephone socket before he could speak to the Control. He then arranged with some Doctors on the train to render first aid to the injured and protected his train in rear. He could not locate his Driver and Assistant Driver as the locomotive was smashed up and so he assisted in detrainning the passengers and in rendering first aid to the injured till the arrival of the power wagon and the medical and breakdown train. He thereafter worked as per the instructions of the Officers at site. He left site with the unaffected coaches of 6 Up to Vadodara at about 07.55 hrs. on 27-10-80.

(b) Answering questions, he stated that—

- (i) the vacuum on his guage which was 40 cm dropped to zero gradually when the train came to a halt before Itola at Km. 382/9-11;
- (ii) his Driver did not experience any difficulty in controlling his train on the run from Ahmedabad.

(iii) the speed was about 90 km/h and he felt 2 severe jerks at 01.10 hrs. before his train came to a halt;

(iv) after the accident, he saw the Guard of another train standing 4 metres away from his brakevan towards the Vadodara end and his Guard told him that he had placed one detonator to protect 6 Up but did not show him where the detonator had been placed; this Guard also said that before he could place the second detonator, 6 Up had passed him and met with the accident;

(v) he did not hear the sound of any detonator exploding under his train;

(vi) he had all emergency equipment including an emergency phone, detonators, hand signal lamp, a 3-cell torch, emergency lighting equipment and a first aid box;

(vii) the visibility was clear and there was bright moon-light;

(viii) 3 of the detonators used by him for protection were subsequently burst by the Tower Wagon when it came on the Up line from Vadodara.

5.5. (a) Shri S. Bhikhabhai was the Brakesman (Assistant Guard) on duty on 6 Up in the front LR next to the locomotive from Ahmadabad. After the train left Vadodara, it stopped for 5 to 7 minutes somewhere between Makarpura and Itola because of OHE current failure. While running between Itola and Miyagam Karjan, there was a loud sound and this was followed by another and the lights in his LR compartment went off and he fell from his seat. Travelling in his LR were the DSTE/Ajmer and an electrical employee.

(b) Answering questions, he stated that—

the speed was approximately 80—90 km/h just before the accident.

5.6. Shri Abdul Mazid Nizam was the Switchman on duty in the 'C' Cabin at Miyagam Karjan. He granted line clear to 'B' Cabin for BTD Down Goods and the train ran through at 00.39 hrs. He exchanged alright signals with the Driver and Guard and found nothing unusual when the train ran through. He gave line clear to Itola 'A' Cabin for 6 Up at 00.46 hrs. and received Train Entering Section Signal at about 01.05 hrs. At 01.52 hrs., Shri Shashivadan Fireman, travelling by 6 Up, came to his Cabin and informed him about the accident. He immediately advised the ASM on duty at Miyagam Karjan and the Control about the accident. The weather was clear. The visibility was also clear and it was bright moonlight.

5.7. (a) Shri J. A. Khan was ASM on duty at Miyagam Karjan station from 20.00 hrs. on 26-10-80 to 07.30 hrs. on 27-10-80. Down

BTD Goods passed through Miyagam Karjan at 00:39 hrs. and all-right signals were duly exchanged. Nothing unusual was noticed when it ran through the station. At 01:03 hrs., he gave concurrence to the Cabins for 6 Up to run through. At 01:52 hrs., he was informed from 'C' Cabin that 6 Up and BTD Down had met with a serious accident and the Control was informed accordingly. He promptly advised all concerned including the Medical Officer of the Public Health Centre, Miyagam Karjan about the accident.

(b) Answering questions, he stated that—

- (i) Train Entering Section Signal for 6 Up was received from Itola at 01:03 hrs;
- (ii) there were no speed restrictions on the Up and Down lines between Itola and Miyagam Karjan.

5.8. Shri M. Ramsingh was the Switchman at Itola 'B' Cabin. He granted line clear for 6 Up to Makarpura 'A' Cabin at 00:38 hrs. on 27-10-80. 6 Up left Makarpura at 00:45 hrs. and passed Itola 'B' Cabin at 01:03 hrs. The headlight was burning normally when 6 Up passed by his Cabin.

5.9. Shri M. Jiwabhai was the Switchman at Itola 'A' Cabin. He gave line clear for Down BTD Goods to Miyagam 'C' Cabin at 00:36 hrs. on 27-10-80 and received Train Entering Section Signal at 00:40 hrs. He also obtained line clear for 6 Up from Miyagam 'C' Cabin at 00:46 hrs. and it passed by his Cabin at 01:01 hrs. on all-right exchange of signals with its headlight burning normally. He noticed overhead power tripping twice between 00:40 hrs. and 00:45 hrs. When IBTD did not arrive at the expected time, he brought this to the notice of ASM Itola and Control at 01:00 hrs. Subsequently he heard about the accident. The weather was clear and visibility was satisfactory.

5.10. Shri R. M. Pathak was the ASM on duty at Itola from 22:00 hrs. on 26-10-80 to 06:00 hrs. on 27-10-80. He gave slide control to 'A' Cabin at 00:44 hrs. for Down BTD Goods train to be received on Down Main line and slide control at 00:46 hrs. to both Cabins for 6 Up Mail to run through on Up Main line. Accordingly, 6 Up ran through Itola at 01:05 hrs. with its headlight burning and all-right signals were duly exchanged. Thereafter, the Traction Power Controller asked him to open SM 94 and 95. He therefore called the Sr. ASM and Pointsman from their quarters to get this done. On enquiry, he was also told by the TPC that the power supply on the Down line had been cut off due to some fault and the Down BTD Goods would be delayed. At 01:55 hrs., he was told by the Control that 6 Up and BTD Goods had met with an accident in mid-section between Miyagam Karjan and Itola.

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5.11 (a) Shri J. P. Pradhan, DSTE/Ajmer was travelling in the Luggage Van next to the locomotive of 6 Up as he could not get accommodation elsewhere on the train. He dozed off after the train left Vadodara at about 00:40 hrs. and could not recollect if the train stopped en-route before the accident. After some time, he heard the sound of the crash and immediately thereafter, the lights in his Luggage Van went off and the Luggage Van went topsy-turvy. Along with him were the Brakesman and an Electrician. After about 10 minutes they were able to light a hand signal lamp. At this time it was 01:20 hrs. After some time, he and his companions managed to get out of the van.

(b) Answering questions, he stated that—

- (i) the train was running at full speed i.e. about 90 to 100 km/h before the accident;
- (ii) he did not hear the sound of detonators before the crash;
- (iii) the visibility was definitely poor consistent only with the moon-light and the weather conditions were good;
- (iv) he did not hear the Driver of 6 Up whistling just before the accident;
- (v) he did not feel the impact of sudden braking before the crash;
- (vi) he was not looking out and therefore did not see anybody exhibiting a danger signal before the accident.

5.12. Shri K. Diwakar, Station Pump Attendant, Vadodara was travelling with the Brakesman and the DSTE in the front Luggage Van of 6 Up next to the locomotive. He confirmed that the train stopped once when the current tripped after it left Vadodara and after about 15 or 20 minutes the train started again and the accident occurred. He heard the sound of one detonator exploding before the crash. He also experienced the effect of sudden braking and reduction in speed after the detonator burst.

5.13. (a) Shri O. P. Khanna, Station Superintendent, Bombay Central was travelling in the 16th Coach from the engine by 6 Up from Vadodara. The train left at about 00:40 hrs. on 27-10-80 and after about 20 minutes of its departure, it stopped in mid-section for about 10 minutes. 15 minutes later, he got a severe bump when the accident took place. On getting down, he met the ACS Shri Meena who was travelling in another coach and together they assessed the situation and assisted the passengers to the extent possible. Then they proceeded to Miyagam Karjan 'C' Cabin from where they gave the Control the details of the accident and also requested for medical aid and breakdown assistance. They then returned to the site of accident and rendered further assistance to the passengers till the arrival of the Tower Wagon and the Medical Van. Shortly thereafter, the Divisional Officers and

the General Manager arrived on the spot and he assisted them in further relief operations.

- (b) Answering questions, he stated that—
- (i) he did not hear the sound of detonators exploding before the collision;
  - (ii) on the way to the station, he and ACS checked the brakevan and found the Guard's Hand Signal lamp lying by the side of his box in the brakevan;
  - (iii) he first met the Guard of the Goods train near 'C' Cabin. He was moving about with an ordinary torch at that time; though he asked the Guard to show him the exact location where he had placed the detonators, the Guard did not do so;
  - (iv) the weather was clear and it was a dim moonlit night;
  - (v) he did not check up the stock of detonators with the Guard;
  - (vi) on his return to the site of accident, he walked as far as 60 metres beyond the level crossing but did not come across any burst detonators.

5.14. (a) Shri N. C. Meena, ACS, was travelling by 6 Up from Vadodara in a First Class Coach, 7th from the locomotive. After leaving Vadodara, the train stopped for some time in mid-section and after a few minutes at about 01.15 hrs. he felt a sudden jerk which was followed by a serious jerk and the accident took place. He corroborated what Shri O. P. Khanna, SS/BCT had said about their joint examination of the position after the accident and reporting thereafter to the Control from the 'C' Cabin. He also corroborated about finding the Guard's Hand Signal lamp lying unlit in the brakevan on their way to the station and the Guard not coming with them to show the location where he had placed the detonators to protect the train.

(b) Answering questions, he stated that the medical van burst 2 detonators when it came to the site at about 04.00 hrs.

(c) At this stage, Guard Shri H. K. Sheikh was confronted with S/Shri Meena ACS and Khanna SS/BCT. Guard Shri Sheikh maintained that he had protected the train with detonators but had not pointed out to anybody the locations where the detonators had been placed by him. He stated also that he had mentioned this fact of placing detonators to several people including these 2 Officers.

5.15. Shri P. C. Bhanage, Dy. Director, RDSO, was travelling in the 1st Class Coach which was third from the rear. He was asleep and was rudely awakened when he received 4 rattling jerks and the train came to a halt. He rendered first aid to one of the injured passengers in his coach and after surveying the site of accident, met the Guard of 6 Up about

15 to 25 minutes after the accident took place. He confirmed that the key of the lock on the plug-in socket was not available on the Emergency Telephone Box with the Guard and 15-20 minutes extra time was lost in getting some tools to break open the lock. The Guard of the Goods train met them in the meanwhile and had stated that he had time to place one detonator only before 6 Up passed by on the Up line. He confirmed that the Tower Wagon had burst 2 detonators when it came to the site after the accident and later the Medical Van had also burst one detonator.

5.16. (a) Shri V. B. Bagia, Traction Power Controller (TPC) Pratapnagar was on duty and incharge of this section from 00.00 hrs. to 08.00 hrs. on 27-10-80. At 00.45 hrs., circuit breaker CBO7 at Makarpura sub-station tripped. He asked his colleague Shri P. H. Dhanwani, TPC of another section to close the circuit but it was not holding. Thereafter Shri Dhanwani did sectionalising and located the fault in the Down Main line of the Miyagam Karjan Makarpura section. At 01.08 hrs., circuit breaker CBO7 tripped again and on again sectionalising, the Up line of the Makarpura—Miyagam Karjan section was found faulty. At 01.26 hrs., he asked the ASM, Itola to open isolator SM 95 and 94. This was done at 01.48 hrs. Thereafter at 01.50 hrs. he charged Makarpura—Itola Up and Down Main lines and informed Chief Power Controller. At 02.25 hrs. the Guard of 6 Up came on emergency phone and informed him of the accident. At the request of the OHE staff, he granted power block at 03.45 hrs. between Miyagam Karjan and Makarpura.

(b) Answering questions, he stated that—

- (i) In his experience, normal trippings never exceed half a minute. If there is a supply failure from a sub-station on one side then the supply is fed from the sub-station on the other side and the time for such operation never exceeds 2-3 minutes.
- (ii) At 00.52 hrs., he informed the ATNL of the Down line between Miyagam Karjan and Makarpura was faulty and was of an unusual nature and not a normal tripping and at 01.55 hrs., he even advised the ATNL to introduce single line working, if necessary.
- (iii) After isolating the section and informing the Section Controller when an unusual fault occurs, he is only required to inform the maintenance staff, Chief Tower Controller and his DEE and he accordingly took this action.

5.17. Shri P. H. Dhanwani, Traction Power Controller (TPC) Pratapnagar corroborated what his colleague had said and added that sectionalising and location of the fault on the Down Main line between Miyagam Karjan and Makarpura and its isolation was done at

00.52 hrs. At 00.55 hrs. he discussed with the Section Controller regarding introduction of single line working and despatch of OHE staff with Tower Wagon to check the section. At 01.08 hrs. when the section tripped again, he sectionalised and located the fault on the Up line in the same section and informed the Section Controller accordingly.

5.18. (a) Shri R. D. Mathuresh, Assistant Controller (ATNL) Vadodara Control Office was on duty from 18.00 hrs. to 02.00 hrs. on 26/27-10-80 in-charge of Vadodara-Surat section. At 00.51 hrs., he was informed by the TPC that there was a fault on the Down line and Down trains are not to be allowed beyond Miyagam Karjan. At 00.55 hrs., the TPC informed him to introduce single line working between Miyagam Karjan and Makarpura as the Down line was faulty. At 01.15 hrs., the TPC told him that the Up line is also faulty and OHE breakdown staff have been ordered from Viswamitri and Bharuch to locate the fault. At 01.52 hrs., Shri Shashivadan Fireman, Vadodara spoke to him from 'C' Cabin Miyagam Karjan and informed him that 6 Up had met with an accident. Dy. TNL was informed accordingly. At 02.10 hrs., Shri Khanna, SS/BCT spoke to him from Miyagam Karjan 'C' Cabin and gave further details of the accident.

(b) Answering questions, he stated that—

- (i) since 6 Up was running on the normal Up line, he in consultation with Dy. TNL decided to introduce single line working only after passage of 6 Up;
- (ii) there were no rules requiring the Control to caution a train running in the opposite direction when intimation of a breakdown on the other line is given to them.

Note :— TPC Shri Bhagia likewise confirmed at this stage that there was no such rule on the Traction side but after the accident, an instruction to this effect has been issued by the CEE.

5.19. Shri G. G. Mokashi, Deputy Train Controller (Dy. TNL), Vadodara Control Office was on duty from 00.00 to 08.00 hrs. on 27-10-80. He corroborated what the ATNL Shri Mathuresh had stated. It did not occur to him that the OHE failure on the Down line could be caused by the BTD train which was in the section. There were no instructions of the precaution to be taken to stop a train in the opposite direction and issue a caution order until the cause of OHE fault was known. On receipt of information of the accident at 01.52 hrs., he ordered breakdown train and medical van from Vadodara at 01.55 hrs. and the Fire Brigade at 02.00 hrs. He then gave details of other breakdown trains ordered and the Officers informed, with timings of each event.

5.20. (a) Shri P. K. Gopinathan, Petty Officer Indian Navy, Okha was travelling in an unreserved compartment of the 10th or 11th bogie from the locomotive. After leaving Vadodara, the train came to a halt somewhere in mid-section at 00.45 hrs. and after about 15 minutes it started again. 15 minutes thereafter at about 01.15—01.20 hrs., he experienced 3 severe jerks and the accident took place. He got the impression that the Driver had suddenly applied the brakes to stop the train when he felt the jerks. He got down and rendered necessary assistance to the passengers in the coaches which had derailed. 3 Doctors on the train rendered first-aid to the injured till the arrival of the Railway Medical staff. At 06.30 hrs., he went to the station to check up about some defence stores, which were in the luggage van which had been smashed up.

(b) Answering questions, he stated that—

- (i) the speed was normal just before the accident;
- (ii) there was bright moon-light;
- (iii) the visibility was good and normal;
- (iv) he did not hear any sound of detonators bursting just before the accident.

5.21. Shri Madanlal J. Tatia, Passenger was travelling with his wife in the 3rd coach from the engine. After the train left Vadodara, it did not stop on the way. Two minutes before the accident took place, he felt sudden application of brakes, and was thrown forward and sustained injuries. Within seconds, the crash took place and his coach tilted to one side. His wife was seriously injured. They were taken out of the coach and brought in the Medical Van to Vadodara and then to S.S.G. Hospital. The train was running at approximately 80 km/h just before the accident.

5.22. Shri B. R. Patel, Passenger was travelling in the 2nd coach from the engine. After the train left Vadodara, it did not stop anywhere till the accident took place. The speed must have been about 55 to 60 miles per hour. He suddenly heard a big bang followed by 3 more bangs and the accident took place. He did not hear the sound of any detonators bursting nor of the Driver whistling before the accident.

5.23. Shri Manilal D. Dattani, Passenger was travelling in the 3rd or 4th coach from the engine. He was asleep and was awakened by the sound of the crash when the accident took place. This was followed by 2 or 3 successive crashes before his coach came to a stop. After about 15 minutes, he was able to get out of the coach and checked the time as 01.30 hrs. Some Doctors gave him medical aid and between 03.30 and 04.00 hrs., he was attended to by the Railway Doctor and carried in a stretcher into the medical van, which brought him and other injured passengers to Vadodara at about 07.30 hrs.

5.24. (a) Shri S. Suryakant was TXR at Down Despatch Yard of Bandra Marshalling Yard (BAMY) in the shift of 07:00 to 15:00 hrs. on 26-10-80. Along with 4 Fitters and 2 Khallasis, he examined IBTD train consisting of 73 units from 12:50 hrs. to 13:35 hrs. All the security fastening, safety brackets, undergears, draw and buffing gear, spring gear and body were checked and defects and deficiencies noticed were attended to before despatch. He then furnished details of what had been done during this examination.

(b) Answering questions, he stated that—

- (i) he carried out a safe-to-run examination as he was aware that this load was a through load, which had been intensively examined earlier;
- (ii) he had not particularly noted the existence of a dead buffer and one of the two draw-bar springs broken into 2 pieces in one of the wagons (No. 17196) since these defects were not rejectable items;
- (iii) he did not check the side-lights in the BVG as it had already undergone Neutral Control TXR's examination earlier and there was no complaint from the Guard about the sidelights.

5.25. Shri Mohammed Muslim, TXR Down Despatch, BAMY did the vacuum testing and brake power examination of IBTD Goods, after the engine was attached from 13:05 hrs. to 13:35 hrs. on 26-10-80. He found 6 cylinders in-operative in 6 wagons out of the 73 units and since the brake power was 91% and vacuum 46 cm on the engine and 34 cm in the breakvan, he issued the necessary brake power certificate. The vacuum levels on the train were what is normally obtained during vacuum examination.

5.26. Shri Baliram Kashiram, C & W Fitter, Bhusaval did the last repacking of Wagon No. 17196 at Bhusaval on 23-8-80. He confirmed that during repacking, each axle box is lifted and the bearing and slipper plates are removed and examined. The bearing of axle boxes 1 and 3 were replaced during this examination by new SGCI bearings. In axle boxes 2 and 4 the bearings were good, as such they were redressed and reused. After repacking, the face plates were rivetted and the date of repacking, stencilled. His work was supervised by the on duty HTXR Shri S. D. Shevale and later on the wagon was passed by the Neutral Control HTXR.

5.27. (a) Shri S. K. Ayre, was the HTXR at BAMY from 23:00 to 07:30 hrs. in the Down Reception Yard on 25/26-10-80. He along with one TXR, 8 Fitters and 11 Khallasis intensively examined 17 wagons of the Down BTD load of 52 wagons which had been left for examination

by his predecessor. The following repairs were carried out :—

1. 17196 ER/CR Provided one missing draw bar key plate rivet. Repaired one bent brake rake. Tightened one Trunion bracket bolt. Provided one syphon pipe clip. Provided one missing buffer bolt. Attended 1 bearing spring plates shifted.

2. 60990 WR/CR Attended one shifted T/Pipe. Provided two missing draw-bar wear plate rivets. Provided two split pin into brake beam hanger pin.

Provided two missing trunion bracket bolts. Tightened one trunion bracket bolt. Tightened one buffer bolt. Provided one missing buffer plunger nut and cotter.

Attended Axle Box canted.

(b) When asked why he did not attend to Wagon No. 17196, which was found after the accident with one buffer dead and one broken draw-bar spring on one side and on the other side with a buffer which had some of the rubber pads perished, he stated that during intensive examination he tries to rectify whatever defects are possible but as it was a case of a single dead buffer and the draw-bar spring broken into not more than 2 pieces, he allowed the wagon to go as this is permitted under the Conference Rules. It was also not possible to rectify such items during the period of this examination (23:15 hrs. to 00:30 hrs.).

(c) Answering questions, he stated that—

his fitters S/Shri R. N. Pande and Mukut Bihari had checked the 2 wagons for warm boxes and for bearing brass mounting on journal cap by the Vaidyanathan gauge but they did not report any defect; the Neutral TXR does not exercise this check; if the bearing brass goes back to normal position, the Vaidyanathan gauge will not detect such displacement.

5.28. Shri J. P. Bhatt was the Neutral TXR at Down Reception, BAMY from 15:00 to 23:30 hrs. on 25-10-80. He did the prebilling examination of Dn BPT load which arrived at 21:15 hrs. and final billing was done in the next shift. When asked why he did not mark Wagon No. 19176 sick which was found with one dead buffer and one broken draw-bar spring, he stated that these were permissible defects as per rules and therefore he allowed the wagon to go.



5.29 Shri M. C. Savita was TXR at Hapa from 15.00 to 23.30 hrs. on 25-10-80. He and his staff attended to the rake of 6 Up on the washing line from 20.10 to 23.30 hrs. He gave details of the maintenance work done on the rake and the repairs attended to. He produced a vacuum brake certificate of the rake given by the TXR, who carried out the vacuum test before the 14-Coach rake left Hapa at 13.10 hrs. on 26-10-80, certifying 46 cms. on the engine and 38 cms. in the brakevan.

5.30. Shri M. A. Shetty was the TXR at Ahmedabad (BG) on 26-10-80 when 6 Up arrived from Hapa. 3 slip coaches normally attached to 6 Up and one extra coach were maintained on the washing line along with the rake of 80 Up between 10.00 a d 12.00 hrs. on 26-10-80. The vacuum was also tested during this maintenance. He gave details of the repairs carried out and checks recorded in the books at Ahmedabad.

5.31. Shri Harihar M. Iyer was the platform TXR in the 16.00 to 24.00 hrs. shift on 26-10-80 when 6 Up arrived. While the 4 coaches were being attached within the SLR in the rear and electric engine was being attached in the front, he carried out the examination of the rake and found no defects. He also issued a vacuum brake certificate to the Driver, thereafter, which showed only 46 cms. on the engine but no record of vacuum in the brakevan as this was not checked by him.

5.32. (a) Shri R. A. Bhatnagar was Wagon Foreman at BAMY on 26-10-80 when Down BTD Goods train was examined in the Down Despatch Yard. This train had been formed out of the wagons that had arrived by 3 earlier trains, which had been intensively examined in the Down Reception Yard under the supervision of a Sr. Grade HTXR and staff and were also subjected to neutral control examination and certification. He furnished details of the repairs carried out to wagon Nos. 17196 and 60990 and other wagons which were finally attached to Down BTD train.

(b) Answering questions, he stated that—

- (i) the defects noticed in Wagon No. 17196 after the accident, pertaining to a single dead buffer and one draw-bar spring broken in not more than 2 pieces, were permissible defects under the Conference Rules and were passed by the Neutral TXR even though it was known that this wagon was on a through load and had to run about 900 Km. before its next examination;
- (ii) the staff strength at BAMY as per schedule for intensive examination of a load of 70 wagons is 36 man hours i.e. 16 men working for 2 hours 15 minutes.

(c) When shown the condition of the axle boxes and bearings of Wagon No. 17196, he observed that the lug of the right trailing

box was worn out to the extent of 75% of its depth and a half liner had been provided on one side of the axle box groove. The brass bearing metal was damaged to the extent of 65 mm on the right trailing side and the slipper plate had marks of mounting. On the left trailing side, the axle box lug was in good condition but the bearing was damaged upto 45 mm and about 35 mm white metal was broken; here too, the slipper plate had mounting marks but to a lesser extent. This appeared to indicate that the right and left slipper plates had mounted on the lugs and due to this, the journal cap had damaged the white metal. He opined that this excessive play (25 cms. and above) generally takes place but this cannot be the primary cause of the accident; it could be a contributory factor by increasing the amplitude of the vibration of the axle. In his opinion, the extent of damage observed in one of the lugs could not have taken place under normal conditions since repacking was last done at Bhusaval on 23-8-80 and the breakage of lug could also have occurred after the repacking.

5.33. (a) Shri S. L. Vaishampayan, Senior C & W Instructor, Vadodara came along with the Medical Van, which reached the site at 03.15 hrs. He was present when the track readings were jointly taken on 27-10-80 with the Engineering Inspectors. On 5-2-81, he and PWI jointly measured the clearances between the axle guard horn checks and axle box grooves of Wagon No. 17196 ER (reproduced as Annexure-I).

(b) Answering questions, he opined that—

- (i) the first wagon to derail was Wagon No. 17196 due to a combination of factors like slack gauge and excessive lateral clearance of more than 10 mm between the axle guard horn checks and grooves of 3 axle boxes, which caused excessive hunting of the rear wheels of this wagon and impulse to mount and derail;
- (ii) the Driver of the Goods train should have felt two jerks, first at the time of derailment and then at the time of train parting;
- (iii) the variation in spring chambers would have affected the stability of the wagon if the difference was more than 12 mm;

CRS's Note :—Spring chamber results (see Annexure-II) indicate a difference of more than 12 mm.

- (iv) other deficiencies like a single dead buffer, one draw bar spring broken in 2 pieces & the perished condition of the rubber pads were within permissible limits as per Conference Rules and would not have affected the stability of the wagon.

(c) He and the other 2 Inspectors, who recorded the joint track measurements, had not accepted the PWI's observation that the track in rear was affected by derailment and distorted because it fell in the 5-rail panel,

5.34. Shri S. D. Shewale, was a HTRX at Bhusaval on 23-8-80 when the repacking of Wagon No. ER 17196 was done at Bhusaval. He confirmed that the repacking was done by Carriage & Wagon Fitter Shri Baliram Kashiram but pointed out that his work had not been supervised by him as on that day, all 8 TXRs under him had gone to the site of an accident and he was the only one at Bhusaval co-ordinating the work of the TXR staff working at different points in the Yard.

5.35. Shri Rama Hira, Permanent Way Mistry, was in charge of DTM Unit No. 6, whose jurisdiction extends from Km. 363/0 to 369/22. His gang last attended the Down line from Km. 369/23 to 368/12 under casual packing on 5-10-1980. The section was maintained by Directed Track Maintenance (DTM) and the location where the derailment took place was last attended by his DTM unit on 18-7-80.

5.36. Shri D. P. Kumare, Assistant Permanent Way Inspector, Palej was the sectional APWI in immediate charge of the section where the accident took place. He arrived by push trolley at 06:30 hrs. and assisted in the restoration operations. He last inspected the Up and Down lines on 22-10-80 by push trolley and did an engine inspection of the Up and Down lines on 19-10-80. His records were checked and it was noted that there was no reference to the location of derailment in any of the notes recorded by him during these inspections. He had last adjusted the creep on the Down line on 13-3-80.

5.37. (a) Shri S. V. Vilekar was PWI (BG) in-charge of the section where the accident occurred. His beat extends upto Km. 369/22, 3 Kms. away from Miyagam Karjan on the Itola side. He accompanied his AEN and DEN, who were at Bharuch, by the Medical Special and reached the site at about 05:20 hrs. After surveying the damage to the track and making arrangements for the permanent way materials required for restoration, he took the track observations jointly with the CWS/Vadodara and TI/Miyagam Karjan under free and loaded conditions and completed the same by about 10:30 hrs. He last inspected the Up and Down lines on 18-10-80 by push trolley. Earlier, he had done an engine inspection of the Up and Down lines on 5-10-80 but had no records of defects noted by him. In fact, he stated that the sheet of paper on which he had written the mileages of inspection were not readily available. The Down line was last attended to by the Gang under casual packing on 5-10-80.

(b) Answering questions, he stated that—

- (i) the slack gauge between station No. 9 to 14 behind the point of mount was due to distortion of track of the 5-rail panel

where the mounting occurred; the panel was thereby affected due to thrust on the rail after the derailment;

- (ii) the variation in cross levels between station No. 72 and No. 78 was attributed by him to the existence of a free joint on the right side rail;
- (iii) he did not take track measurements as required under Para 1407(c) of the Way & Works Manual as there was pressure to release the track for restoration; this was also confirmed by Shri Dalbhide, CWS, who had jointly taken the track measurements. Shri Dalbhide further confirmed that the parts found near the point of mount viz. one hose pipe, one brake block, one bearing brass and one axle box had been verified as not belonging to Wagon No. 17196 the first wagon of the parted load of BTD Goods train;
- (iv) no gap register was maintained by him for this track. However, when gaps exceed the permissible limit, the rails are pulled back. Pulling back was last done on 12-3-80.
- (v) he accompanied the Amsler Car on its run on 7-10-80 and 14-10-80.

## VI. OBSERVATIONS AND TESTS

### 6.1. Down Main Line.

(a) The first mark of mount of the IBTD Down Goods train was observed on the left rail 9.14 m, ahead of EM No. 369/2. This was followed by a clear mark of drop of one wheel, about 2.48 m in front, on the inside of the CST9 plate of the right rail. This pattern continued till the left wheel dropped to the left of the left rail at Sleeper No. 19. At Sleeper No. 30, a second set of derailed wheel marks appeared on the track moving towards the left as one approached the Miyagam Karjan end of the girder bridge No. 545 (1×3.05 m) at Km. 369/2-4.

(b) The marks of these 2 derailed right wheels were thereafter found in-between the guard rails with its splayed ends at the Miyagam Karjan approach uprooted and badly distorted and all the bridge timbers crushed. At the bridge itself, the rail ballast walls and the coping stones at both ends were dislodged and damaged.

(c) The same pattern of derailment continued in the CST9 sleepers just beyond this girder bridge till bunching of wagons and complete distortion of track occurred between Km. 369/6-8.

(d) The Down OHE mast at Km. 369/8, which had fallen towards the Itola side, bore clear marks of being hit and ridden over by some wagons of the derailed IBTD Down Goods train.

## 6.2. Up Main Line

(a) Covered loaded Wagon No. 59858 (28th from the locomotive) of IBTD Down Goods was found entangled with the front cab of the Electric Locomotive of 6 Up Saurashtra Mail. Likewise, the 29th loaded Wagon No. BRH 61730 of IBTD Down was found entangled with the 5th coach No. WGSCNY 7213 of 6 Up.

(b) The Up OHE mast at Km. 369/7 bore similar hit and riding marks of 6 Up as the mast fell towards the Miyagam Karjan side.

## 6.3. Visibility Test

A trial was carried out by me at 23.30 hrs. on the dark night of 30-10-80 to ascertain the visibility of a red Hand Signal lamp and a wagon to the Driver of an approaching Up train. A red Hand Signal Lamp was prominently held up at Km. 369/27 as 28 Up Vadodara Express approached the accident site. Travelling on the front cab of the electric locomotive at a slow speed of about 30 km/h and expecting to see a danger signal, I could sight a dim red light when about 486 metres away and got a clear view of it when just 3 electric masts (about 200 m) away. An obstruction of a wagon kept on an adjoining line at Miyagam Karjan station could be clearly seen just 1 1/2 electric masts (about 100 m) away. On the same line, the visibility could not have been more than 200 m. On the moon-lit night of 27-10-80, the visibility must have been somewhat better.

## VII. DISCUSSION

### 7.1. Time of Accident

7.1.1. The two OHE breakdowns, when the 2 accidents (first the derailment of IBTD Down Goods train and later the collision of 6 Up Saurashtra Mail with the infringing wagons of IBTD Down Goods) occurred, caused instantaneous tripping of circuit breakers at the Makarpura sub-station and failure of power supply. Both trippings were simultaneously flashed on the panel at the Traction Control Office at Vadodara and were noted to have taken place at 00.45 hrs. and 01.08 hrs. respectively on 27-10-80.

7.1.2. These timings more or less tally with the evidence of—

- (i) the Guard of IBTD Down, who noted the two events as occurring at 00.45 and 01.09 hrs.;
- (ii) the Driver of IBTD Down, who stated that his DJ tripped at 00.45 hrs., when the derailment of his train took place; and
- (iii) the Guard of 6 Up, who noted the crash of the collision as having taken place at 01.10 hrs., 6 minutes after the train ran through Itola at 01.04 hrs. as against the Control & Station run-through timing at Itola of 01.02 hrs.

7.1.3. These timings also generally agree with the run-through timings recorded of the 2 trains involved from their respective last stations before the accident i.e. 00.40 hrs. for IBTD Down from Miyagam Karjan and 01.02 hrs. for 6 Up from Itola plus the time taken there after at the speeds they were found to be running, to the site of the accident.

7.1.4. I therefore accept the time of the derailment of IBTD Down Goods train as 00.45 hrs. and the subsequent collision of 6 Up Saurashtra Mail as 01.08 hrs. on 27-10-80.

### 7.2. Speed of 6 Up at the time of collision

7.2.1. It is seen from the speed recorder chart that when the brakes were applied just before the accident, the speed came down from 95 km/h showing a fine line upto 75 km/h and thereafter a thick and disturbed line down to zero. This indicates an abnormal feature at 75 km/h and must have occurred when 6 Up crashed into the infringing wagons of the IBTD Down Goods train. Further, the evidence of most Railway staff and passengers of 6 Up support the readings on the speed recorder chart that 6 Up was running at or near the maximum speed of 100 km/h and within seconds of sudden braking and jerks felt by many Railway staff and passengers, the crash occurred.

7.2.2. I therefore consider that the speed of 6 Up at the time of collision was of the order of 75 km/h.

### 7.3. Speed of IBTD Down Goods train at the time of derailment

7.3.1. The Driver and Guard of IBTD Down have testified that the train ran through Miyagam Karjan at full speed and there was no reduction in speed till the accident took place. The Guard estimated the speed when he felt the first jerk as 60-65 km/h and the Driver estimated his speed as about 70 km/h when his DJ tripped. Looking at the fact that the train, ran through Miyagam Karjan station and the gradient was generally falling from Miyagam in the direction of travel of the train and the line ahead was on a straight, I accept the version of the Guard and Driver that they were running at or near the maximum speed.

7.3.2. I therefore consider that the speed of IBTD Down Goods train at the time of derailment was of the order of 65—70 km/h.

### 7.4. Collision and Derailment of 6 Up

The Guard of IBTD Down Goods train has testified that the derailment of his train resulted in some wagons fouling the Up Main line and even as he tried to protect the on-rushing 6 Ups by exhibiting a red light and placing detonators on the Up track, the train passed him and crashed in to the infringing wagons. There is evidence also of the Driver of 6 Up suddenly braking,

most probably when he saw the red light and/or the obstruction ahead; in fact, many passengers, including Railway staff, travelling on 6 Up felt the jerks of sudden braking, seconds before the collision occurred. It is therefore abundantly clear that 6 Up Saurashtra Mail ran into the derailed wagons of IBTD Down Goods train and became derailed. Its electric locomotive then swerved to the left, wrenching the 28th Wagon No. 59858 CL of IBTD Goods train along with it, rolled down the embankment and landed on the ground below about 12.46 metres away and to the left of the Up Main line.

#### 7.5. Derailment and parting of IBTD Down Goods train

7.5.1. The marks of derailment on the tiebars and CST-9 sleepers in the track from the point of mount to the girder Bridge No. 545 about 86.20 metres ahead [See Para 6.1(a)], clearly established the fact that only 2 wheel sets had derailed before the girder bridge. These wheel sets then hit, rode over and uprooted the splayed guard rails at the Miyagam Karjan end and the rail ballast walls of the girder bridge. The same pattern of derailment marks were seen on the CST-9 sleepers just beyond the girder bridge.

7.5.2. I had nominated 2 Officers of the Western Railway, Shri B. M. Arte AME and Shri A. D. Gadhari AEN, to jointly examine the wheels and underframes of all the derailed wagons and locate tell-tale marks on the tread and danges of the wheels of the derailed wagons to identify the 2 culprit wagons which has derailed first. The study was quite revealing. All the hit and damage marks on the trailing wheels and underframe of covered loaded Wagon No. 17169 ER and the leading wheels and underframe of covered loaded Wagon No. 60990 WR (1st and 2nd wagons of the parted portion of IBTD Down Goods train—22nd and 23rd from the locomotive) could be tallied e.g. there where clear marks of hit on the wheels, axles and underframes where they struck the guard rails and rail ballast walls of the girder bridge.

7.5.3. The 4 fallen parts, found on either side of the girder bridge, could also be identified as belonging to particular wagons on the train i.e. the hose pipe and brake-block found at the Miyagam Karjan approach belonged to Wagon Nos. 63834 and 44237 (51st & 38th respectively from the locomotive) and the bearing brass and axle box to the leading wheel of Wagon Nos. 60990 CL (23rd from the locomotive—2nd wagon of the parted load), which fell when the derailed wheel worked itself out after the wagon struck the girder bridge.

7.5.4. It was therefore quite clear that the trailing wheels of Wagon No. 17196 and the leading wheels of Wagon No. 60990 (1st & 2nd on the

parted load) were the first to derail. The fact that all the wheels derailed to the left led me to believe that the trailing wheels of the 1st wagon of the parted load were the first to derail and in doing so, they pulled out the following wheels i.e. the leading wheels of the 2nd wagon in the same (left) direction.

7.5.5. There was no evidence to support any theory that overspeeding/injudicious controlling by the Driver or an obstruction on the track had caused the accident. Neither was there any evidence of wilful tampering of the track. All these possibilities were therefore ruled out and attention concentrated on the 2 wagons that derailed and the track conditions near the point of mount.

#### 7.6. Examination of Wagon Nos. 17196 & 60990

7.6.1. Wagon Nos. 17196 & 60990 were examined in detail by the AME and AEN and all measurement and observations were jointly recorded by them. A summary of their observations on certain items, which could throw some light on the cause of the accident, is enclosed as Annexure-III. A perusal of these reading makes it abundantly clear that Wagon No. 60990 was in fairly good condition and was not the first to derail. The discussion that follows is therefore confined only to the defects observed in Wagon No. 17196 which was the first wagon to derail.

#### 7.6.2. Defects/Deficiencies noted in Wagon No. 17196

7.6.2.1. The right leading buffer was dead. The left draw-bar spring of the leading draw-bar was broken into 2 pieces. This breakage was obviously an old one. During clearing operations, the trailing buffers of this wagon had to be removed by flame cutting and some of the rubber pads used were found partly perished. The single dead buffer and a broken draw-bar spring in 2 pieces only were explained as non-rejectable defects, which need not be attended to as they are covered by the provisions of Paras S.4.9.2 and S.4.9.8 of the Conference Rules Part III.

7.6.2.2. The condition of the axle box and bearings were found as under :

##### 7.6.2.2.1. Right side trailing wheel

(a) Axle Box—The lug inside the axle box was found worn out to the extent of 75% of its depth. A non-standard half channel liner had been provided on one (front) side only of the axle box groove, to reduce the play between the axle guard horn check and axle box groove. Both legs of the axle guard had been bent outwards and damaged as a result of the accident.

(b) SGCI Bearing—The bearing was smoothly worn out leading to the formation of a groove (without any serrations) for a width of 60 mm and a depth of 9 mm. The white metal in this

portion has been sutured out except at the edge where traces of it could still be seen without any signs of fusion.

(c) Slipper plate—This was in good condition but there were clear marks of mounting on the lug of the axle box and the edge of the slipper plate.

#### 7.6.2.2.2 Left side trailing wheel.

(a) Axle Box—The axle box had a normal lug and no liner in the axle box groove. Both legs of the axle guard had been bent outwards and damaged as a result of the accident.

(b) SGC1 Bearing—Here too, the position was the same as on the right side except that the groove formation extended for a width of 36 mm and a depth of 8 mm and beyond this the white metal was found to have chipped off and probably fallen out.

(c) Slipper plate—This too was in good condition with marks of mounting, which were less noticeable as compared to the right side.

7.6.2.2.3. The axle boxes and SGC1 bearings on the leading wheels appeared normal on both right and left sides with tolerable wear of the bearings and no groove in them.

7.6.2.2.4. There was excessive lateral wear in the axle box groove on the leading Right Axle Box. This caused excessive lateral play of 18 to 25 mm on this box. There was also lateral clearance in excess of 10 mm on the leading and trailing left axle boxes.

#### 7.6.3. Laminated springs

(i) The left trailing spring had its 10th plate fractured. The right trailing spring had its top screw missing. The left leading spring had a non-standard packing piece—a circular spring washer—wedged  $\frac{3}{4}$  distance inside between the buckle and top plate. Its top screw was missing and the buckle shifted by 3 mm.

(ii) The free camber of the spring was measured as under :

LL	71 cms.	RL	73 cms.
LT	63 cms.	RT	65 cms.

(iii) The laminated springs were sent to the Loco Workshop at Dahod for a spring deflection test and the results, tabulated by AME and AEN, were as under :

Sl. No.	Load	Theoretical Deflection in mm	Actual Deflection				Remarks
			LL	RL	LT	RT	
1.	Free Camber (no load)	76	71	73	63	65	On leading left spring, non standard packing washer was fitted and then load test taken.
2.	1 ton	69.8	68	69	60	61	
3.	2 ton	63.5	61	65	55	54	Drawing No. IRS WA-8
4.	3 ton	57.1	55	57	48	46	
5.	4 ton	50.8	49	53	43	40	
6.	5 ton	44.4	45	46	37	33	
7.	6 ton	36.5	36	40	30	27	
8.	7 ton	30.2	31	35	24	18	
9.	8 ton	23.8	25	30	19	12	
10.	9 ton	17.4	19	25	12	7	
11.	10 ton	11.1	14	19	7	Nil	

Note :—The relevant particulars of this covered 4-Wheeler Wagon No. 17196 are :

- (a) Carrying capacity 22.4 tonnes.  
 (b) Tare 10.5 tonnes  
 fully loaded with fertiliser (Phosphate).

#### 7.7. Examination of Track

7.7.1. The track measurements on the down main line were jointly recorded by PWI/TI/CWS before clearing operation were commenced on the morning of 27-10-80. The measurements were recorded under loaded and free conditions for (1)90 metres behind the point of mount and (1)45 metres ahead of the location where the first derailed wagon came to a halt. Details of (1) above only, being relevant, are reproduced in Annexure-IV.

7.7.2. Surprisingly, no track measurements were taken and recorded for 50 metres ahead

of the point of mount, though quite clearly required vide Para 1407(c) of the Indian Railway's Way & Works Manual. My enquiries reveal that the Inspectors and Junior Officers, who recorded the joint measurements, were pressurized to complete the taking of those measurements to enable clearing operations being commenced and none of the Senior Officers present ensured that this essential information was taken before the restoration operations were commenced. Considering that the top brass of the Railway were present at the scene of the accident well before clearance operations commenced, I can understand the predicament of the small fry who recorded the measurements

and consider this a lapse on the part of the Senior Civil Engineers present at that time [ADRM & DEN(I) Vadodara]. Fortunately, I had reached the site of accident before dusk on 27-1-80 itself and got a fairly good idea of the track conditions immediately ahead of the point of mount to draw my own conclusions.

7.7.3. The pertinent observations of the track measurements noted were—

- (i) Slackness of gauge just behind the point of mount and in particular between station Nos. 10 to 12, which was +16 to +17 mm under free conditions and +14 to +16 mm under loaded conditions.
- (ii) Cross level variations up to a maximum of 16 mm left low under load at station No. 2 just near the point of mount.
- (iii) Cross level variations between station Nos. 70 and 85 and in particular on either side of station No. 73 where there was a rail joint only on the right side, the other side being a welded joint. The maximum cross level variation was between station Nos. 73 & 76 (9 mm right low to 3 mm left low under free conditions, and 9 mm right low to 4 mm left low under loaded conditions).
- (iv) Station Nos. 0 to 23 (22 metres) behind the point of mount were on a 5-rail welded panel. This 5-rail panel extended 36.2 metres beyond the point of mount in the derailment zone ahead; the tie bars had been noticeably bent forward as a result of the derailed wheels travelling over them.

7.8. Which event took place first, the parting or derailment of IBTD Down Goods train?

7.8.1. A theory was advanced that the parting took place first and the resultant destruction of vacuum from the front of the parted (rear) portion of the train caused bunching and jumping of the 2 wheel sets that derailed *i.e.* the trailing wheels of the 22nd Wagon No. 17196 and the leading wheels of the 23rd Wagon No. 60990 (1st & 2nd Wagon of the parted load).

7.8.2. I discard this possibility for 3 reasons :—

- (a) The effect of bunching, causing a jump of wheels, will be felt more on the wagons in the middle of the parted load rather than in the front 2 wagons; in fact, the most vulnerable to jump should have been the empty Wagon, CRT No. 68970 and 76219 (24th & 26th from the engine —3rd & 4th of the parted load), which were the only 2 empty wagons on the train.
- (b) The derailed wagons, moving towards the left, should have hit OHE Mast No. 369/6, about 40 metres ahead of the girder bridge. Instead, the derailment marks indicate that these wagons were

pulled towards the centre of the Down track after they hit the girder bridge and steered clear of OHE Mast No. 369/6.

- (c) Bunching should have taken place on either side of the girder bridge rather than about 80—90 metres ahead.

7.8.3. I have no doubt, therefore, that the derailment of only 2 wagons took place first and as the bunching and derailment of other wagons occurred, the screw rod of the coupling gave way and caused the parting. This is farther borne out by the crystalline nature of the fractured surface of the broken screw coupling, which showed no signs of flaw. The screw rod had obviously broken under sudden tensile stress as borne out and confirmed by the Report of the Chemist & Metallurgist, Western Railway, Ajmer, extract enclosed as Annexure-V.

7.9. Mechanics of the derailment of IBTD Down Goods train

7.9.1. With the above background of the wagon defects/deficiencies and track conditions, it is possible to visualise how the derailment took place.

7.9.2. Wagon No. 17196 ER was running in a potentially unstable condition just before the derailment. Its left trailing spring had a weak/fractured plate and a non-standard packing piece *i.e.* a spring washer wedged in with its buckle shifted by 3 mm and the top screw missing. The test results of the load deflection test of the springs have disclosed that both trailing springs were weak; under loaded conditions, the difference in working camber exceeded 12 mm; in fact, the maximum variation was 17 mm between the right trailing and leading springs. The bearing brasses of both trailing axle boxes were riding over the collars and both slipper plates had mounting marks—the right side being more pronounced than the left side. There was excessive lateral clearance (more than 10 mm) between the axle guard and axle box groove in 3 out of 4 axle boxes and particularly in the leading right axle box (18 to 25 mm). On the 4th (right side) axle box groove had been fitted a non-standard half channel liner in a manner not conducive to restricting the lateral play. To cap it all, there was slack gauge of 16 to 17 mm and appreciable difference in cross levels upto 16 mm left low just near the point of mount.

7.9.3. The normal oscillations set up on the run must have got built up with the excessive lateral play of the wheels and the uncontrolled lateral play between the bearing brasses and journals of the trailing wheels. The slipper plates and bearings not being in position with the journal caps riding over the bearings, the transfer of load was also affected. There was also unequal transfer of load due to the weakness of the trailing springs. All these defects set up oscillations of great amplitude and increased

the flange forces. This ultimately resulted in the rear left wheel of Wagon No. 17196 mounting the left rail and derailing.

7.9.4. What happened thereafter to the Goods train has already been indicated in Para 1.3.1 above.

7.9.5. The slack gauge as measured at stations 10 to 12, in rear of the point of mount, was of the order of 16 to 17 mm. It was contended by the Engineers that this was found at one isolated location only. Further, the Amsler Car, on its run of 7-10-80, had classified this kilometre in the 'B' category with only 6 peaks between 3 and 6 mm and no peaks above 6 mm and within a period of 20 days, it was not possible that one particular panel could have deteriorated to the extent of the gauge becoming slack by as much as +17 mm; therefore, in their view, the slackness of gauge as also the cross level variation upto 16 mm left low at station No. 2 was due to distortion of the track ahead of the point of mount within the same panel and disturbance of sleepers. This inference is acceptable. It would have been more convincing, however, if instead of drawing inferences, the Engineers had recorded the track data ahead of the point of mount after the accident. Unfortunately, this was not done (See Para 7.7.2 above).

**7.10. Could the collision of 6 Up Saurashtra Mail have been averted?**

6.10.1. There was a clear interval of 23 minutes between the derailment of IBTD Down Goods train and the collision of 6 Up Saurashtra Mail. There were 3 Railway Staff on the Goods train, who could have warned the Driver of 6 Up of the infringing wagons and averted the collision. Their role in this matter is discussed below.

**7.10.2. Guard of IBTD Down Goods train.**

7.10.2.1. He felt the jerk immediately after the derailment and was the first to realise that an accident had taken place. However, at this point of time, he would not have realised that a parting had taken place. The responsibility for protection in front devolves on the Driver and therefore the Guard's realisation of the need to protect the Up line in front arose only after he passed the derailed wagons after getting down and up the bank (3—5 metres in height) to the other side. One can also visualise the unexpected situation he was suddenly faced with, alone in mid-section at dead of night and take due cognisance of the same. Events have shown that the 23 minutes time available was not enough and the efforts he made to protect the Up line in front were inadequate.

7.10.2.2. It has not been established beyond doubt that the Guard of IBTD Down placed detonators on the Up line to protect 6 Up, as

he (Guard) failed to point out his burst detonators to anybody immediately after the accident; also, while he had a stock of 12 detonators of 1977 vintage, the burst detonators found on the Up track after day break on 27-10-80 were those of other years and were burst by the Tower Wagon and the Medical Van when they came on the Up line after the accident.

7.10.2.3. I believe, therefore, that the Driver and Assistant Driver of 6 Up were pre-warned only by the Guard's red light about the same time when they saw the obstruction just 2-3 OHE masts ahead and applied their emergency brakes.

7.10.2.4. In as much as the Guard, in such a situation, is not immediately called upon under extant rules to protect the other line in front—this duty under G.R. 166(h) falls on the Driver—I absolve him of any responsibility for not averting this accident.

**7.10.3. Driver and Assistant Driver of IBTD Down Goods train.**

Under circumstances mentioned therein, G.R. 166 clearly places the entire responsibility for the action to be taken and protection to be done in front squarely on the Driver. This completely absolves the Assistant Driver of any responsibility. The train had suddenly stopped in mid-section. The first reaction of the Driver should have been to ascertain if the rest of his train was following in the rear by sounding his whistle and exchanging hand signals with the Guard. Instead, he spent practically 20 of the 23 minutes time available, going through the trouble shooting drill prescribed in Para 1714 of the Railway Board's Manual of AC Traction Maintenance and Operation (Manual of ACTM & O), on the assumption that the DJ tripping was occasioned by an OHE/Loco failure. The Driver gave me a detailed account of what checks he and his Assistant did during this period and thereafter, how his Assistant Driver had hardly gone 2-3 wagons in rear when 6 Up passed by at normal speed. He, apparently, took the stoppage of his train to be an ordinary case of tripping and it never occurred to him to check if the rest of his train was attached to his engine in rear. He could have averted the accident had he taken the action clearly laid down in G.R. 166 of whistling and exchanging signals with the Guard and protecting the Up line in front. I have no doubt that the cause of stoppage in this case was "on account of failure or an exceptional cause", requiring this action to be taken by the Driver under this G.R.

7.10.4. My reasons for coming to this conclusion are as follows.

7.10.4.1. The Driver has deposed that there was a gradual drop in his vacuum from 52 cms to 40 cms and then the vacuum dropped suddenly from 40 cms to 0. This could not have happened if a simple power failure had taken place;

the drop in vacuum in such a case should have been gradual from 52 cms to 0 and this should have taken place in 5-7 minutes.

7.10.4.2. Time limits have been prescribed in various AC Traction Rules and Manuals on the action to be taken by a Driver when there is a failure of OHE/Loco. These are briefly summarised below.

- (i) Para 1264 of the Board's Manual of ACTM&O—If Power supply is not restored within 5 minutes of stopping the train, the Driver should make use of his portable telephone to contact the TPC and if for any reason, he is likely to take more than 15 minutes to ascertain the time of restoration of the O.H. power supply from the TPC, he must first protect the train against rolling as prescribed and then contact the TPC. In addition, the precautions prescribed in G&SR for protection of train when stopping out of course must be observed.
- (ii) Para 1714 of the Board's Manual of ACTM&O. If the locomotive fails, the Driver is expected to follow the procedure laid down in the trouble shooting Manuals and seek the guidance of the Traction Loco Controller on phone through the TPC.
- (iii) The corresponding instruction in Para 2 of Chapter I of the Trouble Shooting Directory of the Western Railway requires the Driver to follow a prescribed drill in the event of DJ failures and also specifies that he must contact the TPC after 10 minutes.
- (iv) Para 16.20 of the Western Railway's AC Traction Manual on Measures to be taken in case of power failures prescribes that the Driver should contact the Traction Loco Controller, after waiting for 10 minutes, by deputing his Assistant with a written message if contact on the Emergency Telephone is not possible and if the stoppage is due to an accident (derailment damaged catenary etc.), the Driver should protect the train first before he contacts the Controller.

7.10.4.3. In the instant case, the Driver of IBTD Down Goods train was not provided with an Emergency telephone (although vide Para 1715 of the Manual of ACTM&O—he should have been provided with one) and therefore, he should have waited for 10 minutes before deputing his Assistant with a written message to the nearest Station Miyagam Karjan, which was 3 Kms. away. He was also required to protect his train in terms of Para 1264 of the ACTM&O. This he failed to do.

7.10.5. This accident has clearly demonstrated the effect of AC Traction Rules and Regulations giving more importance to trouble shooting

directions to Drivers to ascertain the cause of failure instead of stressing the paramount importance of ascertaining whether there is anything wrong with the load hauled by the locomotive and may be taken into consideration when evaluating the gravity of the Driver's failure to protect his train.

#### 7.11. Did the Driver experience a jerk?

7.11.1. The parting took place after 2 wagons had derailed and hit the bridge; the travel of 2 wagons in a derailed condition may not have resulted in much of a jerk at the moment of derailment but when the 2 wagons hit the girder bridge and a parting took place thereafter, I believe that at least 2 heavy jerks must have taken place and must have been experienced by the Driver. When this was followed by a stoppage in mid-section, it should have sufficed to alert the Driver that the cause of the stoppage was an exceptional one, attracting the provisions of G.R. 166. The Driver should therefore have sounded his whistle to apprise the Guard of the stoppage exchanged hand signals with him and protected the Up line in front, as required by G.R. 166. To the extent he failed to do so when there was adequate time available for this purpose, he is responsible for not averting the accident.

7.11.2. In a note on the responsibility of the Driver to protect the Up Main line in terms of G.R. 166(h), the railway administration has stated that the IBTD Down Driver's failure to do so has to be judged in the context of the following circumstances—I quote.

“1.1. Since the tripping of power in the OHE is inferred to have occurred within a very short time (seconds) after the derailment took place, the Driver concluded that the initial slow drop in vacuum in his gauge and subsequent stoppage of train was caused by tripping only; whereas the initial slow leakage would indicate that derailment took place earlier, and was followed by parting and hitting of the mast causing the power to trip, which resulted in sudden drop of vacuum. When power trips, the Driver feels a small jerk if traction current is high and the Driver of Dn BTD Goods, who has stated that he did not feel any jerk must have thought that what he experienced on this occasion was nothing unusual. The power tripping is not an uncommon feature on the electrified sections, though not very frequent.

1.2. Again, para 1264 of AC Traction Manual and instructions issued to the Driver thereunder, would appear to give greater importance to trouble shooting by the Driver than to protection of the adjacent track. These instructions are understandable as, except in an isolated case as the present one, power is generally



restored within a short time and normal running is resumed after a brief interruption. Besides, if the Driver were to start protecting the adjacent line in every instance of trains coming to a halt in mid-sections after a OHE power tripping, train running would become very difficult, if not impossible.

- 1.3. In terms of the instructions, therefore, the Driver of Down IBTD Goods waited after verification (Trouble Shooting) that the loco was in order for 10 minutes after tripping occurred expecting restoration of power. When he did not get power, he sent his Assistant to go in the rear to ascertain if the train was complete and in order. From the nearest point he could not contact the TPC regarding OHE power failure as there was no RE telephone supplied to the Driver. It was not until the Assistant Driver reported to him that the Driver became aware of the train parting and absence of rear portion of the train, but then it was too late to take action to protect the adjacent line as this must have taken another 10—15 minutes."

#### 7.11.3. My itemwise comments are—

- 1.1. Though power tripping by itself causes a small jerk if the traction current is high, the Driver should have felt the two heavy jerk when the 2 derailed wagons hit the bridge and the parting took place if he did not feel the small jerk when the power tripped; in other words, he should have experienced more than one severe jerk. His plea that he did not experience any jerk cannot therefore be accepted.
- 1.2. The record of earlier cases of power tripping that have occurred on Vadodara Division indicates that they take place for half a minute only except when there is a failure of supply from a sub-station when it takes about 2-3 minutes to feed the affected section from the adjoining sub-station. In every case, the first duty of a Driver should be to see that his train is following in a safe and proper manner and to check this and protect the other line if the situation so warrants. To the extent that the Traction Manuals lay more stress on trouble shooting than to protection, there is a lacuna in their wording and this needs to be immediately rectified. The administration's contention that the manner of their present wording caters for the general case and not the exception and that train running would become very difficult, if not impossible, if the rules have to be worded differently, is hardly convincing as protection will not be mandatory in every case of power

tripping—the revised wording will merely emphasise that ascertaining the situation of the train in rear is to be given overriding priority and protection is to be done only when the situation so warrants it. Such cases will be few and far between.

- 1.3. The duration of the power failure was 23 minutes. The relevant instructions speak of trouble shooting for 10 minutes when there is a failure of locomotive. In this case, according to the Driver, his Assistant Driver had hardly gone 2-3 wagons in rear when 6 Up passed by. This clearly shows that the Driver reacted after trouble shooting on his locomotive for about 20 minutes, a much longer time than he should have under the extant rules.

#### 7.12. Role of other Railway Staff in averting the collision.

Besides the Driving Crew of IBTD Goods, the Traction Power Controller was another Railwayman in the know of the power failure that occurred when IBTD Down Goods derailed and damaged the OHE. He located the fault in 7 minutes and took the usual action to apprise OHE breakdown staff and his superiors of what had happened but it never occurred to him that this breakdown could have been caused by the derailment of a Goods train, some wagons of which could foul the other line. The run-through of 6 Up at 01:02 hrs. at Itola was well within 20 minutes, after allowing the normal running time of 10 1/2 minutes of the departure of IBTD Down Goods train from Miyagam Karjan and therefore, ASM Itola was not required to issue a Caution Order in terms of G.R. 166(2). Neither did the Traction/Operating Rules require the TPC/ATNL to ascertain the cause of OHE failure on the line before allowing another train to run-through on the other line or stop and give a Caution Order to the Driver of the other train. I, therefore do not hold any other Railway Staff (Traction Power Controller, Area Controller ASM or Cabin man) responsible for not averting the accident. The Railway can profit by this experience and take preventive steps in the future.

#### 7.13. End-to-end running of Through Goods trains.

7.13.1. IBTD Down Goods train was a through Goods load, intensively examined at Bandra Marshalling Yard on the Western Railway, and was bound for Tughlakhabad on the Northern Railway—a total distance of 1356 Kms. The intensive examination done was to rejection standards with intensive repairs of rejectable items and 36 man hours of attention by a standard gang at the originating station and a system of intermediate safe-to-run examinations at certain nominated stations en-route at distances

varying from 700 to 900 Kms. This was based on norms earlier accepted by the Railway Board.

7.13.2. In June 1979, a Committee of Directors of the Railway Board went into the question of rationalisation of Carriage & Wagons examination of Goods train and based on their recommendations, the following relaxations were permitted by the Railway Board [Reference Board's letter No. 78-M(W)/814/8-Vol. II dated 1-10-80].

- (i) The runs of Goods trains should be so regulated that even with a 20% brake fade on 85% originating effective vacuum, the trains could generally cover runs upto 800 Kms. with a speed regulation of 60 km/h.
- (ii) For empty pure BOX racks, the existing limits of 800 Kms. for intensive train examination could be extended upto 1000 Kms., for train runs confined on the same Zonal Railway, by ensuring proper intensive examination/repairs. For inter-railway empty BOX trains having a run of over 1000 Kms., decision could be taken for eliminating the en-route train examination on merits in consultation with the concerned Zonal Railway.

7.13.3. The Chief Mechanical Engineer, Western Railway has advised that the above relaxations were based on Railway Board's yardstick of Rejection Standard Examination, which allows for intensive repairs of rejectable defects and making good the deficiency of penalty and debit items in 50 man hours of attention by a standard gang comprising of 2 TXRs, 8 Fitters, 4 wheel Fitters, 4 Vacuum Fitters, 4 Skilled Khalasis and 5 Fitter Khalasis (25 men taking 2 hours time) for a Goods train of 60—70 wagons (in terms of 4 wheeler units).

7.13.4. Notwithstanding the above norms laid down by the Railway Board, the General Manager, Western Railway revised the Railway's yardstick in 1979 itself on the basis of the following directions given by Director General (Operations), Railway Board in January 1979:

"There should be end-to-end running of Goods trains without intermediate carriage examination irrespective of distance involved."

and he (G.M.) permitted

- (i) end-to-end running of through Goods trains (loaded and empties) from destination to destination even outside the Western Railway's system, covering distances upto 1356 Kms. e.g. IBTD. Goods trains from Bandra Marshalling Yard to Tuglakabad; and.
- (ii) intensive examination at originating stations to be to Rejection Standard with intensive repairs of rejectable defects only without making good the defi-

ciency of penalty and debit items or ensuring the minimum input of 50 man hours (At BAMY, on 27-10-80, the Schedule in vogue was 36 man hours and the deficiency of penalty and debit items was not made good).

7.13.5. End-to-end running introduced on the Western Railway has recently been extended on the BG and MG of all Indian Railways by the Chairman Railway Board, vide his XXR Message No. 80-TTI/9/3 (CRB-III dated 20-11-80) extracted below :

STATUS QUO IN END-TO-END RUNNING AS ORDERED IN JANUARY 79 WILL BE MAINTAINED AND NO CHANGE EXPECTED IN THE PATTERN UNTIL FURTHER ORDERS FROM THE BOARD (.) GMS. NE, NF, SC & S RAILWAYS WILL COME UP WITH PROPOSALS FOR EXTENDED RUNS ON THE MG AS HAVE BEEN PREVALENT ON THE WESTERN RAILWAYS (.)

GUJRAL  
CRB

7.13.6. The issues for examination arising out of the prevailing practice on the Western Railway, which came to light in this Inquiry, are—

- (i) End-to-end running is a vague term; should the current Schedule of intensive C&W examination spelt out by the Board equally apply to loaded wagons and empties of different types and bearings running varying distances over several Railway systems e.g. from Bajva to Tuglakabad (964 Kms.) or Carnac Bunder to New Delhi (1388 Kms.) or Madras to Delhi (2192 Kms.) or Punjab to Kerala (over 3500 Kms.)?
- (ii) Whether 36 to 40 man hours intensive examination without making good the deficiency of penalty and debit items can safely permit of Goods trains (loaded or empties) running end-to-end from Western Railway to other Railways without any intermediate examination en-route?
- (iii) A wagon, like any other mobile machine, requires periodical examination en-route in spite of intensive repairs for its safe running and certain norms have been laid down by the Mechanical Engineers based on past experience of local conditions on the Indian Railways. Would it be appropriate to drastically amend these well established practices, based on the operating experience of the Western Railway, when the directives issued are not altogether in conformity with the Railway Board's extant policy of intensive examinations at originating stations and safe-to-run examinations en-route? What

is the experience of the Western Railway in terms of what is laid down and what is actually happening on the line? What will be the long term effects of extending this policy to all Railways, vis-a-vis brake fade and speeds of Goods trains, on the safety of Railway operations?

7.13.7. The standards of rejection, laid down in the Conference Rules Part III and specifications of materials used in certain Goods Rolling Stock were prescribed when running of Goods trains were from Yard to Yard, entailing one engine run only. These standards are outmoded in the context of end-to-end running of Goods trains, were the runs have been extended five to ten fold.

7.13.8. While recommending a consistent and steady policy, I would urge that, in view of the long term ill effects on the Goods Rolling Stock and its repercussions on the safety of Railway operations, the end-to-end running of Goods trains recently introduced on all Railways should be held in abeyance till action is taken to (i) enforce the Railway Board's standards of intensive examination at the originating stations, (ii) improve the specifications of materials used in Goods Rolling Stock, and (iii) ensure the integrity of the fittings in the wagons over the extended runs. Till then, the norms of distance runs within the Railway and inter-Railway for different types of Rolling Stock, laid down in Railway Board's letter No. 78-M(W)/814/8-Vol. II, dated 1-10-80, should be strictly enforced on all Railways. At all originating points of Carriage and Wagon Examination of through Goods trains, where 50 man hours of intensive examination and making good the deficiency of penalty and debitible items are not yet implemented, as at BAMY on the Western Railway, the Chief Mechanical Engineer should obtain the specified number of man hours with the existing staff by suitably increasing the time allowed for such examination and ensure the making good of all penalty and debitible items during such intensive examination.

#### 7.14. The State of the Track.

7.14.1. The Miyagam Karjan to Itola section where the accident took place is on the main trunk route of the Western Railway from Bombay Central to Delhi, which is also the Rajdhani route.

7.14.2. The track conditions noted on the Down line were not satisfactory and though they did not contribute to the cause of the derailment, the existence of certain defects and the routine attention paid to them by the track maintenance staff are high lighted below, as high standards are required to be maintained on a Rajdhani route.

(i) Within a distance of 125 metres *i.e.* 73 m in rear and 48 m in front of the point of mount, I noted 2 locations with a welded joint on one rail and a fishplated joint on the opposite rail. The cross level variations observed between station Nos. 70 to 85 and particularly on either side of station No. 73 [See Para 7.7.3(iii) above] gave a clear indication that the fishplated joint on one rail was the cause of the cross level variations, which in this case gave a twist to the track of 3.71 mm/metre, albeit at one isolated location. The Division's record showed that the fishplated joints on one rail in the 2 cases cited above had been allowed to remain in the track for over 3 years. This was not correct.

(ii) The Down track at the kilometrage of derailment (Km. 379) had been attended to by the DTM gang on 5-10-80. Yet its running was bad and this kilometrage (Km. 379) was one of the worst in the Up & Down length of track under this DTM gang, as recorded by the Amsler Car on its run over the Down line on 7-10-80 and Up line on 14-10-80 and earlier runs. In spite of this, no further attention was paid to this kilometrage before 27-10-80. Obviously the Supervisory Officials, PWI/APWI, never took proper action on the Amsler Car results or ensured proper DTM of this location.

(iii) The PWI Bharuch Shri S. V. Vilekar's inspections of track were perfunctory. He had no record of mileages needing attention and no notes were kept or tasks recorded in the gang task book on his trolley inspections of 24-10-80 and 18-10-80. He had also no record of bad mileages noted by him after his engine inspection of the Up line by 12 up on 5-10-80.

7.14.3. It is not surprising therefore that track conditions were not upto the expected Rajdhani standards in the kilometer where the IBTD Down Goods train derailed. A concerted drive should be instituted to improve the state of the track here and elsewhere on this Rajdhani route by proper Directed Track Maintenance.

## VIII. CONCLUSIONS

### 8.1. Cause.

8.1.1. On full consideration of the factual material and circumstantial evidence, I have come to the conclusion that the Collision of 6 Up Saurashtra Mail between Electrical Mast Nos. 369/9-5 between Itola and Miyagam Karjan stations on the Vadodara-Surat double line Broad Gauge electrified section of Vadodara Division of the Western Railway at 01.08 hours on 27-10-80 was due to the train running into the derailed wagons of IBTD Down Goods train which were fouling the Up line. This obstruction of derailed wagons of the IBTD Down Goods train, in turn, was caused by the derailment of Wagon No. 17196 ER/C, 22nd on the train, at 00.45 hrs. while on its run between Electrical Mast Nos. 369/2-4, resulting in the parting of the train between the 21st

and 22nd wagons and the consequent bunching and derailment of other wagons in rear, some of which fouled the Up line.

8.1.2. The collision would most probably have been averted, had the Up line been protected in the adequate time of 23 minutes that was available after the derailment of IBTD Goods train and before the arrival of 6 Up.

8.1.3. The derailment of the covered Wagon No. 17196 ER of the IBTD Goods train was due to the excessive lateral clearance between the axle guard and axle box grooves on 3 out of the 4 axle boxes of this wagon, the uncontrolled lateral play of the rear bearing brases and the weak laminated springs on the trailing wheels.

## 8.2. Responsibility.

### 8.2.1. For the collision of 6 Up.

Shri Bhikhubhai Ukhahbai, 'C' Grade Driver of IBTD Down Goods, is responsible for not ascertaining that the rest of his train was correctly attached to his locomotive and safely following it in the rear and for not protecting the Up line in front in the 23 minutes time that was available to him after the stoppage of his train. He violated the provisions of GR 166(h) Paras 1264 and 1714 of the Manual of AC Traction Maintenance and Operation, Para 2 of Chapter I of the Trouble Shooting Directory of Western Railway and Para 16.20 of Western Railway's AC Traction Manual.

### 8.2.2. For the derailment of covered loaded wagon No. 17196 ER on IBTD Down Goods.

8.2.2.1. Shri Baliram Kashiram, C&W Fitter Central Railway Bhusaval, who carried out the last repacking of Wagon No. 17196 ER at Bhusaval on 23-8-80 is responsible for allowing this wagon to leave the Depot with the following defects :

- (1) Excessive lateral clearance between the axle guard and the axle box groove in the leading right axle box.
- (2) A non-standard half liner in the groove of the trailing right axle box.

He violated the provisions of Para 2.10.3 of the Conference Rules Part III and Para 7.5 of the Prevention of Hot Boxes Guide.

8.2.2.2. Shri Sudhakar K. Ayre HTXR Bandra Marshalling Yard, who carried out intensive examination and repairs of Wagon No. 17196 ER on its arrival at Bandra Marshalling Yard on 25/26-10-80, is responsible for not properly examining and repairing the wagon inasmuch as he certified it fit to run on a through goods train when it had defects of—

- (i) Excessive lateral clearance between the axle guard and the axle box grooves in 3 of the 4 axle boxes and particularly in the leading right axle box.

- (ii) Excessive variation of more than 13 mm in the camber under load of the laminated springs over the right leading and trailing wheels.

- (iii) Excessive side displacement of the SGCI bearings upto 60 mm on the right side and 36 mm on the left side inside the axle boxes of the trailing wheels.

He violated the provisions of Para 4.5.1 of the Conference Rules Part III for item (i), Note under Para 3.9.1 of the Conference Rules Part III for item (ii), and failed to check the axle boxes and detect the displaced SGCI bearings with the Vaidyanathan gauge as required vide Item E(6) of the Western Railway's Standard check list of Items to be checked at the time of intensive examination.

8.2.2.3. The Fitters of the intensive examination gang, who were nominated for checking the axle boxes with the Vaidyanathan gauge, must share responsibility for not detecting the defect in the wagon as enumerated in Item (iii) of Para 8.2.2.2. above.

8.2.2.4. Shri S. Suryakant TXR, Bandra Marshalling Yard, who carried out the final examination of Wagon No. 17196 ER before its departure from Bandra Marshalling Yard on 26-10-80, must share responsibility for not having marked the wagon sick in spite of the defects in the wagon as enumerated in Item (i) and (ii) of Para 8.2.2.2. above. He is also responsible for permitting a non-standard spring washer to be used as a packing piece between the buckle and top plate of the left trailing spring of this wagon.

8.2.2.5. The Neutral Train Examiners, who certified Wagon No. 17196 ER fit after repacking at Bhusaval on 23-8-80 and after intensive examination and repair at Bandra Marshalling Yards on 25/26-10-80, cannot also escape their responsibility for not having detected the defects/deficiencies in this wagon at Bhusaval and Bandra Marshalling Yard as enumerated in Para 8.2.2.1 and 8.2.2.2. respectively.

Note :—All the Rules are extracted in Annexure-VI.

### 8.3. Service Record of staff held responsible.

8.3.1. Driver Shri Bhikhubhai Ukhahbai, aged 43 years, joined railway service in March 1957. He was promoted as a Driver in February 1979 and on receiving electric engine training, he was appointed as an Electric Engine Driver in August 1980. His accident index was nil on 27-10-80.

8.3.2. C&W Fitter Shri Baliram Kashiram, 46 years old, joined railway service in November, 1952 as a Carriage & Wagon Khalasi and was promoted as Fitter in October 1979 after working as a Basic Fitter from August 1962.

He was punished on six occasions, once for his failure to attend the alarm chain of a Passenger train, the second time for careless working, the third time for not attending a coach for repairs thereby delaying the departure of the train, the fourth time for his refusal to carry hose pipes, the fifth time for his failure to attend a coach and the sixth time for his failure to attend the rakes of two Passenger trains.

8.3.3. HTXR Shri Sudhakar K. Ayre, aged 36 years, joined railway service in March 1976 as an Apprentice. He was punished six times, once for careless supervision and negligent working, the second time for detaching a wagon on-route for hot axle, the third time for staff working under him without tools, the fourth time for train parting due to defective coupling, the fifth time for shifting of load in wagon due to loose lashing and the sixth time for leaving his duty post without proper handling cover charge.

8.3.4. TXR Shri S. Suryakant, aged 34 years, joined railway service as an Apprentice and was promoted as TXR in July 1965. He had had no punishments during his service till 27-10-80.

#### 8.4. Relief Measures

I am satisfied that the medical aid and relief measures were prompt and adequate.

### IX. REMARKS & RECOMMENDATIONS

9. I had submitted 3 immediate recommendations along with my Preliminary Report on 14-11-80. These are reiterated below (Paras 0.1 to 9.3).

9.1. With the heavy incidence of traffic on electrified and double line sections, quicker ways and means must be adopted for the Driver and Guard of trains in one direction to communicate warnings to adjoining stations and Drivers of trains in the opposite direction in addition to the time consuming and age-old practice of placing detonators and displaying danger signals at adequate distances as per extant rules. The feasibility of providing mobile radio communication equipment and/or fitting of yellow flashing lights on all electric and diesel engines in certain heavily worked double line sections merits serious examination. In addition, the supply of fuses should be extended to the Guards and Drivers of all trains as recommended by the Commission vide letter No. Rs. 28-T(3)/76 dated 29-9-76 and not confined only to Suburban, Ghat, Automatic and Absolute Permissible sections as decided vide the Boards letter No. 75/Safety (A&R)/29/22 dated 21-10-76, which needs review. Training in the use of fuses and its use at night whenever available should now be emphasised to all Drivers and Guards possessing fuses. It is

unfortunate that the Guard of IBTD Down-Goods train possessed a fusee but did not even think of using it to warn the approaching Driver of 6 Up Saurashtra Mail to save precious minutes when he realised that the train was fast approaching and there was no time for him to adequately protect with detonators the onrushing train.

9.2. The Rules for the working of Electric trains on electrified sections and the Traction Manual of the Western Railway should contain a provision that when the power supply fails and the train stops between stations, the first duty of the Driver on double line section is to protect the adjacent line or lines on which normally trains run in the opposite direction of the affected train, unless it is quite apparent and clear to him that such adjacent line or lines are not obstructed. The instructions in the Rules for working of Electric trains on electrified sections and Traction Manuals of all Railways, too, should emphasise the overriding necessity, on failure of power supply, of a Driver exercising this check and protecting the adjacent line or lines, if so warranted, before carrying out any other trouble shooting or other checks in his locomotive.

9.3. The Traction Power Controller on all Railways should be issued standing instructions that in the event of any serious OHE breakdown on an electrified section of a double line, the cause of which is not known to him, he must, after isolating the section, advise the concerned traffic controller to immediately impose a speed restriction of 20 km/h by day and 10 km/h by night with cautious driving by the Driver of the first train on the adjacent line, if a train had earlier entered the isolated faulty section before the OHE breakdown and has not reached the station in advance. If a train has already entered the adjacent line of the affected section, the Traction Power Controller, after isolating the faulty section, shall "Switch ON & Switch OFF" the supply in a predetermined manner to serve as a warning to the Driver of the train on the adjacent line to keep a sharp look out for any obstruction and for cautious driving to the next station.

9.4. In view of the long term ill effects on the Goods Rolling Stock and its repercussions on the safety of Railway operations, the end-to-end running of Goods trains without an examination en-route, recently introduced on all railways, should be held in abeyance in the light of what is actually happening in practice on the Western Railway till action is taken—(i) to enforce the Railway Board's standards of intensive examination at the originating station, (ii) to improve the specifications of materials used in Goods Rolling Stock, and (iii) to ensure the integrity of the fittings in the wagons over the extended runs. Till then, the norms of distance runs within the Railway and inter-

Railway for different types of Rolling Stock, as laid down in Railway Board's letter No. 78-M(W)/814/8-Vol. II, dated 1-10-80, should be strictly enforced on all Railways (Para 7.13).

9.5. With 85% originating effective vacuum stipulated for through Goods trains and 20% brake fade experienced for runs covering upto 800 Kms. the maximum speed should be reduced from 72 km/h to 60 km/h after about 400 Km for runs covering upto 800 Kms. For runs in excess of 800 Kms., the maximum speed should be further reduced pro-rata to the average brake fade taking place in the particular section.

9.6. Speed recorders should be provided on all electric and diesel locomotives working through Goods trains which are running end-to-end.

9.7. The AC-DC & AC electric locomotives working goods trains on electrified sections of the Vadodara Division are not provided with emergency telephones in contravention of Para 1715 of Railway Board's Manual of ACTM&O. The lapse should be taken up and immediate action taken to provide these telephones.

9.8. Every Train Examiner and Mechanical representative, who appeared before me at the Inquiry, maintained that intensive examination carried out by them at Bandra Marshalling Yard for IBTD Goods train would be followed by a safe-to-run examination en-route at Kota i.e. after about 900 Kms. Yet no such examination was carried out at Kota as checked by me on 100 IBTD Goods trains, which ran from Bandra Marshalling Yard to Tuglakabad before this accident. The same situation existed in respect of 100 Oil Tank Specials running from Bajva to Shakurbasti without a safe-to-run examination at Gangapur City. Evidently the Mechanical Officials were still following the distance norms laid down in Board's Circular Letter No. 78-M(W)/814/8-Vol. II, dated 1-10-80, as applicable to their intensive examinations, as per the extant practice on the Western Railway, notwithstanding the blanket order for end-to-end running issued by the General Manager to the Operating Branch. As a result, the fixing of responsibility on train examining staff for through goods train accidents occurring beyond Kota and Gangapur City was open to dispute, the mechanical representatives contending that the train should have been offered for inspection by the Operating Branch at Kota and Gangapur City. This misunderstanding should be cleared by issue of executive orders specifically clarifying the extant responsibility of TXRs after intensive examination and the responsibility of the Operating Branch when trains are not offered for examination en-route.

9.9. The same vacuum brake certificate issued for the AC/DC Locomotive at Bandra Marshalling Yard was handed over to the Driver of the AC locomotive when the locomotive was replaced at Valsad. The result was that the Driver

& Guard of IBTD Down Goods train ex Valsad did not know the vacuum level on the train. Likewise, when 3-4 coaches were attached to 6 Up at Ahmadabad and the locomotive was changed from steam to electric, a fresh vacuum brake certificate was given by the TXR to the Driver without indicating the level of vacuum in the rear brake van. It is absolutely necessary that the Driver & Guard should know the vacuum level on a train whenever the locomotive is changed or additional coaches are attached to the train. This may be strictly ensured by the Western Railway in future.

9.10. All Goods trains which have been intensively examined at the originating stations should be given a nomenclature, which should be prefixed with the letter 'I', as in the case of IBTD Goods train. Cases have come to notice where several through Goods trains are running on the Western Railway, which are intensively examined but their nomenclature is not prefixed with the letter 'I', with the result that it is not possible for the staff on line to know whether this train was intensively examined or not at the originating station. It is therefore recommended that the letter 'I' should be prefixed on the nomenclature of all intensively examined Goods trains on the Western Railway and other Indian Railways.

9.11. The Western Railway has not re-printed their Abstract of Goods Working Time Table since 1-6-79 whereas on all other Railways, it is the practice to re-print the Goods Working Time Table along with the Passenger Working Time Table every six months. It is further observed that the Western Railway Abstract of Goods Working Time Table shows only the intersectional running time for Goods trains for varying speeds and each Division has circulated the running time between stations for Goods trains without specifying the speed at which the trains are to be run. In view of the mandatory provisions of the Note under Para 4413 of the Western Railways Operating Manual that speeds of Goods trains should be restricted to 65 km/h whenever the minimum average vacuum is less than 45 cms., as reiterated in the printed vacuum brake certificate in use on the Western Railway and the fact that this level is not obtained in the majority of Goods trains in actual practice, it is recommended that the inter-station & inter-sectional running times for Goods trains should be indicated separately for maximum speeds of 72 and 65 km/h and printed in the Working Time Table. During the Inquiry it came to light that though the IBTD Goods train had an average vacuum of 40 cms. only at the originating station, the train ran at the maximum speed of 72 km/h. Everyone, from the Controller to the Station and running Staff, was working to one inter-station running time for Goods trains circulated by the Divisions based on the maximum speed of 72 km/h. This

is an unsafe practice and needs looking into immediately in the manner suggested above.

9.12. A drive should be instituted on the Western Railway to improve the standard of track maintenance on the Rajdhani route particularly in Miyagam Karjan—Itola section of the Vadodara Division. The APWI Shri D. P. Kumare and PWI Shri S. V. Vilekar should be taken up for their lapses noted in the Report (Para 7.14).

9.13. The provision of side lamps in working order on the brake-vans of Goods trains is an exception rather than the rule. The lighting of these lamps at night is generally never done. Apart from the IBTD Down Goods, where the side lamps were not in working order and were not lit after nightfall on the night of 27-10-80, I came across several Goods trains running without side lamps at night during the course of my Inquiry. As side lamps when lit at night give an indication to the Driver of the situation of the wagons in rear, it is necessary that a drive be instituted to ensure that the side lamps are in proper working order at all examinations at originating stations and severe action taken against Guards for not lighting them at night. The TXRs of Bandra Marshalling Yard and Guards of IBTD Down Goods trains should be taken for their failure to repair/light the side lights of the IBTD Goods train after dusk and before the accident.

9.14. No Vigilance Control Device was fitted in the Electric Locomotive of 6 Up although this was a long distance train. The provision of a Vigilance Control Device on the Electric Locomotive of all long distance Mail and Express trains is therefore recommended.

9.15. The headlight of the Electric Locomotive gets shut off when there is no OHE supply. It should be possible to work the headlight from the battery for short periods of about 20 minutes wherever the OHE supply gets cut off/fails. This will also enable the driver to flash his headlight as a warning to the driver of another train in the opposite direction in the event of the flasher light failing in an emergency. It is therefore recommended that the electric circuitry of the headlight of electric locomotives should be suitably modified to make this possible.

9.16. In Para 9.12 of my Report on the derailment of 6 Up BG Saurashtra Mail at Sabarmati and its consequential side-collision with 24 Down MG Somnath Mail in Baroda Division of Western Railway on 22-11-1979, I had pointed out that 5 coaches of 6 Up were found with Return Dates beyond 12 months of the last POH, contrary to the standing instructions contained in Board's letter No. 72/M(W)/814/60 dated 29-4-1972. It was a matter of surprise therefore to find 6 coaches with return dates beyond 12 months of the last POH on the same train i.e. 6 Up Saurashtra Mail. The Vadodara Division has apparently not taken note of the Board's instructions and neglected this safety aspect. This matter needs an urgent review and immediate compliance by Western Railway of the Board's standing instructions.

Yours faithfully,  
(A. A. REGO)

*Commissioner of Railway Safety  
Western Railway*

BOMBAY.

DATED. : 3rd April 1981.

*Annexure I*

**Joint measurements of Axle guard horn checks and Axle Box groove of Wagon No. 17196 ER/C derailed on the Down line on 27-10-1980**

Position of wheels		Width of Horn checks in mm		Width of Axle Box Groove in mm	
		Left Leading	Right Trailing	Left Leading	Right Trailing
Leading Left	Top	44	44	57	59
	Centre	43	43	53	54
	Bottom	45	44	55	55
Leading Right	Top	44	43	62	69
	Centre	44	43	59	68
	Bottom	43	42	61	60
Trailing Left	Top	43	44	57	57
	Centre	44	44	55	55
	Bottom	46	41	57	56
Trailing Right	Top	45	49	51	57
	Centre	45	48	51	54
	Bottom	45	45	52	57

**Remarks :—**Liner fitted in Trailing Right leading side half channel in front side.

Sd/-  
(S.V. Vilekar)  
P.W.I./Bharuch  
5-2-81

Sd/-  
(S. L. Vaishampayan)  
W.F.O./Vadodara  
5-2-81 Yard

*Annexure II*

**Details of spring deflection under load of Wagon No. 17196 ER/C derailed on 27-10-80 on Down line between MYG-ITA. Testing was done at DHD Work-shop**

Sl. No.	Theoretical spring deflection under load in mm	Actual spring deflection under load in mm				Remarks
		L/L	R/L	L/T	R/T	
1.	Free camber 76 mm (No load).	71	73	63	65	On leading left spring non-standard packing washer was fitted and then load test taken Drawing No. IRS WA-8.
2.	At 1 ton 69.8 mm	68	69	60	61	
3.	At 2 ton 63.5 mm	61	65	55	54	
4.	At 3 ton 57.1 mm	55	57	48	46	
5.	At 4 ton 50.8 mm	49	53	43	40	
6.	At 5 ton 44.4 mm	45	46	37	33	
7.	At 6 ton 36.5 mm	36	40	30	27	
8.	At 7 ton 30.2 mm	31	35	24	18	
9.	At 8 ton 23.8 mm	25	30	19	12	
10.	At 9 ton 17.4 mm	19	25	12	7	
11.	At 10 ton 11.1 mm	14	19	7	NIL	

Sd/-  
AME/BRC  
20-11-80

Sd/-  
AEN(I)/BH  
20-11-80



## Joint Observations of certain Items noted in Wagon No. 17196 &amp; 60990

Sl. No.	Description of item	Wagon No. 17196 ER/C			Wagon No. 60990 WR/C				
			Measurement in mm		Remarks	Measurement in mm		Remarks	
1.	Wheel gauge in mm.	A	L 1602	T 1601	Within limits.	L 1602	T 1600	Within limits.	
		B	1601	1600		1601	1601		
		C	1601	1602		1601	1600		
		D	not measured.			not measured.			
2.	Wheel dia in mm.	LL	1046		Within limits.	1022		Within limits.	
		RL	1046			1022			
		LT	1036			1017			
		RT	1036			1017			
3.	Flange thickness in mm.	LL	23		Within limits.	22		Within limits.	
		RL	24			26			
		LT	24			25			
		RT	25			23			
4.	SGCI bearing brass thickness in mm.	LL	41	See remarks @below	Brass not available	37	See remarks @below		
		RL	36.5					40	
		LT							37
		RT							
5.	Clearance between brass and journal collar in mm.	Wagons lying upside down and hence readings could not be taken.							
6.	Clearance between Axle groove and Axle guard.	All Axle guards bent and hence readings could not be taken.							
CRS Note :- Since taken vide Annexure I.									
7.	Free camber of spring in mm.	LL	71	O.K.	Non standard spring fitted in LL washer.	85		Top plate opened out and gapping by 6 mm. O.K. O.K. O.K.	
		RL	73	O.K.		82			
		LT	63	Weak		83			
		RT	65	Weak		79			
8.	Clearance between shackle plate and shackle pin in mm.	L	7	R 7	Under lined beyond permissible limits.	L 1	R 1	Under lined beyond permissible limits.	
		RL	10	4		5	4		
		LT	5	1		2	3		
		RT	5	5		2	2		
9.	Thickness of slipper plate in mm.	LL	15.5		LT There are hammer marks on top and bottom at front edge.			LT Slipper plate dropped at site could not be traced out.	
		RL	15.5						
		LT	8.16						
		RT	11.5						
					RT Flattened at top, clear impression of bearing seat of 2 mm depth, exists at bottom.			RL Not recorded, but O.K. LT Do. RT Do.	
					LL O.K. Two hammer marks of 25 mm each of outer top.				
				*Wagon No. 17196 ER/C	@Wagon No. 60990 WR/C				
	LL	Metal expanded (12 mm) at shoulder and slightly at sides—Defective but tolerable.			LL	Bearing brass worked out from behind the box. Brass taken away during accident.			
	LT	Formation of groove towards periphery of bearing shell at front for over a length of 36 mm and depth 8 mm upto a length of 75 mm. White metal O.K. around the periphery. At shoulder metal expanded in the form of thin sheet. Also metal expanded both sides white metal damaged at shoulders, very bad. Rejectable.			LT	Front end white metal slightly spread, rear end white metal slightly spread. Front and left corner white metal compressed.			

Sl. No.	Description of item	Wagon No. 17196 ER/C		Wagon No. 60990 WR/C	
		Measurement in mm	Remarks	Measurement in mm	Remarks
		<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>
		RL Metal expanded and broken at the journal cap round the periphery. Metal at shoulder also expanded—Defective but tolerable.		RL Dent marks across the edge 50 mm long and 3 mm deep. Others 25 mm long and × 1 mm deep. One edge battered. Ends white metal spread slightly.	
		RT Formation of groove round the periphery of bearing shell at front for over a length of 60 mm and depth over 9 mm. Metal expanded at shoulder left corner and loose.		RT Edges of bearing dented and damaged extending upto 25 mm towards corner.	

Sd/  
AEN(I)BRCSd/  
AME/BRC

## Annexure IV

Track reading from point of mount in rear for derailed Down BTD at stations 1.0 m apart on 27-10-80 between MYG—ITA.

Station No.	Down line under free condition		Down line under loaded condition		Station No.	Down line under free condition		Down line under loaded condition	
	X-Level	Gauge	X-Level	Gauge		X-Level	Gauge	X-Level	Gauge
0*	8L	+7	Not recorded	Not recorded					
1	6L	+7			31	2L	C	C	C
2	6L	+7	16L	+6	32	C	+2	4L	+2
3	12L	+6	10L	+7	33	4L	+4	4L	+4
4	10L	+7	12L	+6	34	4L	+4	4L	+4
5	10L	+7	10L	+6	35	4L	+3	4L	+3
6	8L	+6	8L	+5	36	4L	+3	7L	+3
7	2L	+6	6L	+5	37	6L	+4	7L	+3
8	6L	+7	7L	+7	38	5L	+4	5L	+3
9	6L	+11	6L	+8	39	3L	+3	2L	+3
10	5L	+16	6L	+16	40	C	+2	C	+2
11	6L	+17	6L	+16	41	C	C	C	C
12	6L	+16	6L	+14	42	2L	+1	2L	+1
13	5L	+12	6L	+11	43	2L	+1	2L	+3
14	3L	+10	3L	+8	44	3L	+2	4L	+4
15	4L	+8	5L	+7	45	4L	+5	4L	+4
16	3L	+7	3L	+5	46	3L	+6	4L	+5
17	2L	+6	2L	+5	47	4L	+6	4L	+6
18	2L	+4	2L	+3	48	6L	+6	6L	+5
19	C	+4	C	+4	49	7L	+5	7L	+4
20	C	+4	C	+2	50	6L	+3	6L	+3
21	C	+4	1L	+4	51	5L	+4	5L	+3
22	2L	+5	4L	+6	52	4L	+4	3L	+3
23@	8L	+2	6L	+3	53	2L	C	3L	+3
24	6L	+2	4L	+2	54	2L	C	2L	C
25	4L	+2	4L	+2	55	C	+1	C	-1
26	5L	+3	4L	+3	56	C	+1	C	C
27	2L	+2	2L	+2	57	C	+3	6R	+3
28	1L	+2	2L	+2	58	C	+4	4R	+3
29	C	+1	C	+2	59	C	+6	C	+5
30	1L	+1	C	+2	60	C	+7	C	+5

\*Point of mount.

@Free joint.

Station No.	Down line under free condition		Down line under loaded condition	
	X-Level	Gauge	X-Level	Gauge
61	4L	+6	4L	+5
62	5L	+5	4L	+4
63	3L	+4	4L	+3
64	2L	+6	2L	+6
65	4L	+4	2L	+4
66	2L	+3	2L	+3
67	C	+4	C	+3
68	2L	+3	2L	+3
69	2L	+4	2L	+3
70	C	+3	C	+3
71	C	+3	2R	+3
72	5R	+2	6R	+2
73	9R	+3	9R	+2
74*	5R	+3	4R	+3
75	2L	+3	2L	+2
76	3L	+1	4L	+3
77	4L	C	4L	C
78	6L	+1	5L	C
79	6L	C	6L	C
80	7L	+1	6L	C
81	7L	+1	8L	+1

Station No.	Down line under free condition		Down line under loaded condition	
	X-Level	Gauge	X-Level	Gauge
82	4L	+1	6L	+2
83	3L	+1	3L	+2
84	2L	C	4L	+2
85	2L	-1	C	C
86@	C	-1	C	+1
87	C	+2	2R	+1
88	C	+2	C	+3
89	C	+3	C	+3
90	C	+2	C	+2

\*Joint on right side.

@Free joint with normal gap.

Note :—Condition of bolts & fittings tight.

Sd/- Sd/- Sd/-

CWS/VADODARA PWL.BG/BHARUCH TI/MIYAGAM  
Station 0 to 22 falls on 5 Rail panel affected by derailment and track distorted in alignment due to impact and thrust on the rail.

L=Left low.

R=Right low.

Sd/-  
PWL BG/BHARUCH

#### Annexure V.

Extract of the report of the Chemist and Metallurgist, Western Railway, Ajmer

(No. C&M/MRF/11B/6835 MF 80/637 MF 80, dated -12-80)

#### 1. BROKEN SCREW ROD

##### 1.1. Particulars :

Wagon No. 17196 ER/C  
Broken Screw rod  
Lab. No. 635 MF 80

##### 1.2. Visual Examination:

The fracture was of sudden rupture type as indicated from the crystalline nature. The screw rod was broken at a distance of about 29 cms from the washer end.

##### 1.3. Chemical composition :

Carbon 0.43%  
Silicon 0.20%  
Manganese 0.68%  
Sulphur 0.039%  
Phosphorus 0.041%

1.4. Hardness Survey: 190, 180, 185, 185=185 BHN  
Tensile strength (Calculated) 64 Kg./Sq. mm.

##### 1.5. Micro examination :

(i) Cleanliness (Non-metallic inclusions) as per ASTM No. 45-46 T.

A1 thin series sulphide, B<sub>2</sub> thin series.

Alumina type D2 thin series globular type oxide.

(ii) Micro structure.

Pearlite ferrite.

1.6. Comments : (i) Chemical composition Satisfactory  
(ii) Cleanliness Satisfactory

In normalised condition } (iii) Micro structure Satisfactory  
(iv) Hardness Satisfactory

1.7. Remarks :—The failure of screw coupling rod is due to stress rupture having taken place on sudden tension in loading and being the primary cause of failure.

(2) The physical and chemical test results indicate that screw rod was manufactured from class IV steel to IS-1875 as specified. However, the micro examination revealed that the screw coupling rod was normalised instead of oil quenched and tempered as per requirement of clause 4 of IRS-R-9. The normalised steel has lower tensile strength than oil quenched and tempered steel.

xxx xxx xxx

Sd/-  
(C.M.BHATNAGAR)  
CMT AH.

## Extract of General Rules.

166. **Trains stopped between Stations.**—(1) When a train is stopped between stations on account of accident, failure, obstruction or other exceptional cause, and the Driver finds that his train cannot proceed, he shall as prescribed by special instructions, sound his whistle to apprise the Guard of the fact and exchange hand signals with him. The Guard and the Driver will then take the following action immediately :—

xxx                      xxx                      xxx

- (h) if the stoppage has occurred on a portion of the line adjacent to which are one or more parallel lines, whether of the same or different gauges, the primary duty of the Guard or a person deputed under clause (a) shall be to protect the adjacent line or lines on which normally trains run in the direction of the affected train, unless it is quite apparent and clear that such adjacent line or lines are not obstructed. Similarly the primary duty of the Driver or the person deputed under clause (g) shall be to protect the adjacent line or lines on which normally trains run in the direction opposite to that of the affected train. The protection of the adjacent line or lines shall receive precedence over that of the occupied line. If the adjacent line or lines are found to be free from obstruction at a later stage, the detonators and danger signals may be removed except where it is desired to stop the first approaching train in order to obtain assistance.

2. **Extracts of Rules from Railway Board's Manual of AC Traction Maintenance and Operation.**

1264. **Protection of Train when OHE Supply fails.**

1. When overhead supply fails specially on gradients, the Driver shall endeavour to proceed on the momentum of the train and stop the locomotive close to the next emergency telephone socket. To help the Driver, arrow marks are painted on the faces of OHE masts indicating the direction in which the nearest emergency socket lies. If power supply is not restored within 5 minutes after stopping the train, he should make use of his portable telephone to ascertain from the TPC

through the emergency telephone socket the time when the supply is expected to be restored. If it is likely to be more than 15 minutes then the Driver should apply air and hand brakes on the loco and pin down brakes on 10 wagons immediately behind the loco in the case of goods trains and all available hand brakes in the case of passenger trains. This is necessary to avoid rolling down of the train, specially on gradients, due to gradual loss of vacuum.

If the Driver is unable to stop the train close to the emergency telephone socket, and is likely to take more than 15 minutes to ascertain the time of restoration of the over head power supply from TPC, he must first protect the train against rolling as indicated above and then contact the TPC.

The same instructions have to be observed in case of electric loco failure when it becomes necessary to make loco dead and call for assistance.

2. In addition to the above, the precautions prescribed in General and Subsidiary Rules for protection of trains when stopping out of course should be observed.

3. If, after power is restored, the Driver experience tripping again, he shall not energize the locomotives until he has personally satisfied himself that there is no abnormality on his locomotive.

1714. **Expeditious Clearing of Track.**

In the event of a failure of locomotive or EMU, the primary objective should be to clear the line as quickly as possible so that the repercussions on traffic will be minimized. The Driver should follow the detailed instructions given in the respective trouble-shooting manuals. He should seek guidance from TLC wherever necessary.

If the Driver is unable to move the locomotive or EMU on its own power, he should ask for a relief engine or assisting train as the case may be.

3. **Extracts of Rules from Chapter I of Trouble Shooting Directory of Western Railway.**

Nature of failure with abnormal sign	Sub Abnormal sign/operation to be carried out	Remedial action
xxx 2. UA does not deviate and DJ trips when BLRDJ is released	xxx (i) If Arnc starts  (ii) If Arno does not start (no starting noise of Arno)	xxx (a) Check CCUA. If melted—Replace with CCTFS/CCQV61. If it melts again wedge Q 44 and clear the section.  (a) Check Panto. (i) If panto is not touching OHE, raise the other panto trouble shoot if necessary. (ii) If panto touches OHE, check for abnormality tension—try every three minutes and contact TPC after 10 minutes.
2. 'A' UA deviates and DJ trips on releasing BLRDJ.	(i) If Arno starts	(a) Q 30 relay is either defective or not getting energised wedge Q 44.

4. **Extracts of Rules from Western Railway's Traction Manual.**

16.20. **Measures to be taken in case of failures.**—(a) **Running Train.**—(i) As soon as the driver is aware of a power failure on the run, he should immediately bring his master controller to "off" position. The pantograph may be left in the raised position and the

driver may continue his run for one minute provided the track ahead is clear and no previous warning has been given. If the failure is caused due to some defect in the locomotive he must stop immediately.

(ii) While coasting under these circumstances the driver and his assistant should maintain a sharp look

out on the track catenary and instrument panel of his train.

(iii) While coasting without current if the compressed air pressure falls below 4.5 atmosphere or the engine is defective and if the power supply is not restored within one minute of failure, the driver should stop the train immediately. The driver should try to stop the train as close to an emergency telephone or an establishment as possible. If the driver is compelled to stop his train due to a power failure he should lower the pantograph before leaving the loco for informing TLC.

(iv) After stopping, the driver should contact the Traction Loco Controller. If however the stoppage is due to an accident (derailment, damaged catenary etc.), he should protect the train first before he contacts the controller.

(v) If the emergency telephone is out of order the driver should wait for 10 minutes and if the supply is not restored (he must test for power by raising the pantograph every 3 minutes) by the time, he must send his assistant with a written message to the nearest station.

(vi) When the supply is restored the driver should resume his normal run again observing G.R. and S.R. 167.

(b) *Shunting*.—In the event of failure of power while shunting the driver should immediately trip the circuit breaker, lower the pantograph and stop the engine. Then he should take necessary instruction from the Station Master.

#### 5. Extracts of Instructions from Prevention of Hot Boxes Guide.

7.5. Some of the other items which require inspection and repairs at the workshops are replacement of all axle box liners which is important from the point of view of centralised control of the axle box while in service and checking the flatness of the inside crown of the axle box. No concave wear on the inside crown is to be permitted, under any circumstances.

#### 6. Extracts of Conference Rules Part III.

2.10.3. Maximum permissible total lateral clearance between the axle guard and the axle box groove of between the horn check and axle box (Plate 43) is given below :—

	Bogie	Four wheeler
Broad and Metre Gauge	10 mm.	10 mm.
xxx	xxx	xxx

4.5.1. Axle box visibly worn in such a way as to interfere with the lubrication of the bearing.

Note under Para 3.9.1.

Note :—A difference of 13 mm. or more in the working camber between any two springs under a unit under load will indicate uneven loading or a weak spring.

## REVIEW OF RAILWAY BOARD ON VARIOUS PARAS OF REPORT

### Findings :—

The findings of the Commissioner of Railway Safety with regard to the cause of the accident and responsibility therefor as given in paras 8.1 and 8.2 of the report are, prima facie, acceptable.

### Remarks & Recommendations :

**Para 9.1 :** For adopting quicker ways and means by the drivers and guards of trains in one direction to communicate warnings to adjoining stations and drivers in trains in the opposite direction, on heavily worked double line sections, the Commission of Railway Safety has made the following suggestions :—

- (i) Provision of mobile radio communications equipment on diesel/electric locomotives.
- (ii) Fitting of yellow flashing lights on diesel/electric locomotives.
- (iii) Supply of fuses to guards and drivers of all trains.

Regarding (i) above, the matter has been examined and position explained to CCRS, vide CRB's D.O. letter No. 81/Safety-I/24/1 dated 5-8-81 (Copy enclosed).

As for (ii), it may be mentioned that flasher lights have been provided on all diesel and on almost all electric locomotives to serve as a warning to drivers of approaching trains to stop and avoid running into obstructions, if any, caused by derailed vehicles. A few electric locomotives, on South Eastern Railway are yet to be provided with flasher lights; work is in progress.

Regarding (iii), instructions have been issued to the Railways vide Board's circular letter No. 79/Safety (A&R)/29/22 dated 9-1-81, laying down that in addition to supplying fuses to guards/drivers/patrolmen/gatemen working on ghat, suburban, automatic and absolute permissive block territories, fuses should also be supplied to these categories of staff on double and multiple line sections and that detailed instructions should be issued explaining the circumstances in which the staff should make use of this equipment. It has also been stipulated that demonstration should be organised and checks intensified to educate the staff to ensure that they have a clear concept as to when and how fuses are to be used. A copy of the circular letter issued is enclosed.

**Para 9.2 :** Detailed instructions setting out special precautions to be taken by controllers/station masters and train crew on electrified sections, when a section of OHE is found to be

faulty, have been issued to the Railways vide Board's letter No. 80/Safety (A&R)/29/15 dated 12-1-81. General Rules 166 has also been amended vide notification No. 80/Safety (A&R) 29/15 dated 30-4-81 to make the position explicit.

**Para 9.3 :** As mentioned in this Ministry's remarks against para 9.2 above, detailed instructions indicating the special precautions to be taken by the controllers etc. in the event of OHE failure, have been issued to the Railways.

AS regards the suggestion to switch OFF & switch ON supply by the Traction power Controller in a pre-determined manner to serve as a warning to the driver of the train on the adjacent track, such a procedure will be of a little practical value as a driver cannot distinguish between switching OFF of power and tripping of the DJ. Once the power is off or the DJ has tripped, it takes the driver about 3 minutes of complete the sequence for re-starting the loco & if the power trip again, he is likely to be confused whether this is due to a fault on the loco or as a warning signal from the traction power controller. In any event deliberate switch off & switching on of the power is not desirable as it may damage the equipment. In any case, instructions issued vide para 9.2 will help in preventing a train on adjacent line from running into an obstruction, on an electrified section.

**Para 9.4 :** The matter of end-to-end-running of goods train is already in correspondence with Chief Commissioner of Railway Safety separately. CCRS's letter No. RS. 25-T(7)/79 dated 5-12-81 and Board's letter No. 80M(W)/814/39 dated 6-2-82 refer.

**Para 9.5 :** A study on the subject has been conducted by two Officers on Special Duty. While the report is under examination, it has indicated that there is a brake fade to the extent of about 5 per cent for every 500 kms. The question of carrying-out intermediate examination is under correspondence with the Chief Commissioner of Railway Safety separately.

**Para 9.6 :** The extent instructions are that speed recorders be provided on all locomotives working mail/express trains while locomotives working through goods trains are to be provided with speed indicators. Since end-to-end running by itself is only an extension of through goods running of diesel and electric locomotives, which were already of substantial runs, it is felt that end-to-end running by itself does not warrant change of extent instructions. In this connection, it is also pointed out that diesel and electric locomotives running end-to-end are not segregated.

Board have, however, approved fitment of speed recorders on new built main line diesel electric locomotives.

**Para 9.7 :** The deficiency of emergency telephones was due to non-availability of the instruments. Action has been taken by the Railway Administration to procure adequate number of emergency telephones to provide those in all electric locos.

**Para 9.8 :** In the case of end-to-end running of goods trains, clear instructions have already been issued stipulating the requirements for carrying out intensive examination at the originating/next train examining station and prefixing 'I' on the number of such trains in the vacuum brake certificate for the guidance of the operating as well as mechanical staff en route. As for other stock, instructions have also been issued vide Board's letter No. 80-M(W)/814/39 dated 4-6-82 that it would be given intensive examination and made fit to run for 800 Kms. for B.G. This scheme is being followed in the case of tank wagons also. Western Railway have also issued instructions that Tank Specials should be given safe-to-run examination at Gangapur City after intensive examination at Bajuwa. Such a course would take care of 800 Kms. run not being exceeded to.

**Para 9.9 :** Instructions regarding fresh vacuum brake certificate being issued when engines are changed, have been reiterated vide Board's letter No. 82/M(C)/141/6, dated 7-7-82.

**Para 9.10 :** Instructions have been reiterated by the Railway Administration that all long distance trains scheduled for end-to-end running, after intensive examination at originating points should be given the prefix 'I' for the guidance of staff en route.

**Para 9.11 :** Action is being taken by the Railway to publish the Goods Working Time Table incorporating therein inter-sectional running time at normal and restricted (for brake-fade) speeds. Instructions on the subject are also being issued to all the Railways.

**Para 9.12 :** Necessary action has been taken by the Railway Administration in compliance with CRS's recommendation.

**Para 9.13 :** A drive was instituted for putting side-lamps on brakevans in proper working order at train originating stations. The Railway has been asked to take action against the examiners at Bandra Marshalling Yard and the guards of IBTD Down Goods Train for their failure to repair/light side-lamps on the train.

**Para 9.14 :** Keeping in view the fact that two crew members are available on the diesel/electric locomotives and the operation of VCD was found to distract the attention of the driver from safety functions, the recommendation No. 190 contained in Part II of report of RAEC '78 has been accepted for not pursuing the installation of VCD of the present design. It was also found that VCD served as an irritant to the driver.

**Para 9.15 :** The General and Subsidiary Rules provide for detonators to be placed on track to protect an oncoming train. In addition, flasher lights have been provided on diesel/electric locomotives which are to be switched on immediately to warn the drivers of approaching trains to stop and avoid running into obstructions.

Feeding the head-light from battery when OHE supply fails, as proposed by CRS, is, therefore, not considered absolutely essential. However, such a feasibility has been examined by Western Railway as well as RDSO and it is found that this is not an easy proposition that can be implemented readily. Considerable developmental work will be necessary, which has been taken in hand. Action on the proposal will be taken based on results of the developmental work and technical and financial implications.

**Para 9.16 :** Instructions exist not to use coaches on Mail and Express trains which had last POH more than 12 months ago. In exceptional cases, when it is unavoidable to do so, such coaches which have been given POH more than 12 months ago, may be used provided they are examined and properly certified by Carriage & Wagon staff as fit for service on Mail/Express trains after checks on the condition of coaches specially underframes, bogies wheel sets, axle box, brake gear and brake power etc. Board's instructions contained in letter No. 81/M(C)7/7 dated 10-7-81 on the subject are clear and comprehensive.

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