No. SAC/5/2011-2012/NCR Dated: 01. 8.2011

To,

Secretary(Safety),
Railway Board,
Ministry of Railways,
Rail Bhavan, New Delhi.

Subject :- Derailment of Train No.12311 UP Howrah- Kalka Mail at about 12.19 Hrs of 10.07.2011 at Malwan Station between Fatehpur and Kanpur Stations on Allahabad-Kanpur Broad Guage double line electrified section of Allahabad Division of North Central Railway.

Sir,

1.1 **Preamble**

In accordance with Rule 3 of "Statutory Investigations into Railway Accidents Rules, 1998" issued by Ministry of Civil Aviation, I forward herewith the Preliminary Report of my Statutory Inquiry into the derailment of 12311 UP Howrah- Kalka Mail train at about 12.19 Hrs of 10.07.2011 at Malwan Station of Allahabad- Kanpur Broad Gauge, double line, Electrified Section of Allahabad Division of North Central Railway.

1.2. **Inspection and Enquiry**

1.2.1 On 10.07.2011, at about 13.30 Hrs, Commissioner of Railway Safety(CRS), North Eastern Circle, Lucknow told me on my mobile phone that Howrah - Kalka Mail train had derailed at Malwan Station between Fatehpur and Kanpur and fatalities/injuries to passengers were expected. Then, I saw news, related to the accident, on Television. Shri. P. K. Bajpai, Commissioner of Railway Safety, North Eastern Circle, having jurisdiction over North Central Railway, was already having four accident inquiries in hand. Therefore, I directed CRS/NF Circle to conduct statutory inquiry into the accident. This was conveyed to General Manager/ North Central(NC) Railway, asking NC/Railway to make arrangements for his inspection of site. I also advised Chief Safety Officer(CSO)/NC Railway, through CRS/NE Circle, to arrange preservation of clues and detailed

photography. In the evening, at about 21.00 Hrs, I saw the news flash on TV news channels about occurrence of an accident on Northeast Frontier Railway, which is in the jurisdiction of CRS/NF Circle. Then, I changed the programme and directed CRS, NF Circle to conduct statutory inquiry into the accident, which had occurred on NF Railway and decided to conduct the inquiry into the subject accident, myself. I conveyed this and my programme of inspection on 11th & 12th July 2011 to CSO NC.

On 11.07.2011, at 09.00 Hrs in the morning, I, accompanied by CRS/NE Circle, proceeded by road and reached the accident site at about 11.45 hrs. I inspected the site from 11.45 to 16.00 Hrs along with CSO/NCR and other officers of the NC Railway.

After 16.00 Hrs, I went to Fatehpur Civil Hospital, where large number of injured passengers were undergoing treatment. I was accompanied by CSO during hospital visit. I enquired from some injured passengers about arrival of their family members and regarding ex-gratia payment made by Railway. Part of ex-gratia payment had been made to injured passengers by Railway. X-ray reports of some persons were awaited. Railway Doctor told that X-ray film examination had got delayed, since many Government Doctors had been engaged till then, in post-mortem of dead bodies. Proper medical care of injured passengers was being taken.

I advised CSO/NCR on 11th July that I would be holding statutory inquiry into the accident on 13th, 14th & 15th July, 2011 at Kanpur. CSO/North Central Railway was asked to get published the notice of inquiry by the undersigned on 13th, 14th & 15th July, 2011 at Kanpur.

On 12.07.2011 morning, I visited Coach Maintenance Depot at Kanpur and inspected some coaches with a view to have understanding of undergears and underslung components of coaches. Thereafter, I went to accident site again and inspected locomotive, coaches and site from 11.00 to 15.00 Hrs. About half km track from km 957/14 to 957/2 was inspected to see fitment of joggled fishplates. Thereafter, I went to Fatehpur Railway Station for inspection of three coaches, which had been brought there, after rerailment.

Notification for the inquiry was published in the newspapers. Civil & Police Authorities were informed about the inquiry by Railway.

Inquiry commenced at 10.00 Hrs of 13th July in the office of Dy. Chief Traffic Manager, Kanpur. Inquiry was held from 10.00 to 18.00 Hrs on 13th, 14th and 15th July 2011.

Evidences of 79 witnesses were recorded at Kanpur from 13th to 15th July 2011. 3 were members of public, 3 were police personnel and 73 were Railway officials.

SDM/Fatehpur, Shri Ram Chandra attended the inquiry on 14th July 2011 and briefed about initial response by Civil and Police authorities. He told that Commissioner, Allahabad had intimated National Disaster Response Force(NDRF) at about 13.00 Hrs of 10th July 2011 and had sought their help. Civil and Police authorities had reached the site within 30-35 minutes of the accident. By that time, local persons had already started rescue work.

Following officers were present during the inquiry :.

1. Mr. Narottam Das, CSO/NCR
2. Mr. M. K. Garg, CTE/NCR
3. Mr. A. K. Misra, CRSE/NCR
4. Mr. Naseemuddin, CELE/NCR
5. Mrs. Gauri Saxena, CCM (FM)/NCR
6. Mr. Arun Kumar, CSE/NCR
7. Mr. Manoj Seth, CTPM/NCR
8. Mr. B. K. Agarwal, CRM/ALD

Divisional Officers were called in the inquiry, as and when required.

I inspected some AC Coaches (Not of the train) from 18.00 to 20.00 Hrs of 13.07.2011 in Kanpur to see heights of lowermost underslung fitments of coaches.

Rear bogie of the loco No. 30221, the loco of the train, had detached from the loco in the accident. It had been brought to Kanpur Electric Loco Shed. The bogie was inspected in the shed on 13.07.2011.

Site of accident was again inspected by me in the morning of 15.07.2011. CSO, CTE, CSE/NC Railway and DRM/Allahabad accompanied me in this inspection.

Statements of nine Railway officials were recorded on 22.07.2011 in my office at Lucknow. During this recording of statements, following Railway officers were present :

1. Mr. Narottam Das, CSO/NC Railway
2. Mr. M. K. Garg, CTE/NC Railway
3. Mr. B. K. Agarwal, DRM/Allahabad

1.2.2 **Preservation of Clues**

A joint note, including joint observations of the site, station panel, affected Loco and Coaches was prepared by senior supervisors. Sketch of the site had been prepared

Railway Administration had arranged still photography of the site, damaged track and rolling stock, involved in the accident. Video recording had also been done.

Three rail pieces, two joggle fishplates and broken fittings of turnout had been preserved and were produced in inspections and inquiry.

Report of logged data of signaling relays was got printed and produced in inquiry.

Voice recording of control circuit had been preserved. Transcript of relevant communication between Malwan station and Control office was prepared and submitted during inquiry.

Memory record of the speedometer of locomotive of the train had been preserved. Print out of speed record was made available during inquiry.

Record of memory of onboard diagnostic computer of the locomotive was got printed and produced in the inquiry.

Records of Malwan station, control office, Record of maintenance of the line, points and crossings and signals had been preserved. These were produced in the inquiry.

1.3 **The Accident**

1.3.1 Train No. 12311 UP Howrah- Kalka Mail train, (hereinafter also referred to as 'the train') started from Fatehpur Station, after its scheduled halt, at 12.07 Hrs. It passed running through Kurasti

Kalan station at 12.15 hrs. It passed Up home signal of Malwan station and then, it became derailed.

Locomotive and 15 coaches derailed between km 957/27-28 and km 958/3-4. The Loco capsized and tilted towards left. Five coaches, first to fifth, were derailed on the left side of Up main line. Sixth and seventh coaches, shorn of bogies and axles, landed on up main, DN main and DN loop lines. Seventh coach came to rest on its side. Eighth coach went up, became across to track, and landed on third coach, deforming the body of third coach very badly. Ninth coach went up, became across to track and landed with its rear end riding fourth coach, and front end on ground beyond up loop line. Tenth coach, shorn of bogies and axles, landed on DN main and DN loop line. It had turned turtle and rested on its roof. Eleventh Coach had one end over tenth coach and the other end was on a heap of bogies and axles. Twelvth coach came to rest with leading end over the heap of bogies and axles. Thirteenth and fourteenth coaches remained on alignment of UP main line, over damaged track. Leading bogie of fifteenth coach rested on damaged track and its rear bogie was on track.

Nine rear coaches, sixteenth to last of the train, remained on track.

Third and fifth coaches were badly deformed. Access into these coaches had got severely restricted by their own deformations and also blockage by other coaches. Due to internal structural breakages, persons inside these two coaches were badly trapped in mangled metal. Front portion of sixth coach had also deformed badly. Sixth to twelvth coach had undergone heavy jerks and ends of these coaches had deformed.

Internal structural elements and fittings of first to thirteenth coaches had got deformed, displaced and mangled to various degrees.

The accident was massive, with heavy consequences. Rescue and relief was initially started by local public and few railway officials available at the station and in the train.

Officials of Civil Administration and Police reached in about half an hour and took charge.

Army contingent and NDRF team had been requisitioned by Railway.

Railway's Medical relief vans from Kanpur and Allahabad reached about two hours after the accident. By this time uninjured and injured, but not trapped, passengers had been mostly rescued from the train. ARME staff started rescue of trapped injured passengers and taking out trapped dead bodies.

Army contingents arrived by about 17.00 Hrs and took up rescue work.

NDRF contingent, from Delhi, reached the site at 21.15 Hrs and took charge of rescue of remaining trapped injured persons and taking out dead bodies.

Rescue of injured passengers was completed at 03.00 Hrs of 11.07.2011. Work of taking out trapped dead bodies continued thereafter. Last dead body was removed at 12.30 Hrs of 11.07.2011.

Injured persons had been taken to hospitals and nursing homes at Fatehpur and Kanpur.

A relief train was started from Malwan to take passengers, who could travel, for their onward journey to Delhi.

One relief train was run from Delhi and another from Howrah for bringing passenger's relatives to Kanpur and Fatehpur.

Traffic on Kanpur-Fatehpur line had been totally disrupted due to the accident.

Removal of coaches from track was completed at about 17:40 Hrs on 11.07.2011. Derailed Loco was put back on track at 00:40 Hrs on 12.07.2011.

Restoration was completed in the morning of 12th July.

1.3.2 'Right' and 'Left', 'Ahead' and 'Before' and 'After' and 'Rear' referred to in this report are with reference to the direction of the train's movement and direction of traffic on Up line.

1.4 Casualties

I regret to report that the accident took a heavy toll of human life. Two coaches, one general second class and one sleeper class, got badly deformed due to hits by other coaches and casualties were high amongst passengers of these two coaches. Persons were

trapped and entangled in mangled metal. Rescue of injured persons from these coaches took number of hours even after deployment of Army contingent and Team of NDRF personnel. Extensive cold cutting of metal was required by ARME staff, Army and NDRF personnel. Last injured person could be taken out only at 03.00 Hrs of 11.07.2011 i.e. about 15 Hrs after the accident.
As a result of the accident, 70 passengers lost their lives, 84 passengers were grievously injured and 169 passengers sustained simple injuries.

1.5 Passenger Occupancy

The train was running with 24 coaches. Estimated occupancy of the train was 1394 against the carrying capacity of 1468 passengers. The train was almost fully occupied.

II. RELIEF MEASURES

2.1 Intimation

The accident occurred in front of East Cabin of Malwan station. It was noticed immediately by SM/Malwan. He informed control office at 12.20 Hrs. Dy. Chief Traffic Manager/Kanpur was travelling in the train. He also conveyed the message of accident on his mobile phone. Control Office informed Divisional Officers and Headquarter Control Office within 2-3 minutes.

Disaster Management Cell of ALD Division and Station Master of Malwan station informed civil authorities of Fatehpur.

2.2 Rescue, Relief and Medical Attention

2.2.1 Medical relief equipment vans of Kanpur and Allahabad were ordered at 12.21 Hrs. These departed at 12.52 and 12.50 Hrs respectively.

Rescue and relief was started by local public immediately after the accident. Local Police also reached the site within about half an hour and joined. Local Volunteers and Organisations also joined rescue and relief effort. Management of Laxmi Cotton Mill provided a bus to carry passengers from site.

Railway requisitioned help of Indian Army and NDRF within about one hour of the accident.

Station Staff also assembled to help. Permanent Way and Traction equipment maintenance gangs also contributed to rescue efforts. Ladders and ropes were arranged by traction equipment maintenance staff.

District Administration arranged Ambulances and transport to carry passengers and injured from site. They arranged tractors and ambulances in about 45 minutes after the accident to carry injured passengers to nearby hospitals.

Some uninjured passengers were sent by buses to Kanpur. Injured persons were sent to Hospitals and Nursing Homes in Fatehpur and Kanpur.

ARME from Kanpur, with a team of four Doctors reached the site at 14:10 Hrs. The other medical team from Allalhabad reached at 14:25 Hrs by ARME. Divisional and Headquarter officers had also come by ARME/Allahabad. By that time, only trapped injured persons and dead bodies were remaining, mostly in four coaches i.e. one GS coach and sleepers S1, S2, S3 coaches. Staff of both ARMEs started working with cold-cutting equipments to rescue trapped persons from these coaches.

Railway Officers took charge of rescue work. They directed working on GS 00516, which was capsized under coach GSCN 08202. Two set of cold-cutting equipments were used to safely extract three alive persons and one dead body by 15:15 Hrs. Another alive passenger was rescued later with the help of Army persons. Six dead bodies were extracted from the coach initially and later on ten more dead bodies were recovered from the same coach.

Rescue teams also started working on other coaches, Cold-cutting equipments were used to rescue persons. In the meantime, ladders were organized by OHE department. Ladders helped in expediting rescue and checking of AC coach, which was high in air with one end over a coach and other end on high heap of debris.

Army contingent, including 5 Doctor and 7 Ambulances left Kanpur at 14.10 Hrs and reached site at 16.40 Hrs. Another rescue army team left ALD at 14.30 hrs and reached site at 17.30 Hrs. These contingents joined rescue operations. Defence Helicopters were also put in service for taking injured persons to hospital.

NDRF team of nearly 140 people took up rescue operations at 21:15 Hrs.

Army personnel and NDRF used their expertise and equipment in extracting alive persons and dead bodies from deformed coaches by using cold cutting equipment.

Rescue of injured persons was completed at 03.00 Hrs of 11.07.2011.

Work of bringing out dead bodies was completed at 12.30 Hrs of 11.7.2011.

2.2.2 **Relief**

Help Lines had been set up at Aligarh, Tundla, Kanpur and Allahabad by 12:45 Hrs. National Disaster Helpline 1072 had been set up by 12:50 Hrs.

Relatives of injured passengers were informed through local police station as well as by passengers themselves, who arrived at hospital. Help line service telephone numbers were displayed on local news channels.

Tea, water and biscuits were arranged and served free of cost to the injured passengers at site and hospital.

Details of the accident and the list of injured passengers was given to the media.

A relief train consisting of 16 coaches departed from Kanpur at 15:05 Hrs of 10.07.2011 and reached Kanspur Gugauli at 16:00 Hrs. It departed at 16:55 Hrs for Malwan, reaching there at 17:32 Hrs. Porters were available in the train for helping to load the luggage of stranded passengers in the special train. 150 passengers boarded this relief train from Malwan. This train reached Kanpur at 20:25 Hrs, where two more coaches were attached, 328 passengers boarded this train at Kanpur. This train left for New Delhi with 478 passengers on board and reached Delhi in the morning of 11.07.2011. Passengers had been served water, tea, biscuits at Kanpur and provided with food packets.

One extra coach was attached to 12003 (Shatabdi express) at Kanpur on 10.07.2011 to clear passengers.

A relative special, with fifteen coaches, came from Howrah. It reached FTP at 11:48 Hrs of 11th July. It left FTP at 01:15 Hrs of 12.07.2011 for HWH. Local transport to passengers and relatives was provided to and from hospitals.

A relative Special with 10 coaches had come from Delhi. It reached Kanpur at 05:10 Hrs of 11th July.

Arrangement had been made for issue of travel authorities to the relatives and passengers.

Team of Staff was deployed at FTP, MWH, CNB and ALD to help in identification of dead and for transportation of mortal remains. 60, out of 68 bodies were identified and taken over by 13th July. Eight unidentified bodies were cremated by Police.

2.2.3 **Medical Attention and Relief**

Injured passengers had been taken to Fatehpur and Kanpur. A few injured persons had been taken to Allahabad.

Team of Doctors and commercial staff were formed to visit local hospitals at FTP, CNB and other places and extending necessary assistance in treatment. Railway doctors liaised with hospitals in Fatehpur and Kanpur and progress of injured was monitored .

Chairman/Railway Board paid visits to hospitals, where injured passengers had been admitted.

Hon'ble Minister of Railways visited these hospitals and met injured passengers undergoing treatment.

Teams of Doctors continued monitoring the condition and needs of the injured. Treatment based on need was organized from Government as well as Private Hospitals.

Arrangements were made to attend enquiries in regard to injured/dead.

Relatives of injured passengers, tending to injured, had been served food in Hospitals.

Injured passengers on being discharged from hospitals and their relatives had been helped with reserved accommodation in trains to their home town.

As on 21.07.2011, 15 persons were still undergoing treatment at Kanpur and 4, at Allahabad.

2.2.4. **Ex-Gratia Payment**:

Railway announced special exgratia payment of ` 5,00,000/- in case of death, ` 1,00,000/- in case of grievous injury and ` 25,000/- in case of simple injury.

Railway had immediately paid past Ex-gratia amounts. Further payments were being made. Full payments were likely to be completed by 24.07.2011 for persons injured.

In case of persons killed, full payment is to be made on proof of inheritance from competent authority.

2.3. **Restoration**

2.3.1 Accident Relief Train(ART)/ALD reached the site at 15:10 Hrs and rerailed fifteenth coach on 10.07.11 and thirteenth coach on 11.7.11.

ART/CNB reached the site at 16:30 Hrs and off tracked first, second, sixth, seventh and tenth coaches on 11.07.11 and Locomotive on 12.07.11.

140T BD Crane of MGS reached the site at 22:00 Hrs on 10.07.11 and dealt 4 coaches. Fifth, eleventh and twelvth coaches were made off track. fourteenth coach was rerailed. Heap of bogies and wheels sets lying near twelvth coach was cleared.

140T BD Crane from Lucknow reached the site at 02:10 Hrs of 11.07.11. It dealt third, fourth, eighth and ninth coaches and three wagons of up loop line.

Electric loco was rerailed and repaired bogies were fitted on HWH end at 00:50 Hrs by 140T BD Cranes of Lucknow and Kanpur on 12.07.11. The loco was rerailed.

Damaged rear bogie and one wheel set of loco were loaded in BOXN wagon at 01:25 Hrs on 12.07.11. With this, clearance work was completed.

Thereafter track, signaling and electric overhead equipments were restored.

After restoration, first train in Down direction passed at 07.35 Hrs of 12th July. First train in Up direction passed at 10.39 Hrs of 12th July, 2011.

2.4 **Interruption to Passenger Traffic**

There was large scale interruption to the traffic on Kanpur-Allahabad line. Large number of trains were diverted/cancelled/short terminated/origin changed. Numbers were as follows :

(i) Trains Diverted

Date	No. of Trains Diverted
10.07.2011	12
11.07.2011	53
12.07.2011	22
Total	**87**

(ii) Trains Cancelled

Date	No. of Trains Cancelled
10.07.2011	03
11.07.2011	24
12.07.2011	26
Total	**53**

(iii) Trains Short Terminated

Date	No. of Trains Short Terminaed
10.07.2011	Nil
11.07.2011	02
12.07.2011	02
Total	**04**

(iv) Trains Origin Changed

Date	No. of Trains Run with Origin Changed
10.07.2011	Nil
11.07.2011	01
12.07.2011	Nil
Total	**01**

III. THE TRAIN

3.1 Composition and Marshalling Order of The Train

3.1.1 Locomotive

The train was hauled by Loco No. 30221 WAP7 based at Ghaziabad Electric Loco Shed. The loco was manufactured at CLW and was commissioned on 03.12.2004. Intermediate overhauling of the loco was done on 20.10.2010 in Electric Loco Shed, Ghaziabad. The loco had earned 99,326 Kms since IOH. Last IB Schedule inspection had been done from 02.05.2011 to 04.05.2011 in Loco Shed, Ghaziabad. Last trip inspection had been done on 9th July 2011 at Howrah.

The locomotive was provided with head light, speedometer, speed recorder, flasher light. These were in working condition.

Length of the loco was 20.56 meters. Weight of the loco was 112.8 Tonnes.

3.1.2 Coaches:

The train comprised 24 coaches. Marshalling order and details of coaches are given below:

Position from Loco	Coach No.	Built by	Date of last POH	Date of Return
1st	ER 97731GSLRD	RCF	23.06.2011	01/2013
2nd	ER 10529 GS	ICF	21.02.2011	02/2013
3rd	ER 00516 GS	ICF	27.05.2011	01/2013
4th	ER 09212 GSCN	ICF	09.07.2009	07/2011
5th	ER 00317 GSCN	ICF	13.07.2010	02/2012
6th	NR99803 WCB	RCF	14.02. 2011	09/2012
7th	ER07230 GSCN	BEML	16.01.2010	06/2012
8th	ER08202 GSCN	BEML	30.08.2009	08/2011
9th	ER09232 GSCN	RCF	31.05.2011	01/2013
10th	ER01119 ACCN	RCF	30.11.2009	07/2011
11th	ER94053 ACCW	RCF	30.11.2009	07/2011
12th	ER01133 ACCCN	RCF	03.02.2010	09/2011
13th	ER04052ACCW	ICF	08.12.2010	07/2012
14th	ER94077ACCW	RCF	08.04.2011	11/2012
15th	ER98039 FACCW	ICF	13.02.2010	09/2011

Position from Loco	Coach No.	Built by	Date of last POH	Date of Return
16th	ER04251 GSCN	ICF	31.07.2010	03/2012
17th	ER07234 GSCN	RCF	0401202009	07/2011
18th	ER00204 GSCN	ICF	12.06.2010	01/2012
19th	ER03215 GSCN	RCF	22.09.2010	04/2012
20th	ER09223 GSCN	ICF	01.07.2009	07/2011
21st	ER09233 GSCN	RCF	11.08.2009	08/2011
22nd	ER01209 GSCN	RCF	16.06.2011	01/2013
23rd	ER10533 GS	ICF	25.02.2011	02/2013
24th	ER91733 SLR	BEML	29.12.2010	08/2012

The rake of the train had last been examined at Howrah on 9th July 2011.

(a) Total length of the train excluding the loco was 490.5 meters Total weight of the train excluding the loco was 1151.8 Tonnes.

(b) The train had air brakes. The brake power of the train was 100% as per brake power certificate and also as per the joint note prepared after the accident.

3.2. Damages and Disposition

3.2.1 Locomotive

The loco was found derailed between Up main and Up loop lines. It had got tilted to left. Delhi end bogie was attached with loco. Howrah end bogie had detached from the loco and was lying between Up main and Dn main line.

Damages in the locomotive were :

- Rear cab cattle guard found damaged.
- HWH end bogie worked out and lying between Up and Dn line near rear cab of the loco.
- Wheel set No. 4 with traction motor had worked out from bogie-2 and was lying on Up main line.

- Rear pantograph was broken and lying near loco towards south.
- Right hand side leading wheel of front bogie had hit marks on flange and rubbing mark on wheel disc. Similarly left side leading wheel had hit marks.
- Battery box was damaged and was lying on the ground near loco.
- One compressor motor had worked out and was lying near loco under frame.

Cost of damages to the loco was estimated to be ` 1,00,00,000/-

3.2.2 **Coaches**

H/E denotes Howrah end and D/E denotes Delhi end in following table.

Sl.No. From Engine	Coach No.	Damages and Disposition
1	07731 ER GSLRD	Capsized on the left of Up main line. Front end was butting with Loco. Body torn, body structure and under frame damaged, bent and twisted. Brake gears damaged, bent and twisted. Interior furnishing damaged and entangled. End panel badly bent. Both Trollies worked out.
2	10529 ER GS	Capsized on the left of up main line. End butting with first coach. Body torn, Under frame bent and twisted. Brake gears bent, twisted and broken. Interior furnishing damaged, bent, twisted and entangled. Both trollies with wheels intact.
3	00516 ER GS	Capsized on the left side of up main line. End butting with second coach. Body torn, twisted. under frame bent and twisted.

		Brake gears bent, twisted and broken. Interior furnishing bent, twisted, broken, entangled and damaged. H/E trolley intact, D/E trolley worked out. Eighth coach was over this coach.
4	09212 ER GSCN	Capsized, uncoupled and turned out of track in cross direction on south end side and other end on UP loop, rided over end of third coach. Body bent, under frame bent and twisted. brake gears, under gear bent, broken and damaged. Interior furnishing bent and twisted and damaged. H/E trolley intact. D/E wheels near H/E trolley . D/E trolley intact without wheels.
5	00317 ER GSCN	Capsized. Tilted on South Side on UP loop in uncoupled condition parallel to Up accidental rake. Body bent and one end smashed badly. Under frame bent, broken and twisted. Brake gears bent, broken and twisted. Interior fitting and furnishing badly smashed bent, broken and torn. H/E trolley with both axles intact, D/E trolley worked out.
6	99803 NR WCB	Capsized. Disconnected from rake and lying on DN loop & DN main about opposite to loco. Body badly damaged and broken. Under frame bent, broken and twisted. Brake gears and under gear bent broken, twisted and smashed. Interior furnishing and fitting bent, broken, entangled and damaged. Both trollies worked out.
7	07230 ER GSCN	Capsized on DN main line in scattered condition opposite second and damaged badly. Under gear, brake gear bent, broken, smashed and damaged badly. Under frame bent broken, twisted and damaged badly. Interior furnishing and fitting found

		bent twisted broken and entangled. Both trollies worked out.
8	08202 ER GSCN	Capsized on DN track to Up track. One end lying on third coach. Body bent and damaged badly. Under gear, brake gear bent, broken, smashed and damaged badly. Under frame bent broken, twisted and damaged badly. Interior furnishing and fitting found bent twisted broken and entangled. Both trollies worked out.
9	09232 ER GSCN	Capsized and lying with one end on south of UP loop and other end lying on fourth coach in damaged condition. Body bent and damaged badly. Under gear, brake gear bent broken, smashed and damaged badly. Under frame bent, broken, twisted and damaged badly. Interior furnishing and fitting found bent, twisted, broken and entangled. Both end panels damaged. Both trollies worked out.
10	01119 ER ACCN	Capsized on DN loop and DN main in badly damaged condition. Body bent, twisted and damaged badly. Under gear, brake gear bent, broken, smashed and damaged badly. Under frame bent, broken, twisted and damaged badly. Interior furnishing and fitting found bent twisted broken and entangled. HWH end panel with Lavatory portion badly smashed. H/E trolley intact, both wheel worked out. D/E trolley worked out.
11	94053 ER ACCW	Capsized, Lying one end on 01119 and other end on 01133 in crossed condition from UP main to DN loop in overhead hanging condition. Body torn, bent, twisted and damaged badly. Under gear, brake gear bent, broken, smashed and damaged

		badly. Under frame bent, broken, twisted and damaged badly. Interior furnishing and fitting found bent twisted broken. HWH end panel with Lavatory and doorway portion badly damaged. H/E trolley worked out. D/E trolley intact without H/E wheel set.
12	01133 ER ACCN	Capsized. Lying on UP track. H/E trolley found in derailed condition and D/E trolley dismantled, body lifted on next capsized coach and parallel to coach no. 00317 WGSCN (fifth coach). Body torn, bent, twisted and damaged badly. Under gear, brake gear bent, broken, smashed and damaged badly. Under frame bent, broken, twisted and damaged badly. Interior furnishing and fitting found bent twisted broken. H/E trolly intact, but HWH end wheel set worked out. D/E trolly intact.
13	04052 ER ACCW	Derailed by all wheels in Up main line. All north side wheels inside the track and all south side wheel outside the track. Some fittings of trolley were worked out. Dashpot safety bracket broken. Equalizing stay rod bent. Both trollies intact with wheels.
14	94077 ER ACCW	Dashpot safety bracket broken. Both trollies intact with wheels.
15	98039 ER FACCW	Delhi end trolley, Delhi end wheel south side dashpot bracket bent. Both trollies intact with wheels.

Cost of damages to coaches was estimated to be ` 2,50,00,000/-.

3.2.3 Signalling & Telecommunication

Dn starter signal, its mast and foundation were damaged. One axle counter, 10 Nos. Tail Junction Boxes, one point machine cover were damaged. One signal was bent.

Cost of damages was ` 50,000/-.

3.2.4 Engineering

180 meter track of Up main line, 100 meter track of Up loop line, 70 meter track of Dn main line, 30 meter track of Dn loop line, one turn out and one derailing switch were damaged.

Cost of damages was estimated to be ` 70,00,000/-.

3.2.5 Traction Distribution

One portal was fully damaged. One drop arm was damaged. Insulators, catenary and contact wires, cantilever, balance weight eye, distance rod damaged.

Cost of damage was estimated to be ` 20,00,000/- .

3.3 Cost of Damages

(i)	Locomotive	`	1,00,00,000/-
(ii)	Coaches	`	2,50,00,000/-
(iii)	Engineering	`	70,00,000/-
(iv)	Signalling	`	50,000/-
(v)	Traction Distribution	`	20,00,000/-

Total Cost of Damages to Railway Assets was ` 4,40,50,000/-.

IV - LOCAL FEATURES

4.1 The Section and the Site

4.1.1 The accident took place at Km 957/27 – 958/3 in Malwan station on ALD-CNB broad gauge double line electrified section of Allahabad Division of North Central Railway.

The site falls in the civil district of Fatehpur in the state of Uttar Pradesh.

Allahabad – Fatehpur – Kanpur road (Part of National Highway No. 2) runs on the north of the line near Malwan at varying distances. Malwan township is on national highway. Road distance from take off point from the highway to the level crossing No. 56, on east end of station yard, is about 3 kms. There is no local habitation at the station.

The track at the site runs through open cultivated plain land. The line is on Gradient of 1 in 3333. There is a left hand curve of 0.45^{0} followed by a right hand curve (No. 40) of 0.42^{0}. Curve No. 40 ends at Km. 957/25 and thereafter the line is on straight.

4.1.2 The track at the site of accident runs in about East to West direction.

4.1.3 The track at the site of accident had 60 kg rails laid on PRC sleepers. Turn out was of 60 kg rails, 1 in 12 crossing laid on PRC sleepers.

4.2 **Signaling & System of working:**

The station has Standard-II(R) interlocking. Signals are multiple aspect colour light. Trains are worked by absolute block system. For the train, there were distant, inner distant, home, starter, intermediate starter and advance starter signals of Malwan Station in sequence of movement of train.

4.3 **Kilometerage of Stations/Locations**:

Kilometerages are reckoned from Howrah.

The Kilometerage of locations mentioned in this report are as under :

Station	Station Code	Location
Howrah	HWH	0.00
Allahabad	ALD	825.54
Fatehpur	FTP	942.19
Faizullahpur	FYZ	930.96
Kurasti Kalan	KKS	949.23
Site of accident		**957/27-958/3**
Malwan	MWH	958.31

Station	Station Code	Location
Kanspur Gagauli	KSQ	965.64
Kanpur	CNB	1019.75
Tundla	TDL	1248.51
Aligarh	ALJN	1326.82

4.4 **Permissible speed and speed restrictions:**

Maximum permissible speed for express trains, including the train, on Allahabad-Kanpur section is 110 Kmph. For the train, there was no permanent or temporary speed restriction in the vicinity of the site of the accident.

4.5. **Headquarters:**

Track - Sr. DEN-II/ALD, ADEN/FTP, SSE(P. Way) (In-charge)/FTP and SSE(P.Way) (Sectional)/FTP were In-charge of maintenance of track.

S&T - Sr.DSTE/ALD and SSE(S&T)/FTP were In-chrge of maintenance of signalling.

Control Office is at Allahabad.

4.6 **Description of Malwan Station Yard.**

There are four running lines in the station yard. These are Up loop line (No.4), Up main line (No.3), Dn main line (No.2) and Dn loop line (No.1). All four lines are track circuited. Line No. 2 and 3 have conventional track circuit, i.e. by flow of current through rails. While Line No.1 and 4 are track circuited by axle counters.

Dn loop line is northernmost line, followed by Dn Main, Up main and Up loop respectively towards south.

East end of station yard has two cross overs. One cross over, comprising a Left hand Turnout, Point No. 64a in Up main line, and a derailing switch No. 64b in Up loop line connects two Up lines.

The other cross over comprising right hand turnout, point No 63a on Dn main line and a derailing switch 63b on Dn loop line, connects two Dn lines.

There is a level crossing, No. 56, between Up home signal and Point No. 64a.

4.7 **Working of Malwan Station**

Station has slide control, worked by SM on duty. He allots the line on which a train is to be received. He is also In-charge for granting permission to grant or take line clear and to receive or dispatch a train to concerned end cabin. SM has control on last stop signals of station.

There are two end cabins, one termed East cabin, which has block instruments for block section between Malwan and Blockhut LL. Operation panel for setting route and clearance of signals of east side is available in East Cabin. It is worked by cabin Master. Level Crossing No. 56 is also worked from East Cabin.

Similar functions for west side of station are done from West Cabin.

Station is equipped with Distant, Inner Distant, Home starter and Advance Starter Signals. For Up direction, there is an intermediate starter signal between starter and advance starter signals.

Clearance of Up home signal requires cooperation by SM and West Cabin. Once, slots have been given by SM and West Cabin, Up home signal can be taken off by East Cabin.

V – SALIENT FEATURES

1. A goods train had passed through Up main line, 19 minutes before the train. Nothing unusual was reported in this train. Station staff did not notice any unusual in this train and after this train.

2. For loco and first five coaches of the train, it was like a derailment. Thereafter, from sixth coach onward, it was like a collision with fifth coach and with obstruction caused by rising heap of left over bogies, wheel sets and underslug parts. Sixth to eleventh coach went ahead in scattered manner. Body of sixth coach reached almost upto the loco. Twelvth coach was on the side of fifth coach in final disposition.

3. Shine marks on top of rail were observed in Km 957/19-21 on south side rail and in Km 957/23-25.

Some oil marks, without symptom of spill at speed, were observed outside running rail on both sides in Km 957/23-25.
An unidentified pin was found 24 m in rear of km 957/9 in track. Pin had no marks of having fallen at speed and ballast had no marks of hit by this pin.

An aluminium casting was found 5 m in rear of km 957/9 in track. There was no disturbance to ballast in this location.

4. There was no damage to point machine and rodding of Point No. 64 a. Gap at toe of closed left tongue rail was measured as 8mm under load by Supervisors. They recorded that when load was removed, the toe set properly.

5. Right Side tongue rail had bent inside on its top starting from toe in 120 mm length and had cracked horizontally in this length. Bend was maximum at toe and then reduced away from toe. A piece of 40 mm length and 20 mm height had detached from the toe. Inside bracket had a rub mark.

   This tongue rail was set in open condition for the train's movement on main line.

6. Left tongue rail had no damage at the toe. It was in closed position for the train's movement on main line.

7. Sleeper number in this para and subsequent paras are as per the number, cast on turnout sleepers during manufacture, and sleepers are laid accordingly.

8. Outside nut of left side slide chair of fifth sleeper had a rub mark on its top.

9. Third stretcher bar was bent in elevation. Right hand Bracket top and nut had rub marks on them. Laterally, this location is at about 140 mm inside right side stock rail's gauge face.

10. Fourth stretcher bar was deformed.

11. Fresh rubbing marks on nongauge face sides of both tongue rails were observed.

12. Spacer blocks of left side, between stock and tongue rails, broke and were pushed ahead. Bolts were sheared and bent.

13. There were marks made on spikes on inner side of left side slide chairs on sleeper Nos. 18, 19 and 20. There were corresponding marks on inner foot of left tongue rail.

    Sleeper No. 19 had cracked under the left rail seat. Crack extended beyond inside edge of slide chair.

14. Heel block and distance block of Left side were damaged and displaced. Bolts were sheared and bent.

15. East end top corner of inner fish plate of left stock rail was cut on upper edge. Bolts of this fish plate were sheared.

16. Inside ERC clips of left tongue rail on sleeper No. 22, 23, 24 and 25 had been dislodged.

17. No point of wheel mounting rail was found on left tongue rail.

18. First wheel drop mark was noted to be between 23rd and 24th sleepers on left tongue rail by Supervisors on 10th July 2011 and this was taken as 0 mark for distance reference.

19. While taking observations on 15.07.2011, it was observed that bearing plate of sleeper No. 21 had three marks of 50,80,80 mm lengths and of about 4 mm widths.

20. There were wheel flange marks on outer foot of left tongue rail.

21. Left tongue rail ended in a fractured face. Wheel flange marks on outer rail foot continued upto fractured end of this rail. In the end, one mark was above foot web junction.

    Rail end had part of AT weld in foot. This was over 25th sleeper. There were two fish plate bolt holes in the tongue rail, in rear of rail's fractured end. Inner surface of rear bolt hole of tongue rail had shine.

    Fracture face had shine of freshness.

    Fractured end of tongue rail had no hit marks. Fracture surface in web had fracture progression lines. Fracture surface of head was inclined with normal vertical plane, with nongague end, ahead of gauge face end.

22. On the right side, heel block had been damaged on inner side top. Top edge of east end of outside fish plate of turnout rail had been cut. Inner joggled fish plate of main line rail had wheel tread mark.

23. Right side turnout lead rail as well as main line rail remained in position for some length, beyond the location, where left rail had the breakage. Sleeper seats between lead and main line rails were damaged.

24. A wooden block was available between sleeper No. 25 and 26 on left side to support the rail. Position of this block was such that it would not be supporting the weld between tongue and lead rail.

Left bearing plate of sleeper No.26 had bent downward and some concrete on edge of sleeper had been crushed.

Left bearing plate of sleeper No.27 had been dislodged. One inner spike had bent. The sleeper had line damages caused by wheels.

Sleeper seats of sleepers ahead were damaged.

25. Left rail beyond sleeper No. 25 was not in place. It had been displaced to the right side.

The rail had a fractured end, with hit marks on head. There was no hit mark on fractured face of foot. Nongauge face of head had rubbing mark. Fracture surface of head was inclined with normal vertical plane with nongauge end in rear of gauge end.

There was one bolt hole near fractured end. An approximately rectangular piece starting from bolt hole had loosened with two horizontal fractures, but the piece remained stuck in its place.

Outer foot of rail had no wheel flange mark in the vicinity of fracture end. Outer foot corner had bent upward. Inner foot had a long mark near the fracture end.

26. A sheared bolt, with nut was lying between left rail seats of sleeper No. 25 and 26.

A rail piece containing foot and about triangular part of web was lying between sleeper No. 25 and 26. Rail piece contained part of AT weld in foot and web. Web fracture surface had fracture progression lines. Piece had no hit marks and no wheel flange travel marks on its foot. Inner weld riser had smooth top. Outer weld riser was smooth on top and had metal flow all around. Top of outer riser projected about 20 mm above lower fishing plans of rail. This rail piece had no bolt hole.

Fractured ends of this rail piece matched with fractured face of displaced lead rail, on one side and with fractured face of tongue rail on the other side. After this matching, there remained a gap of about 290mm long in head. Piece containing this head and balance portion of web, could not be located. Piece, which could not be located, was the first to fully detach.

Rail piece containing foot and triangular portion of web had broken from lead rail vertically, after detachment of upper piece.

27. Two joggled plates were produced in the inspection on 12th July, 2011 as plates of this weld joint.

28. One joggle fish plate had wheel flange marks on its top long edge. It had a vertical crack under an inner bolt hole. On the bottom side, it had a local shine mark at one location approximately in the middle. The plate had some bend in plan. The plate had no hit mark on the face, which would have faced flange/tread of a wheel coming derailed from rear. It had no hit/rubbing mark on its inner and outer faces.

29. Outer fish plate had no hit mark on the end, which would have faced flange/tread of a wheel coming derailed from rear. It had no hit/rubbing mark on outer and inner faces. It had a hit mark on top inner edge in about the central portion and a heavy long dent, with downward metal flow, on outer upper edge. The fish plate had become curved in half of its length. On the bottom surface of fishplate, there was dent and local metal flow deformations, in about the centre.

30. Track of Up main line was fully damaged upto about 90 meters from the point of drop. Track, thereafter remained in its place with damages to sleepers. In the last damaged stretch, , sleepers were damaged on left ends and correspondingly on the inside of right rail seats.

31. About 100 m of track of Up loop line had been damaged by derailed coaches.

Track of Dn line had been deformed to the right. Down main and Dn loop lines had damages caused by movement of derailed coaches, without axles and bogies, on this line and by debris, including axles and bogies, which came there after detachment.

32. Loco in its final position rested on the left of up main line. Its front was at about 180 meters from 0 mark i.e. 23-24 No. sleepers of turnout. Loco had tilted to its left side.

During the derailed run, loco had side hit with a Wagon of goods train standing on Up loop line. Wagons panel had been torn.

Rear bogie of the loco had detached from loco. Detached rear bogie of the loco had reached down main line and was about opposite the middle of derailed loco. It was deficient of front axle. There was earth deposits near this bogie. Two OHE wires were passing under this bogie.

Front axle of rear bogie was 3-4 m behind the rear of the loco and on up main line, which was undamaged in this stretch. There were earth deposits on the track near this axle.

Axles and traction motor bearings of rear bogie had free movements, when inspected in Kanpur Electric Loco Shed on 13.07.2011.

33. For OHE, portals had been provided.

Drop arm of up main line, in portal No. 958/1-2, which spanned over all the four lines, had been damaged.

OHE portal 958/3-4 spanned over Up main, Dn main and Dn loop lines.

This Portal had fallen and had been pulled ahead. It rested on top of sixth coach. OHE wires of Dn Main line were passing on ground under this coach.

34. There was no signal failure, on the day of derailment, in the record.

35. Data logger, for recording changes in signalling relay positions, report had following information, related to the running and derailment of the train :

(i) Track circuit No. 1, of the line from Up home signal to 14 m in rear of Point No. 64a, dropped at 12.18.24.578 Hrs and remained dropped.

(ii) Track circuit No. 64a, from East end insulated joints at 14m in rear of toe of point No. 64a, to insulated joints of Up main line berthing track, dropped at 12.18.36.219 hrs. and remained dropped.

(iii) Normal detection of crossover 64a/b dropped at 12.18.39.062 Hrs.

(iv) Track circuit 3 A, berthing track of Up main line, dropped at 12.18.39.203 Hrs. and remained dropped.

(v) Normal detection of crossover 64a/b picked up at 12.18.39.344 Hrs.

(vi) GECR of S4 (Dn main line starter) signal dropped at 12.18.41.500 Hrs and remained dropped. This signal was located between Dn main and Dn loop lines about 90 meters after the point of drop.

(vii) Normal detection of cross over 63a/b, connecting Dn main line and Dn loop line, dropped at 12.18.45.156 Hrs and again picked Up at 12.18.45.359 Hrs.

(viii) Berthing track circuit No. 2of Dn main line dropped at 12.18.45.359 Hrs and remained dropped.

(ix) 63a/b point zone track circuit dropped at 12.18.46.484 Hrs and remained dropped.

(x) Track circuit No. 4, of the line between Point No. 63a and Dn advance starter, dropped at 12.18.46.516 Hrs and remained so.

(xi) 63 NWKR dropped at 12.18.47.625 Hrs and again picked up at 12.18.47.844 Hrs.

This was the last change caused in the accident.

36. SCADA (supervisory control and Data acquisition) report of OHE contained following informations :

Time	Event
12.20.02	BNK-SP FEED From MWH (Malwan) side Lo Alarm 0.24
12.20.03	BKO-SP MWH BKO Up line Fail
12.20.03	BKO-MWH Dn line Fail
12.20.03	MWH-FP 25 KV FR CB1 CCT2 UNCMDED OPENED
12.20.03	MWH-FP AR2. Lockout Signal UNCMDED Operate
12.20.04	MWH-FP 25 KV FR CB09 CCT1 Opened

There were more connected events at these times, but all have not been reproduced here.

Circuit breaker CB-10 was for traction power supply to OHE from OHE mast No. 957/16 towards Kanpur side. Circuit Breaker CB-9 was for traction power supply to OHE from OHE Mast No. 957/22 to Fatehpur side. There was insulated overlap of OHE between km 957/16 and 957/22.

37. Loco repair book had entry only about parking brakes operating handle.

38. Speed record of the locomotive was got printed. Recording had stopped at 12.33.29 Hrs.

Speed in last 6 seconds of record were as given below:

Time	Distance	Speed
12.33.23	148940.402	109
12.33.24	148940.432	109
12.33.25	148940.463	109
12.33.26	148940.493	108
12.33.27	148940.522	104
12.33.28	148940.547	104
12.33.29	148940.567	72

Speed is based on No. of pulses generated by Tacho per unit of time. Tacho was mounted on axle No. 1 of rear bogie of the locomotive.

39. The loco had an onboard computer and errors were recorded in memory.

An error of emergency brake pressure switch was recorded. Time of start of this error was 10.7.48 Hrs and end time was 10.7.55 Hrs. The loco speed, in further detail of this time, was 12.94 Kmph. These times are as per computer clock.

Speedometer record showed speed reduction of the locomotive from 13 Kmph to 0 Kmph at 10.30.00 Hrs [As per speedometer clock].

In speed record, maximum speed after this stop remained 28-29 Kmph for two and half minutes.

Loco Pilot recorded in his diary 3 min time loss at 10.22 hrs as Inner distant signal had no light. This was before a 30 Kmph speed restriction in Km 815/11-815/17.

40. Last five error messages recorded by onboard computer and other relevant data at the time of errors were as given below :

Start Time of Error	End Time	Message	Other Relevant Data
12.11.45	12.11.45	Error tachogenerator	TM4 [Front axle of rear bogie] speed 135 % DC Link voltage 877.2 V [Against normal value of 2.8 KV]
12.11.45	12.11.45	Error Ud too small	DC link voltage 707.76 V TM4 speed 132 %
12.11.45	00.00.00 Did not end till supply failure	SR interlock -Main reservoir low	Pressure Switch Emergency Brake 0 [No brake application from brake controller] Speed 92 kmph OHE voltage 26.51 KV
12.11.46	00.00.00	SR interlock -Auto brake	Pressure switch emergency brake-1 Speed 88 kmph OHE voltage 26.43 KV Control reservoir pressure 4.55 kg/cm^2 Brake cylinder pressure switch 0 for both bogies
12.11.46	00.00.00	SR interlock -Emergency brake pressure	- Similar to above -
12.11.47	00.00.00	Bogie 2 wheel skidding	Actual speed 72 kmph Bogie 2 speed 66 kmph OHE voltage 25.44 KV

After 12.11.47 Hrs, no error message was recorded.

41. In about half km Up and Dn track from km 957/14 to 957/2, 8 joggled fish plated locations were checked by opening fishplates on 12.7.2011. 3 locations were such where joggled fish plates were supported on welds. In one case, a dent had got formed in fish plate.

42. On 15th July, Point No. 64a was tested for setting adjustment. Point No. 64a was in clamped and padlocked condition. Clamp was got opened for testing of point. It was observed during testing that point detection in normal did not fail even when the gap in the point was more than 20mm and when point machine had not locked itself. NWKR dropped only when point was fully in reverse.

Supervisors were instructed to record Joint observations of relevant circuits. It was observed that NWKR was not being controlled by physical detection of Point No. 64a and 64b and had short circuiting.

43. During inquiry on 22nd July, CTE/NC Railway gave a copy of letter

dated 16.07.2011. Vide this letter, NC Railway had directed its Divisions to eliminate cases of point support of joggle fish plates. CTE also gave a copy of Railway Board's letter No. 2011/CE-II/Meeting/2/2 dated 18.07.2011. Vide this letter, progress of ractification of defects in joggled fish plate joints has been included as an item for PCE's Conference scheduled for 30.07.2011.

VI. PROVISIONAL FINDINGS

6.1 On the basis of the evidence so far collected, I have come to the prima facie conclusion that Derailment of Train No. 12311 UP Howrah-Kalka Mail at about 12.19 Hrs of 10.07.2011 at Malwan Station between Fatehpur and Kanpur stations on Allahabad-Kanpur BG double line electrified section of Allahabad Division of North Central Railway occurred due to breakage of rail across the weld between left tongue and lead rails.

Accordingly, the accident is categorized as "Failure of Equipment – Permanent Way".

VII. RECOMMENDATIONS

I am making three immediate recommendations.

1. Railway should ensure that joggle fish plates are fixed such as to have proper mating of fishing planes of rail and fish plates. Cases of point support due to any protrusion of weld metal should be eliminated.

2. Railway should ensure that after Alumino Thermic Weld, riser is broken after cooling of weld and remaining riser does not protrude out of weld.

3. Railway should ensure that signal maintenance staff does not short circuit any interlocking circuit, under any circumstances.

Yours faithfully,

(PRASHANT KUMAR)
Chief Commissioner of Railway Safety,
Lucknow

Copy to The General Manager, North Central Railway, Allahabad.