

*SAFETY-*  
*INDIAN RLYS*

# SAFETY PERFORMANCE OF IR

Year	No. of Accidents	Acdts / MTKM*
1960-61	2131	5.5
<i>10 Yrs Avg</i>	<i>1393</i>	<i>3.3</i>
1970-71	840	1.8
<i>10 Yrs Avg</i>	<i>867</i>	<i>1.8</i>
1980-81	1013	2.0
<i>10 Yrs Avg</i>	<i>757</i>	<i>1.4</i>
1990-91	532	0.9
<i>10 Yrs Avg</i>	<i>464</i>	<i>0.7</i>
2000-01	473	0.7

\* Acdts / MTKM  $\leftrightarrow$  Accidents per Million Train Kilometer

# SAFETY PERFORMANCE OF IR

Year	No. of Accidents	Acdds / MTKM*
<b>2001-02</b>	<b>415</b>	<b>0.55</b>
<b>2002-03</b>	<b>351</b>	<b>0.44</b>
<b>2003-04</b>	<b>325</b>	<b>0.41</b>
<b>2004-05</b>	<b>234</b>	<b>0.29</b>
<b>2005-06</b>	<b>234</b>	<b>0.28</b>
<b>2006-07</b>	<b>195</b>	<b>0.23</b>
<b>2007-08</b>	<b>194</b>	<b>0.22</b>
<b>2008-09</b>	<b>177</b>	<b>0.20</b>
<b>2009-10</b>	<b>165</b>	<b>0.17</b>
<b>2010-11</b>	<b>141</b>	<b>0.16 (Prov)</b>

\* Acdds / MTKM  $\leftrightarrow$  Accidents per Million Train Kilometers

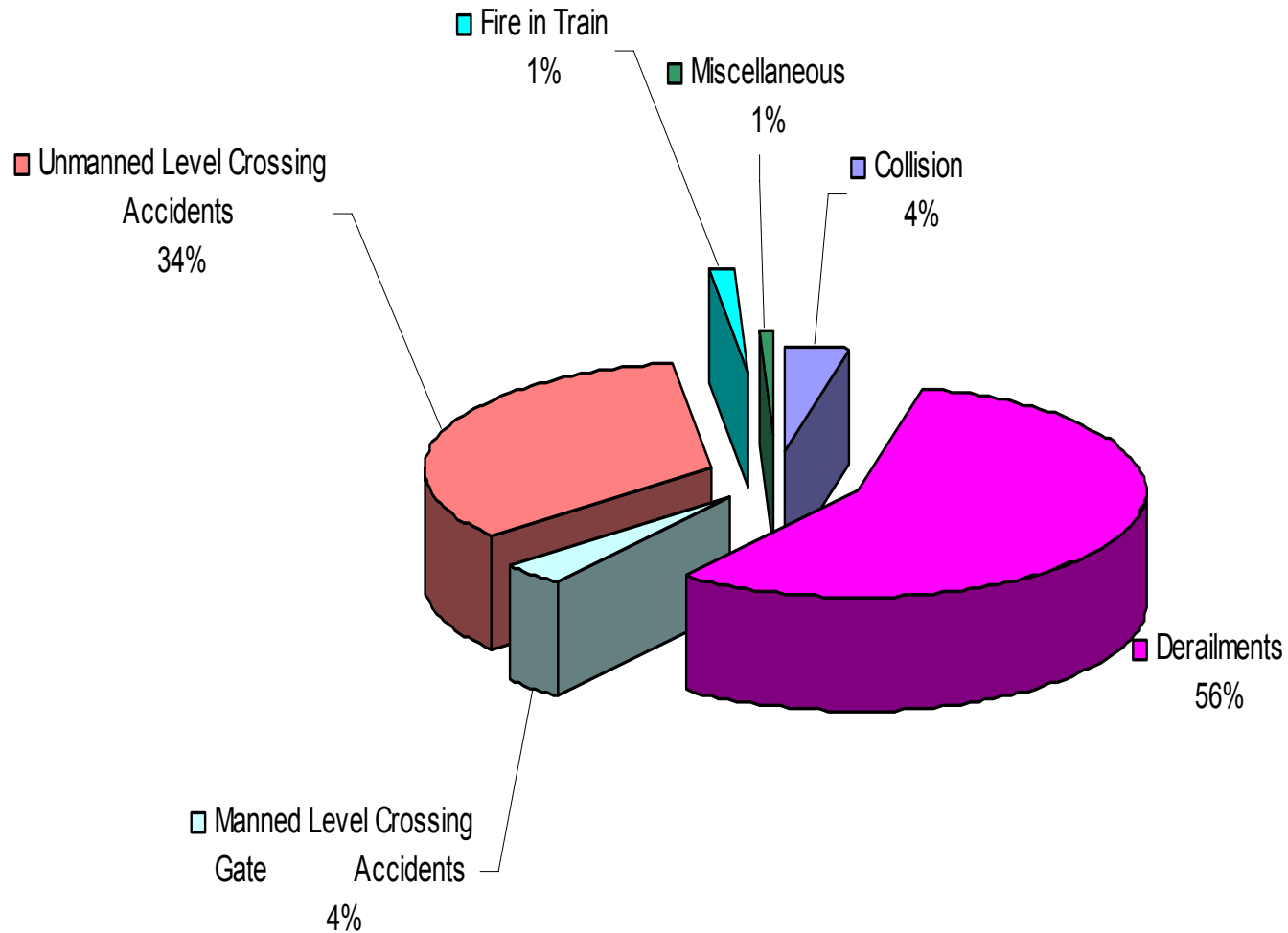
# International Railways – Comparative Figures

Country	Year *	Acdts/MTKMs
Japan	2003	0.63
Germany	2003	0.82
France	2003	0.87
Italy	2003	0.65
EU	2005	1.8
USA	2001	2.3
Australia	1999	2.3
Sweden	2001	0.48
* Last available figures		

# Type wise Accidents since 1960

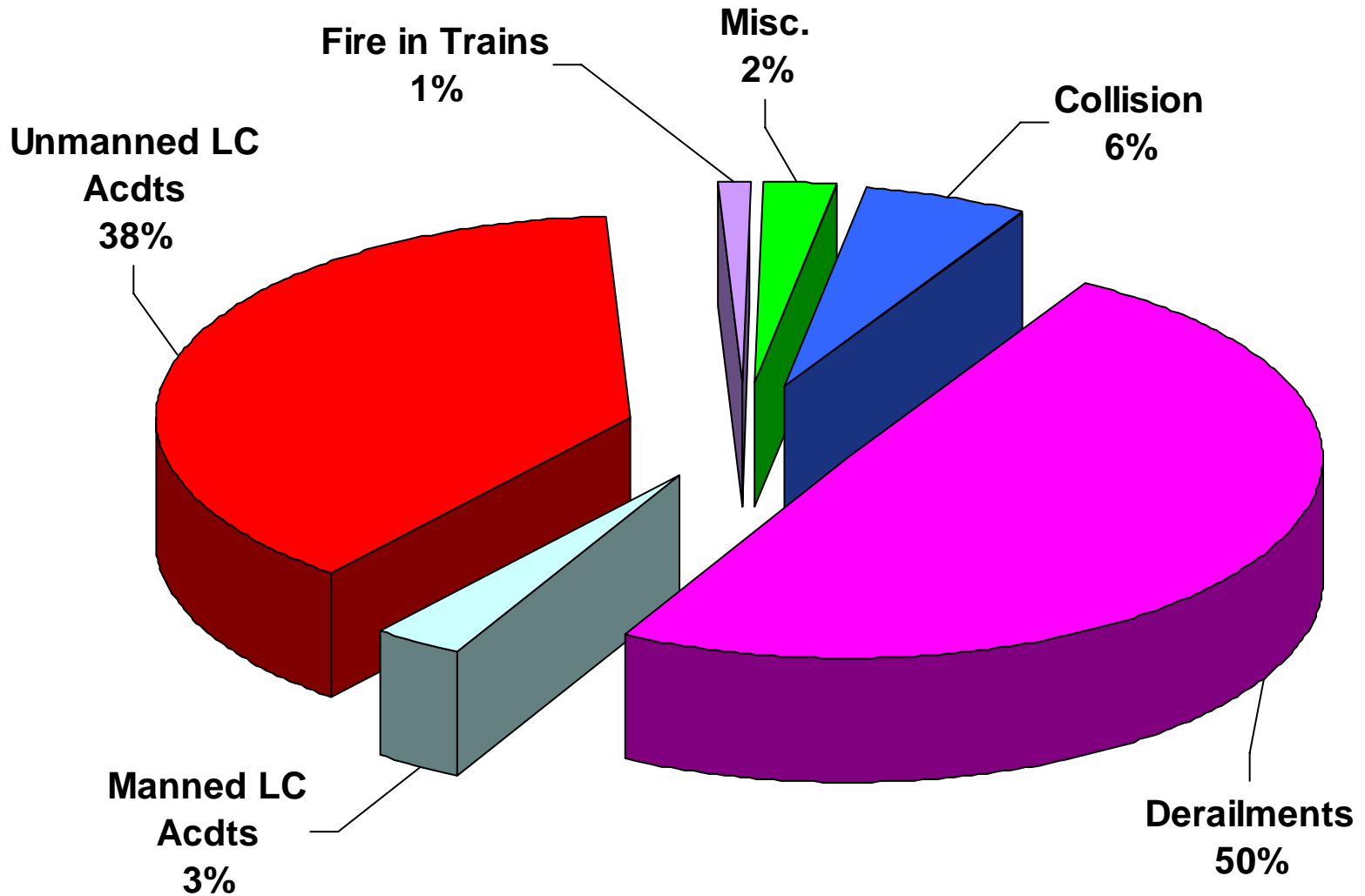
Year	Collisions	Derailment s	Level Crossing Accidents	Fire in trains	Misc.	Total	Million Train Kms.	Acdts per Million Train Kms
1960 - 61	130	1415	181	405		2131	388.1	5.50
1970 - 71	59	648	121	12		840	466.5	1.80
1980 - 81	69	825	90	29		1013	504.5	2.00
1990 - 91	41	446	36	9		532	617.1	0.86
2000-01	20	350	84	17	2	473	723.8	0.65
2001-02	30	280	88	8	8	415	756.4	0.55
2002-03	16	218	96	14	7	351	786.2	0.44
2003-04	9	202	95	14	5	325	790.8	0.41
2004-05	13	138	70	10	3	234	810.1	0.29
2005-06	9	131	75	15	4	234	825.4	0.28
2006-07	8	96	79	4	8	195	866.1	0.23
2007-08	8	100	77	5	4	194	890.5	0.22
2008-09	13	85	69	3	7	177	--	0.20
2009-10	9	80	70	2	4	165	--	0.17
2010-11	5	80	53	2	1	141		0.16 P

# Consequential Train Accidents 2010-2011



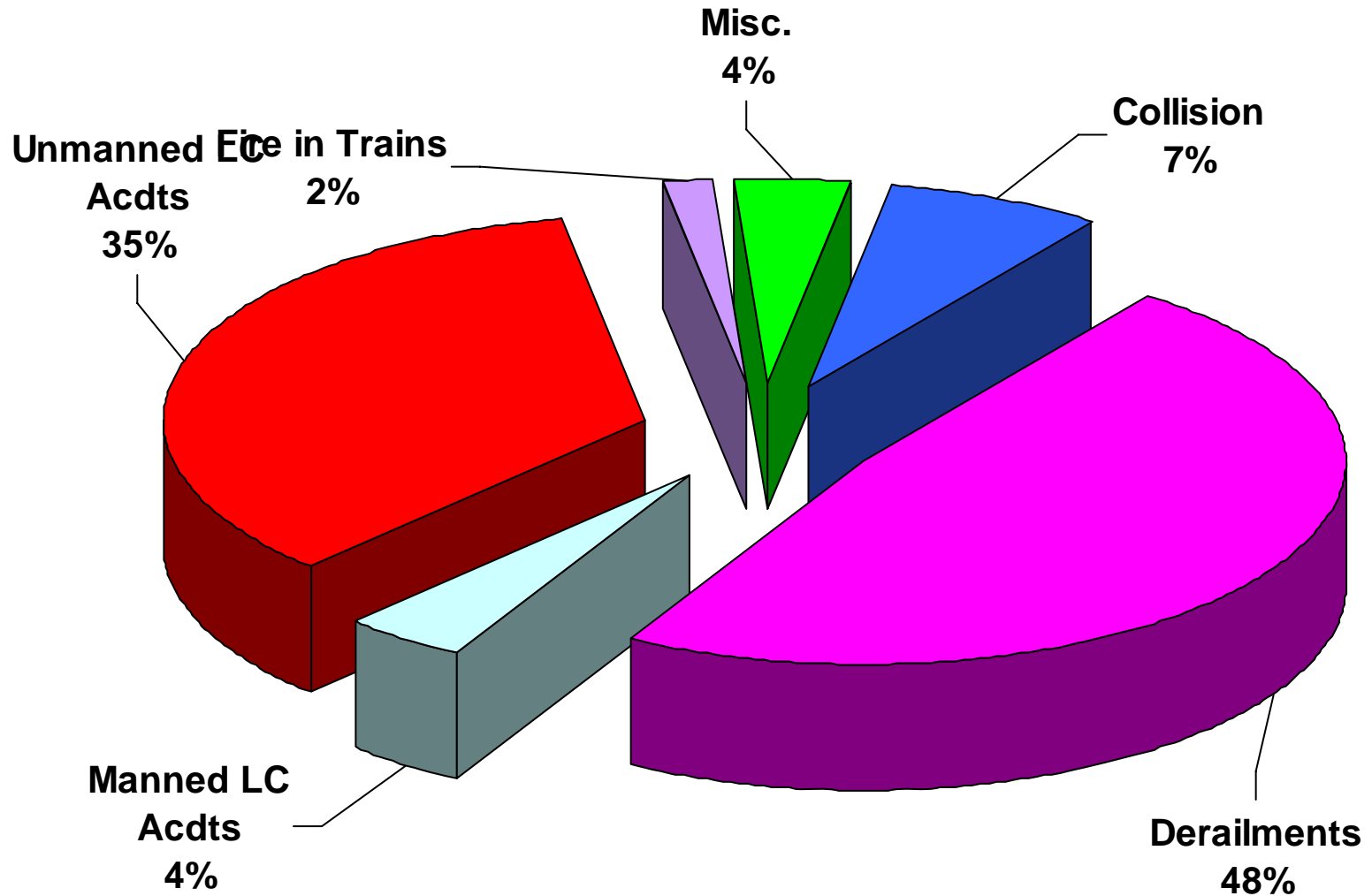
# Consequential Train Accidents

2009-10



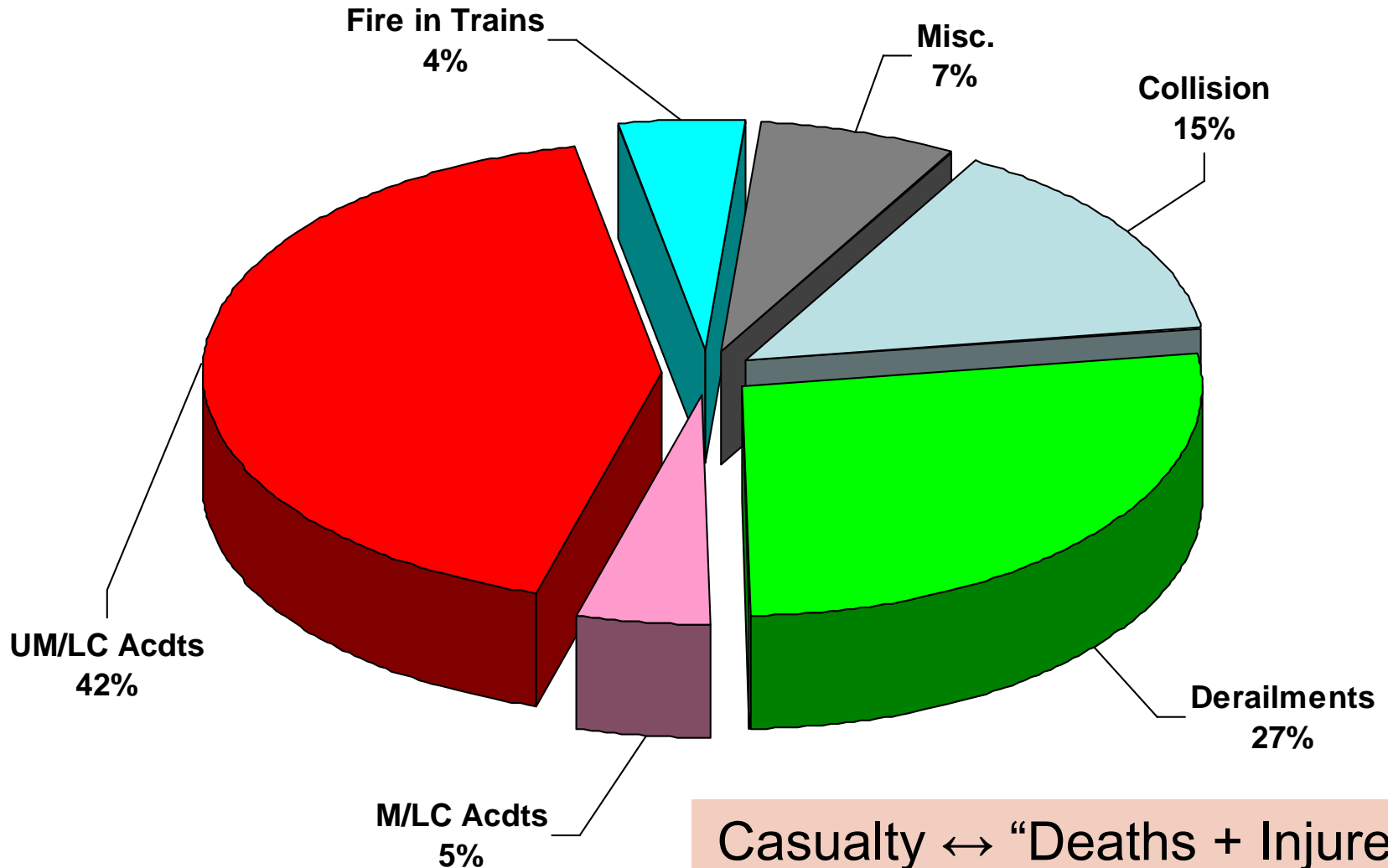
# Consequential Train Accidents

2008-09





# Casualties; Category-wise 2003-04 to 2009-10



# Fatalities in Train Accidents (2003-04 to 2010-11)

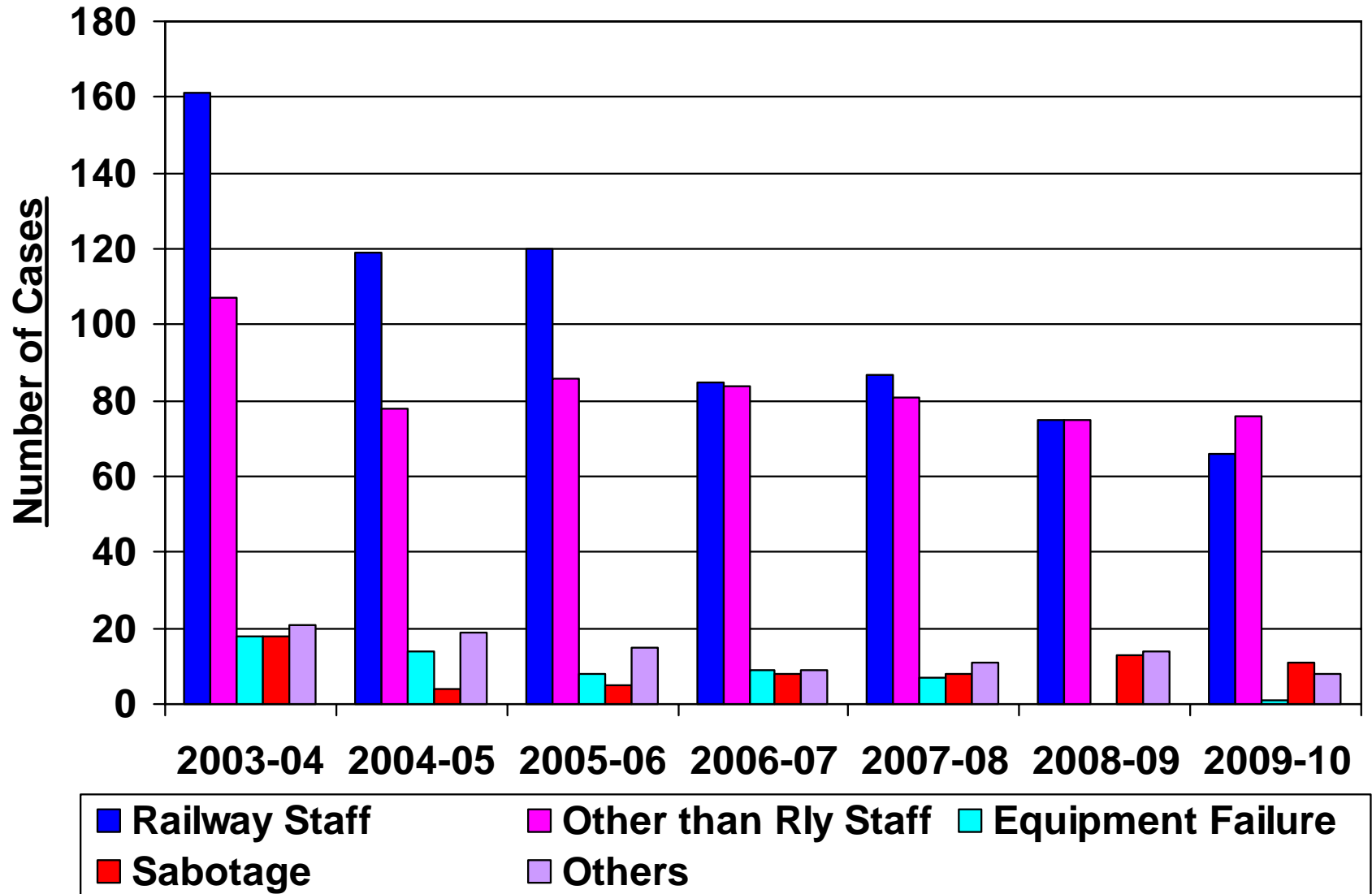
- **Fatalities in 2010-11**

• Collisions	:	239 (63.9%)
• Unmanned level crossing accidents	:	124 (33.1%)
• Derailments	:	4 (1.07%)
• Manned level crossing accidents	:	7 (1.87%)
• Fire in trains	:	0 (0%)
• Misc.	:	0 (0%)

<b>Fatalities in 2003-04</b>	<b>294</b>
<b>Fatalities in 2004-05</b>	<b>236</b>
<b>Fatalities in 2005-06</b>	<b>315</b>
<b>Fatalities in 2006-07</b>	<b>208</b>
<b>Fatalities in 2007-08</b>	<b>191</b>
<b>Fatalities in 2008-09</b>	<b>209</b>
<b>Fatalities in 2009-10</b>	<b>238</b>
<b>Fatalities in 2010-11</b>	<b>374</b>

Our goal, however, continues to be zero fatality

# Cause-wise Analysis of Consequential Train Accidents



# Trend of Accidents – Year-wise and Category wise

Type of Accident	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	-	-	-	-	-	-	-	-	-	-
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<b>Collision</b>	30	16	9	13	9	8	8	13	9	5
<b>Derailments</b>	280	218	202	138	131	96	100	85	80	80
<b>MLC Accidents</b>	8	14	9	5	10	7	12	7	5	5
<b>UMLC Accidents</b>	80	82	86	65	65	72	65	62	65	48
<b>Fire in Train</b>	9	14	14	10	15	4	5	3	2	2
<b>Miscellaneous</b>	8	7	5	3	4	8	4	7	4	1
<b>Total</b>	<b>415</b>	<b>351</b>	<b>325</b>	<b>234</b>	<b>234</b>	<b>195</b>	<b>194</b>	<b>177</b>	<b>165</b>	<b>141</b>

# Trend of Accidents – Train wise

	Passenger	Goods	Total
<b>2006-07</b>	<b>144</b>	<b>51</b>	<b>195</b>
<b>2007-08</b>	<b>125</b>	<b>69</b>	<b>194</b>
<b>2008-09</b>	<b>112</b>	<b>65</b>	<b>177</b>
<b>2009-10</b>	<b>114</b>	<b>51</b>	<b>165</b>
<b>2010-11</b>	<b>97</b>	<b>44</b>	<b>141</b>

# Trend of Accidents – Passenger train derailments - Zone wise

<b>Year</b>	<b>Total derailments</b>	<b>Pass. Train derailments</b>	<b>Worst railway</b>	<b>Worst Divisions</b>
<b>2010-11</b>	<b>80</b>	<b>43</b>	NR-10 ECR-5	Delhi-5 Danapur-3 Hubli-3
<b>2009-10</b>	<b>80</b>	<b>43</b>	CR-12 ECR-7 NR-6	Mumbai-7 Delhi-5 Pune-3 Samastipur-3
<b>2008-09</b>	<b>85</b>	<b>35</b>	NR-6 ECR-4	Lucknow-3 Samastipur-2
<b>2007-08</b>	<b>100</b>	<b>48</b>	NWR-5 ECR-4 NCR-4 NER-4 NR-4 SECR-4 SR-4 WR-4	Bikaner-3 Nagpur-3 Ahmedabad-3

## Trend of Accidents – Train wise (2010-11)

Type of Accident	Passenger	Goods
Collisions	03	02
Derailments	43	37
MLC Accidents	04	01
UMLC Accidents	44	04
Fire in Train	02	00
Miscellaneous	01	00
<b>Total</b>	<b>97</b>	<b>44</b>

# Trend of Accidents – Cause wise

Causes of Accident	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Failure of Railway staff	249	186	161	119	120	85	87	76	63	58
Failure of other than Railway staff	103	118	107	78	86	84	81	75	75	58
Failure of equipment	24	18	18	14	8	9	9	-	6	2
<b>Sabotage</b>	<b>14</b>	<b>10</b>	<b>18</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>7</b>	<b>13</b>	<b>14</b>	<b>17</b>
Combination of factors		2	2	1		1	0	4	1	1
Incidental	20	15	17	16	11	7	8	5	4	4
Could not be established	5	2	2	2	3	1	2	4	2	1
<b>Grand Total</b>	<b>415</b>	<b>351</b>	<b>325</b>	<b>234</b>	<b>234</b>	<b>195</b>	<b>194</b>	<b>177</b>	<b>165</b>	<b>141</b>



# Analysis of Accidents – Deptt. wise

Deptt.	2010-11
Mechanical	11
Engineering	26
Electrical	4
S&T	3
Operating	1
Combination of Staff	14
Equipment Failure	2
Incidental	4
Sabotage	17
FORS	58
Commercial	-
Under Investigation	1
<b>TOTAL</b>	<b>141</b>

# Analysis of Accident - SPAD Cases

	2010-11	
<b>Consequential</b>	<b>07</b>	
	ECoR-1,ER-1, SCR-2, WCR-1,SECR-1, WR-1	
<b>Indicative</b>	<b>27</b>	
	CR-3,ECR-1,NCR-5, NER-3,NFR-1,NR-3, NWR-1,SCR-2,SER-4, WR-3,Metro/Kol-1	

## Corporate Safety Plan, in 2012-13,

- Million Train Kms on IR – 1192  
– ( 2003-04, MTKMs – 791 )
- Acdts / Million Train Kms on IR – 0.17  
– (2003-04, Acdts / MTKMs – 0.41)

# Reporting of Accidents

- Consequential and Indicative Accidents Reportable through Safety wing
- Unusual Incidents Reportable through Security wing
- Equipment Failure Reportable through Punctuality wing

# Accident Classification

- **Consequential Train Accident**
  1. Collision
  2. Fire in Trains
  3. Level Crossing Accidents
  4. Derailment
  5. Others Train Accidents
- **Indicative Accidents**
  1. Averted Collision
  2. Breach of Block Rules
  3. Signal Passing At Danger
- **Equipment failure-** Rolling Stock, P. Way, OHE, S&T
- **Unusual Incidents-** Train Wrecking / Sabotage, Theft/Robbery, Fire/Explosion in Rly. premises, Floods/ Breaches, Run over Cases etc

# Safety Organisation

## Role, Objectives

- Each Deptt. Defines its own Safety Parameters
- Each Deptt. Monitors its own Safety
- Safety Deptt.- In-house Watch Dog, Safety Audit
- Counselling of Staff
- Identify System Deficiencies
- Accident Enquiry, Coordination with CRS
- Inter-departmental and Inter-disciplinary Checks
- Rly Bd – Frames Rules (GR) for Working of Rlys
- Policy Instructions Inter-Depttal on Safety
- Works on behalf of Optg Deptt- Framing Rules
- Analysis of Accidents

# Consequential Train Accidents

- Train Accidents Resulting in Loss of Human Life, Injury, Consequential Loss of Property or Interruption to Traffic.
  - Yard Accdt- not part of Train Accdt
- Threshold - Loss of Property(Rs 2 Crores), Disruption to Traffic (3-12 hrs basis Route)
- Fire given Special Definition
  - Explosion now in Sabotage (Unusual)

# Committees on Railway Safety

- Shah Nawaz Committee - 1954
- Kunzru Committee - 1962
- Wanchoo Committee - 1968
- Sikri Committee - 1978
- Khanna Committee - 1998



# Major Recommendations

## **SHAH NAWAZ COMMITTEE ;-**

- Main Routes, All Stns to be Inter-locked
- Large Stns - Provide Track Circuiting
- Gradually Raise Std of Inter-locking
- Uniform SWR; ATS Review SWR's once/month
- TXR Exam Poor; Inadequate Emphasis
- W/Shop Capacity Inadequate; NTXR in W/Shop
- Trg Class1V Staff; Safety School for Class 1V
- Govt Inspector of Rlys (CRS) – Inspns be done
- Speedometers on all Locos

## **Kunzru Committee:-**

- 377 recommendations; 354 accepted
- Creation of Safety Organisation for Increased Safety Awareness in Staff
- Upgradation of Technology
- Reviewed Methods of Training / Working
- Sr. Subordinates not to join Trade Unions

# Wanchoo Committee:-

- 531 Recommendations, 440 accepted
- Phasing out Steam, 60 Recommendations Implemented later or lost relevance
- CRS Posts open to CE, Tfc and Signal Deptt.
- CRS should be under MHA
- CRS Inquiry- Press/Public/Unions- associated
- Priority to Track Renewal, TF at LC Gates,
- Safety Counsellors with Parent Deptt.
- Review Reservation Quota in Promotions
- One Recognized Union on Railways
- Training of Stores Officers in Material Management

# **Sikri Committee:-**

- **528 Recommendations;450 accepted**
- **Professional Personnel Management Orgn in Rlys**
- **Training of Personnel Deptt Staff/Officers**
- **Training Institutes – With Models and Equipment**
- **Essential Staff – Priority in Quarter allotment**
- **Upgrade Standards of Track / Signalling**
- **Production of Concrete Sleepers**
- **Ballasting Program - Priority**
- **Track Recording Car / USFD – Schedules**
- **Level Crossing – Manning, Census, Speed Breakers; Gate Signals**
- **Joint Inspection of Signals**
- **Double Locking of Relay Room**
- **Track Circuiting on Priority**
- **Anti – Telescopic Coaches**

## **KHANNA COMMITTEE:-**

- 278 Rec , 202 Accepted, 193 Implemented.
- Need for Consolidation, Upgradation of Infrastructure
- Central Govt to provide one time Grant- Arrears in Renewal of Safety Eqpt to be wiped out
- Enhance Educational cut-offs for Rectt / Promotion
- Revamp -- RRB's; System of Psycho Test; Trg Methods
- Improve Running Rooms, Trg on Simulators,
- TPWS, Train Radio Commn System, TAWD at LC Gates
- Track Circuiting, BPAC, Flasher Lights
- Need based USFD Testing, Latest Technology of Thermit Welding, School for Welding Tech. Trg
- Prepare a Corporate Safety Plan-Priority of Investment

# INDIAN RAILWAYS CORPORATE SAFETY PLAN (2003-2013)

- Prepared in August 2003
- Susceptibilities and Trends Analysed
- Envisages Accident **Prevention and Mitigation**
- Directed towards Continuous **Reduction in Risk Level.**

# Features of Corporate Safety Plan (2003-2013)

- Rs.31,835 cr including Rs.17,000 cr. Exp on Safety
- Reduction of Collisions to Nil which amount to 7% Accidents and 38% Fatalities by Extensive Use of GPS based Anti-Collision Device (ACD).
- Accident per Million Train Km from 0.44 to 0.17.
- Passenger Fatality reduction.
- 40% reduction in Accidents due to Human Failure.
- Fail Proof system instead of Fail Safe.
- Fire in Trains – 80% reduction
- Derailments – 60% reduction

# Efforts to Progressively Achieve:

## Reduction in Accidents Attributable to Human Failure

- **Reduced Human Dependence**
  - ✓ **New Technology**
  - ✓ **Improvement in Asset Reliability**
    1. **Environment of “Fail-proof” from “Fail safe” system**
    2. **Renewal & Up-gradation of Assets**
  
- **Human Resource Development Measures**



- Elimination of Collisions by extensive use of :
  - Anti-Collision Device (ACD), an Indigenously Developed GPS based Equipment
  - Signalling Aids – Track Circuiting, Block Proving by Axle Counter (BPAC)

# Measures-Reduce Collisions - ACD

- 1736 Route Kms. N. F. Rly to be completed first.
- Work Sanctioned for additional 1729 Route kms on S.R., S.C.R. S.W.R.
- Further Sanctioned for ER, SER, ECR, & ECoR
- Entire BG network by 2014, cost Rs.14 Lakh /km, total cost Rs. 6000 cr
- Indigenous development – RDSO/CRIS

# Measures-Reduce Derailments by 60%

*Involving- 14% Fatalities and 75%#*

*Accidents:*

- Replacement of over-aged Tracks, Bridges, S&T Gears and Rolling Stock.
- Elimination of Derailment Prone 4 wheeler Wagons.
- Reduction in Thermit Welded Joints.
- Improved Training Facilities for enhancing Human Skills.
- Continuous Track Circuiting.
- Use of State-of-Art SPURT Cars for Rail flaw Detection, WILD.

**# Now 55%**

# Level Crossings

- **Volumes are enormous**

- **As on 1.04.2011**

  - **Unmanned Level Crossings : 14,862**

  - **Manned Level Crossings \* : 17,914**

**\*Includes Inter-locked Gates - 9,016\*\***

**\*\*Approx**

# Measures - Reduce L C GATE Accdts

- LC Accidents amount to 46% Fatalities:  
Construction ROBs/RUBs at LC Gates  
TVUs >1 lakh
  - Limited Height Subways
  - Manning of Unmanned Level Crossings.
  - TF Connection & Interlocking of LC Gates.
  - Use of Train Actuated Warning Device (TAWD) and Anti-Collision Device.
  - Social awareness Programmes.

# **Measures to Reduce – Fire Cases.**

- Fire Accidents amount to 5% fatalities
- Reduce with adoption of near Fire-proof Coaches and use of Fire Retardant Material in existing Coaches.
- Emergency Exit to reduce damage
- Increased Awareness with Passengers
- Super-checks on Luggage/Parcel
- Pantry Cars & Power Cars Vulnerable

# Measures to Reduce Damage

- Crash-worthy Coaches and Tight Lock Couplers with Anti-climbing features
  - Crash worthy Design finalised; All ICF Coaches now of this type. LHB Coaches from this year
  - Design of Crash Buffers – 1200 on Trial
  - Design of Tight Lock Coupler with Anti Climbing features (CBC) finalised. Production started

# Human Resources Development

- Training of Trainers
- Self Teaching Packages, Scenario Simulation, Use of IT Related Tools.
- Centralised approach for Uniform Application and Universal ownership.



# HRD Objectives

## **Enhance Quality of Human Resource:**

- Quality of Recruitment by RRBs.
- Aptitude Test Operating Staff - Entry Level.
- Priority to Refresher Courses.
- Simulator Aided Training to Running Staff.
- Modernization of Training Institutes.
- Breathalyzer Tests be Strengthened

# ACCIDENT RESTORATION

- Main areas of focus :-
  - Faster Response
  - Better Facilities and Equipments
  - Training and Preparedness
  - Crack Team of Rail Rescue Experts in Hd Qrs
  - Every Division / Rly to have DM Plan
  - MOUs & Coordination with Civil Medical Authorities/St. John Ambulance/NGOs
  - Self propelled ART/ARME - Three Coach Train for each Division.

# Compensation

- Train Accident Ex gratia- Death Rs 15,000; Grievous Rs 5000; Simple Rs 500.
- Claims Tribunals- upto Rs 4 Lakhs
- L-xing Accidents – No Claim, no Ex-Gratia for Accidents at Un Manned L C Gates unless Railways fault is proved under- Sec 131 of MV Act and Sec 141 of IR Act
- Manned Gates – Ex-Gratia  
Rs 6000 Death, Rs 2500 Grievous Injury

THANK YOU