

Annual Summary of Molten Metal Incidents in 2024

September 2025



Explosion Rating Force Criteria



Guidelines	Force 1	Force 2	Force 3
Property Damage	None	Minor	Considerable
Light	Minimal	Flash	Intense
Sound	Short cracking	Loud Report	Painful
Vibration	Short and sharp	Brief rolling	Massive structural
Metal Dispersion	<15 feet	>15 to 50 feet	>50 feet

TABLE 1. Explosion Rating Force Criteria

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Incidents by Year

1981 – 2024 (Total 4834)

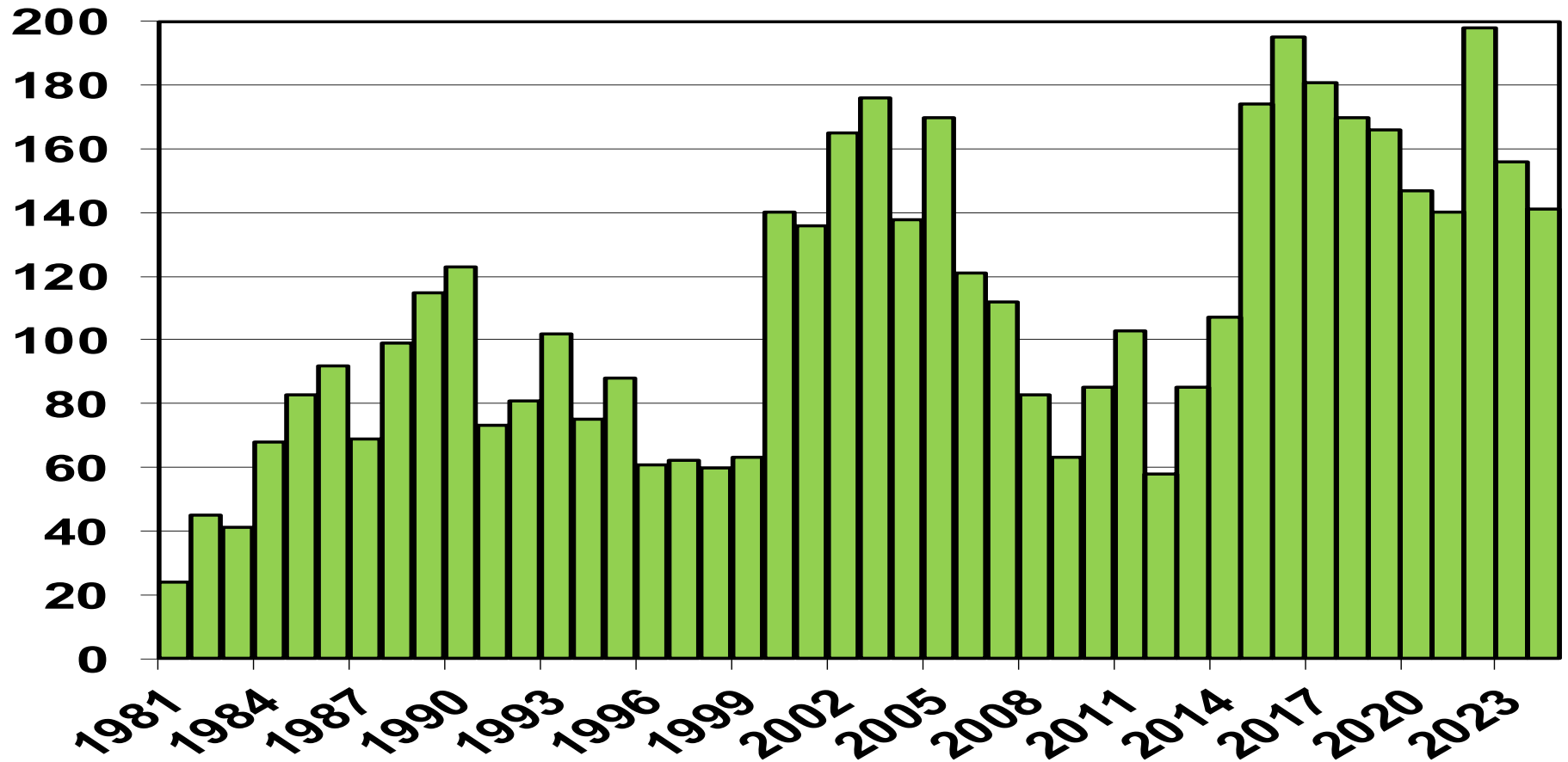


FIGURE 1. Incidents Reported For The Period 1981 – 2024 Sep. 2025

Incidents by Force Level 1981 – 2024 (Total 4834)

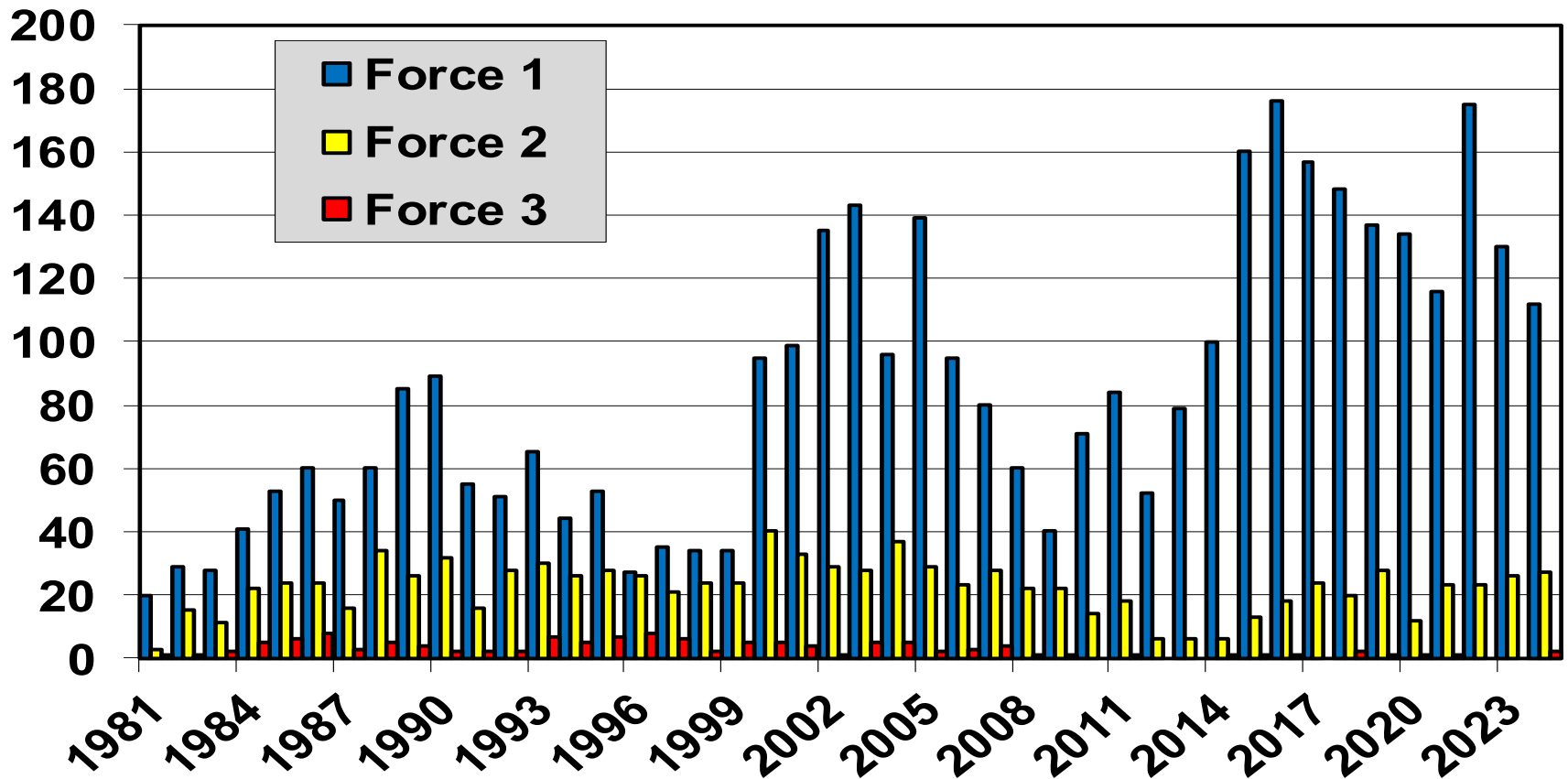


FIGURE 2. Incidents By Force Level 1981 – 2024

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Incidents by Force Levels 2 & 3 1981 – 2024

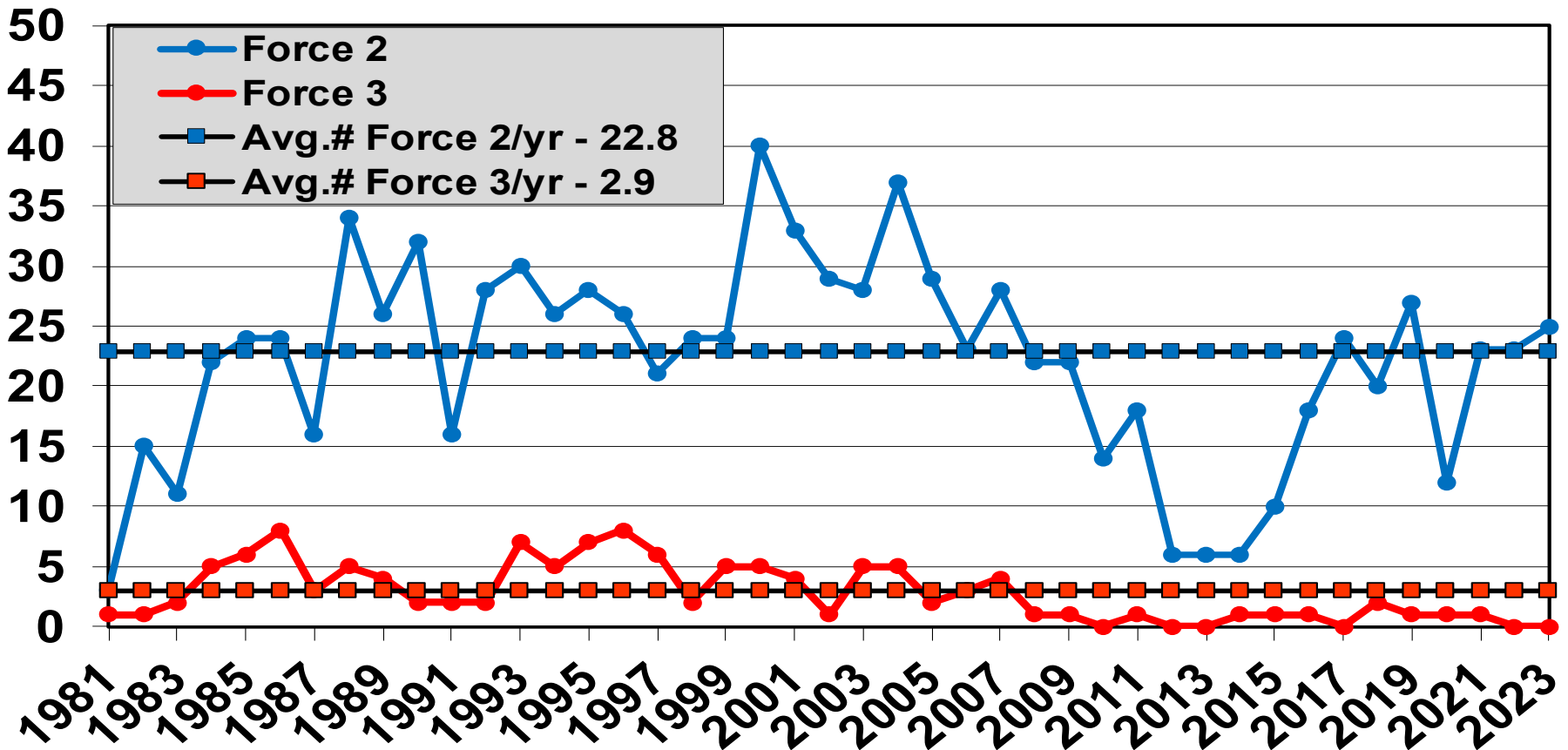


FIGURE 3. Incidents By Force Levels 2 & 3 For 1981 – 2024

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% Incidents Reported as Force Levels 1&2 2000 - 2024

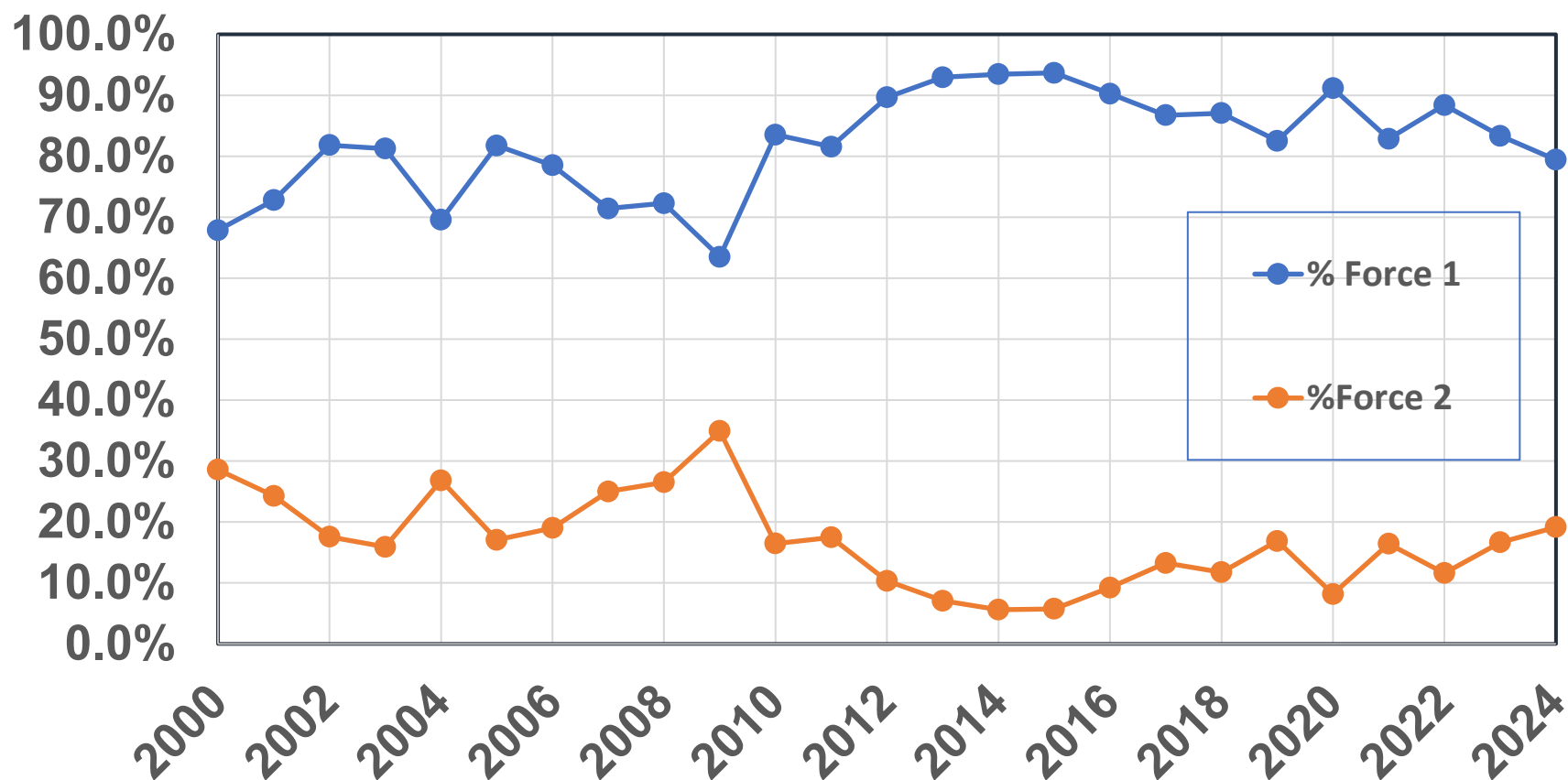


FIGURE 4. % Reported as Force Levels 1 & 2 For 2000 – 2024

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Force 3 Incidents Only 1981 – 2024

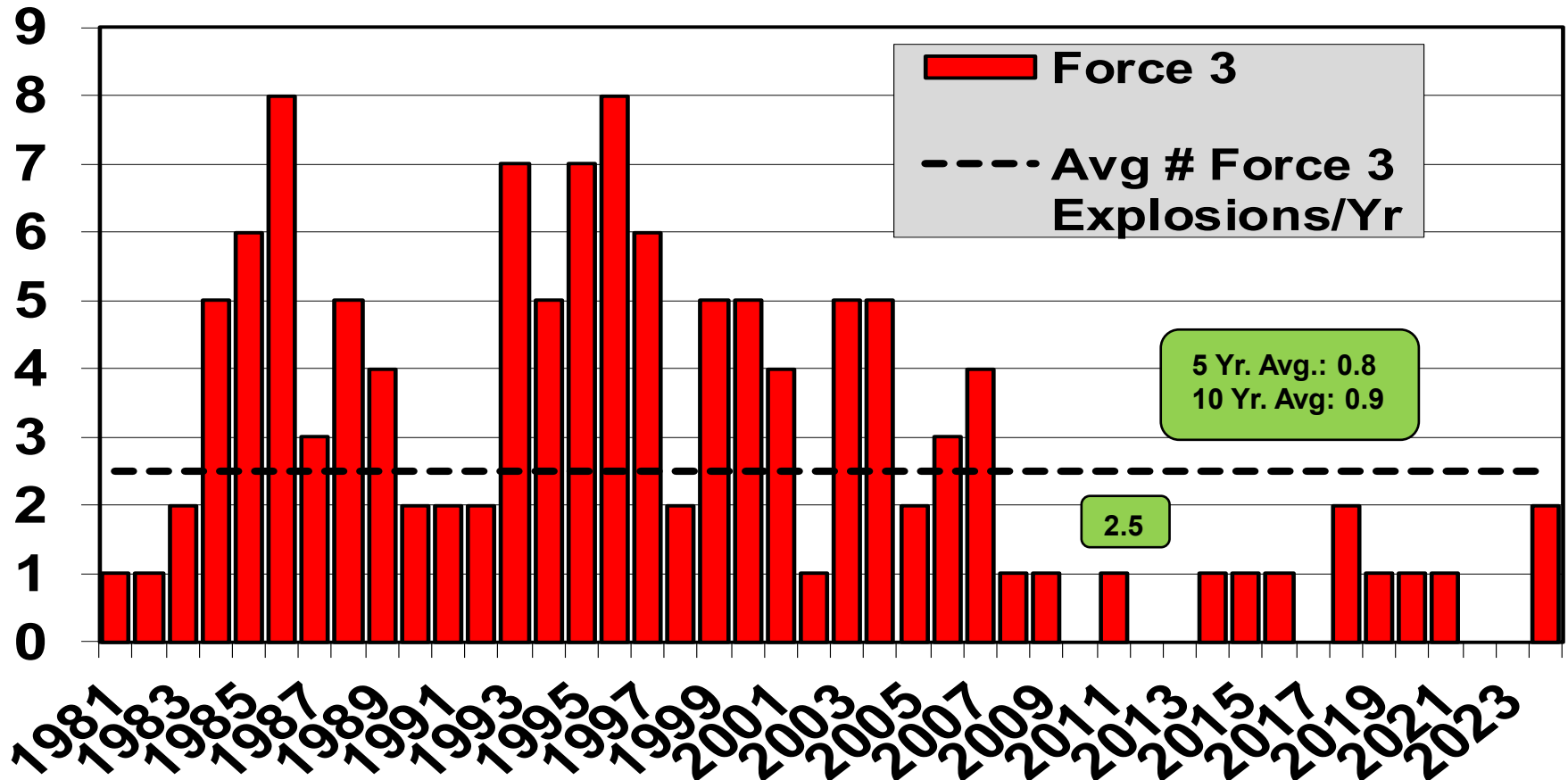


FIGURE 5. Force 3 Incidents For 1981 – 2024

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Incidents by Force Level 1981 – 2024 (Total 4834)

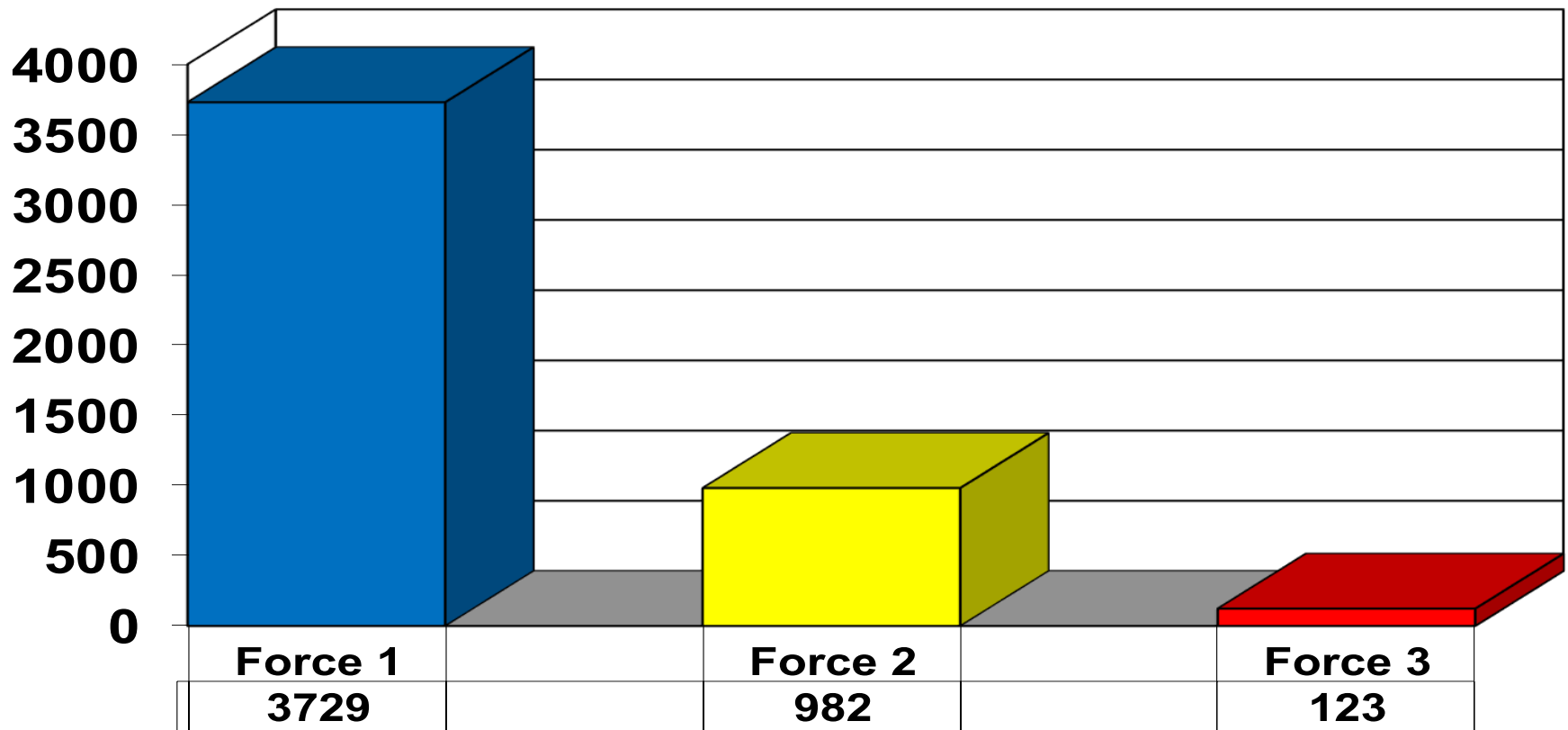


FIGURE 6. Incidents By Force Level 1981 – 2024

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All Force Levels by Percentage 1981 – 2024

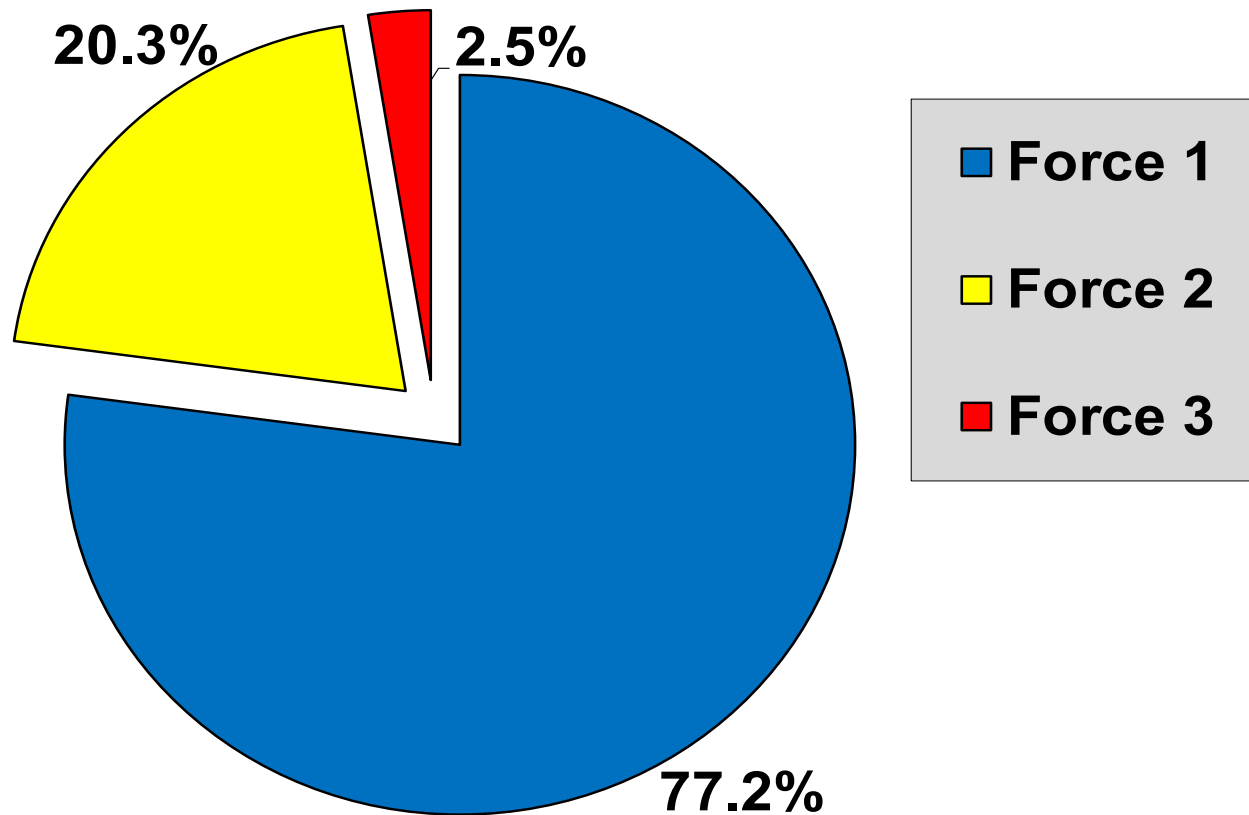


FIGURE 7. All Force Levels By Percentage 1981 – 2024

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Injuries from Incidents 1981 – 2024 (Total 1686)

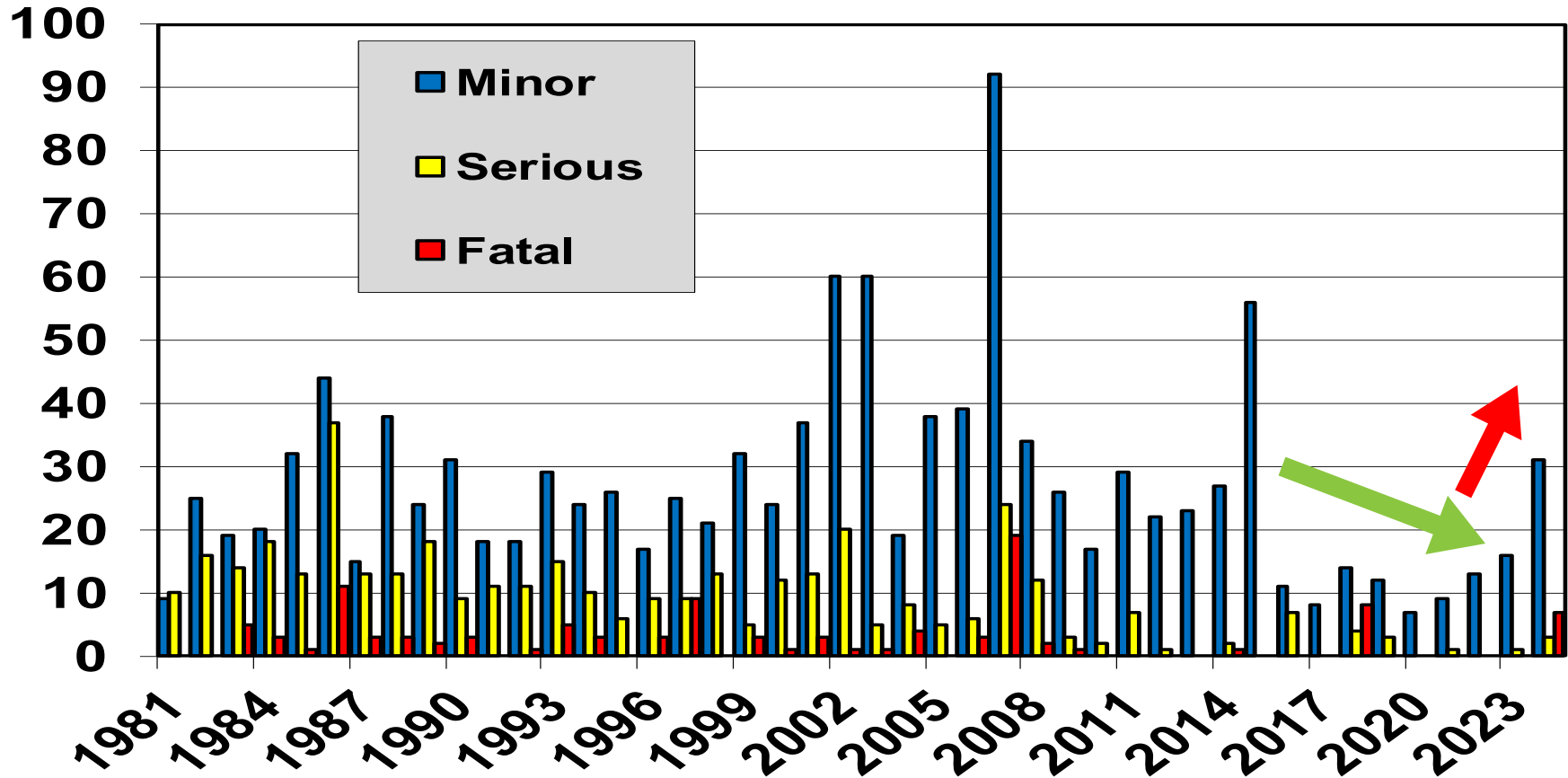


FIGURE 8. Injuries From Incidents For 1981 – 2024

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% Injuries per Total Annual Incidents 2001 – 2024 (Total 877 Injuries)

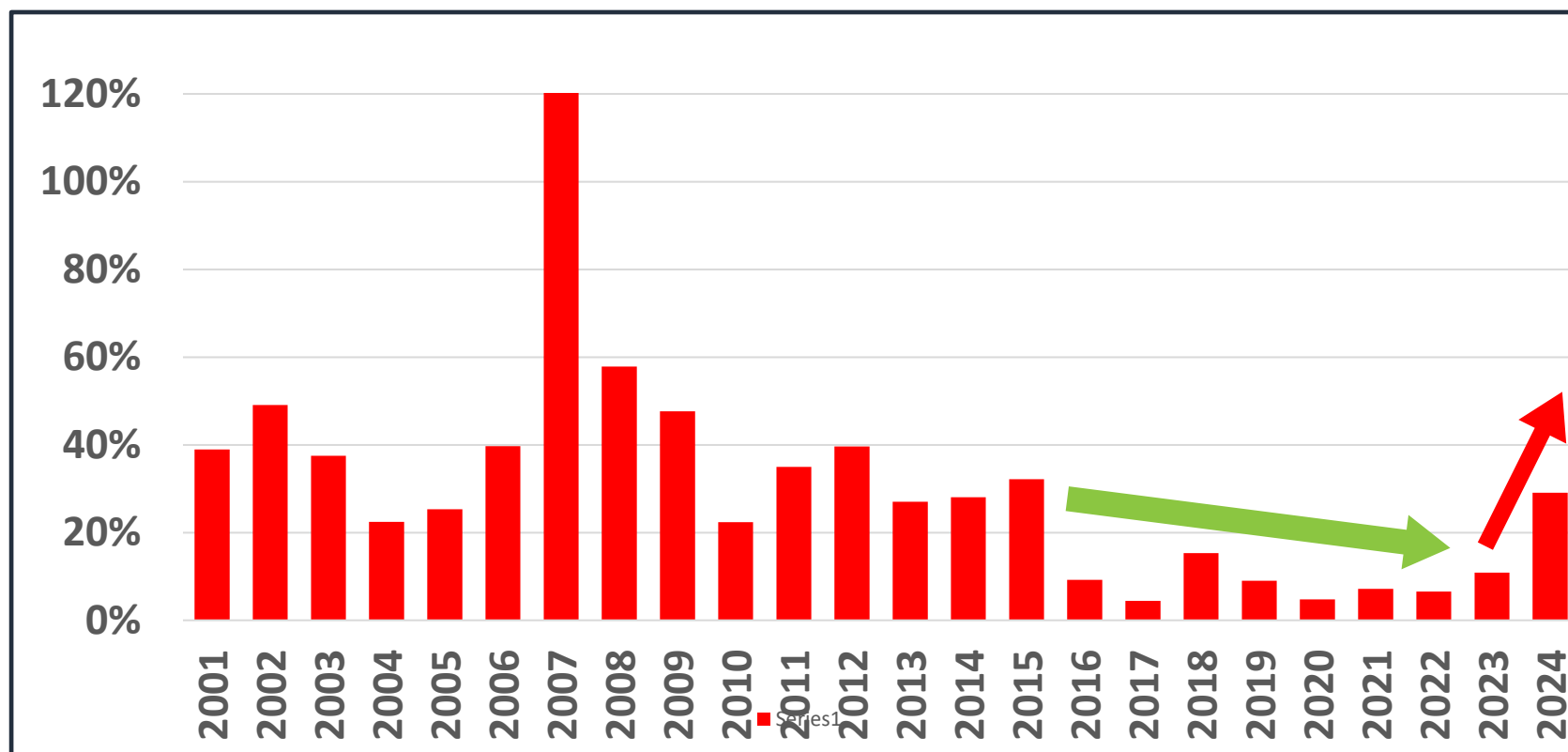


FIGURE 9. % Injuries/Total Annual Incidents 2001 – 2024

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Average # of Injuries / Year from Explosions

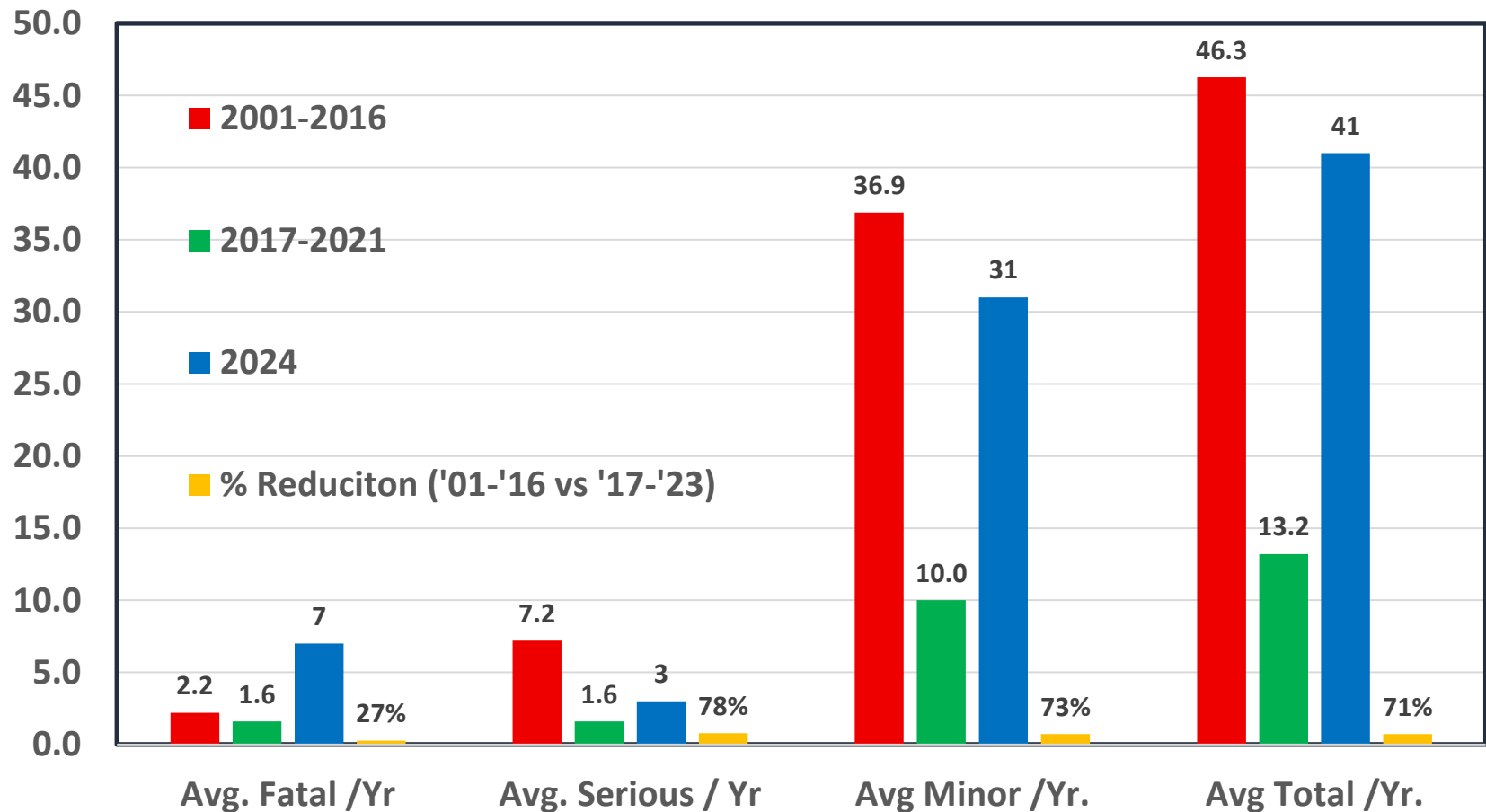


FIGURE 10. Avg. # Injuries / Yr. For 2001-2016, 2017-2023 & 2024 Sep. 2025

Injuries by Severity – Total 1686 1981 – 2024

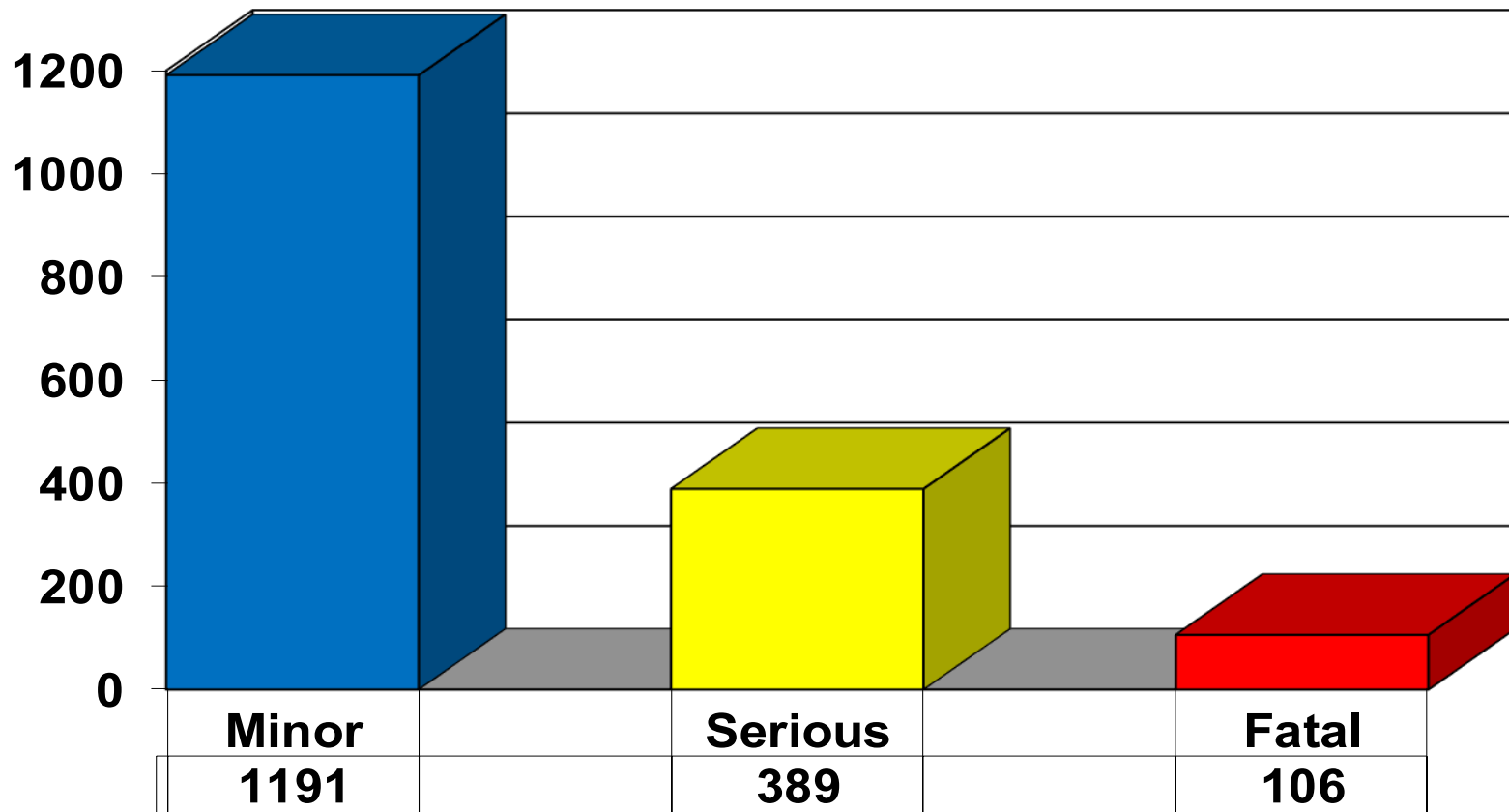


FIGURE 11. Injuries By Severity For 1981 – 2024

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Injury Levels by Percentage 1981 - 2024

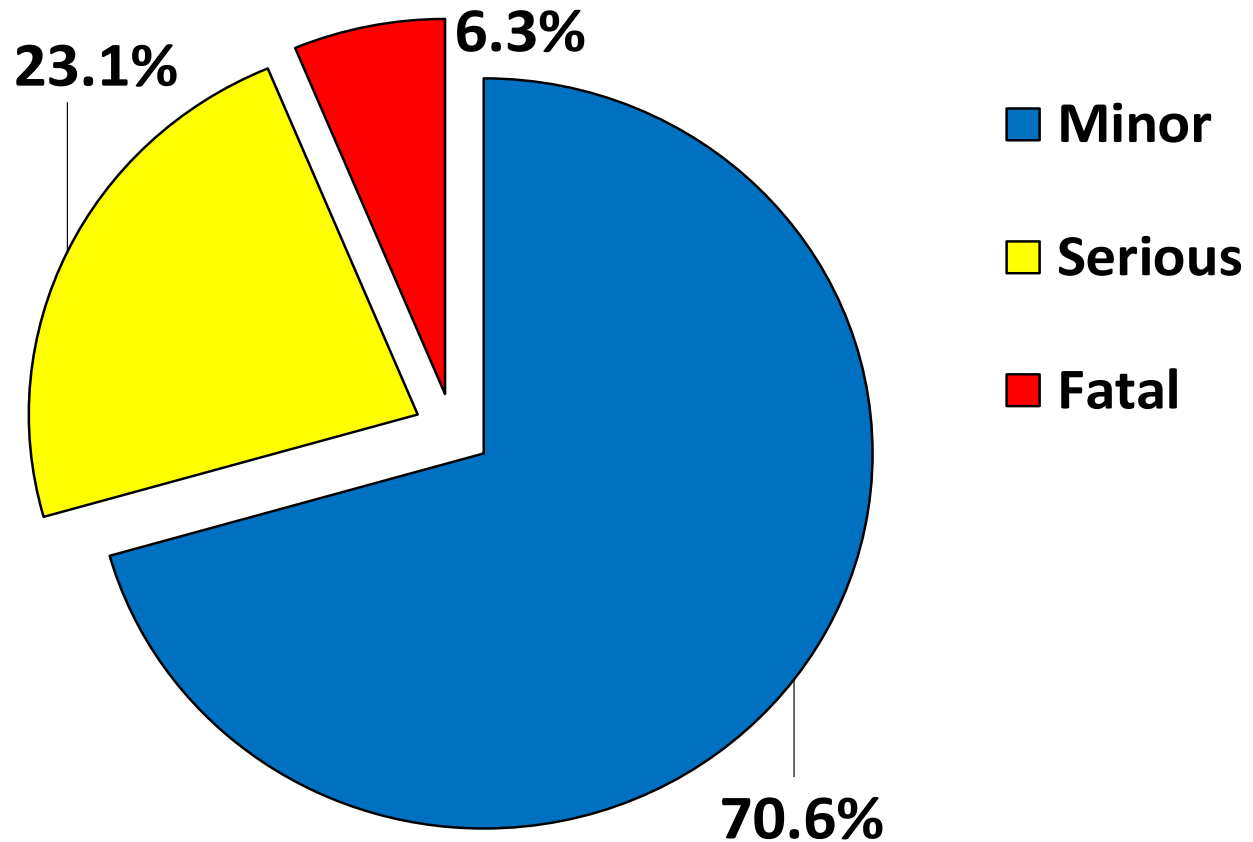


FIGURE 12. Injuries Levels By Percentage For 1981 – 2024

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Injury Risk per 100 Explosions 1981 - 2024

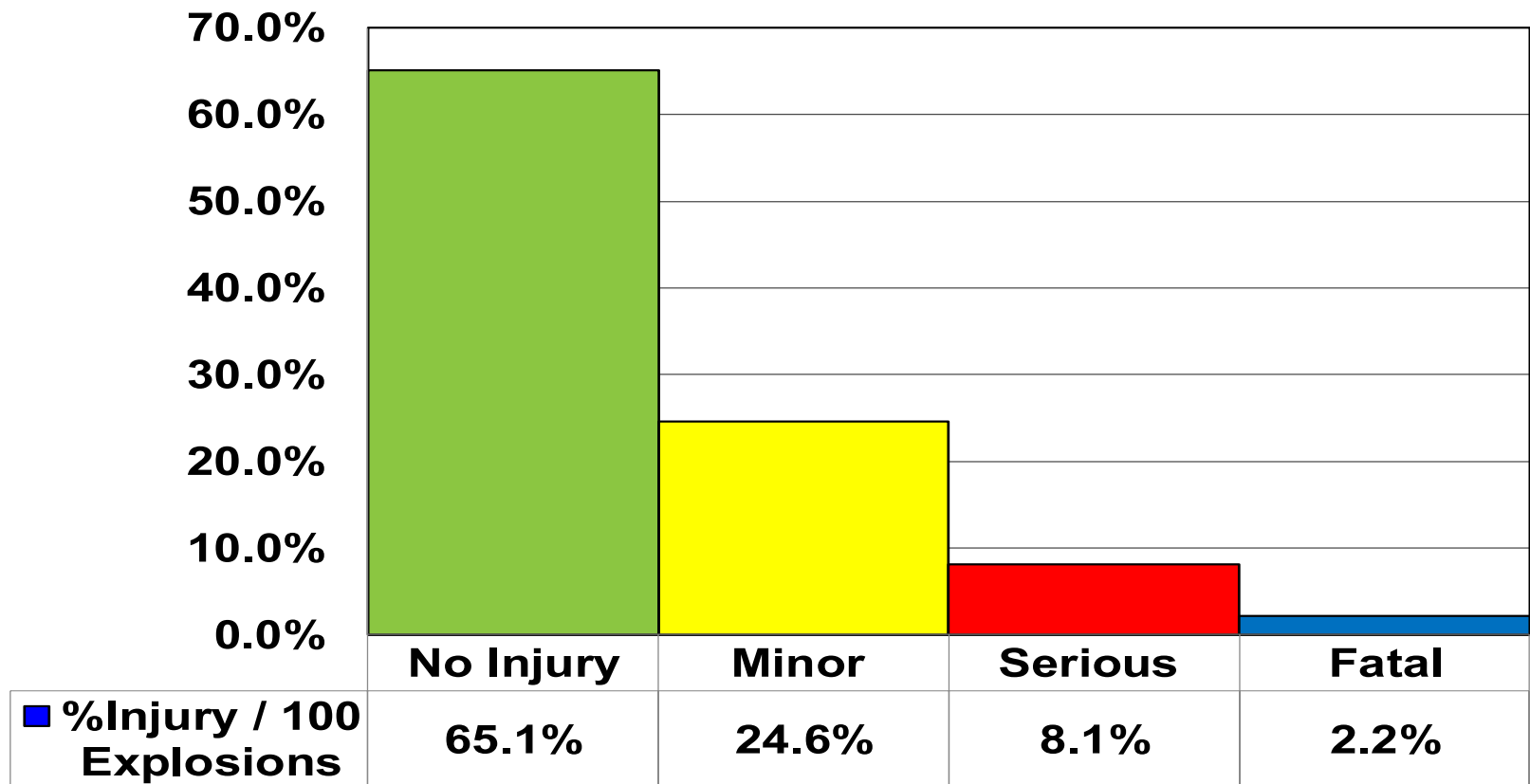


FIGURE 13. Injury Risk Per 100 Explosions For 1981 – 2024 Sep. 2025

Fatalities from Explosions 1981 - 2024

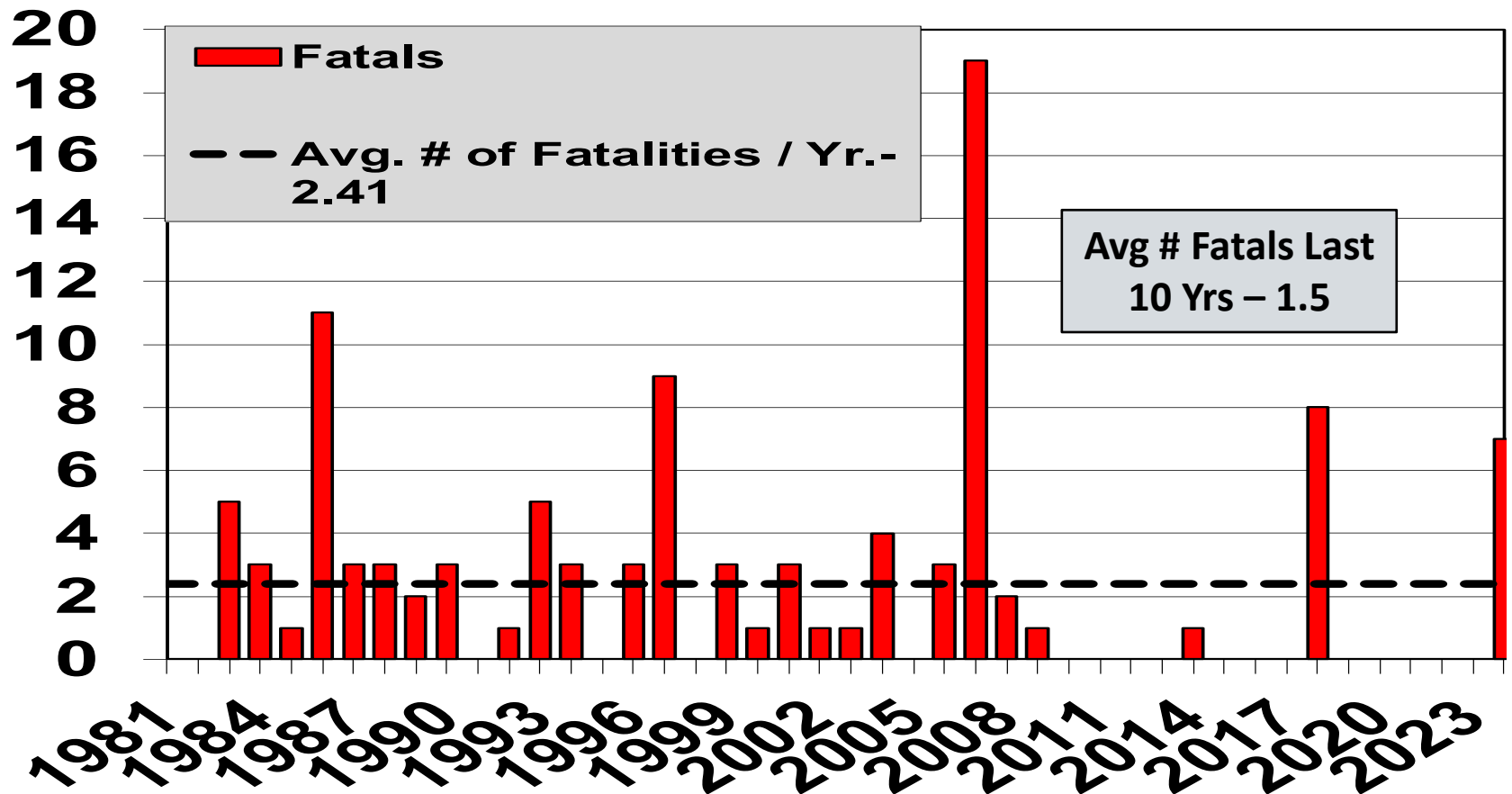


FIGURE 14. Fatalities From Explosions For 1981 – 2024

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Force Level Incidents by Operation – 2024

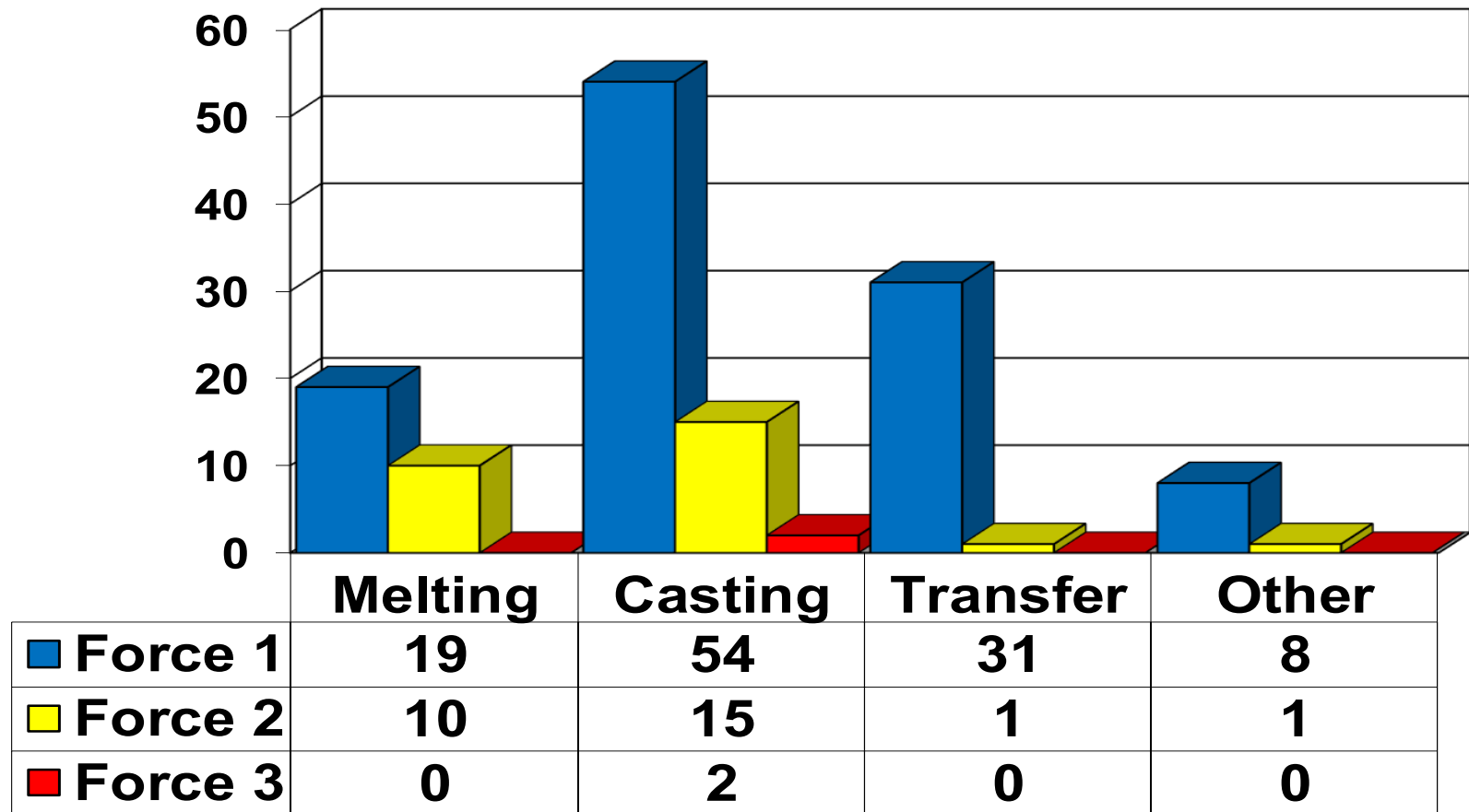


FIGURE 15. Force Level Incidents By Operation For 2024

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Force Level & % Incidents by Operation 1980 – 2024

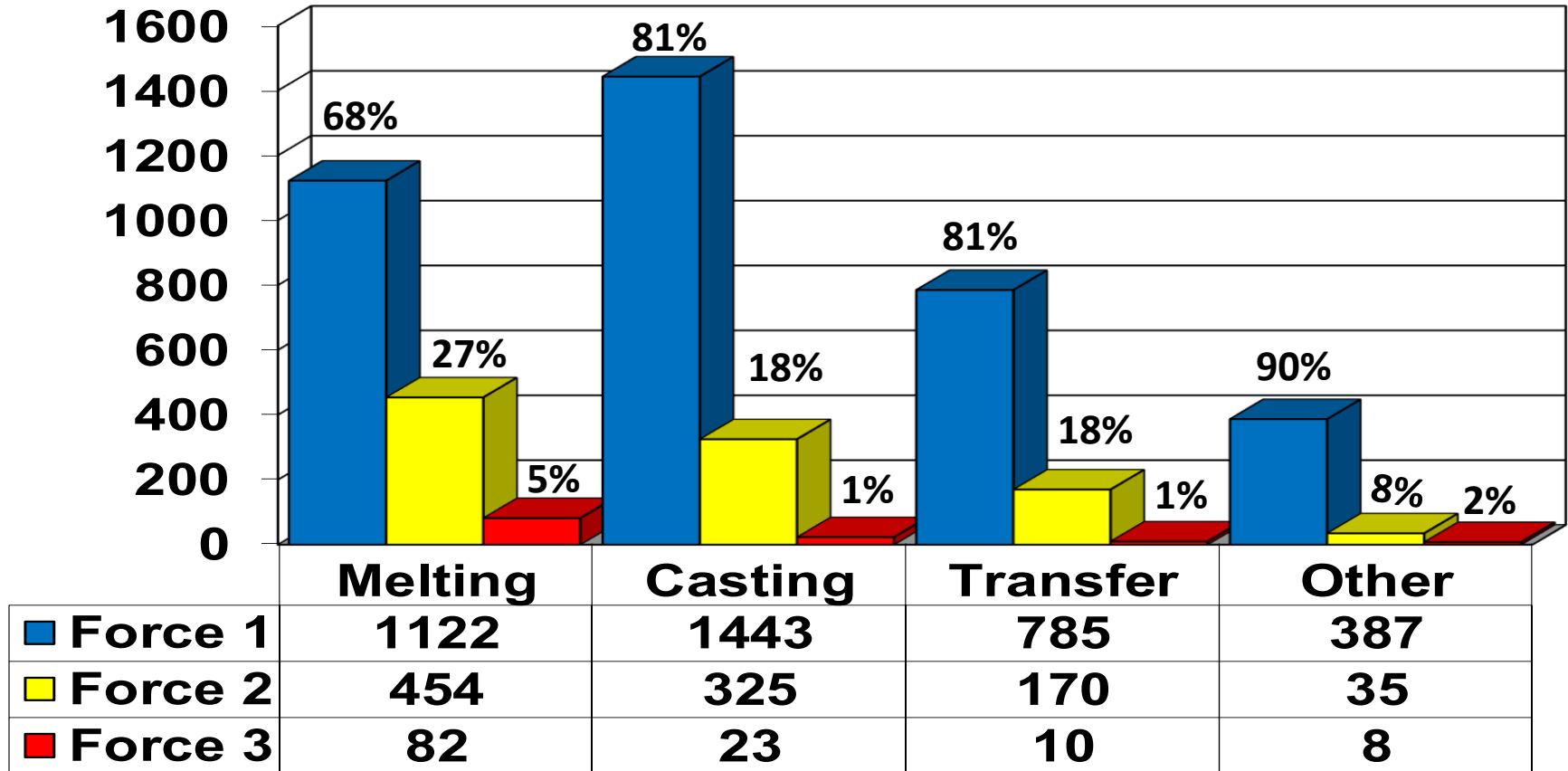


FIGURE 16. Force Level & % Incidents By Operation For 1980 – 2024 Sep. 2025

Melting Injuries and Incidents

1990 – 2024 (Total 335 Injuries)

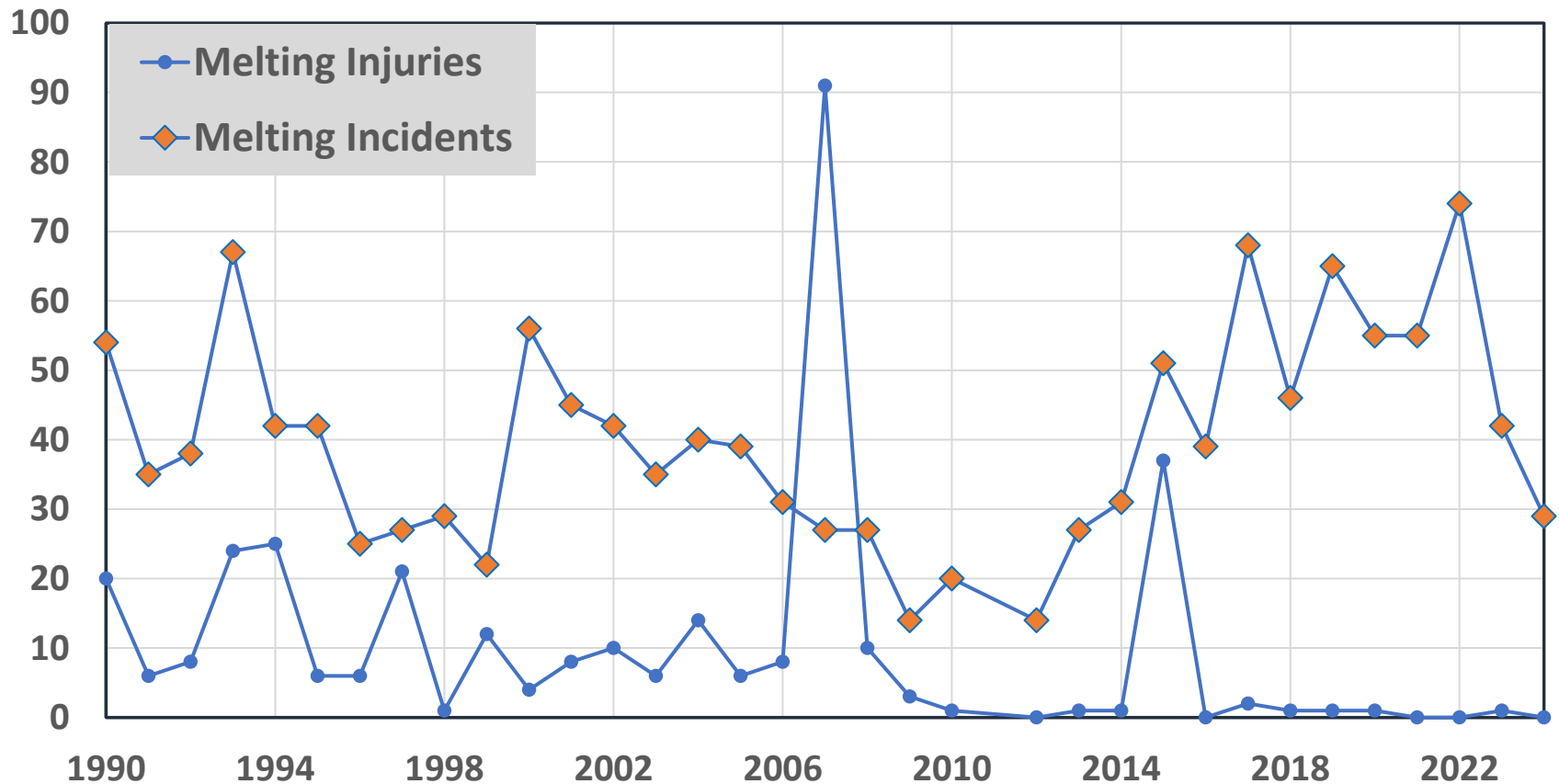


FIGURE 17. Melting Injuries and Incidents 1990 – 2024

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Melting Injuries per Incidents

1990 – 2024

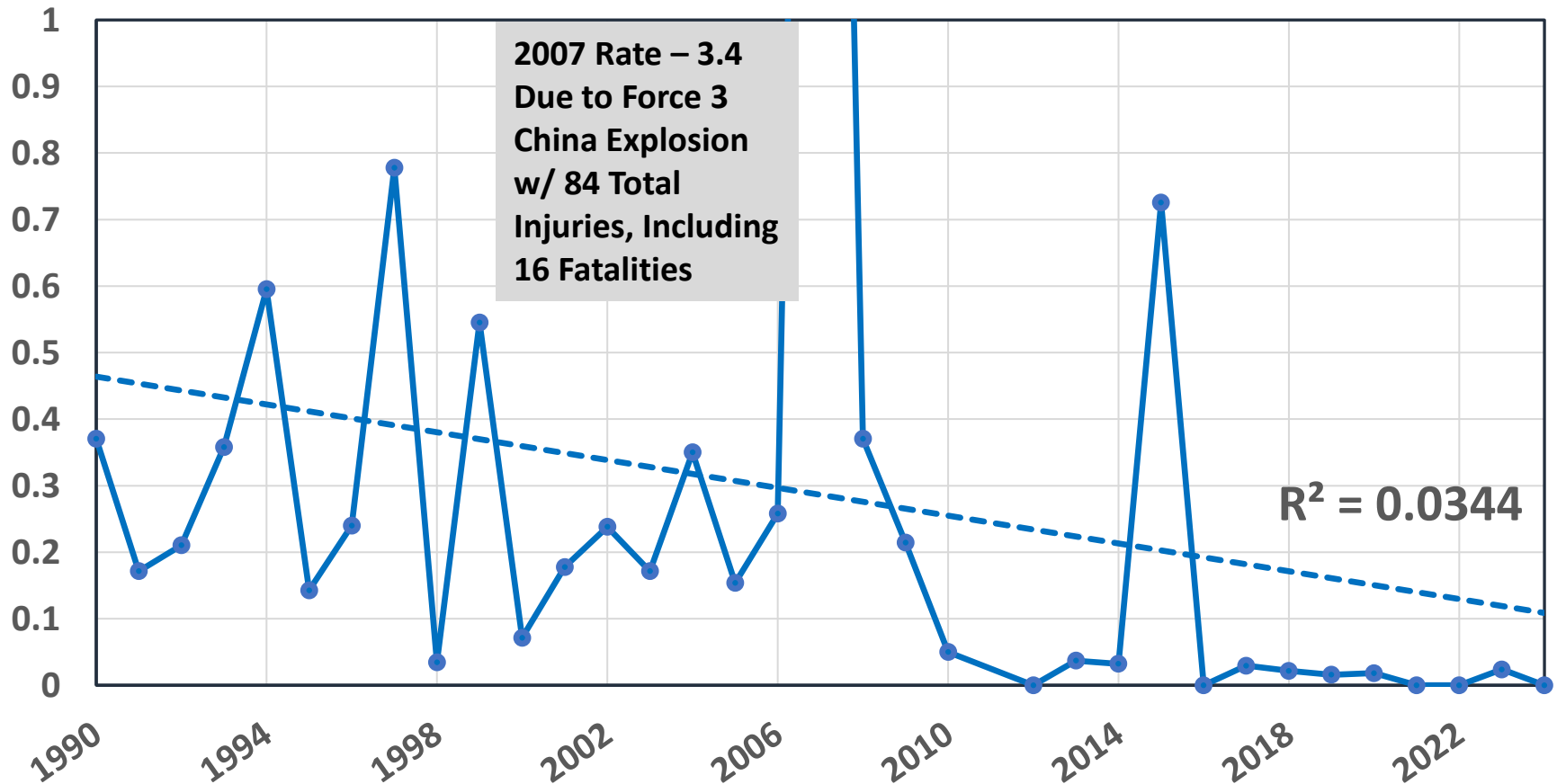


FIGURE 18. Melting Injuries Per Incidents 1990 – 2024

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Casting Injuries and Incidents

1990 – 2024 (Total 394 Injuries)

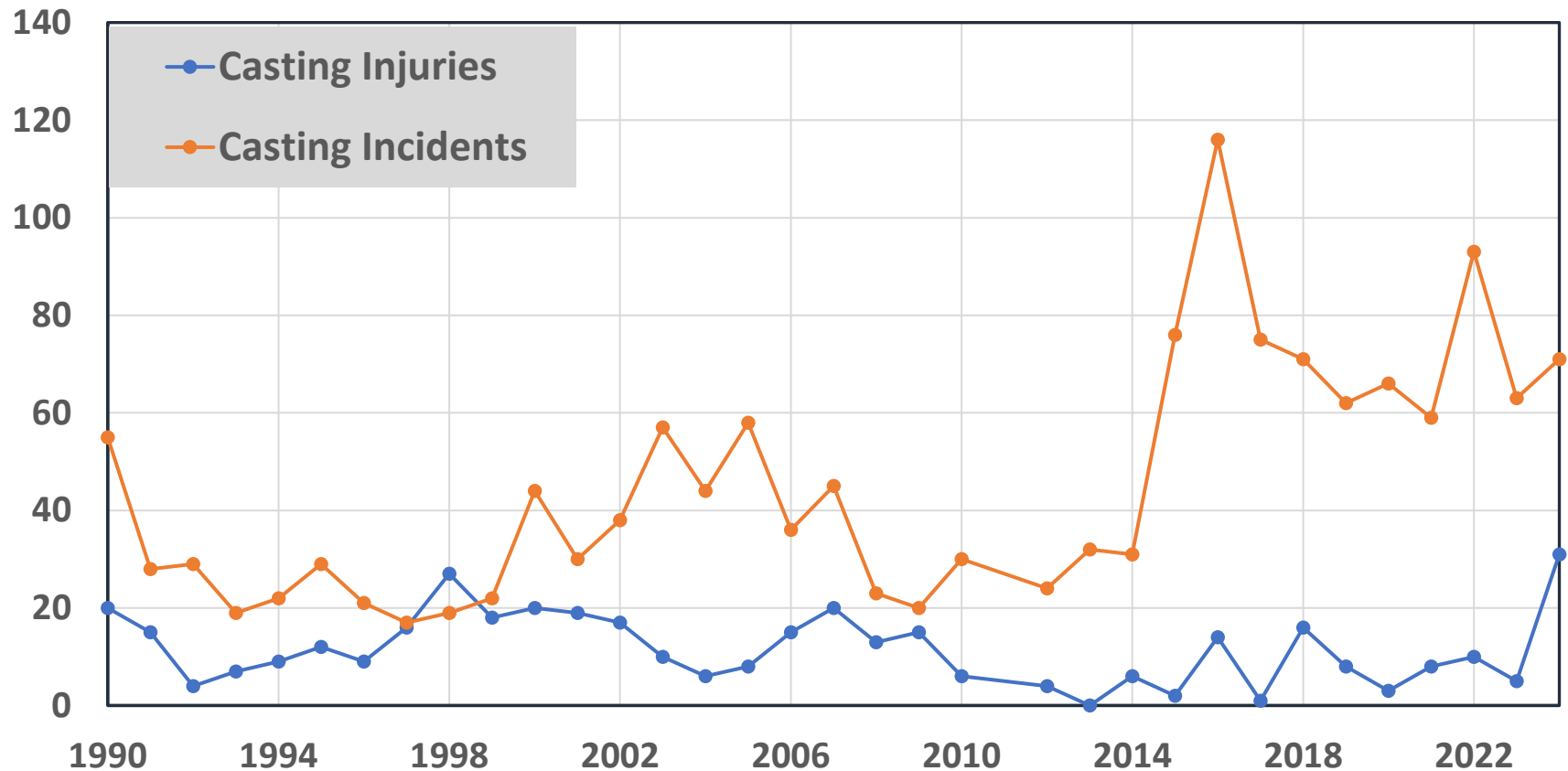


FIGURE 19. Casting Injuries and Incidents 1990 – 2024

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Casting Injuries per Incidents

1990 – 2024

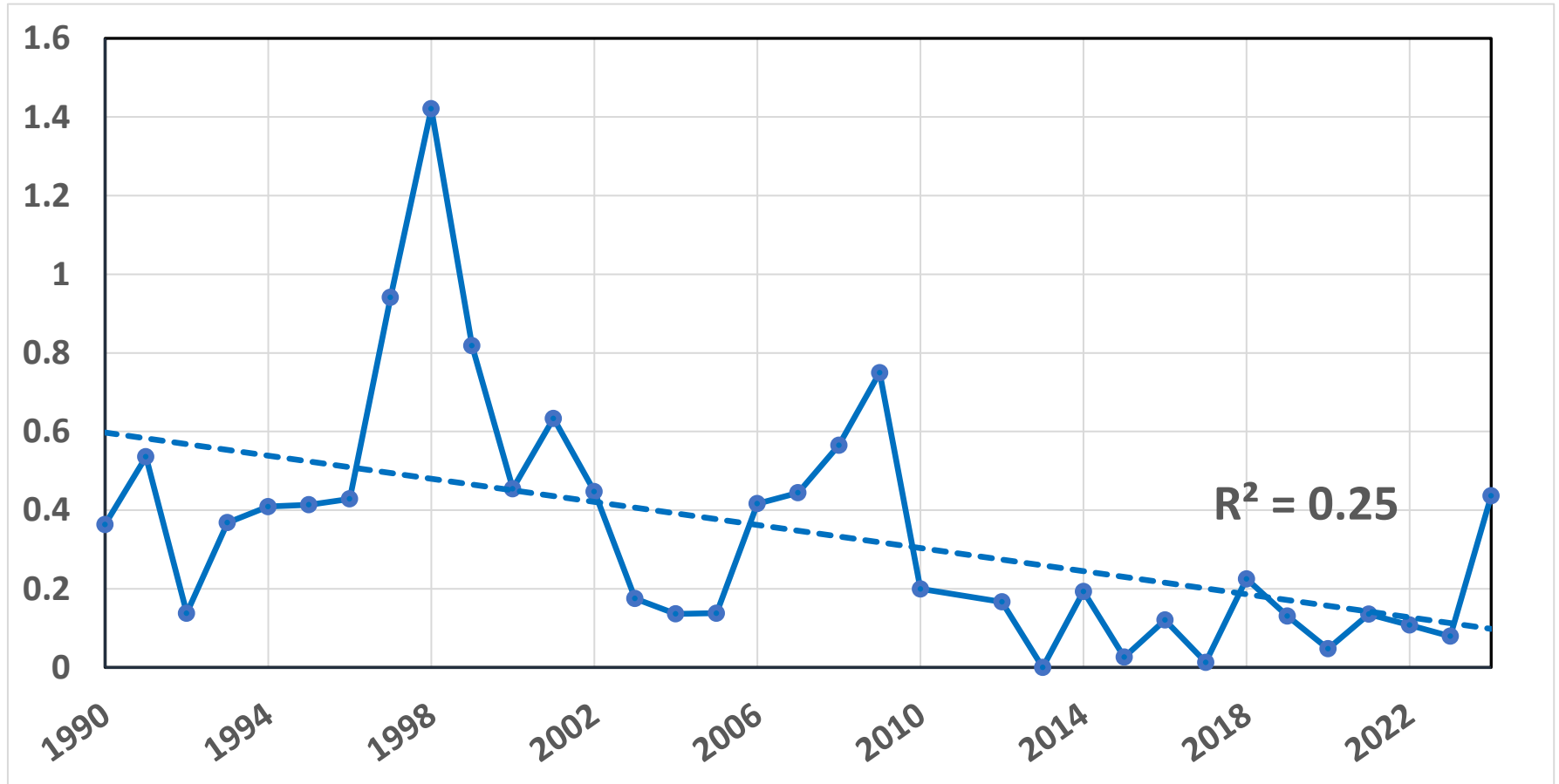


FIGURE 20. Casting Injuries Per Incidents 1990 – 2024

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Transfer Injuries and Incidents

1990 – 2024 (Total 264 Injuries)

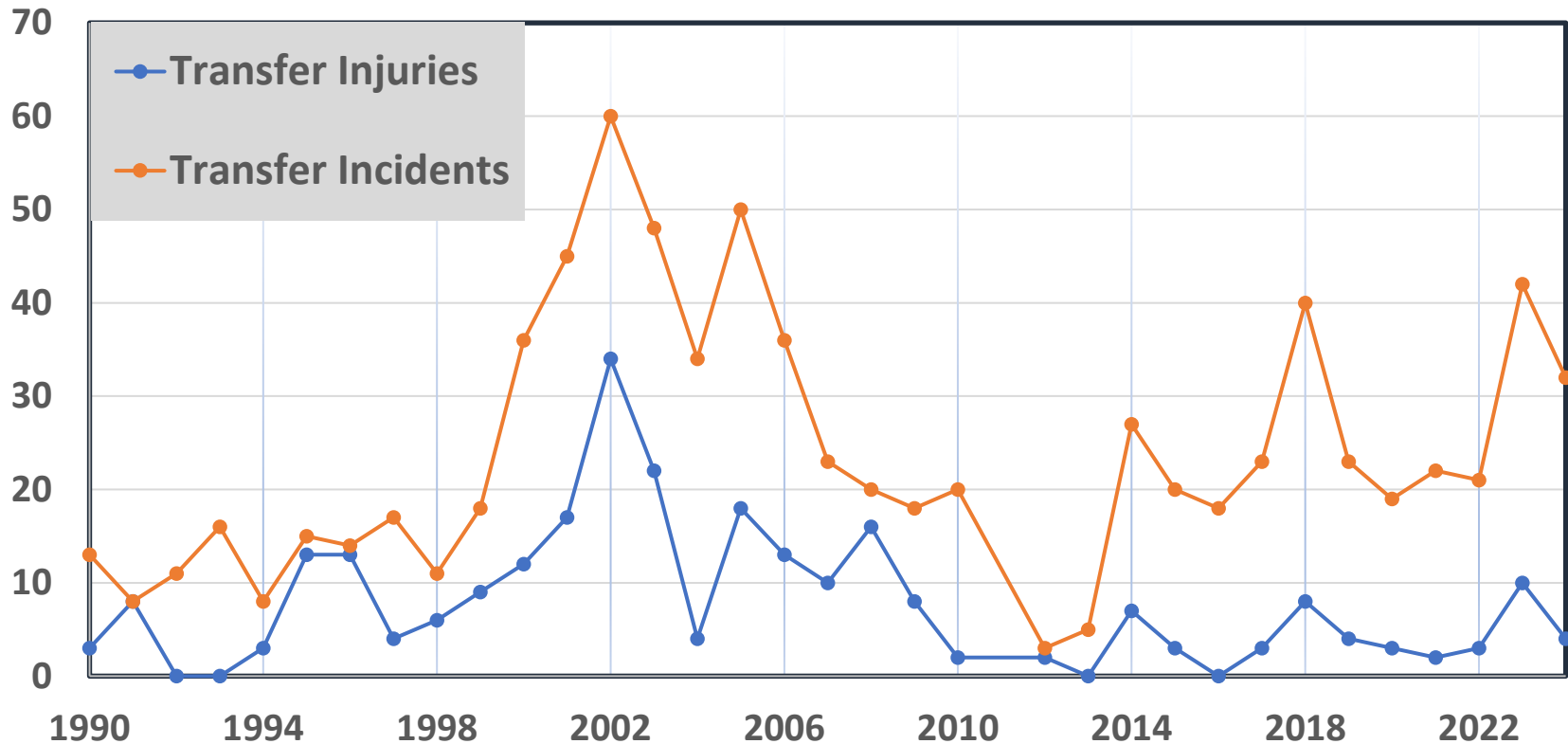


FIGURE 21. Transfer Injuries and Incidents 1990 – 2024

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Transfer Injuries per Incidents

1990 – 2024

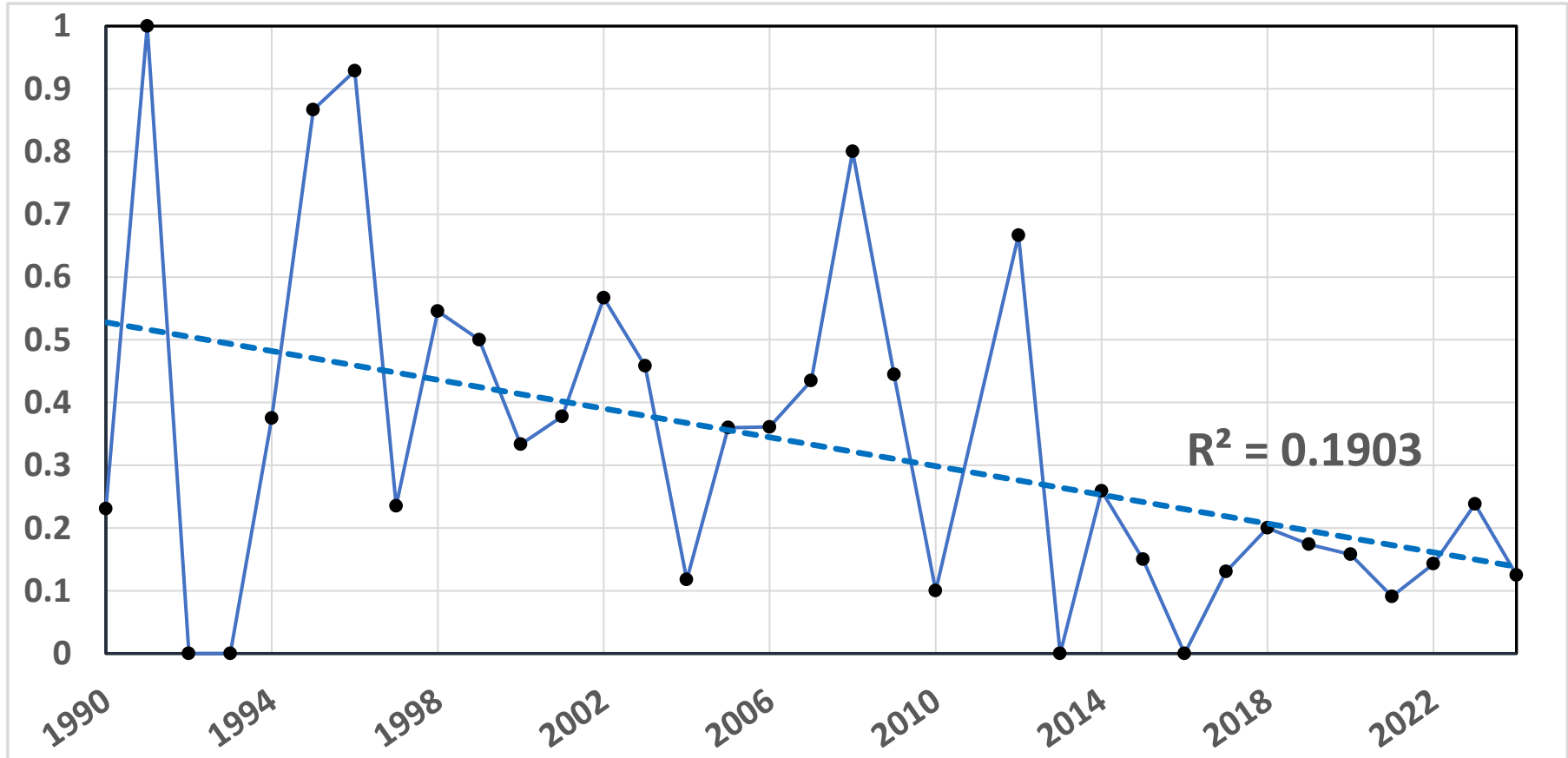


FIGURE 22. Transfer Injuries Per Incidents 1990 – 2024

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29 Melting Explosions – 2024

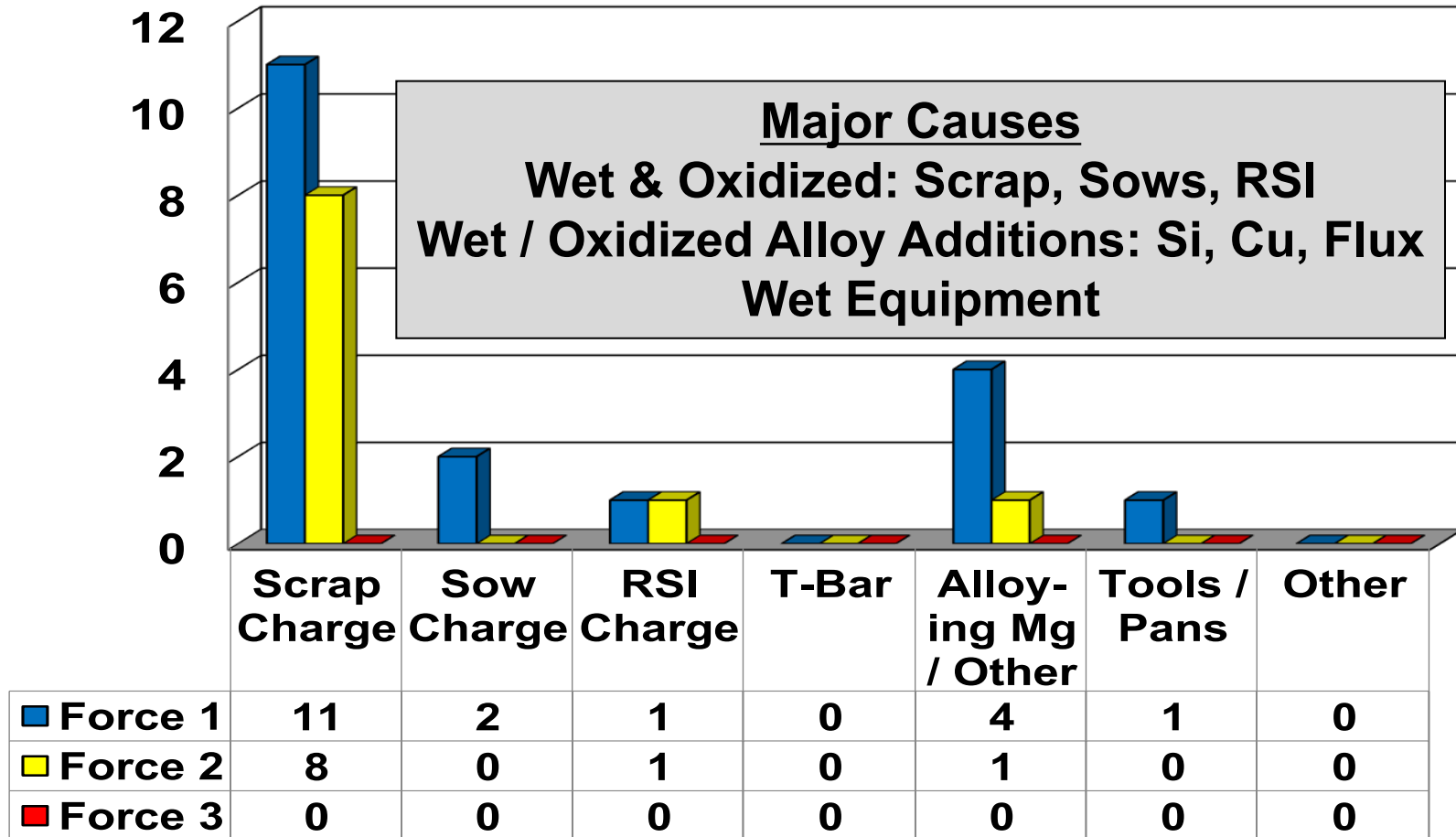


FIGURE 23. Melting Explosions By Cause For 2024

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Melting Explosions – Charge Material Involved 1980 – 2024

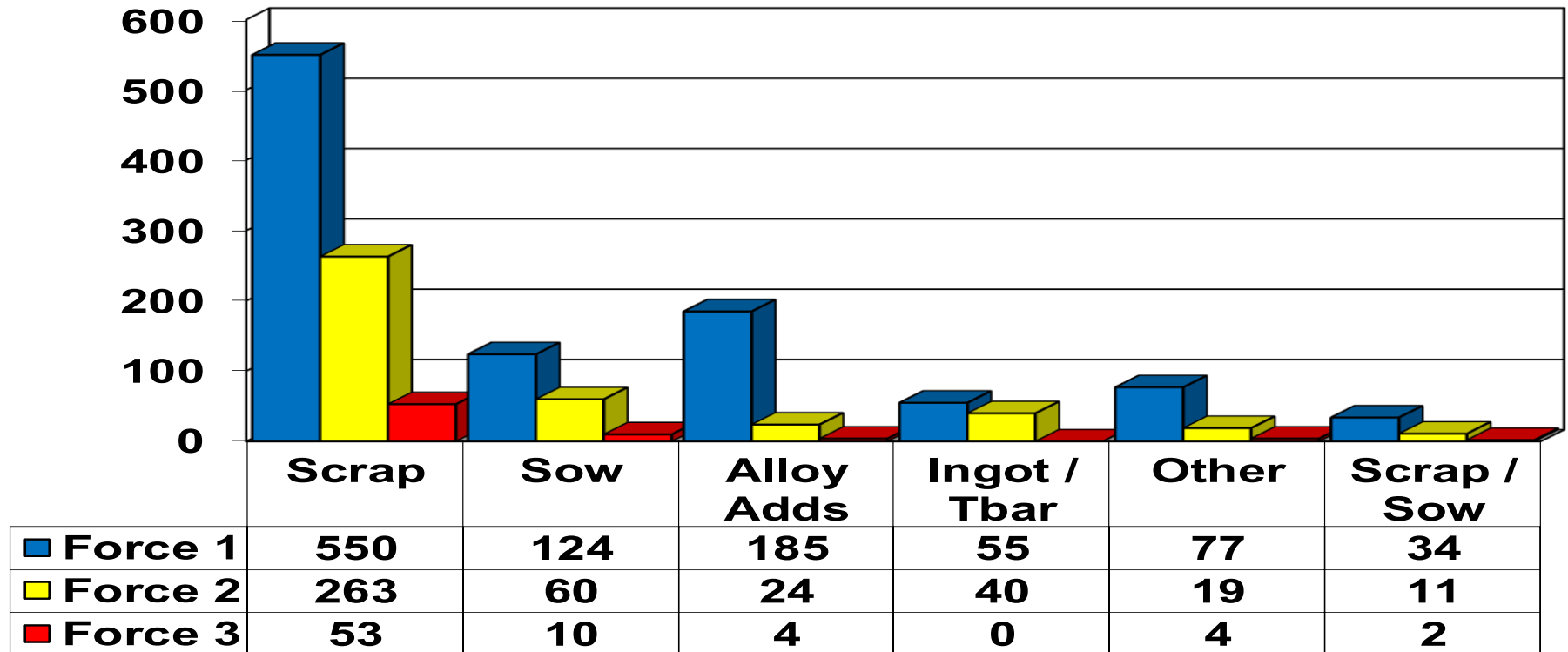


FIGURE 24. Melting Explosions By Charge Material 1980 – 2024

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71 Casting Explosions – 2024

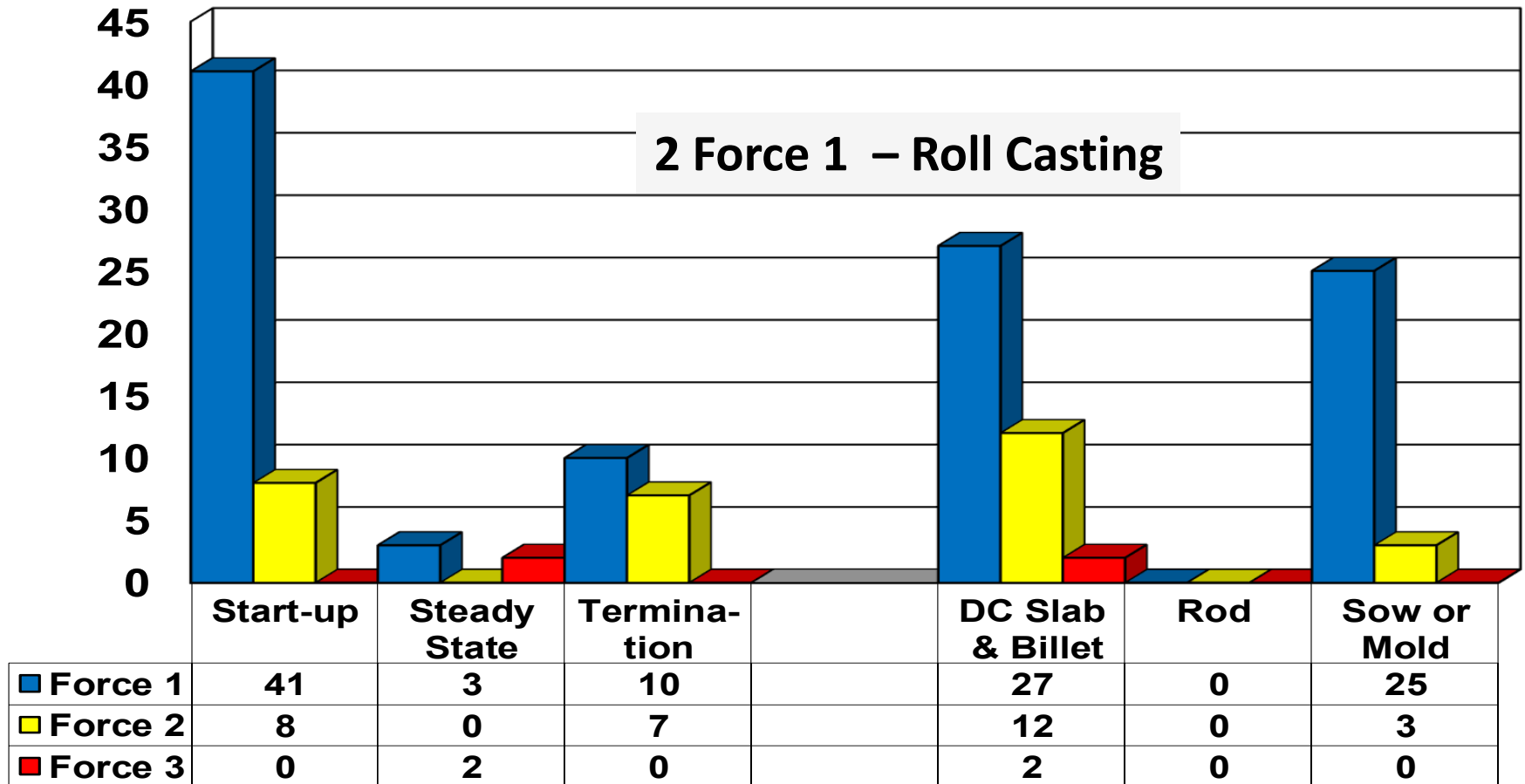


FIGURE 25. Casting Explosions For 2024

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DC/HDC/EMC Explosions by Cast Segment

1980 – 2024

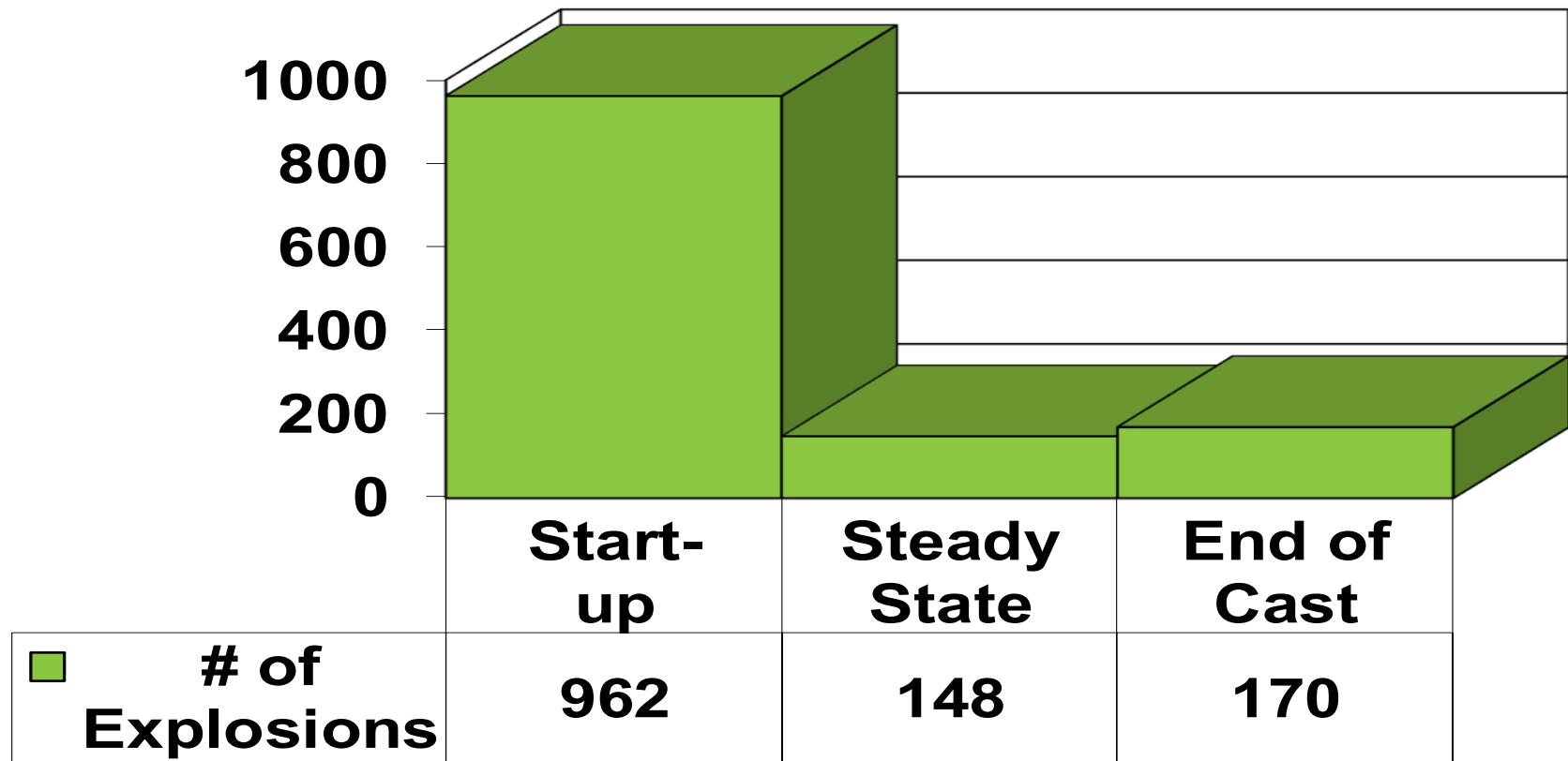


FIGURE 26. Casting Explosions By Cast Segment 1980 – 2024

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Major Causes of 71 Casting Incidents – 2024

- DC Start-up Issues: Wet Starting Blocks / Wet Equipment / Butt Curl –Bleed-outs
- DC Steady State Issues: Equipment Failure / Operator Error
- DC Termination Issues: Wet / Rusty Drain Pan / Wet Hand Tool / Ingot Head Under Water
- Strip / Roll Casting: Start-up Wet Unoiled Drain Pan
- Sow / Mold Casting Issues: Wet / Unpreheated / Cracked Molds; Wet Hand Tool

FIGURE 27. Major Causes of Casting Incidents For 2024

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Major Causes of Casting Explosions 2015 – 2024

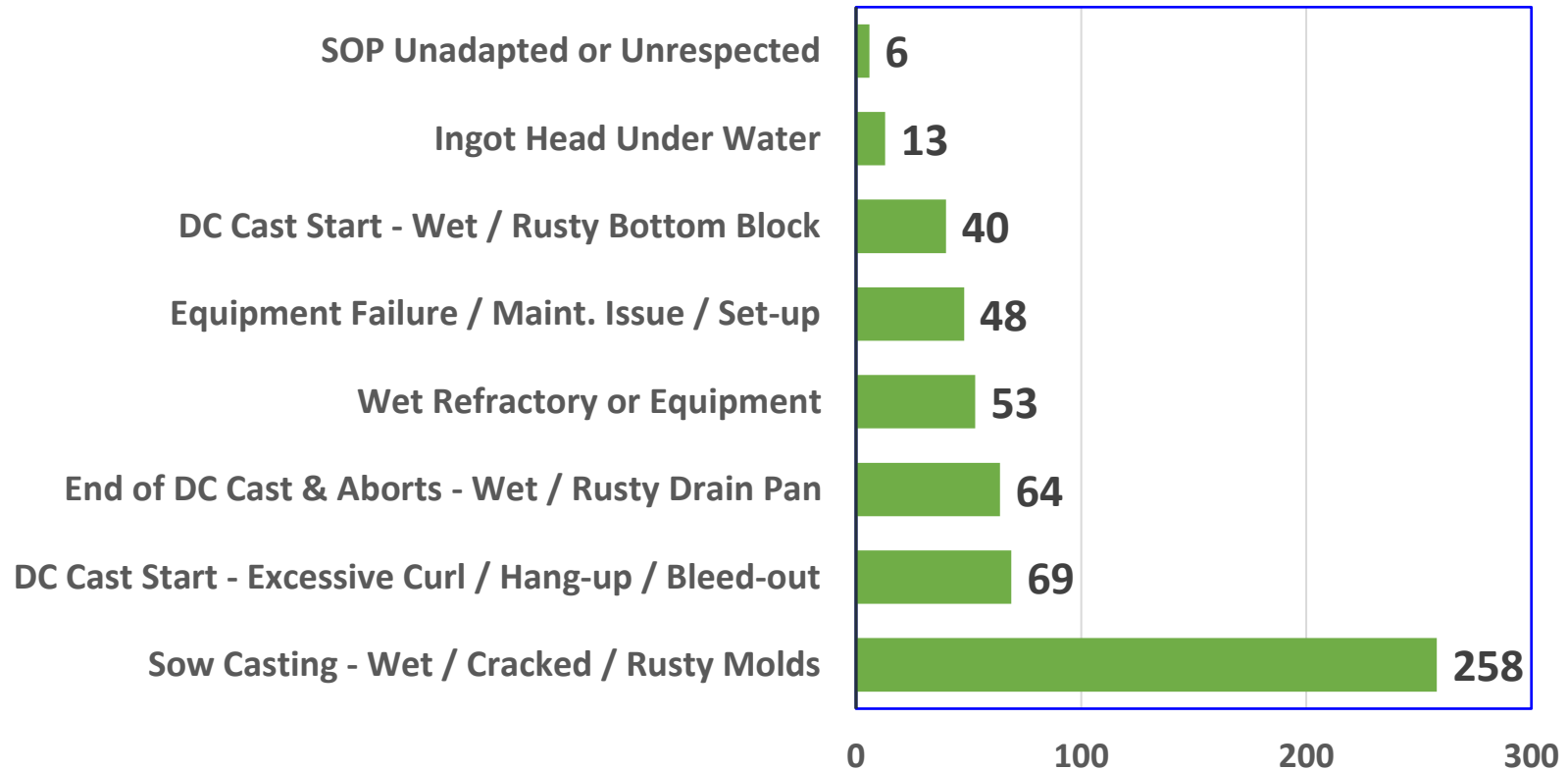


FIGURE 28. Casting Explosions by Major Causes 2015 – 2024 Sep. 2025

Major Causes of Force 2 & 3 Casting Explosions 2015 – 2024

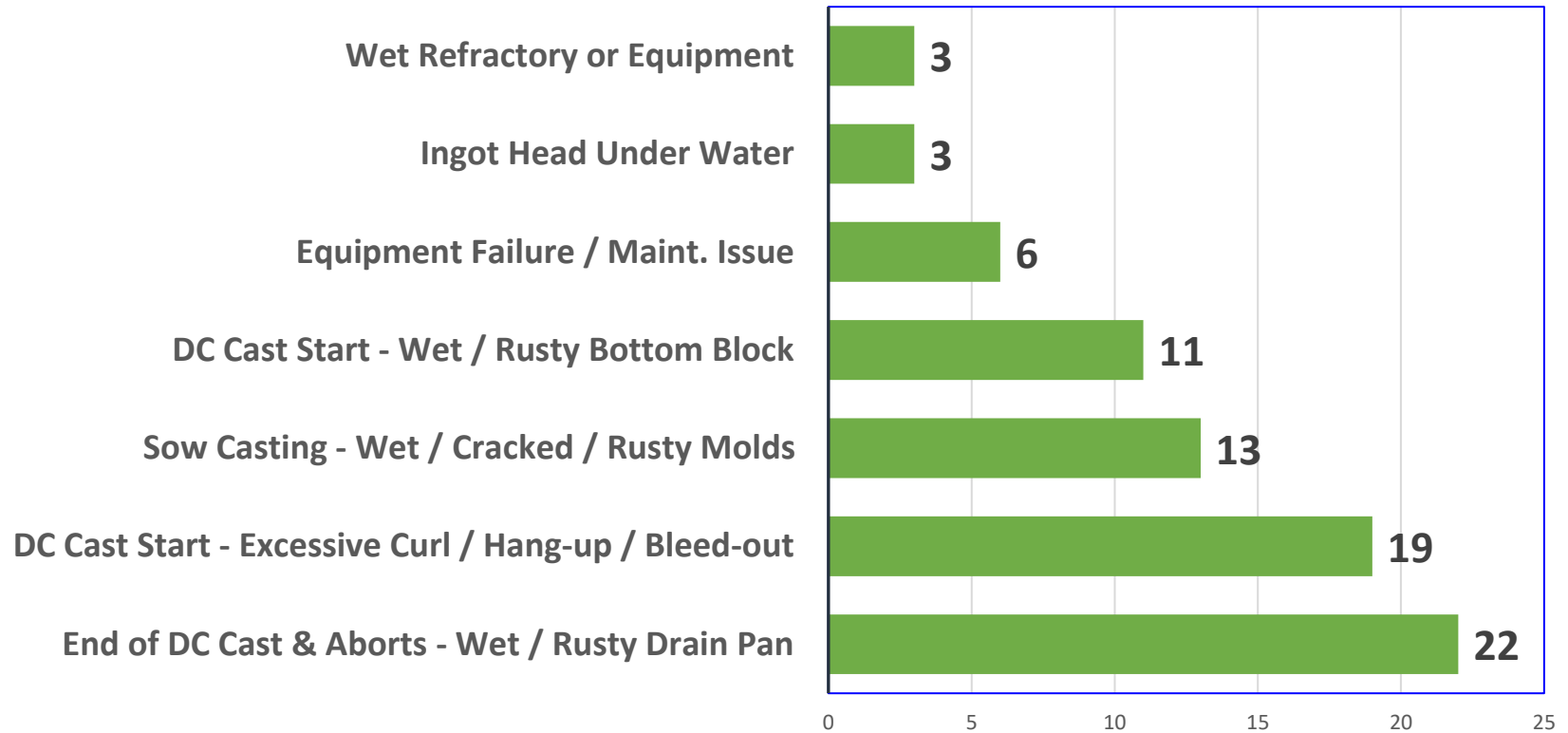


FIGURE 29. Casting Explosions by Major Causes 2015 – 2024 Sep. 2025

Major Causes of 32 Transfer Explosions – 2024

14 - Wet Hand or Furnace Tools, Equipment
6 – Wet / Rusty Drain or Skim Pan (1 Force 2)
4 – Wet Launder Refractory
4 – Wet Sampling Molds
2 – Metal on Floor

FIGURE 30. Causes of Transfer Explosions For 2024

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Transfer Explosions by Equipment 1980 – 2024 (Total 938)

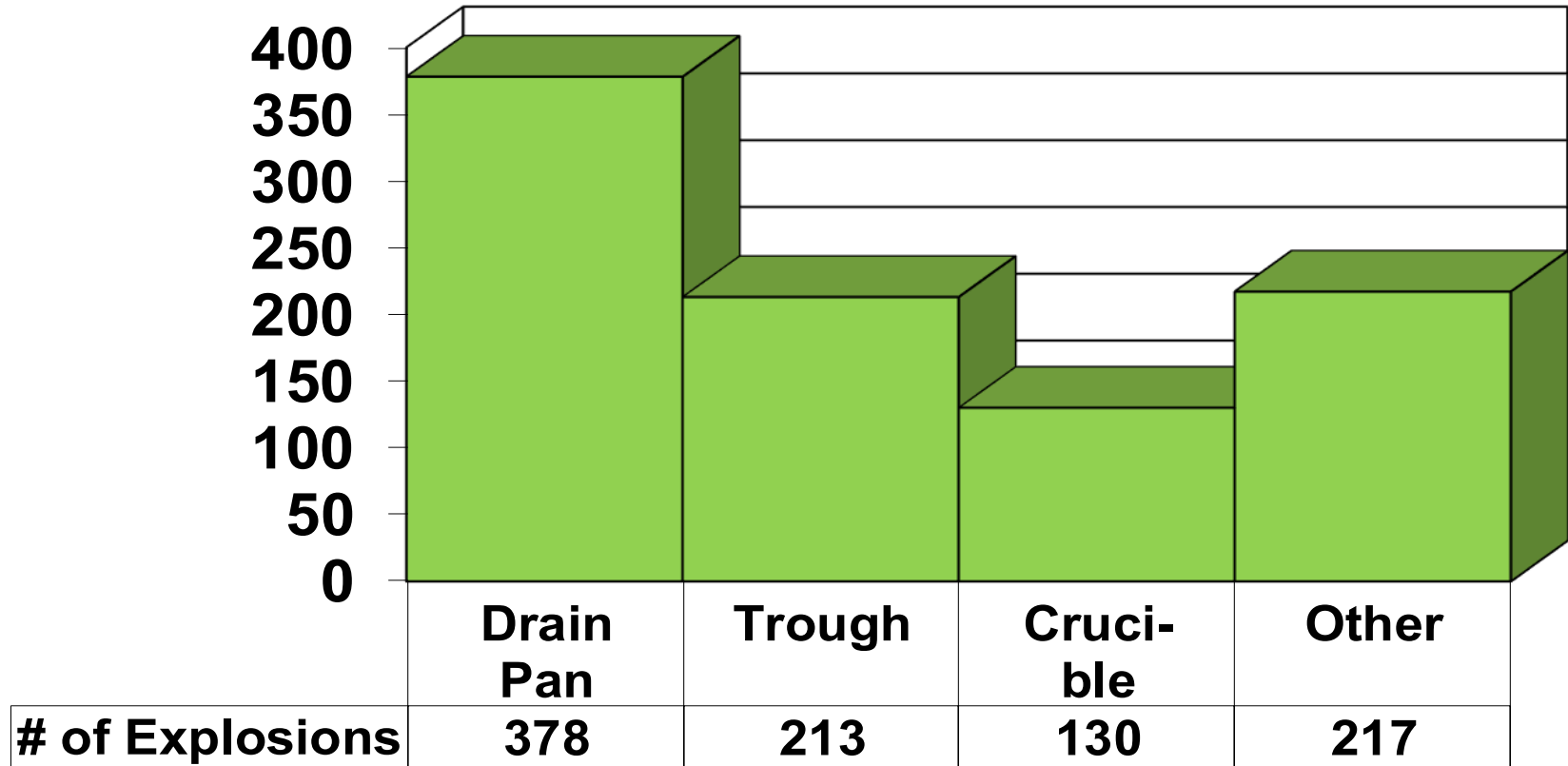


FIGURE 31. Transfer Explosions by Equipment 1980 – 2024 Sep. 2025

Major Causes of Transfer Explosions 2008 – 2024 (w/o 2011)

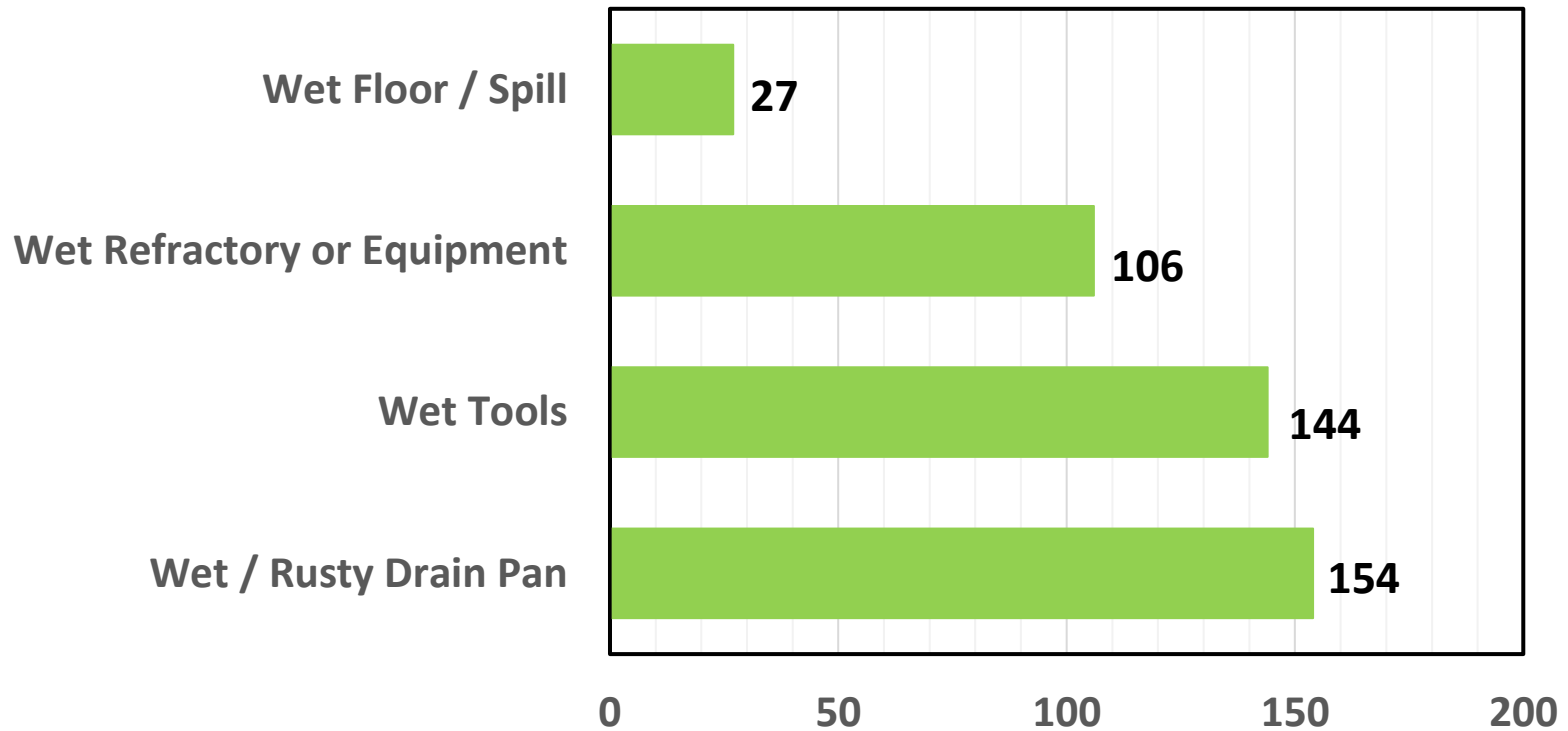


FIGURE 32. Transfer Explosions – Major Causes 2008 – 2024 Sep. 2025

Major Causes of Force 2 & 3 Transfer Explosions 2008 – 2024 (w/o 2011)

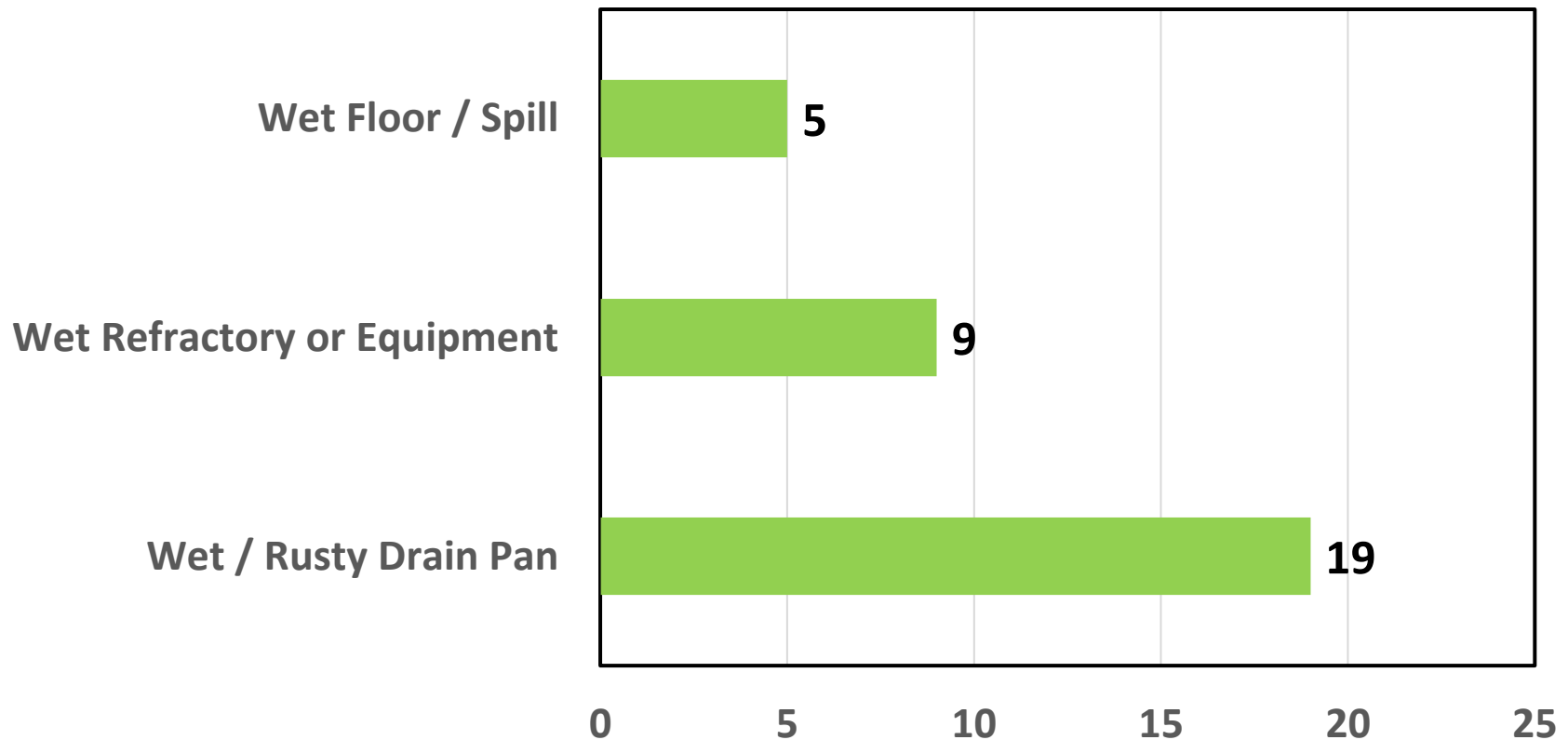


FIGURE 33. Transfer Explosions – Major Causes 2008 – 2024 Sep. 2025

41 Injuries by Operation – 2024

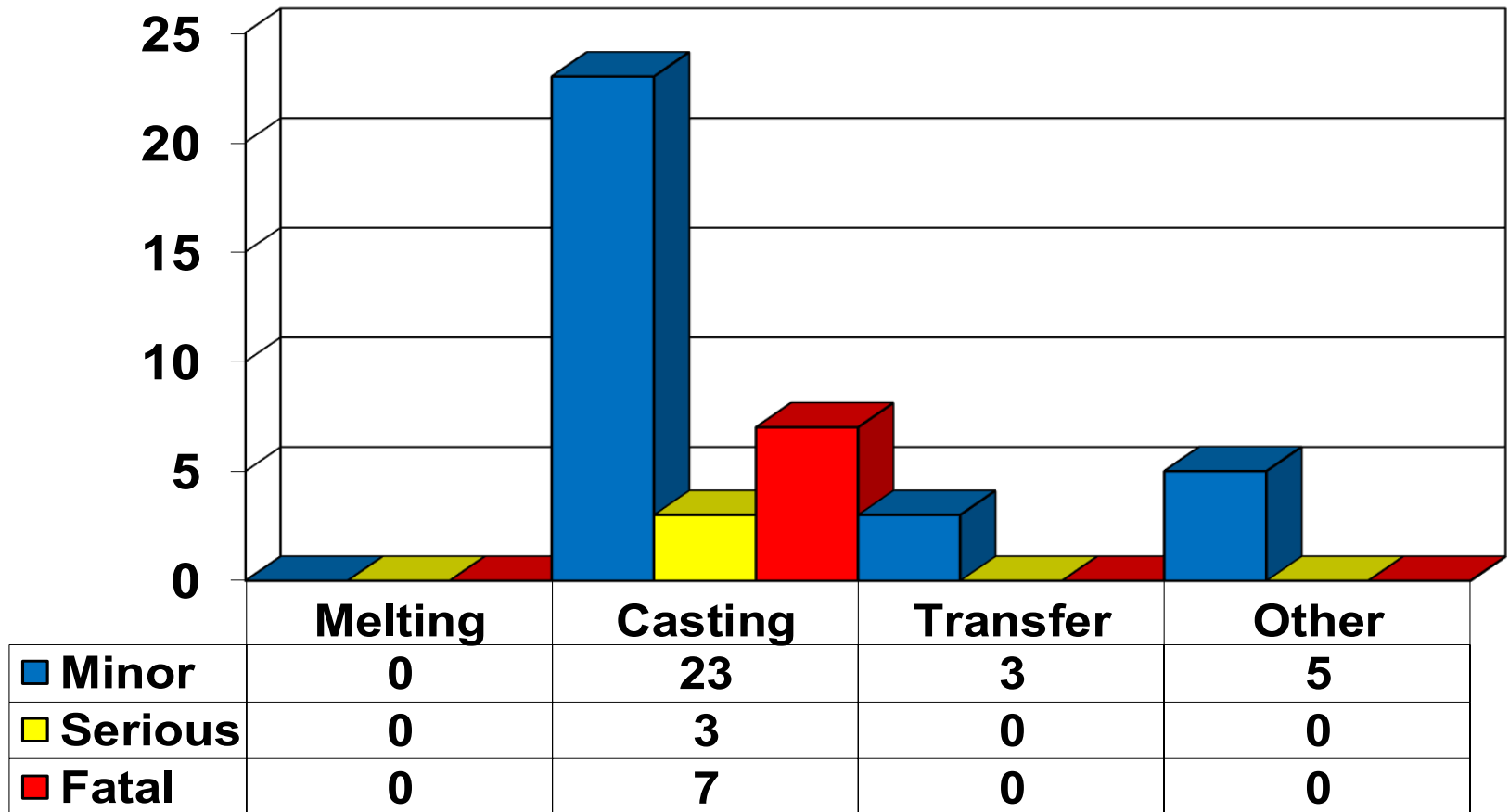


FIGURE 34. Injuries By Operation For 2024

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1693 Injuries by Operation: 1980 – 2024

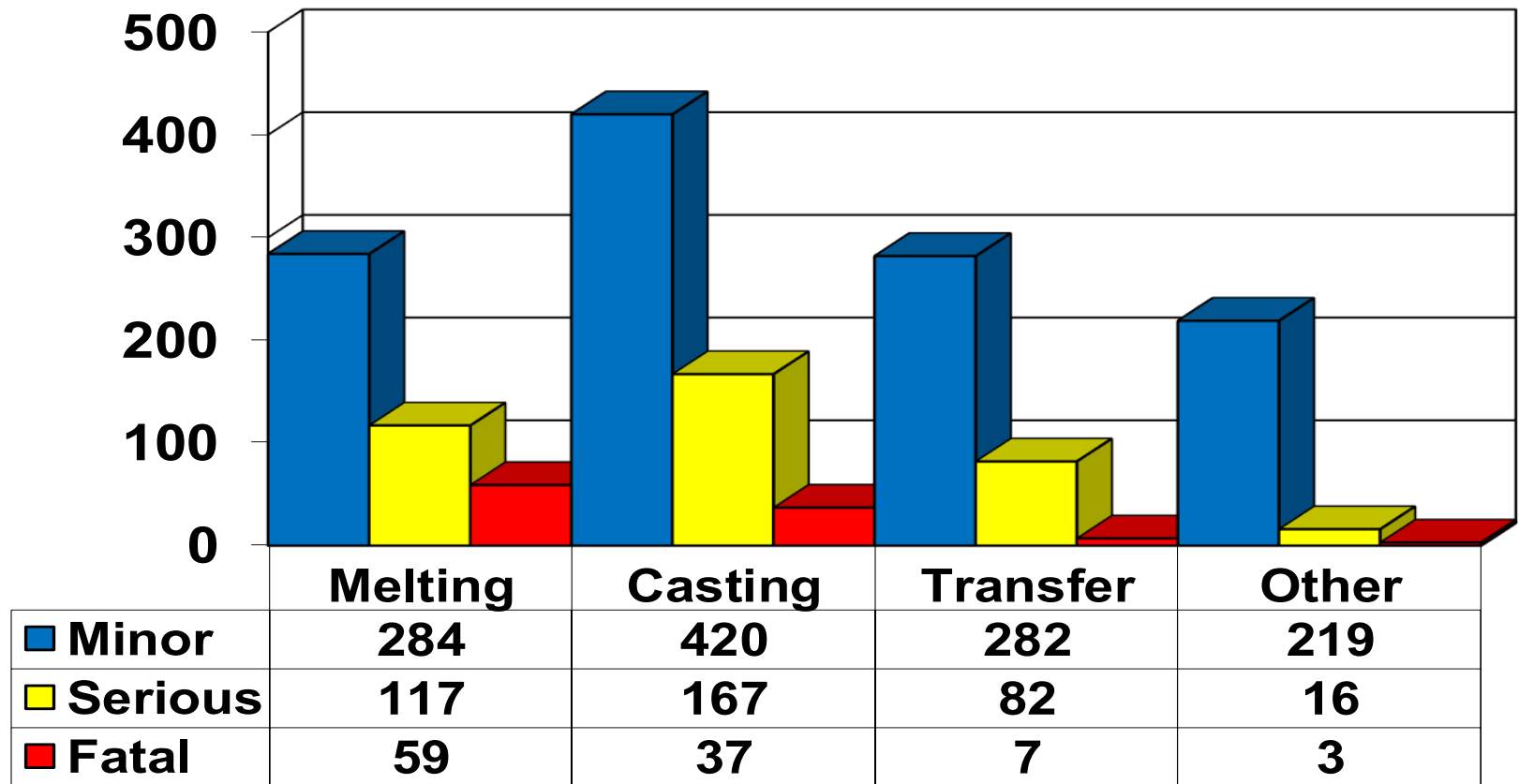


FIGURE 35. Injuries By Operation For 1980 – 2024

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Force Level By Process Plant – 2024

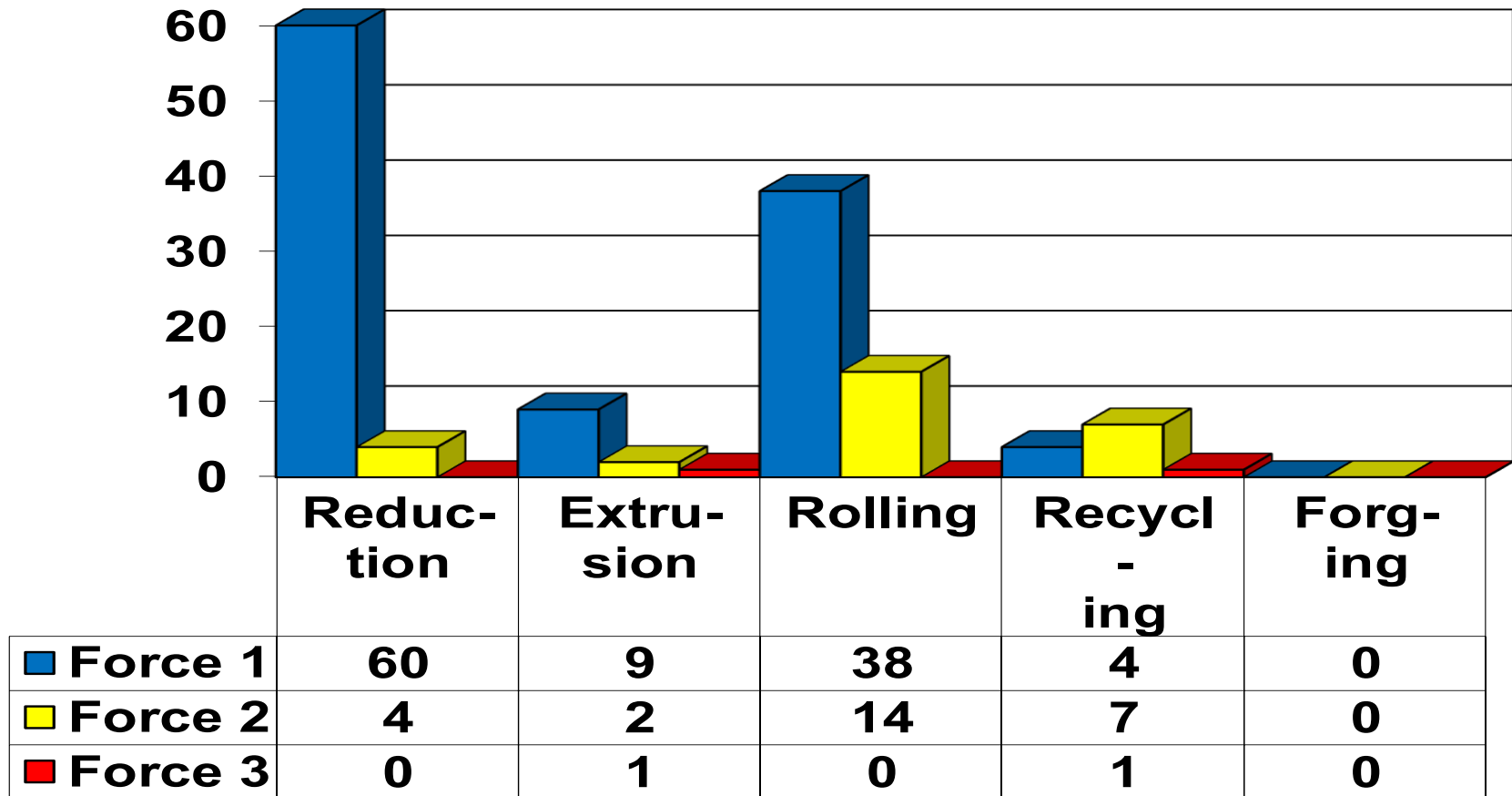


FIGURE 36. Force Level By Process Plant Reported For 2024

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Force Level By Process Plant

1980 – 2024

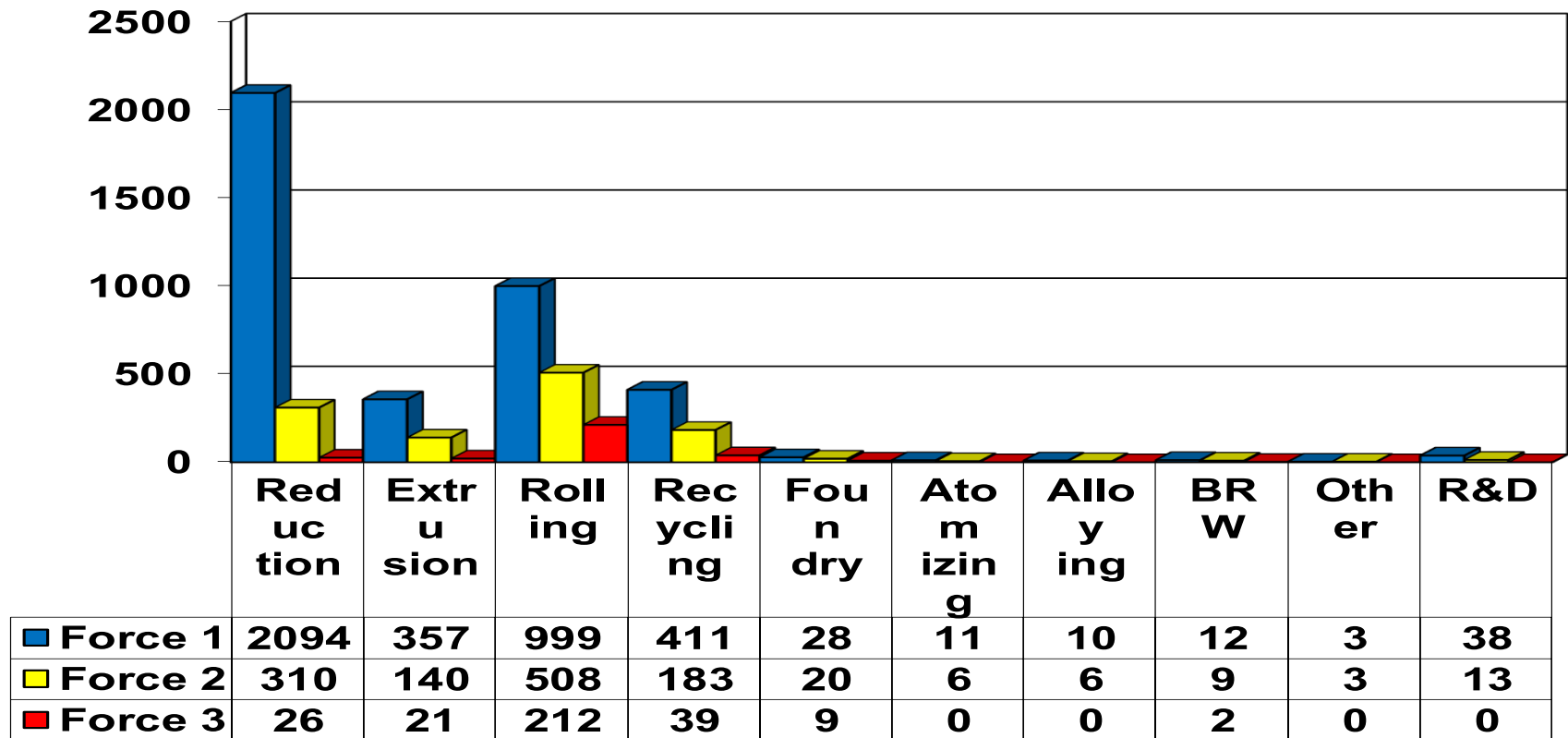


FIGURE 37. Force Level By Process Plant Reported For 1980 – 2024 Sep. 2025

Reduction Plant

Main Causes of 64 Incidents – 2024

Melting Incidents	Casting Incidents
4 – Wet Charge: Scrap (Force 2) 2 – Contaminated Alloy: Si	Small Mold & Sow Casting: 27 – Cracked, Wet or Rusty Molds (3 – Force 2) 1 – Wet Hand Tool
	VDC – Slab 3 – Start-up – Wet Equip. / Hand Tool 1 – Start-up – Excess Curl VDC – Billet 2 – Start-up – Wet Equip. / Hand Tool

FIGURE 38. Reduction Plant Incidents Summary 2024

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Reduction Plant

Main Causes of 64 Incidents – 2024

Transfer Incidents	Reduction Cell
7 – Wet Hand Tools	2 – Wet Anode
4 – Wet Sampler Molds	2 – Wet Pot Addition
3 –Wet Refractory / Transfer Troughs –	2 – Wet Wood
2 – Tap Out – Wet Floor	1 – Tap-out - Wet Floor
2 – Siphoning – Wet Equipment	1 – Wet Equipment
1 – Wet Ladle	
1 – Wet / Rusty Drain Pan	

FIGURE 39. Reduction Plant Incidents Summary 2024

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Recycling Plant

Main Causes of 12 Incidents – 2024

Melting Incidents	Casting Incidents
4 - Wet Charge: Scrap (2 - Force 2)	VDC – Billet: 1 – Stead State – Cable Failure (Force 3) VDC – Slab: 2 - Start-up – Bleedout (Force 2) 1 - Start-up – Wet Bottom Block 1 – Termination – Wet Tool (Force 2) 1 – Termination – Molten on Wet Ingot Head (Force 2)
Transfer Incidents 1 - Wet Trough 1- Wet Skim Pan	

FIGURE 40. Recycling Plant Incidents Summary 2024

Sep. 2025



Reduction Plant Injuries & Incident Causes – 2024

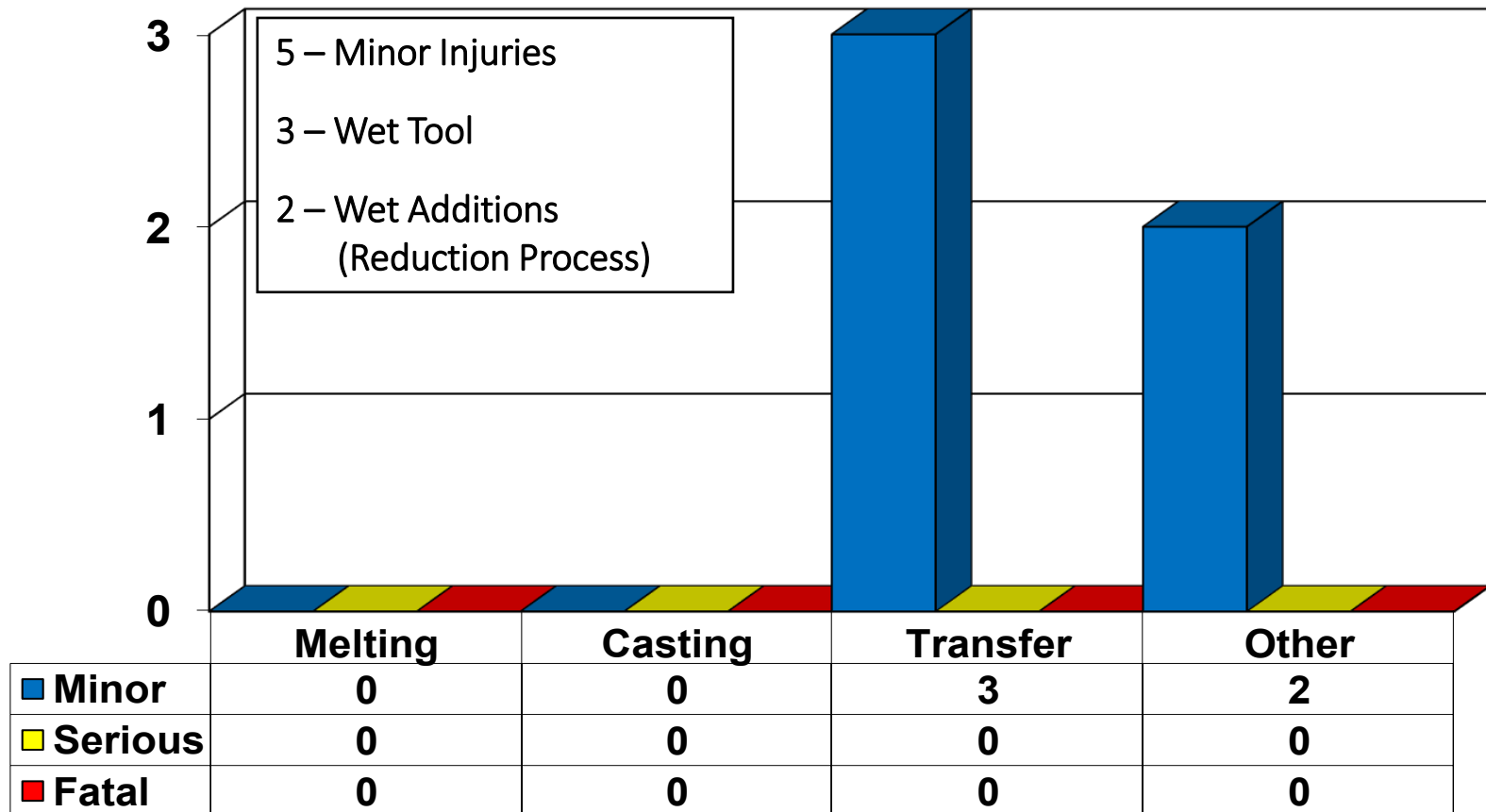


FIGURE 41. Reduction Plant Injuries By Operation 2024

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Rolling Plant Injuries & Incident Causes - 2024

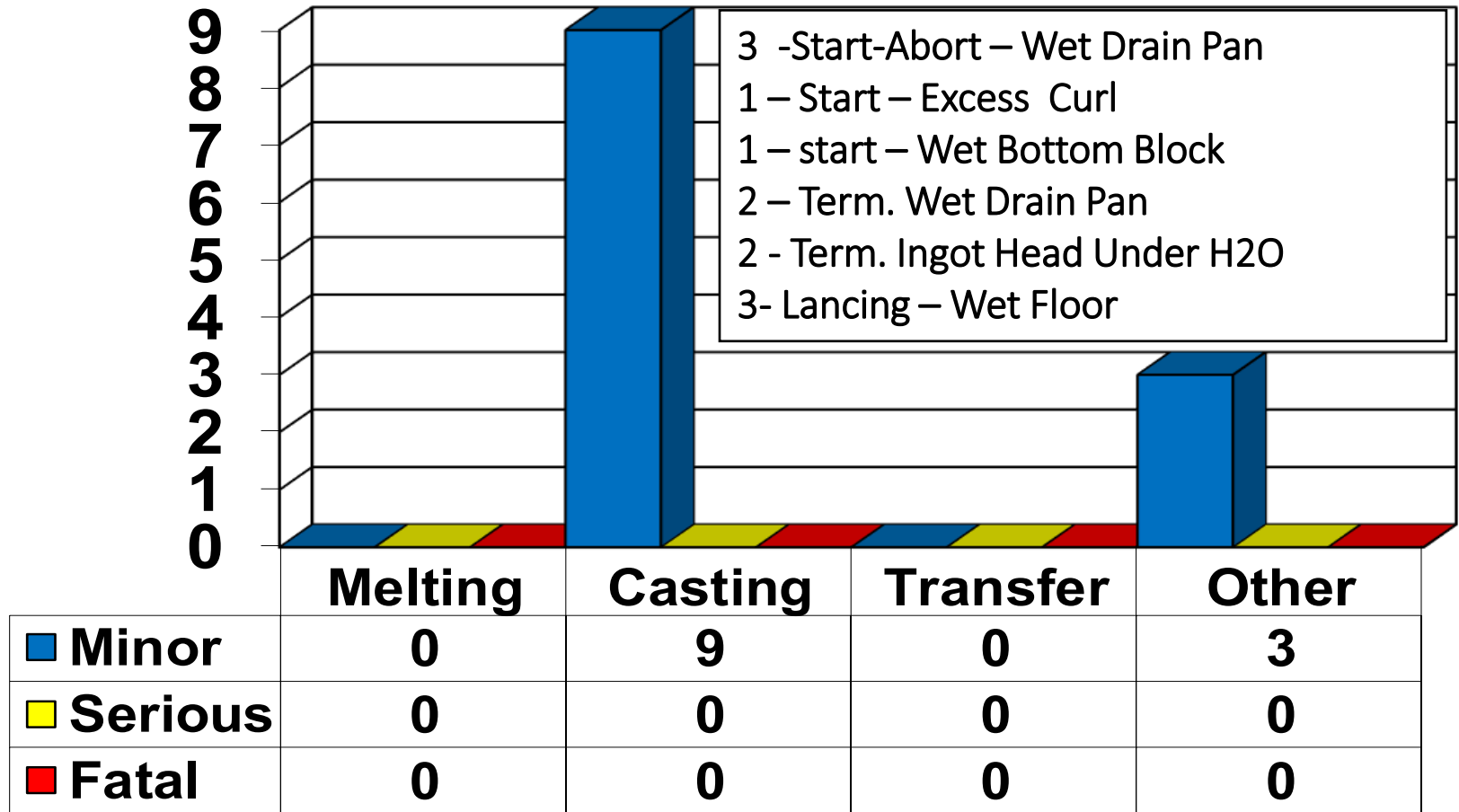


FIGURE 42. Rolling Plant Injuries By Operation 2024

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Extrusion Plant Injuries & Incident Cause – 2024

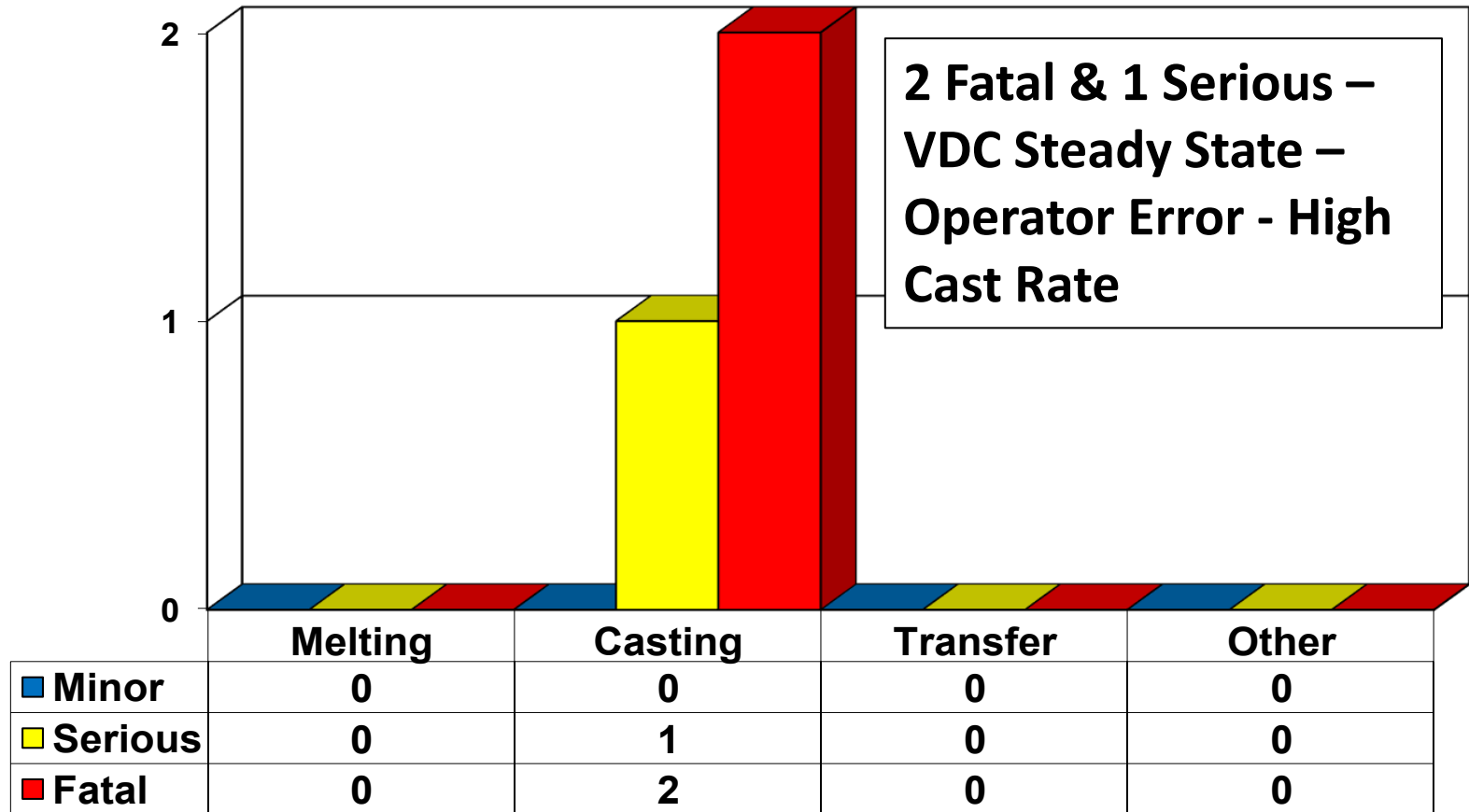


FIGURE 43. Extrusion Plant Injuries By Operation 2024

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Recycling Plant Injuries & Incident Causes – 2024

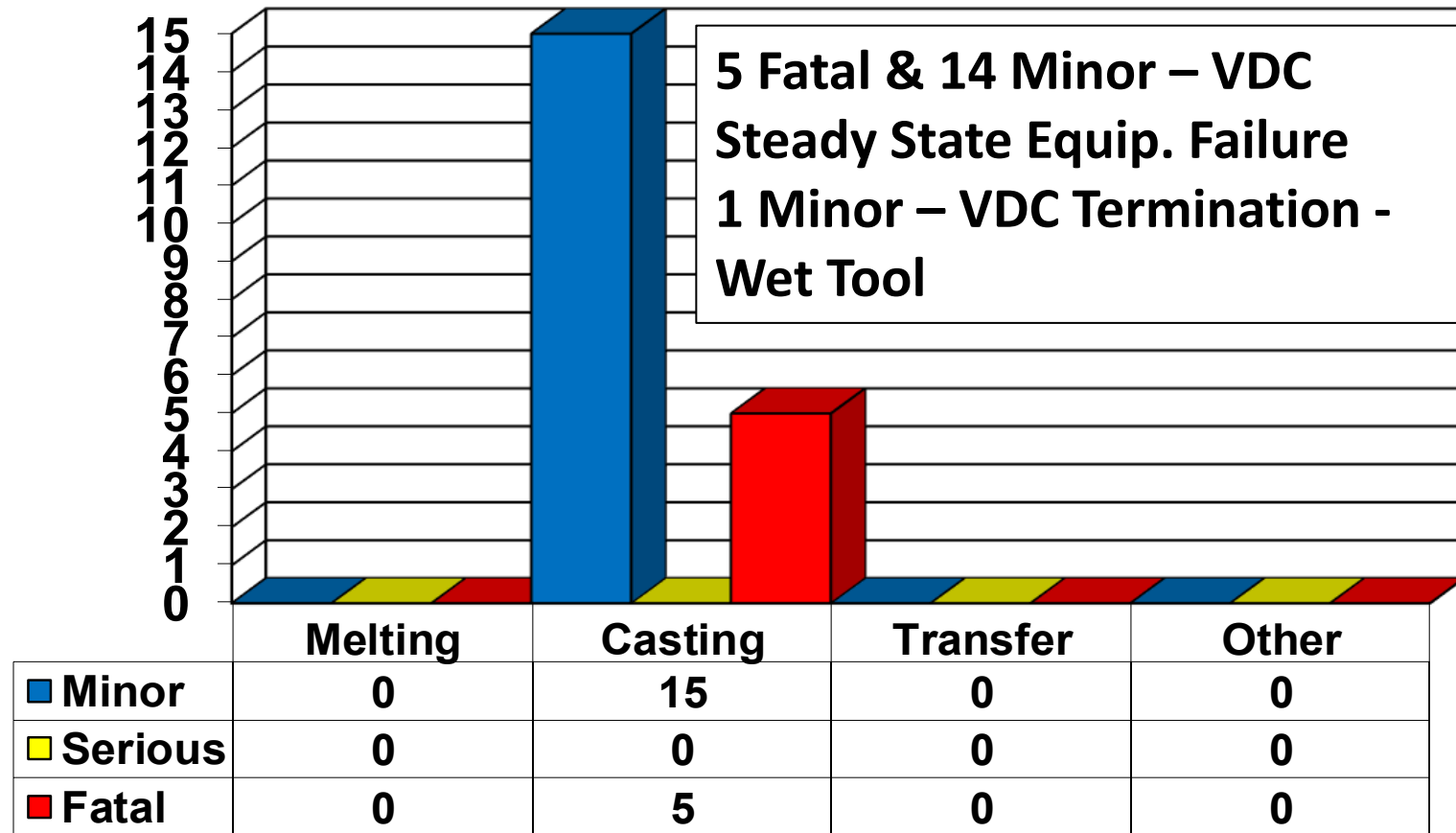


FIGURE 44. Recycling Plant Injuries By Operation 2024

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Injury Severity by Process Plant – 2024

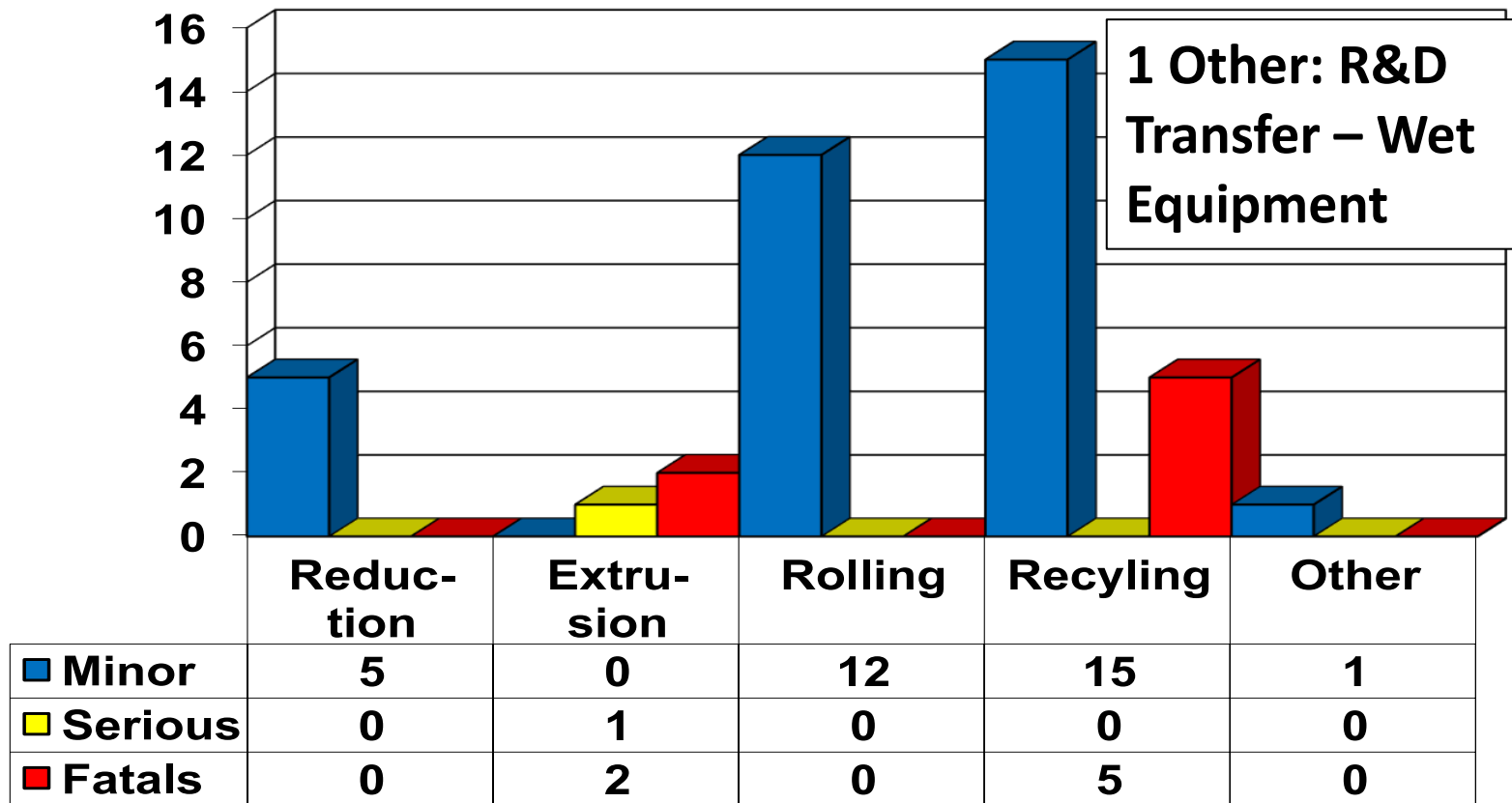


FIGURE 45. Injury Severity By Process Plant – 2024

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Injury Severity by Process Plant

1980 – 2024

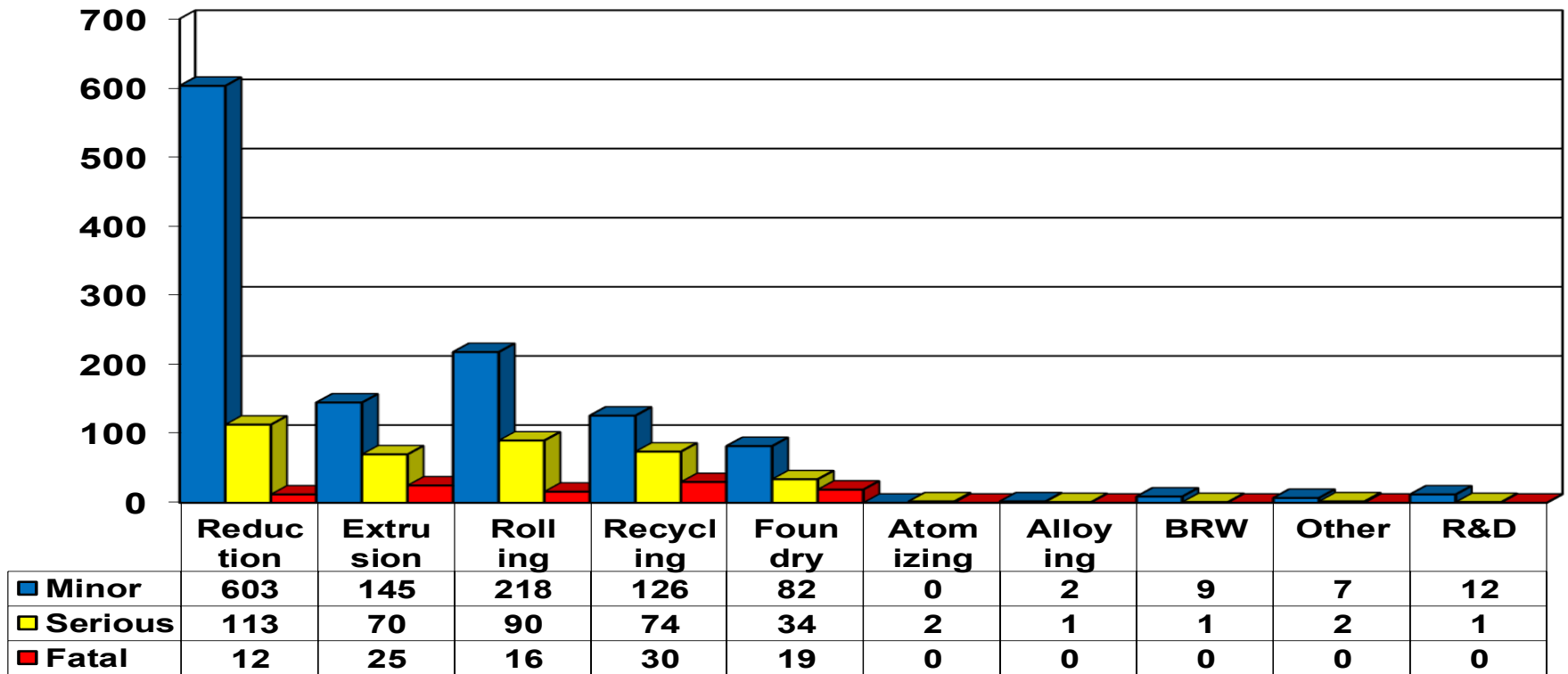


FIGURE 46. Injuries Severity By Plant Reported For 1980 – 2024 Sep. 2025

Reduction & Recycling Plant Incidents, Injuries / Incident Rate

2012 – 2024

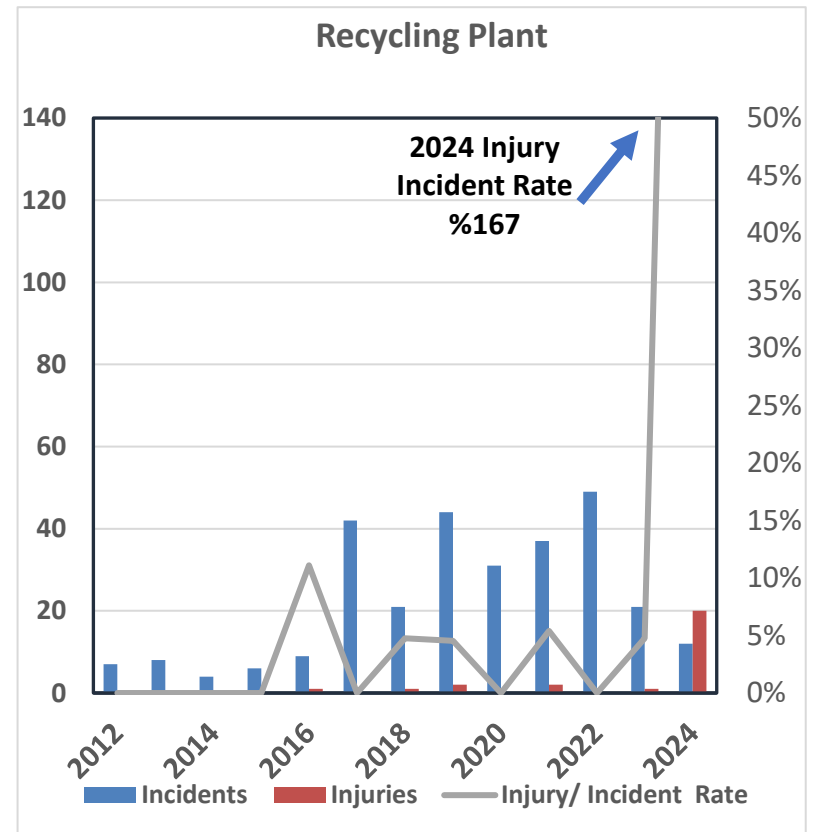
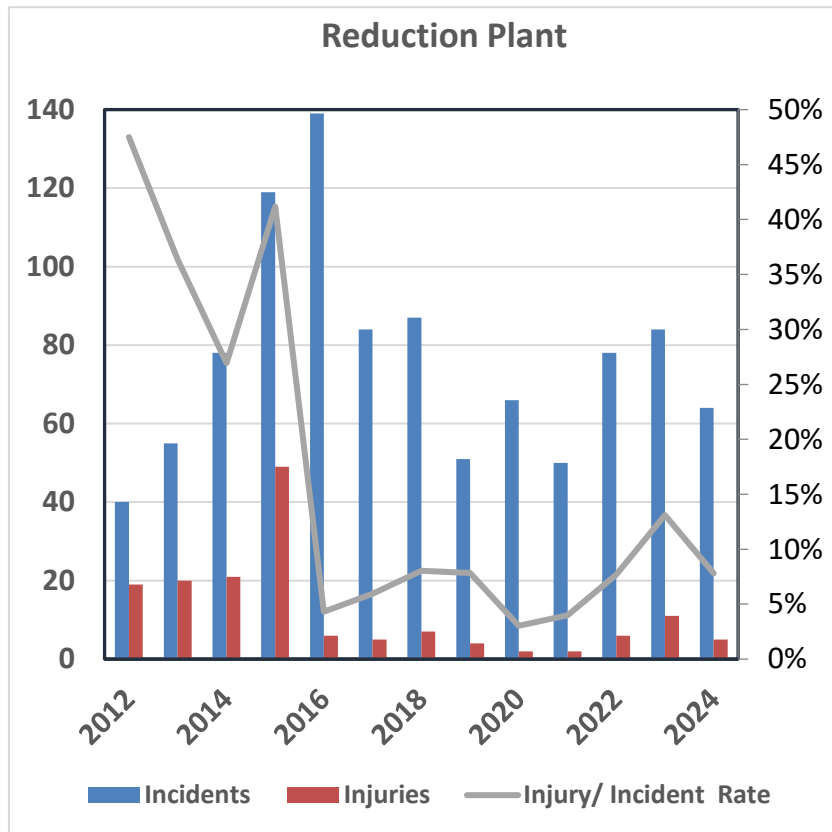


FIGURE 47. Reduction & Recycling Incident, Injury & Injury Rate 2012-2024 Sept. 2025

Rolling & Extrusion Plant Incidents, Injuries / Incident Rate

2012 – 2024

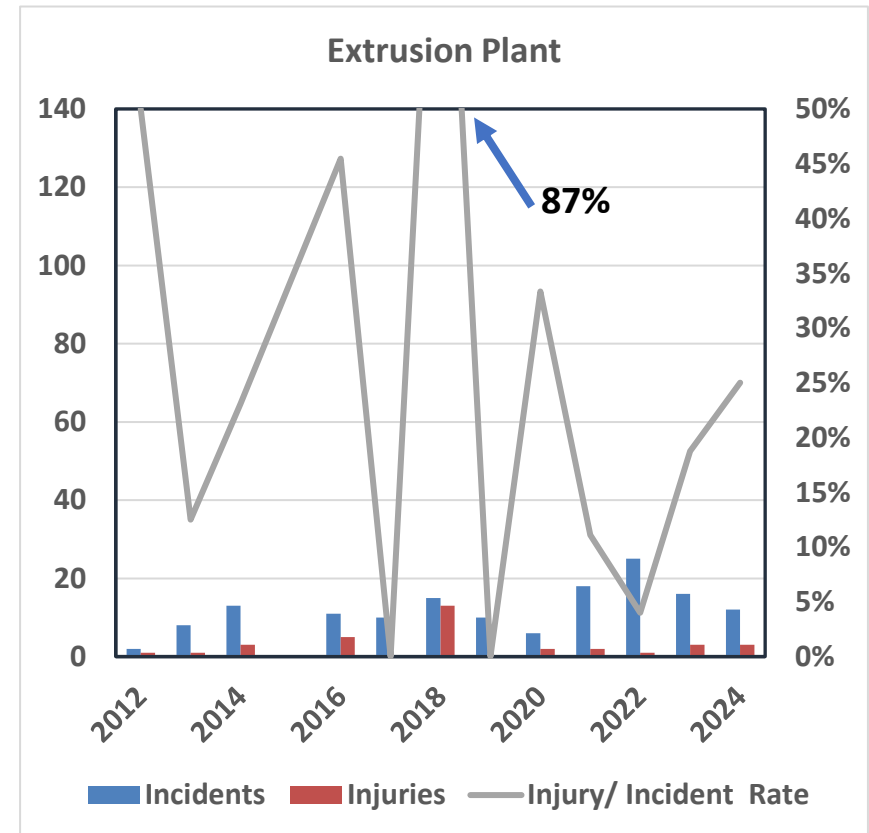
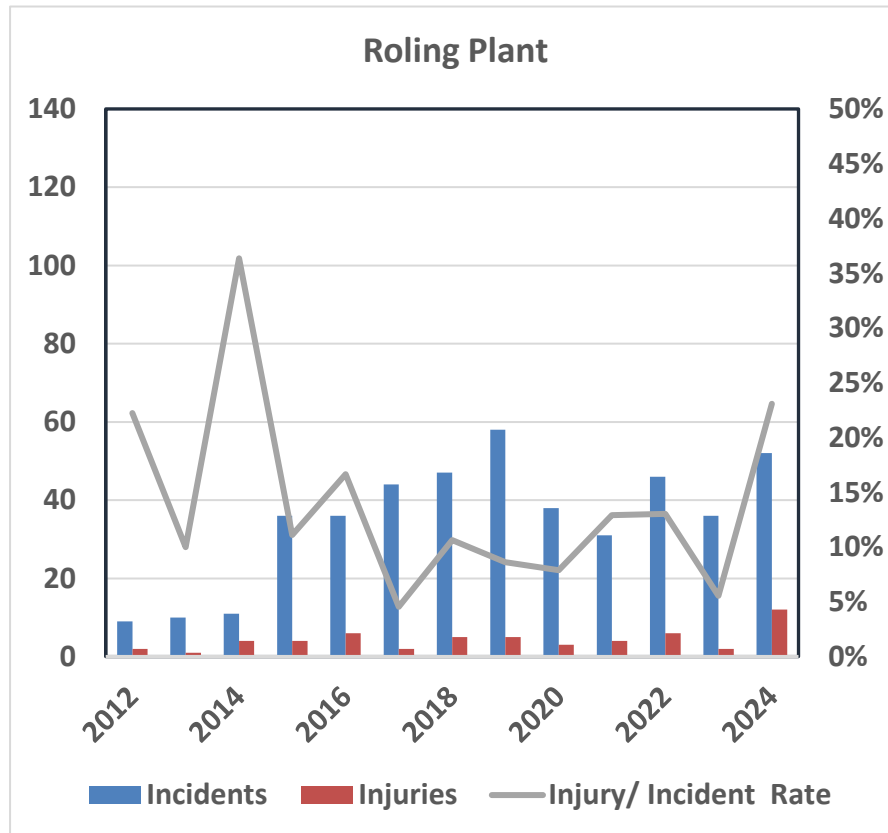


FIGURE 48. Rolling & Extrusion Incident, Injury & Injury Rate 2012-2024

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Thank you!



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