NFPA 70B and You:
What the Standard Means to the Typical Workplace

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SMS, CHST, CUSP, OHST

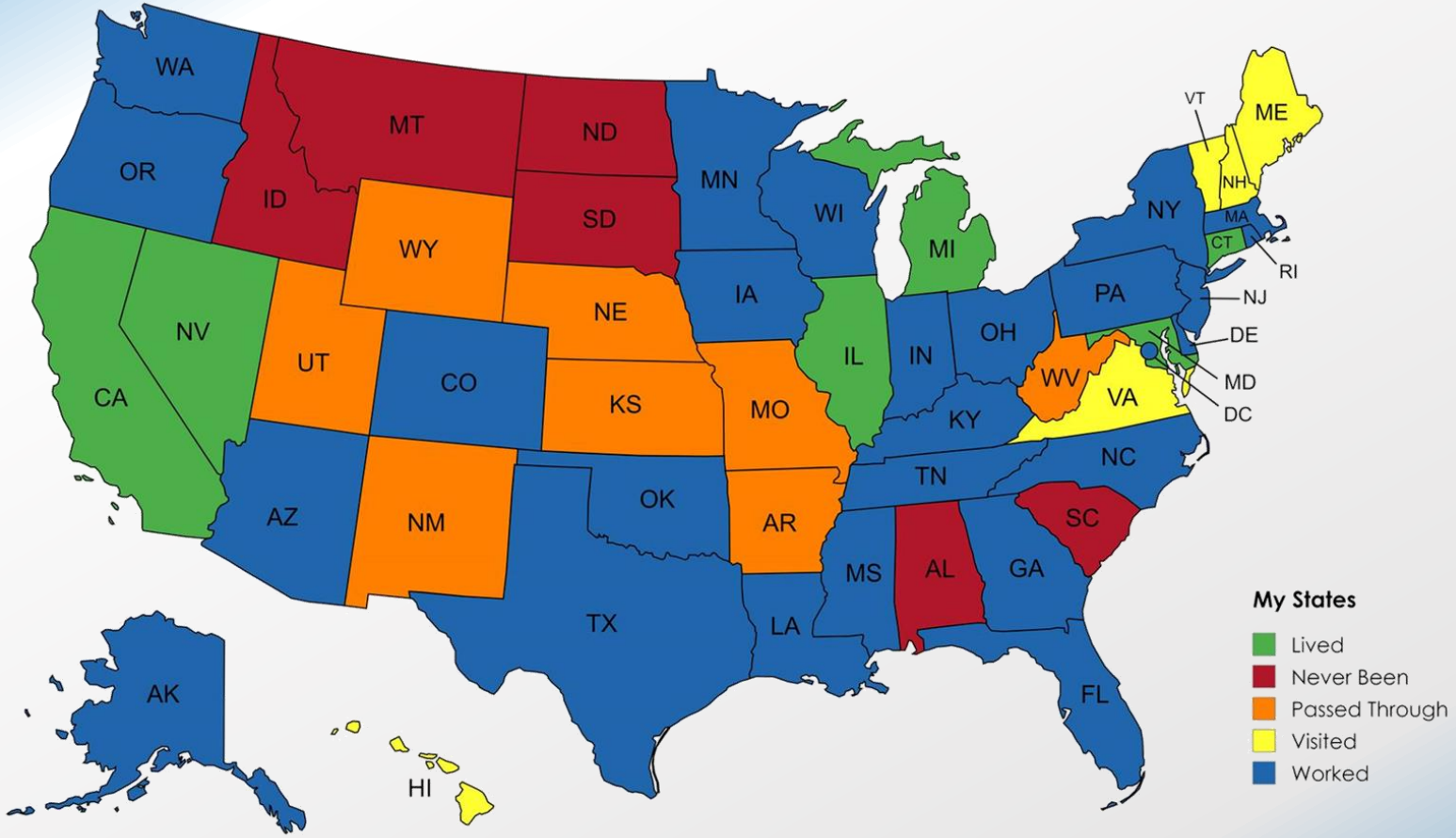
Presented to the

AMERICAN SOCIETY OF
SAFETY PROFESSIONALS

San Diego Chapter

Welcome!

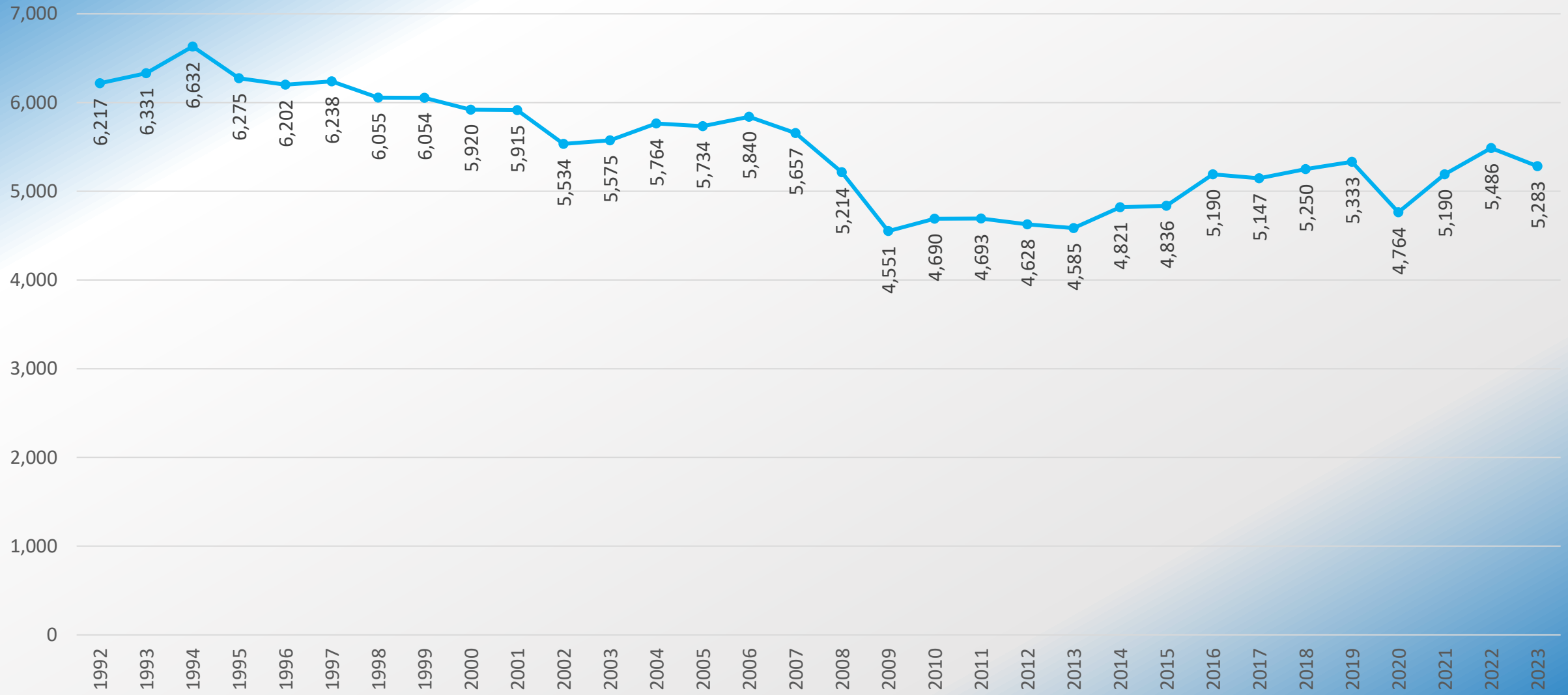
Dad, Electrician, Teacher,
Consultant, “Safety Guy”



Start with Risk

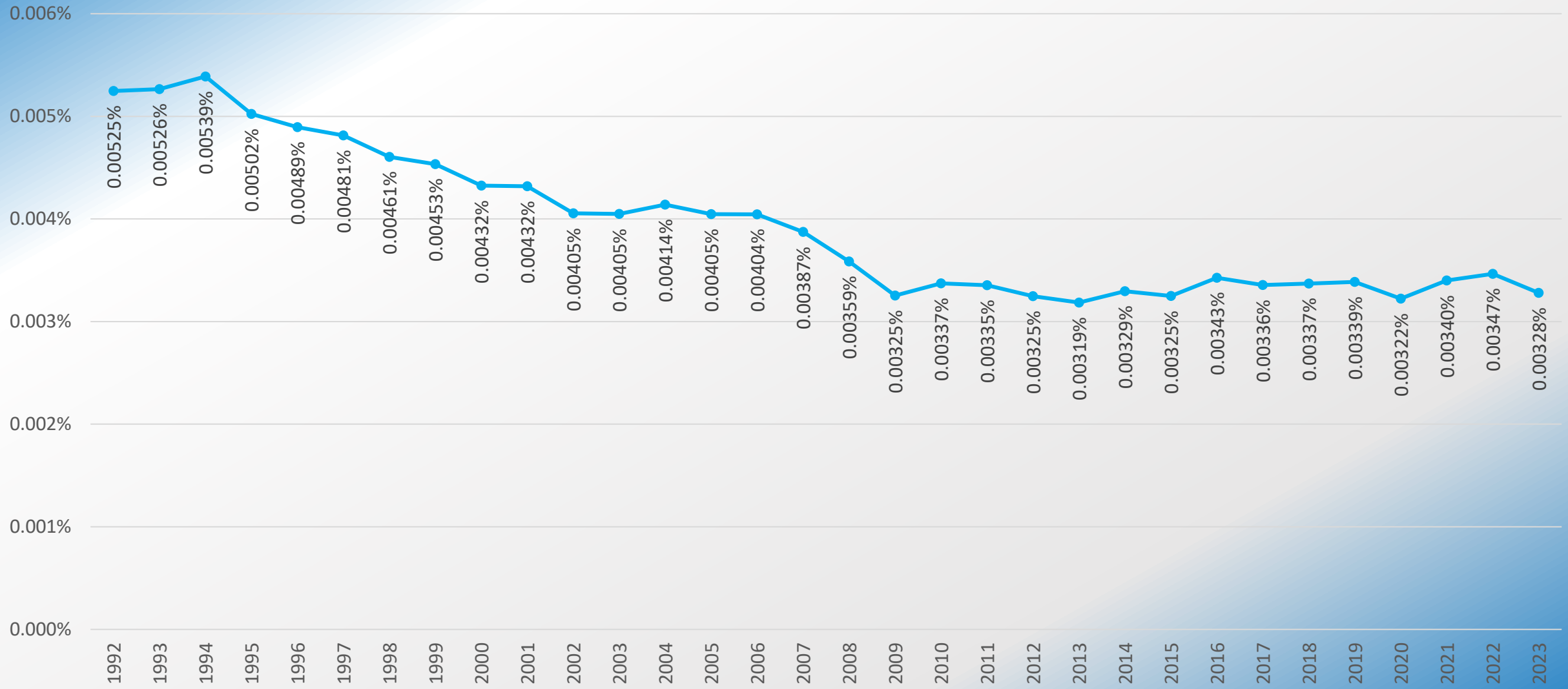
- Probability
- Consequence
- Frequency

Number of US Fatal Work Injuries



Source: U.S. Department of Labor, Bureau of Labor Statistics, USDL-18-1978 Census of Fatal Occupational Injuries Summary 2022

Percentage of Fatal Work Injuries



Methodolody: Number of fatalities reported compared across average employment during that year

Key Events

#1 Transportation Incidents

#2 Falls, Slips, Trips

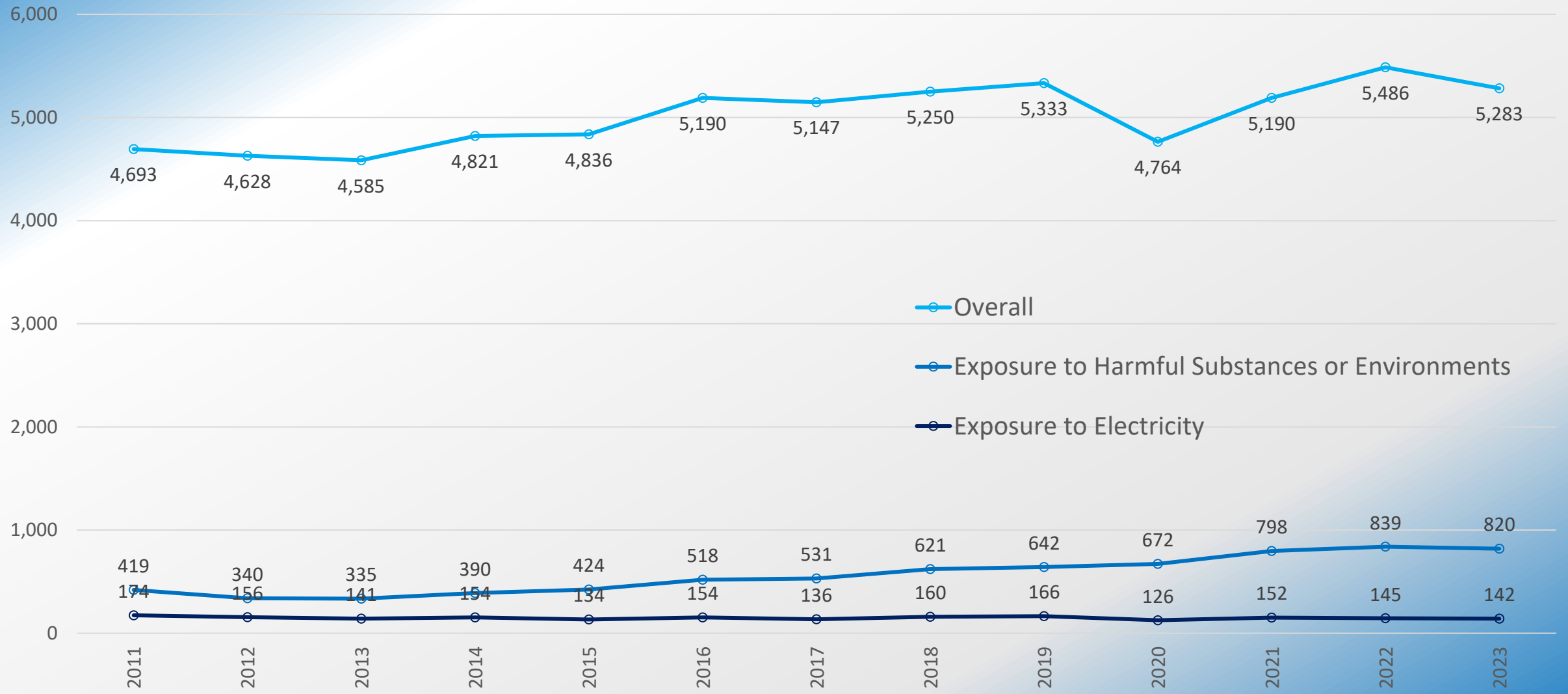
#3 Violence and Other Injuries By Persons or Animals

#4 Contact with Objects and Equipment

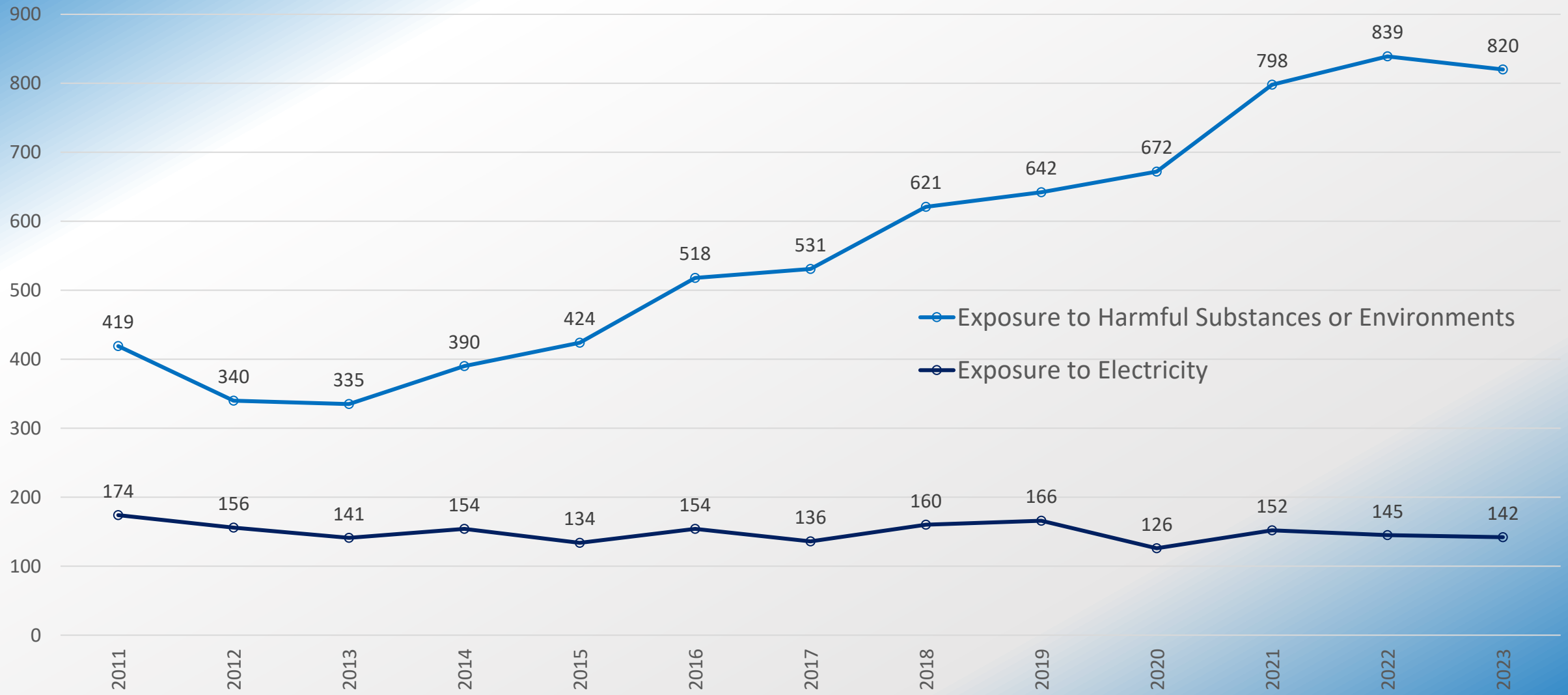
#5 Exposure to Harmful Substances or Environments

#6 Fires and Explosions

More Recently



Look Closer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Exposure to Harmful Substances or Environments
Exposure to Electricity

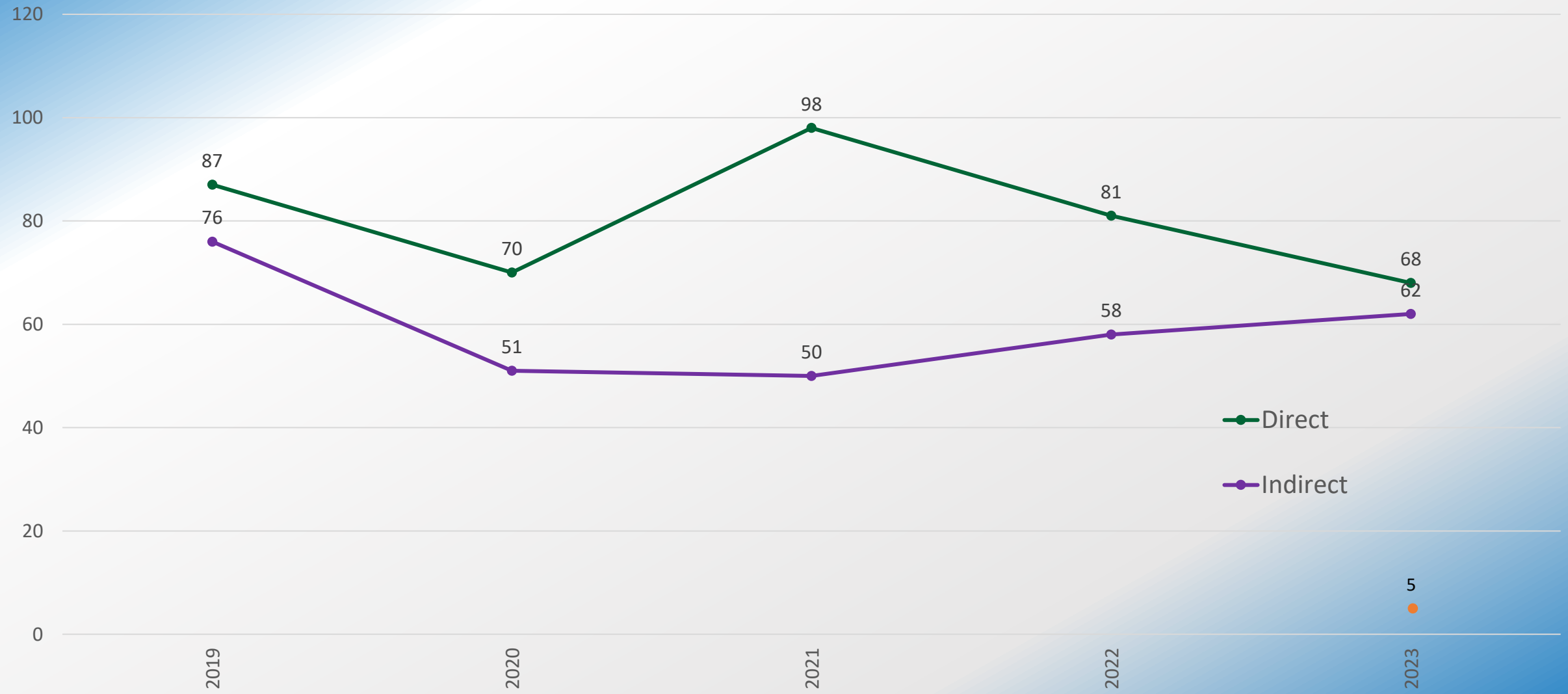
Shock Fatalities

- Numbers are “low”
- Trending is relatively flat

- So why worry?

- The industry is exploding
- The outcomes can be catastrophic
- Iceberg principle

Exposure – Direct vs. Indirect



Exposure – Direct vs. Indirect

- "Direct exposure" means contacting something that has a reasonable likelihood of being energized – wires, bussing, exposed electrical components.
- "Indirect exposure" means contact with something that is inadvertently energized – rebar, a body of water, ceiling grid, and so on.

Indirect exposure is between 34% and 48% of the total.

Analysis of Statistics

- We're still having problems as a working society
- The curves don't match, indicating possible improvements in the industry
  - Shock events appear to have flatlined
  - Overall exposure to "harmful substances" is increasing
- Larger events can impact these outcomes
- Remember, statistics do NOT apply to individual situations
- So what do we do?
- And what is OSHA's role in this?

Limitations of OSHA

- Intended to prevent workplace injury
- Doesn't always specify methods
- "**Consensus** Standards"
  - Can be adopted by parts
  - Can be enforceable
  - Can act as identification of recognized hazards
- Similar structure to NEC
- First published in **1979**

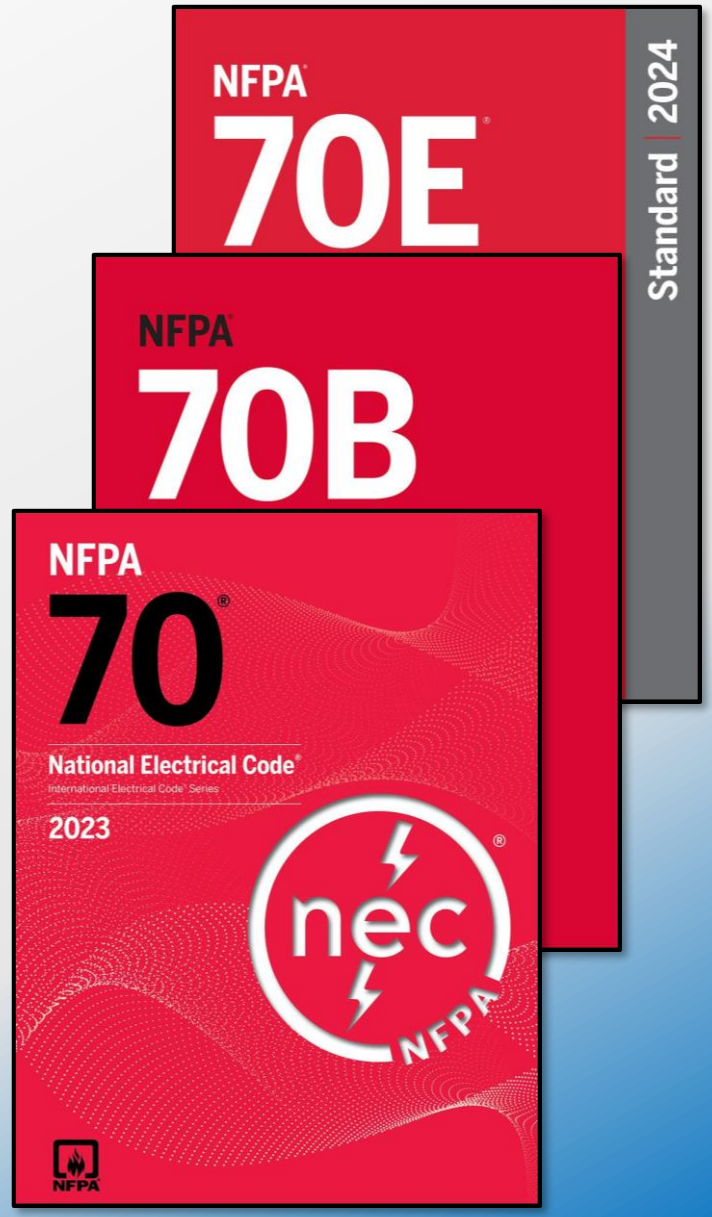
NFPA Codes and Standards

Code: A code, often referred to as a building code or safety code, is a set of regulations, rules, and guidelines established by a recognized authority or government agency.

Standard: A standard is a document or specification developed by a recognized standard-setting organization.

*A code tells you what you need to do, and a standard tells you **how** to do it.*

- **NEC 70:** National Electrical Code
- **NFPA 70B:** Standard for Electrical Equipment Maintenance
- **NEC 70E:** Standard for Electrical Safety in the Workplace



Some NFPA History…

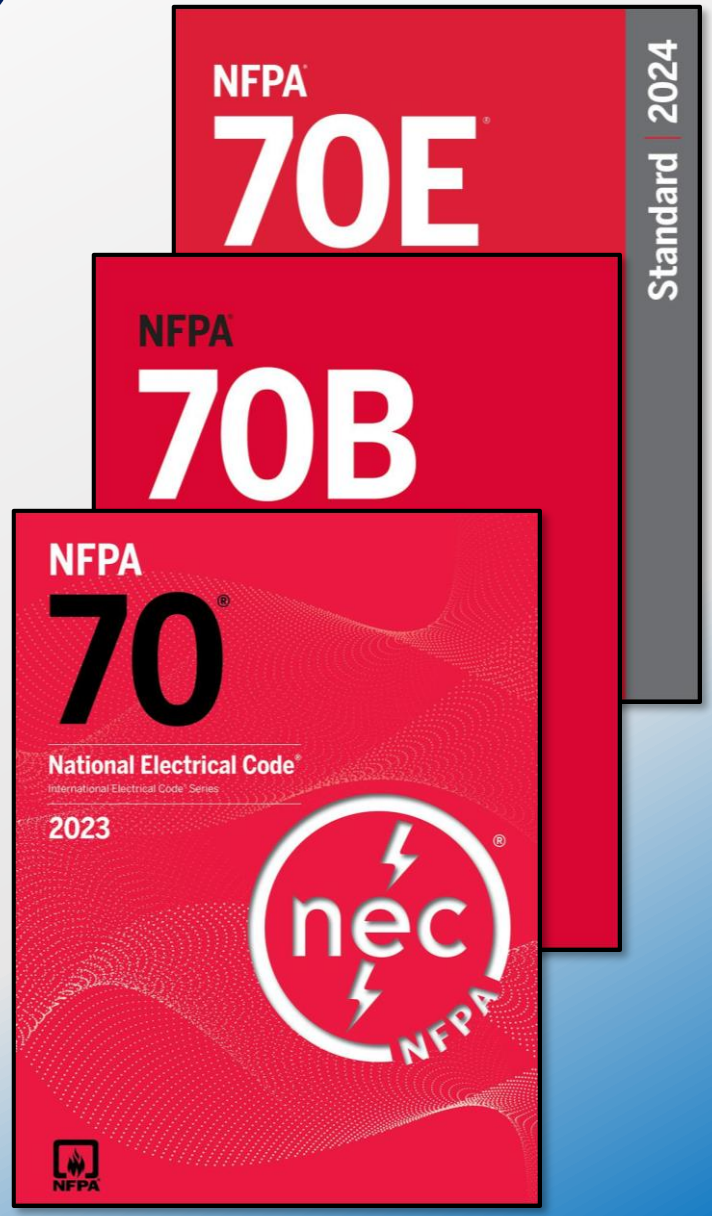
	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
70 NEC	✓		✓						✓		✓		✓		✓*		✓		✓			✓		✓		

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
70 NEC	✓		✓			✓		✓	✓		✓		✓		✓			✓							✓	

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
70 NEC			✓		✓			✓		✓	✓			✓			✓			✓			✓			
70B Maintenance																									✓	✓

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
70 NEC	✓			✓			✓			✓			✓			✓			✓			✓			✓	
70B Maintenance	✓		✓						✓				✓			✓				✓				✓		
70E Safety					✓		✓		✓					✓							✓					✓

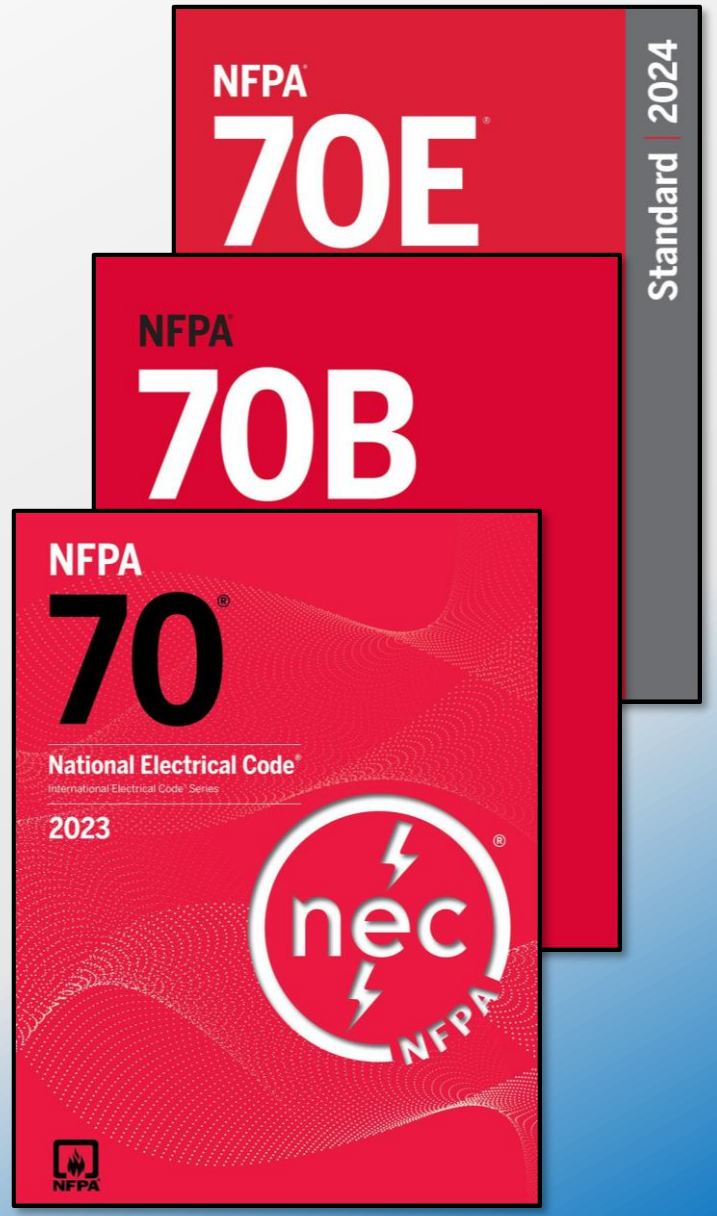
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
70 NEC		✓			✓			✓			✓			✓			✓			✓			✓			?
70B Maintenance		✓				✓				✓			✓			✓			✓				✓*		?	
70E Safety				✓					✓			✓			✓			✓			✓			✓		



NFPA Codes and Standards

- 70 NEC is a regionally adopted Code. It impacts construction and installation practices.
- 70B was formerly a recommended practice and is now a standard. It is now enforceable. It impacts owners and assigns responsibility.
- 70E has been a standard since its inception. It impacts operators and installers directly and others indirectly, and can be used to assign liability.

All three work together.



General Duty

Each employer

- shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.
- shall comply with occupational safety and health standards promulgated under this act.

Each employee

- shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

This is the OSH Act, 29 USC 654 Section 5. Duties

Training

CFR 1910.332 and CCR Title 8, 3203 and 1509

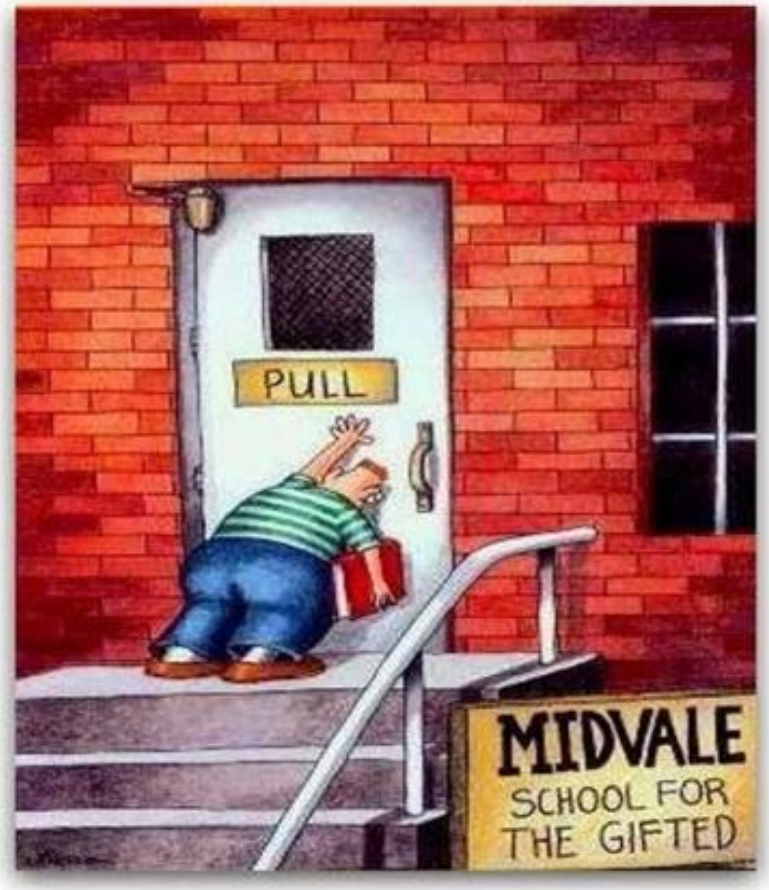
Training focuses on:

- Recognizing live parts
- Determining voltage of live parts
- Clearance distances specified in 1910.333

Note that this focuses on direct contact.

OSHA doesn't say much on training...

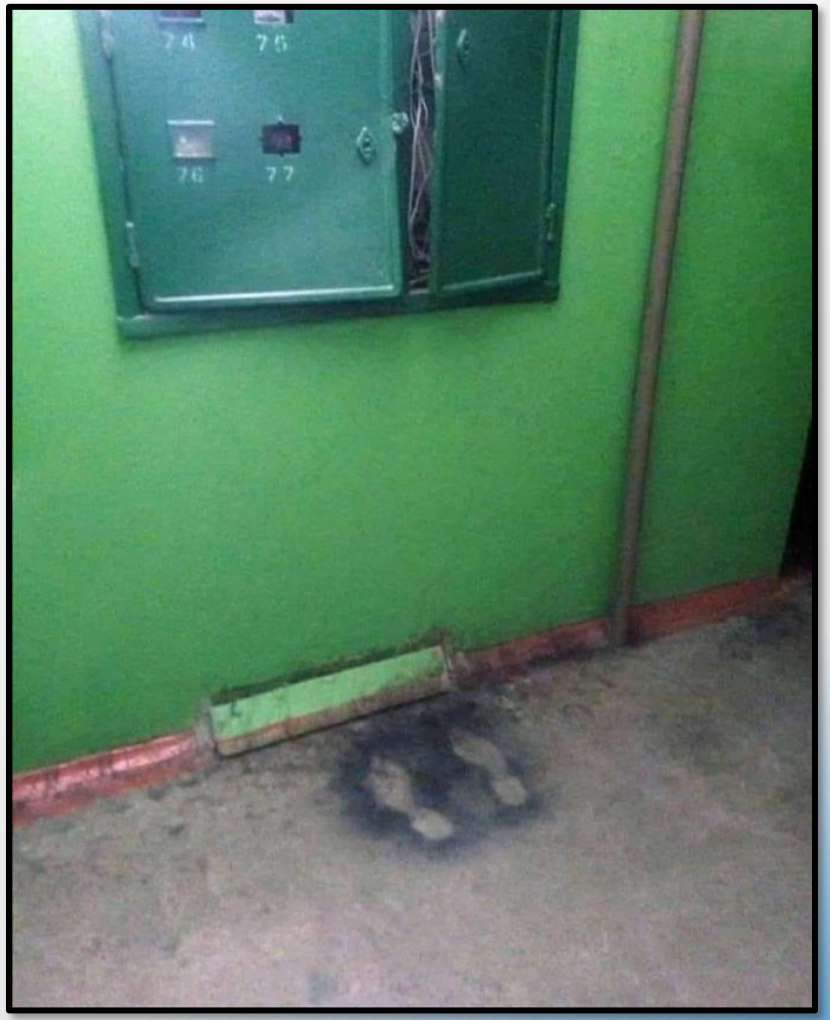
...which leaves it up to the ***CONSENSUS*** *STANDARD!*



Source: The Far Side by Gary Larson

Qualified vs. Unqualified

- Qualified persons: “those who have **training** in avoiding the electrical hazards of working on or near exposed energized parts”
  - Has skills and knowledge related to the construction and operation of electrical equipment or work methods and trained to **recognize and avoid** the hazards that might be present
  - Knows the proper use of precautionary techniques and PPE
  - May be considered qualified with respect to certain equipment and methods but not others
- EVERYBODY ELSE: UNQUALIFIED



Electrician wanted.
Experience required…this time.

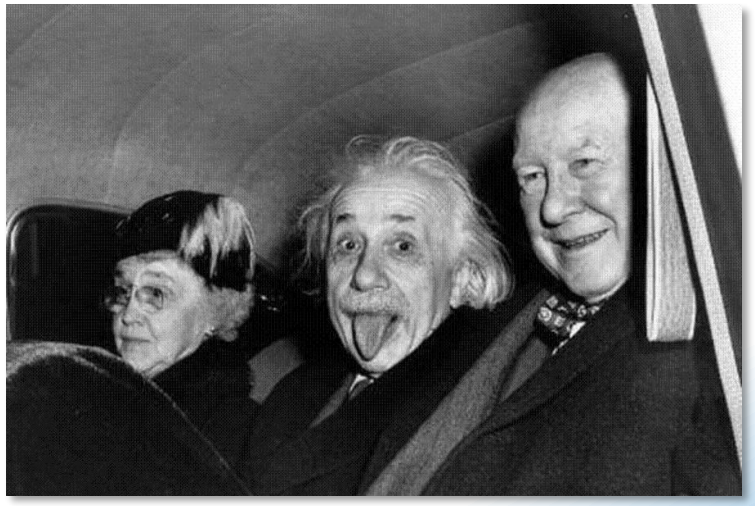
Qualified Person

NFPA 70E

- One who has **demonstrated** skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk.

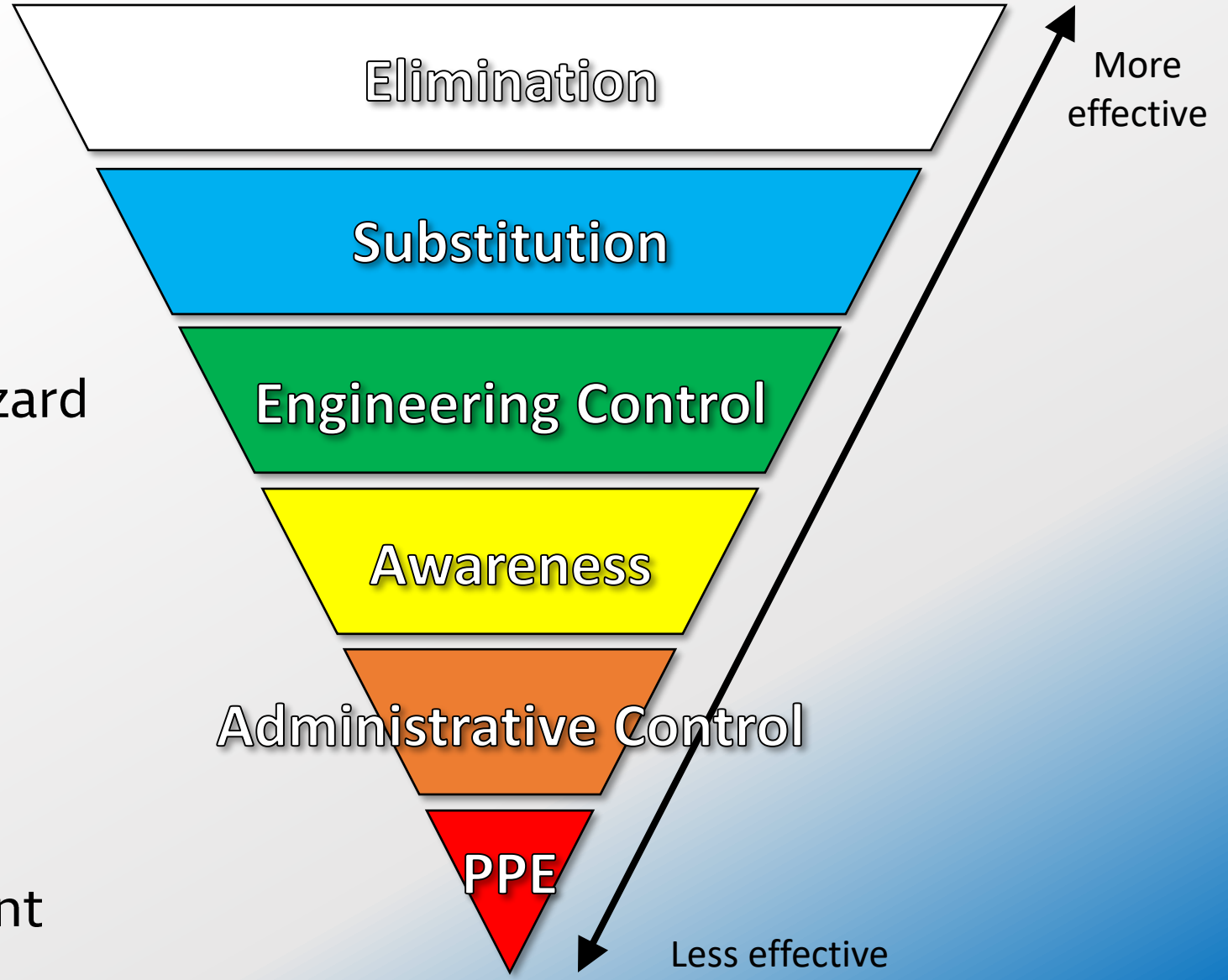
CCR Title 8

- A person **designated** by the employer who has received training in and has demonstrated skills and knowledge in the construction and operation of electrical equipment and installations and the hazards involved.



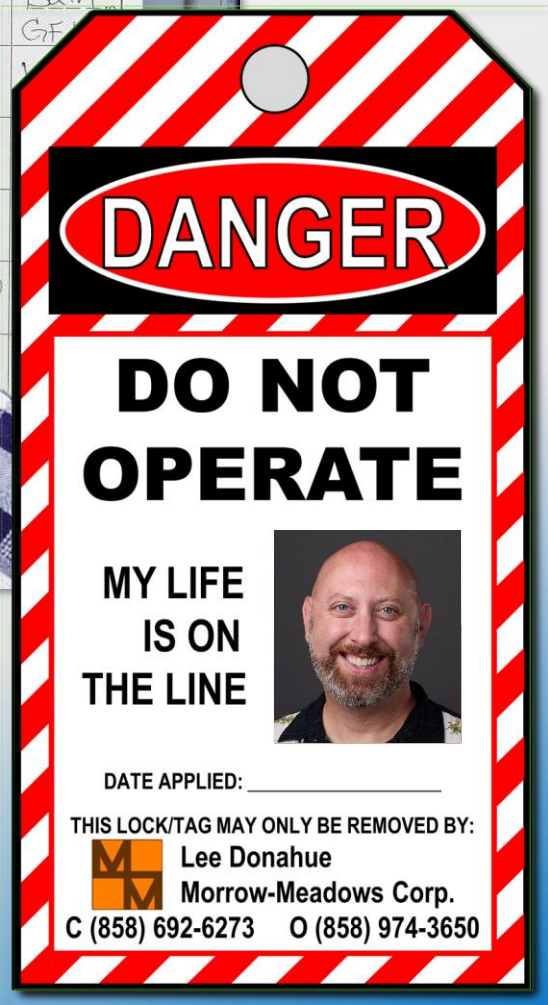
Hierarchy of Controls

- Removes the hazard
- Replaces the hazard
- Isolates workers from the hazard
- Communicates the hazard
- Changes the way the work is performed
- Protects the worker with Personal Protective Equipment



Elimination

- Removes the hazard

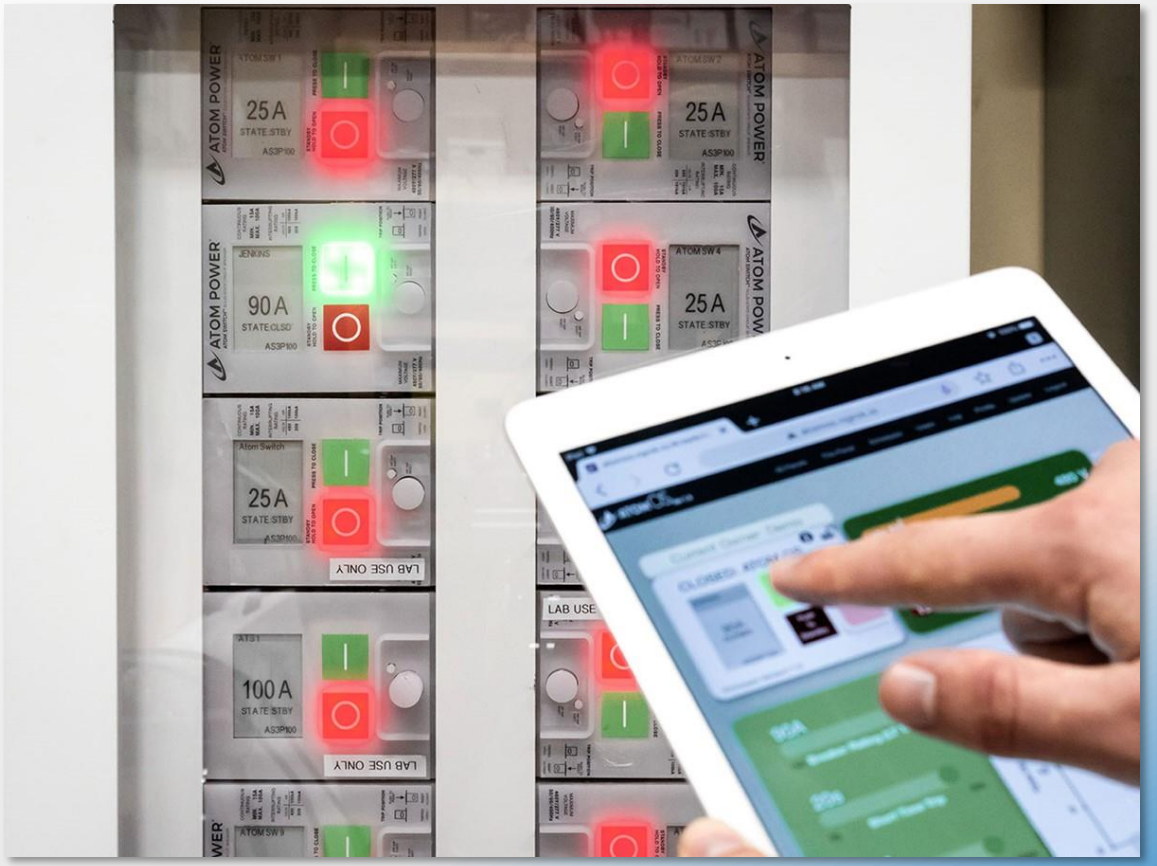


Substitution

- Replaces the hazard

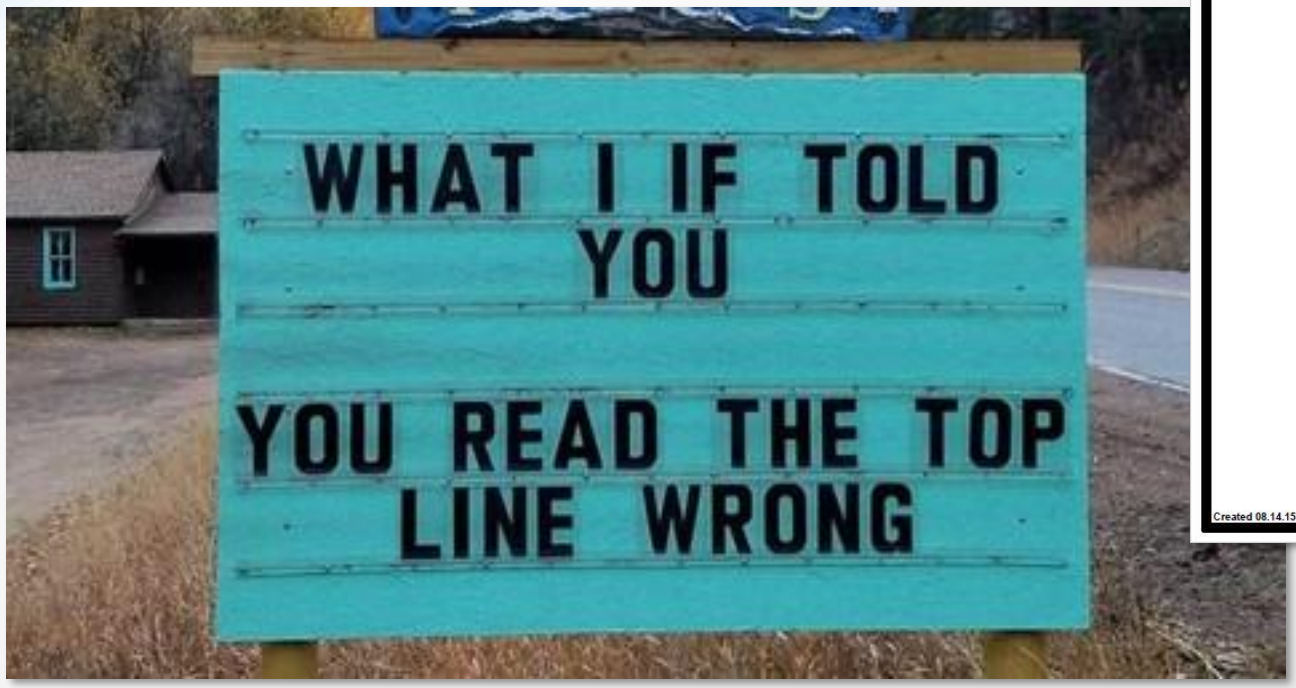
Engineering Controls

- Isolates workers from the hazard



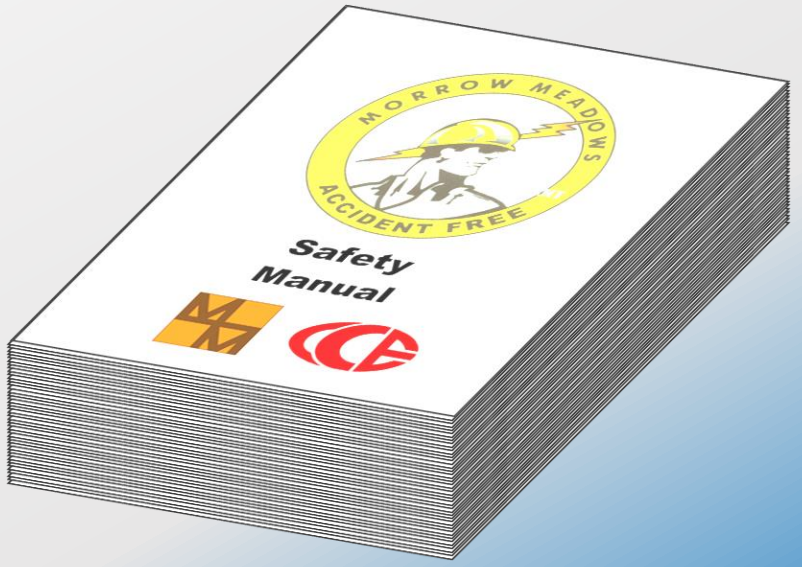
Awareness

- Communicates the hazard



Administrative Controls

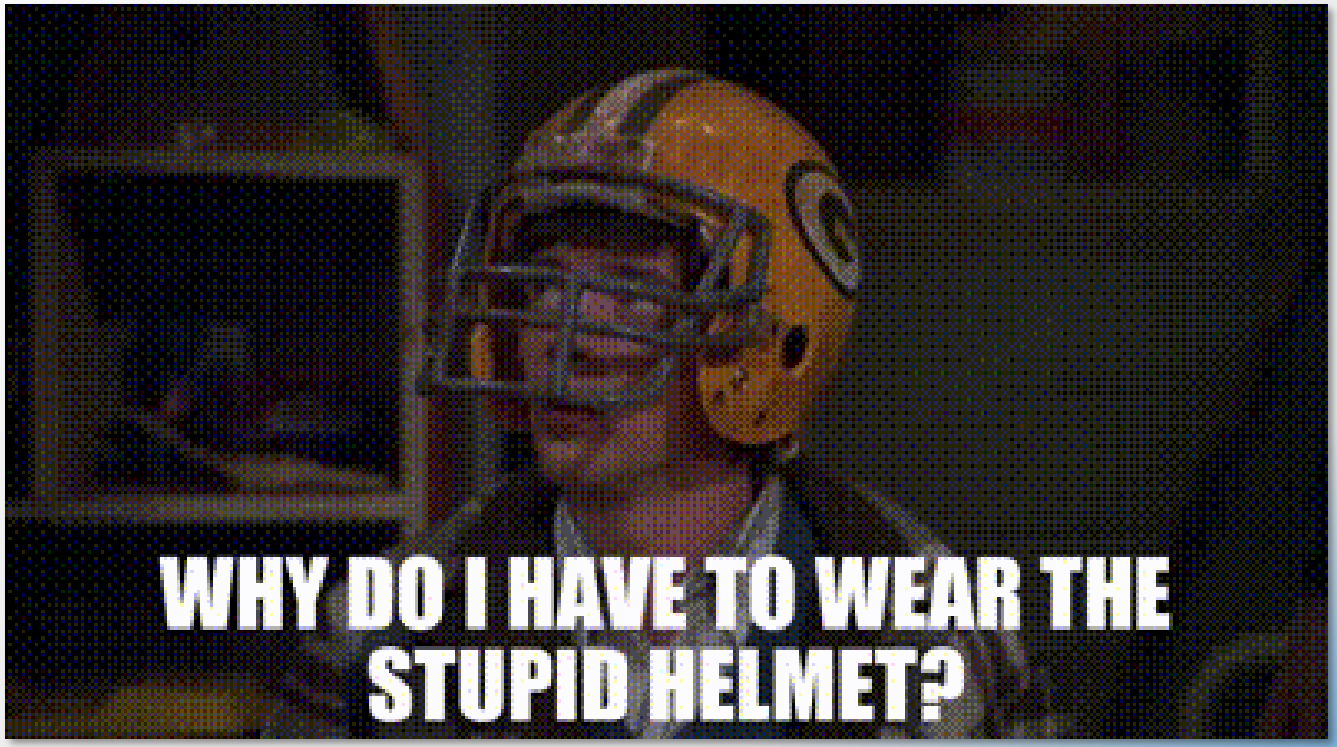
- Changes the way the work is performed



Lots of paperwork

Personal Protective Equipment

- Protects the worker with Personal Protective Equipment
- “Protects”
- Does NOT alter, reduce, impact, affect, or in any way address the hazard

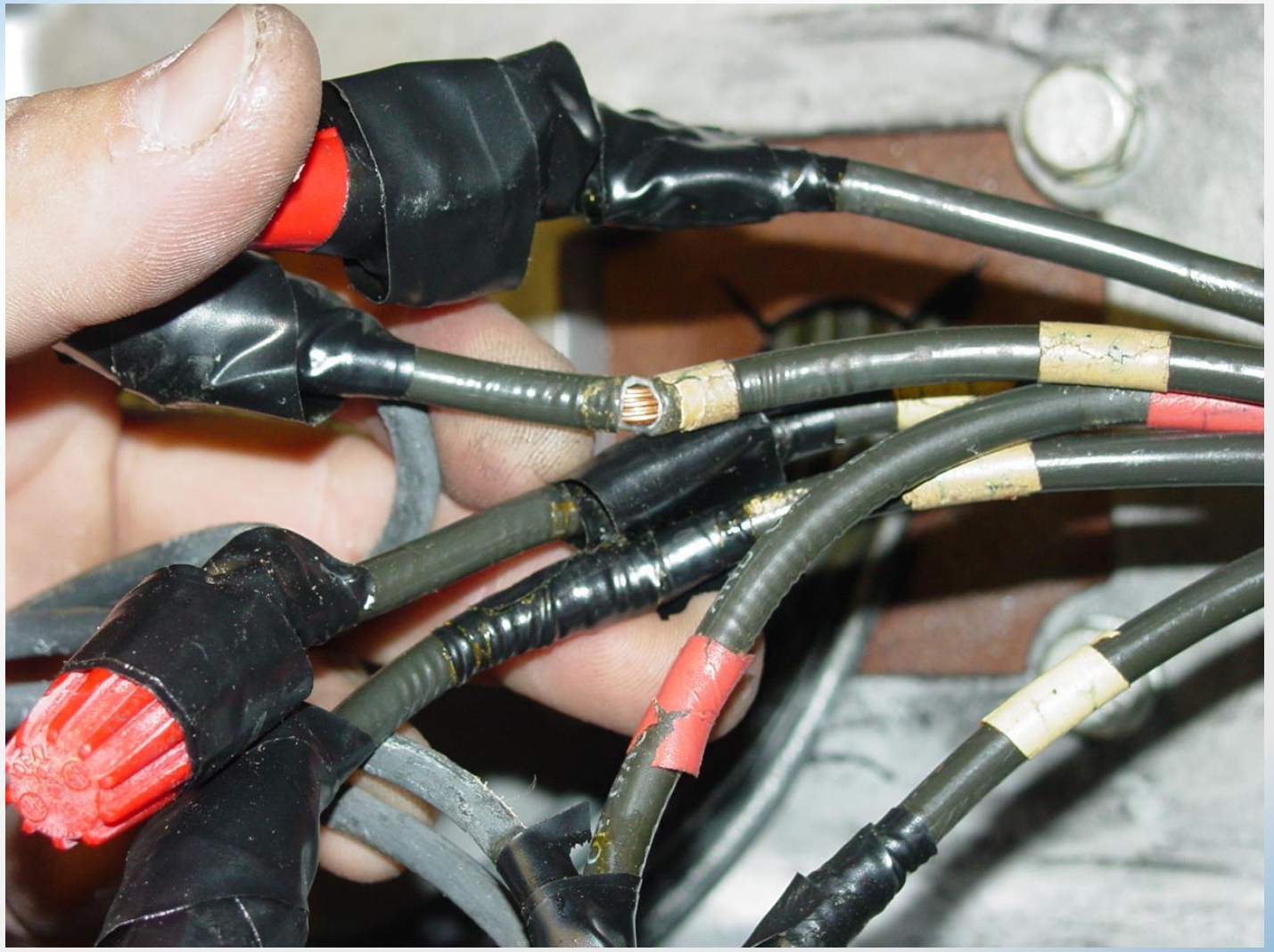


Is Maintenance Necessary?

Of course not!

…but here's what happens…

How Bad Could It Be?



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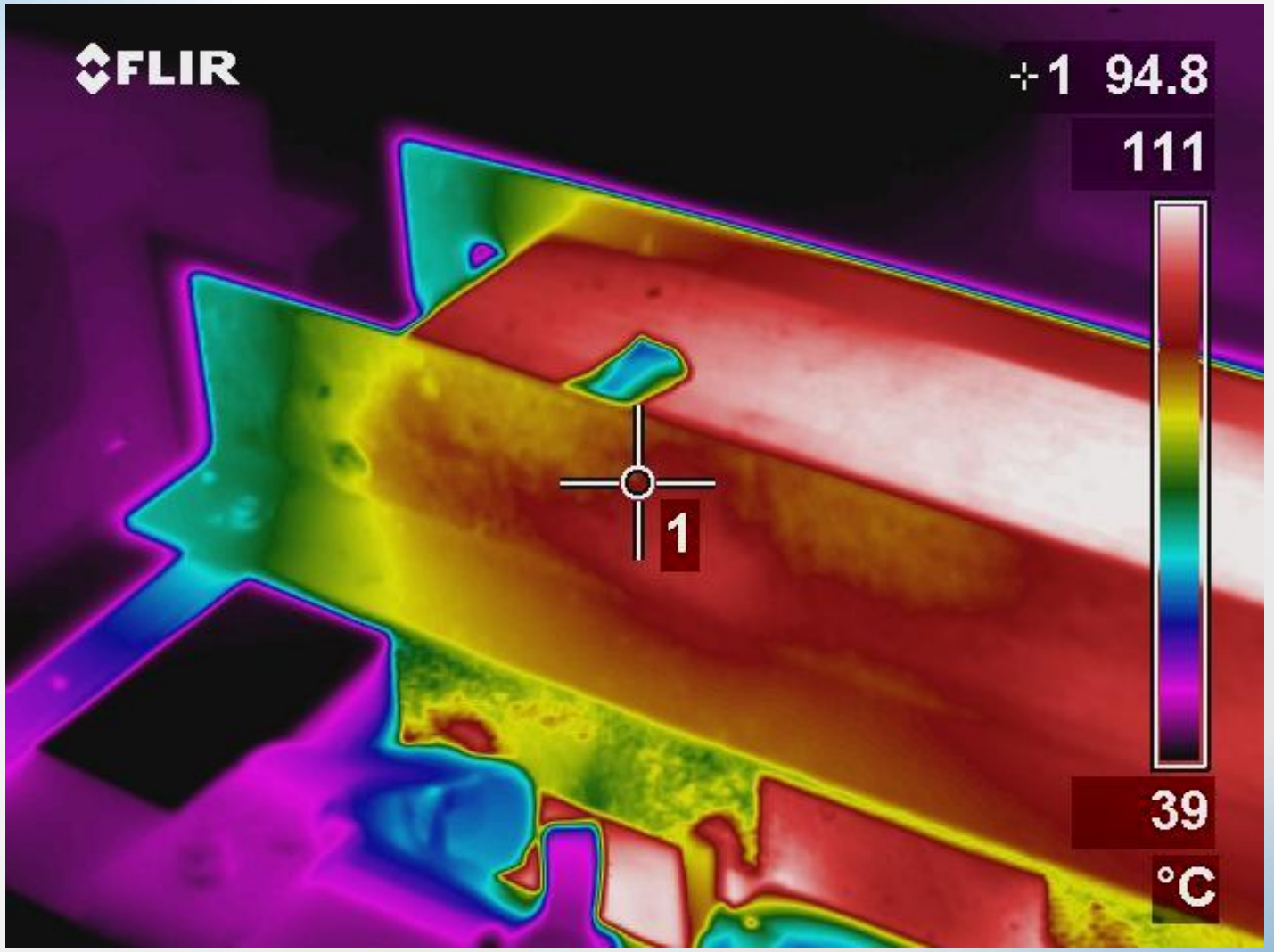

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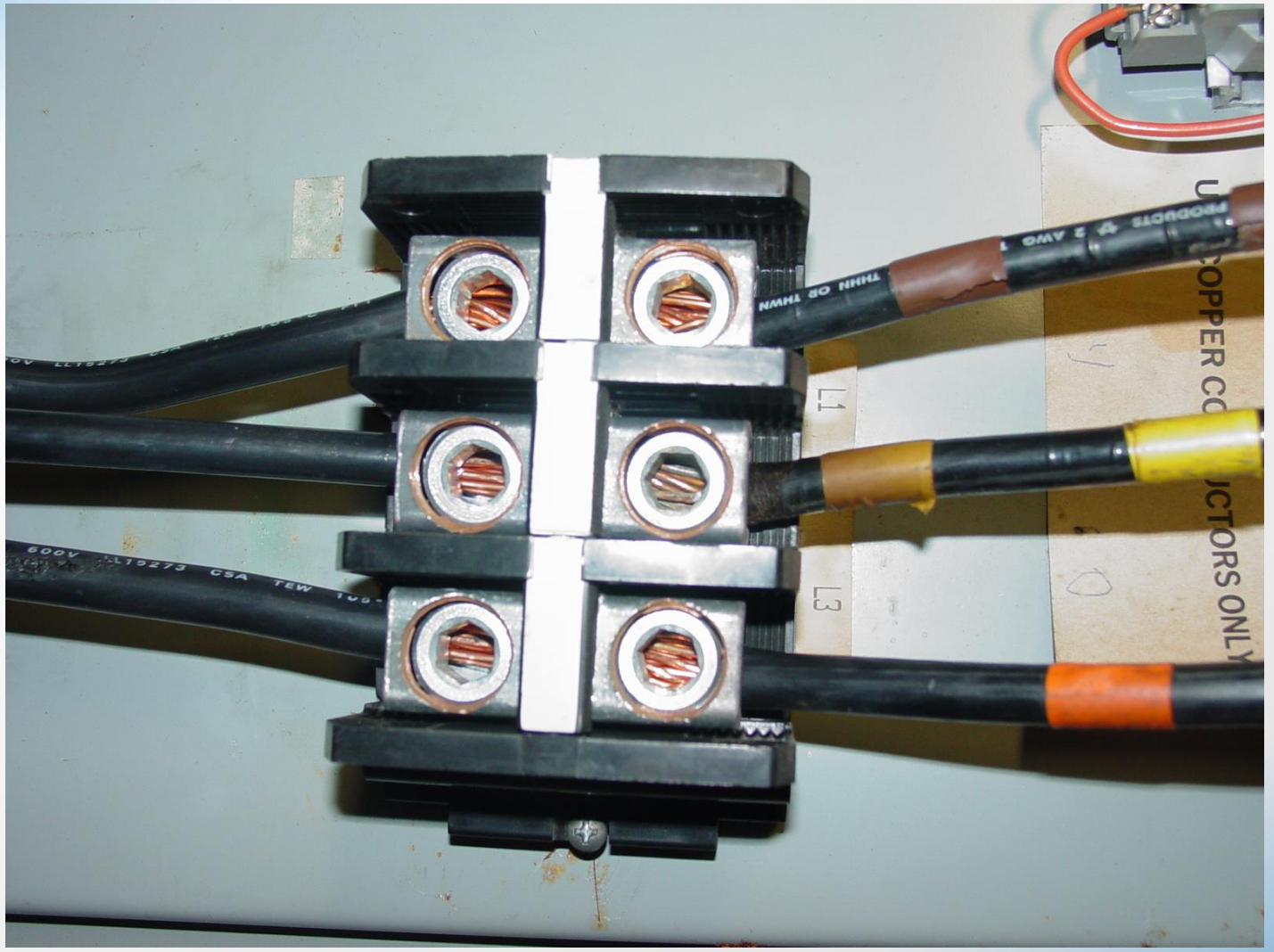

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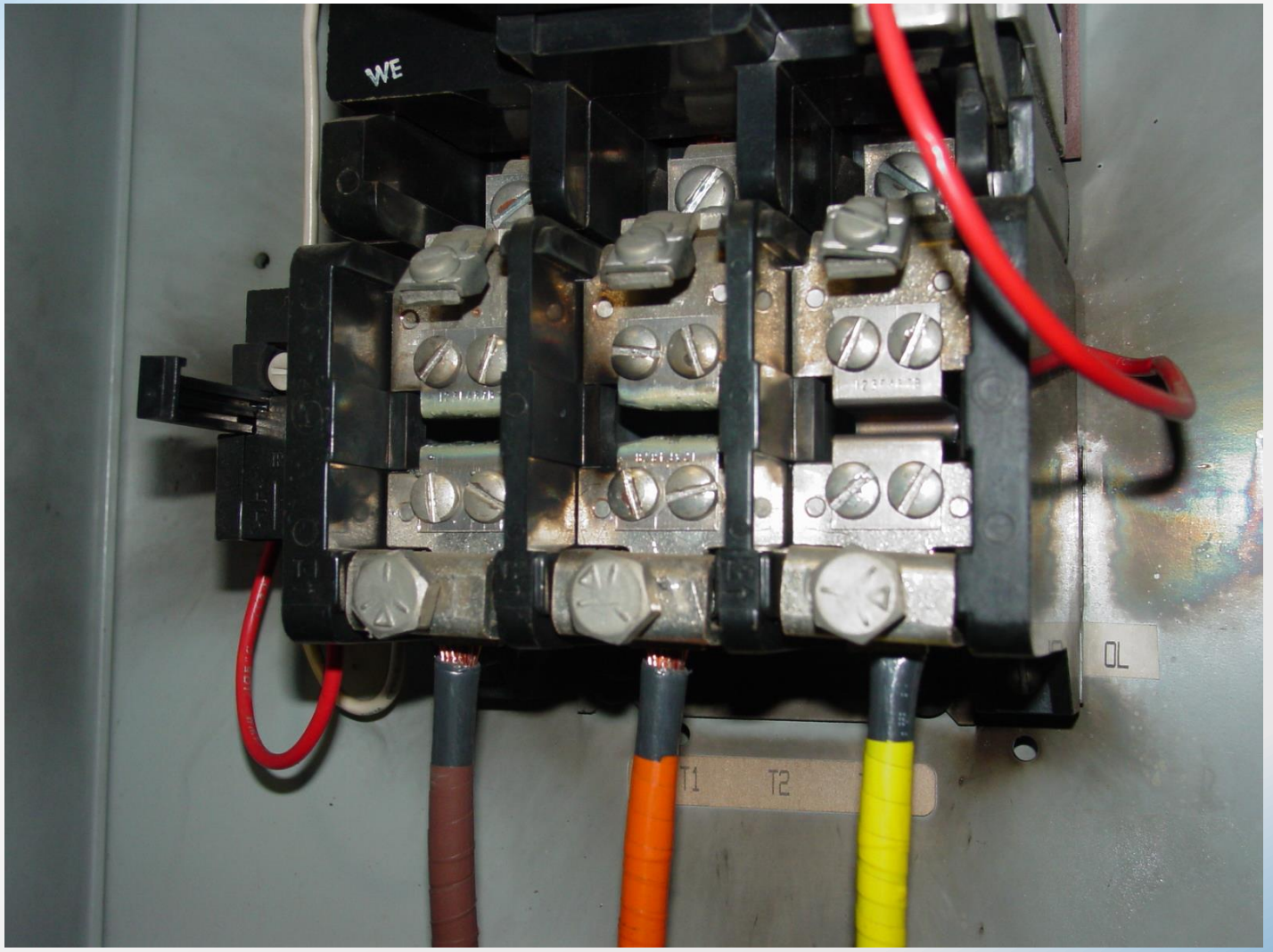

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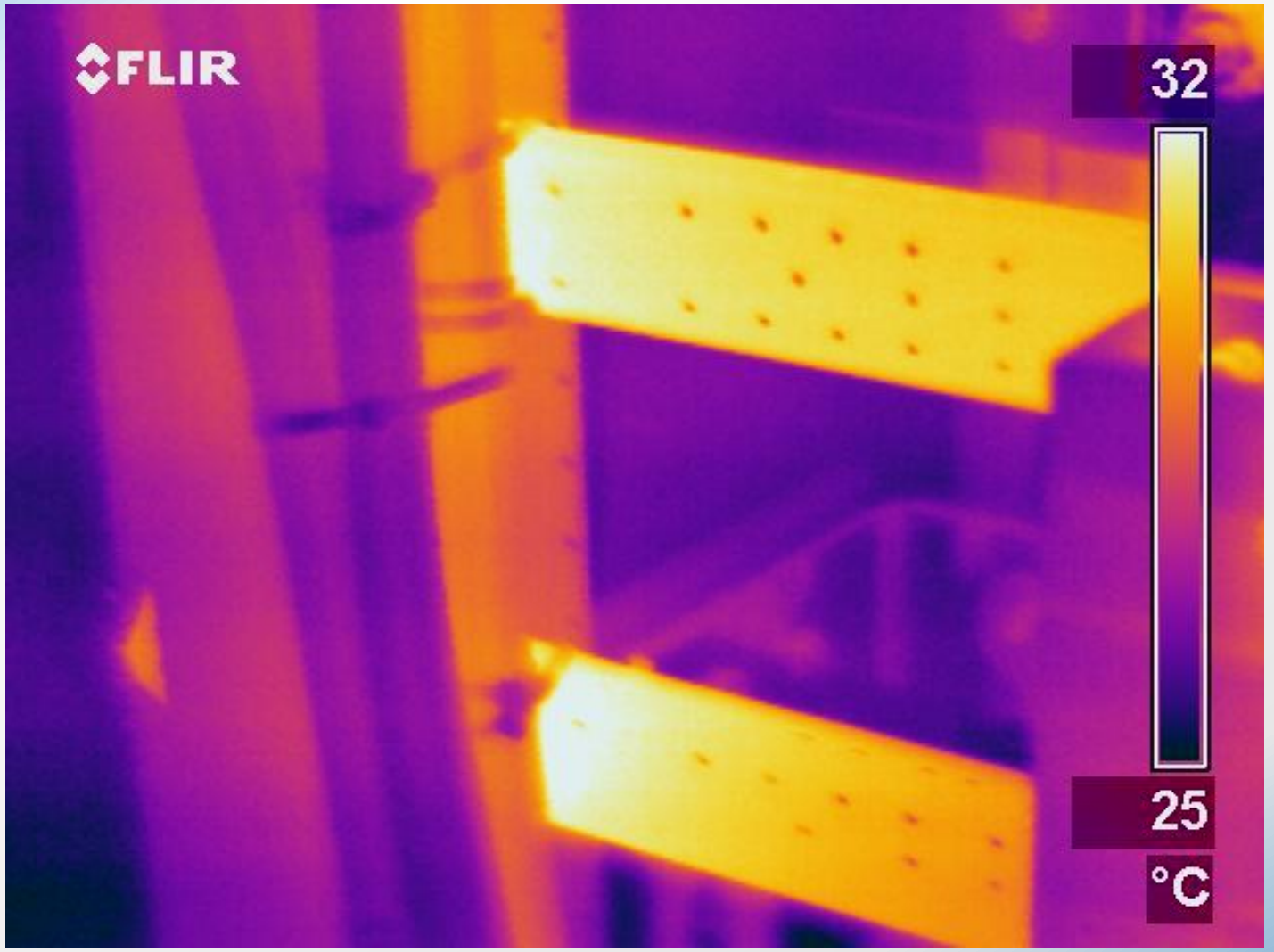


Without Maintenance

My parents didn't appreciate this when I was 6...thanks TV

Timing Matters

Back to NFPA

- NFPA 70 (National Electric Code) relates to installation
  - “The servicing and electrical preventive maintenance shall be performed in accordance with the original equipment manufacturer’s instructions and information included in the listing information, applicable industry standards, or as approved by the authority having jurisdiction.” (110.17)
  - Refers to 70B
- NFPA 70E (Standard for Electrical Safety in the Workplace)
  - Four pages on “Safety-Related Maintenance Requirements”
  - TLDR; See NFPA 70B
- NFPA 70B (Standard for Electrical Equipment Maintenance)

Condition of Equipment

Normal Operating Conditions (NFPA 70E):

- Equipment is properly installed.
- Equipment is properly maintained (manufacturer's specs…**70B**).
- Doors are closed and secured.
- Equipment is rated for the available fault current. *(New in 2024)*
- Equipment is used in accordance with the listing and manufacturer's instructions.
- All equipment covers are placed and secured.
- There is no evidence of impending failure.

Wikipedia

Can't put the magic smoke back in once it's out!

Role of NFPA 70B Specifically

- Chapters 1 to 4 – Administration and General Information
- Chapter 5 – Personnel Safety
- Chapter 6 – Single Lines and System Studies
- **Chapters 7 & 8 – Testing**
- **Chapter 9 – Maintenance Intervals**
- Chapter 10 – Hazardous Locations
- Chapters 11 to 38 – Specific equipment and applications
- **Annex A – Suggestions for Inspection**
- **Annex E – Sample Forms**
- And of course other annexes

70B - Testing

- Gives torquing values if manufacturer info is not available
- Specifies what tests to perform
- Identifies how to perform tests and what instruments to use
- **Defines Conditions of Maintenance**
  - Serviceable
  - Limited Service
  - Nonserviceable

70B – Physical Conditions

Condition 1

- Like new, clean, tight, no moisture
- No unaddressed alarms or recommendations
- Current on maintenance

Condition 2

- Deviation in test results or maintenance identifies needs
- Unaddressed alarms or recommendations

Condition 3

- Equipment has missed the last two maintenance cycles
- Last two maintenance cycles revealed needs
- Active or unaddressed alarms or urgent actions needed

Sample Maintenance Interval

Table 9.2.2 Maintenance Intervals

Product	Scope of Work	Equipment Condition Assessment		
		Condition 1	Condition 2	Condition 3
All equipment	Infrared thermography	12 months	12 months	6 months
Battery ESSs	Visual inspection	60 months	36 months	12 months
	Cleaning	60 months	36 months	12 months
	Lubrication		Reserved	
	Mechanical servicing		Reserved	
	Electrical testing	60 months	36 months	12 months

Path Back to Condition 1:

More than two inspections without requiring additional service

Unexpected Failures:

Depending on cause, may be required to adopt more frequent intervals

Responsibilites

For Contractors:

- Adhere to 70E and 70B
  - Hierarchy of Controls
  - Processes
  - Correct PPE when needed
- Engage with Other Contractors
  - Best Practices
  - “Hold the Line”
- Subcontract if necessary

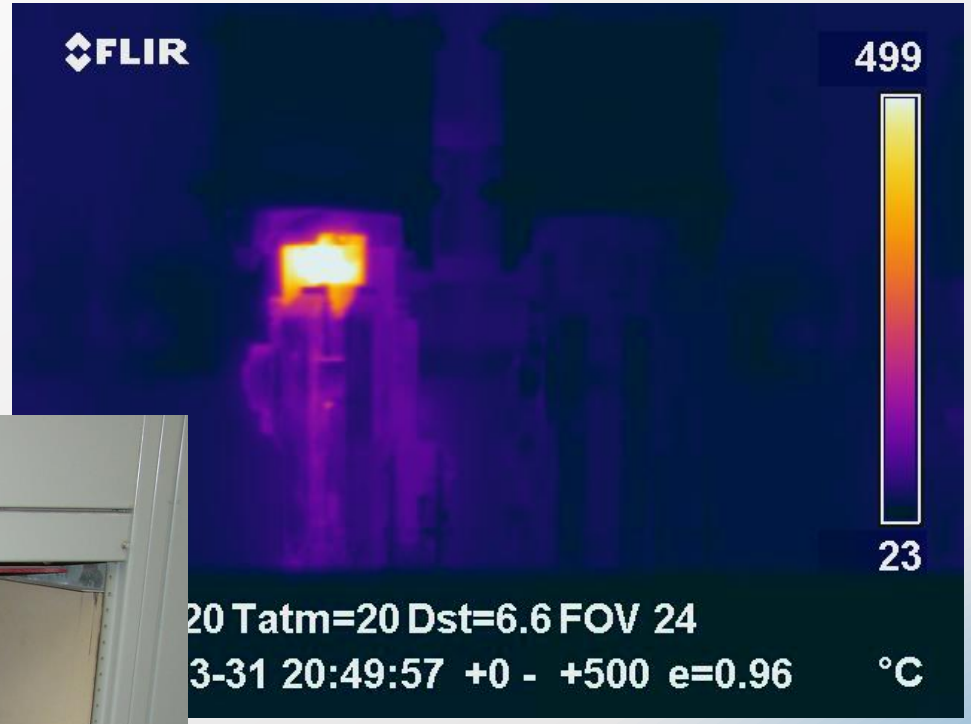
For Owners/Manager/etc.:

- Talk to Insurance
- Use Qualified Contractors
  - Solar
  - Battery Systems
  - Maintenance
- Ask Your Contractor About 70B and 70E
- Maintain Your Equipment!

Enforcement

Who sez?

- Inspectors
- Insurance
- Electricians
- Process
- Lawsuits



THANK YOU!

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