Energy-Based Hazard Recognition

An Introduction to the Energy Wheel

Learning Objectives

- Explain human limitations in hazard recognition
- Apply energy-based hazard recognition to improve skill
- Explain why the method works

Situational Awareness





What Hazards Do You See?



What Hazards Do You See?



What Hazards Do You See?

How Good Are We At Hazard Recognition?





45% of hazards are identified

35%

of hazards are missed because of cognitive "blind spots"

20%

of hazards are missed because they are not reasonably identifiable before work starts

Thought Experiments







Thought Experiment

Why does one change significantly change how we process the hazard?



The hazards we see first and most often are processed instinctually with very little cognitive effort.

Those that we commonly miss are identified through complex problem solving that requires relatively high cognitive effort.

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Every injury is the result of the unwanted release of and contact with one or more energy sources.



Mnemonic Devices



Righty Tighty, Lefty Loosey



Please Excuse My Dear Aunt Sally



ROY G. BIV



Gravity: Force caused by the attraction of mass to the earth

- Work at height
- Overhead loads
- Falling objects or unsure materials
- Slip, Trip, & Fall hazards
- Manual material handling





Motion: Change in the physical position or location of objects or substances.

- Traffic
- Mobile Equipment
- Projectiles
- Flowing water
- Wind
- Body movement / repetitive motion



Mechanical: Working parts of a machine or assembly, including rotation, vibration, tension, or compression

- Rotating equipment
- Compressed springs
- Cables
- Drive belts
- Conveyors
- Angle grinder
- Gears
- Pulleys



- Powerlines
- Transformers
- Switchgears
- Wiring
- Power tools
- Extension cords
- Lightning





Pressure: Liquid or gas compressed or under a vacuum

- Piping
- Pressure vessels
- Compressed gas bottles
- Hydraulic lines
- Air compressors
- Pneumatic tools / hoses
- Pressure washers



Sound: Audible vibrations caused from the contact of two or more objects

- Heavy machinery
- Pile driving
- Power tools
- High pressure relief





- Welding
- X-ray testing
- Sun exposure
- NORM





- Animals
- Insects
- Bacteria
- Viruses
- Bloodborne pathogens
- Contaminated water

Chemical: Toxic or reactive elements in the environment

- Flammable vapors
- H2S
- Engine exhaust
- Silica
- Benzene
- Wood dust



Temperature: Intensity of heat in an object or substance

- Engines
- Heaters
- Furnaces
- Chillers
- Steam
- Sudden or significant pressure change

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The energy wheel improves hazard recognition skills by an average of approximately 30%



Enbridge Field Testing: Charleston

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Crew 1	26.56	32.81	35.00	31.82	38.10	36.99	65.63	68.75	66.13	67.22	68.33	73.33	69.04	72.79	71.39	73.12
Crew 2	39.47	38.46	43.90	33.33	39.02	37.21	39.53	39.53	72.23	72.56	67.93	70.22	66.92	68.58	69.36	71.89
Crew 3	40.00	42.00	35.85	39.62	38.00	36.54	38.46	38.89	37.25	39.62	74.33	76.07	77.31	78.42	76.42	77.80



Enbridge Field Testing: New Orleans

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Day 8	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Crew 1	42.32	35.44	34.76	38.09	41.42	40.53	53.56	56.42	59.12	58.23	62.40	63.33	57.21	65.40	60.20	70.50
Crew 2	33.32	34.67	27.80	25.43	32.60	30.97	26.04	27.67	48.40	52.34	54.89	55.10	54.21	58.43	47.29	51.30
Crew 3	42.26	47.80	41.54	40.20	43.44	39.73	45.40	43.27	46.78	47.32	66.03	61.48	68.83	69.23	70.12	72.32



Best Practices

- Use instinct first, then use the energy wheel
- Integrate the energy wheel with existing practices
- Don't change the paperwork right away
- Don't ID hazards and then try to classify them
- Energy categories themselves are not hazards

Backed By Science

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