



What We Learned from Ethanol Train Derailment Fires

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Analysis of 11 ethanol train derailments 2006 – 2015

LOCATION	DATE	CARS DERAILED	CARS BREACHED	FIRE	GALLONS RELEASED	SPEED
Bon Homme, SD	9/19/2015	7	3	Yes	49,748	10
Alma, WI	7/11/2015	32	5	No	20,000	Unknown
Dubuque, IA	2/4/2015	14	8	Yes	53,000	24
Charles City, IA	5/2/2013	5	2	No	49,000	24
Plevna, MT	8/5/2012	18	12	Yes	245,335	23
Columbus, OH	7/11/2012	3	3	Yes	54,748	25
Tiskilwa, IL	10/7/2011	10	9	Yes	162,000	37
Arcadia, OH	2/6/2011	31	31	Yes	834,840	46
Cherry Valley, IL	6/19/2009	15	13	Yes	323,963	36
Painesville, OH	10/10/2007	7	4	Yes	52,200	48
New Brighton, PA	10/20/2006	23	20	Yes	485,278	37

Analysis of 11 ethanol train derailments 2006 – 2015

Findings:

Total Derailments: 11	Number Resulting in Fire: 9
Total Cars Derailed: 165	Range: 3 to 32 Tank Cars
Total Cars Breached: 110	Range: 2 to 31 Tank Cars
Gallons Released:	Range: 20,000 to 835,000 Average: 212,000
Average Speed: 31 mph	Range: 10 to 48 mph

Analysis of 11 ethanol train derailments 2006 – 2015

Findings:



Study Observation #1

165 tank cars in study – 110 breached (67% failed)

- Head punctures and heat-induced tears (HIT)



Study Observation #1

165 tank cars in study – 110 breached

- Rapid rise in pressure can result in a dynamic failures



Photo Credit: Kelley Gray

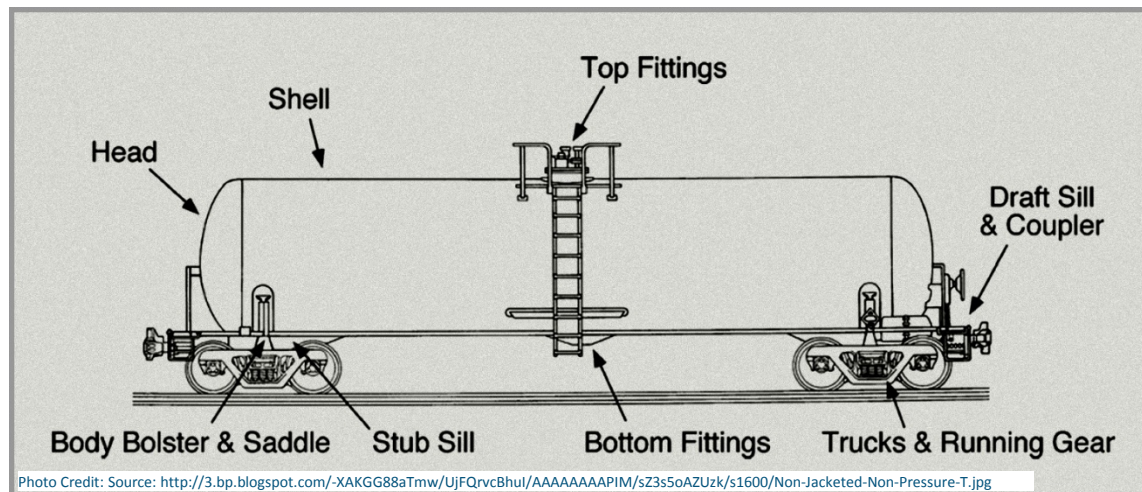


Photo Credit: NTSB Arcadia, Ohio

Study Observation #1

Planning Assumptions Based on Observation #1:

- Expect derailments to result in car failures.
- Punctures can release large volumes of ethanol in short time and increase the risk of fires and environmental damage; expect a rapid escalation in the incident



Study Observation #2

11 derailments in study – 9 fires (82%)

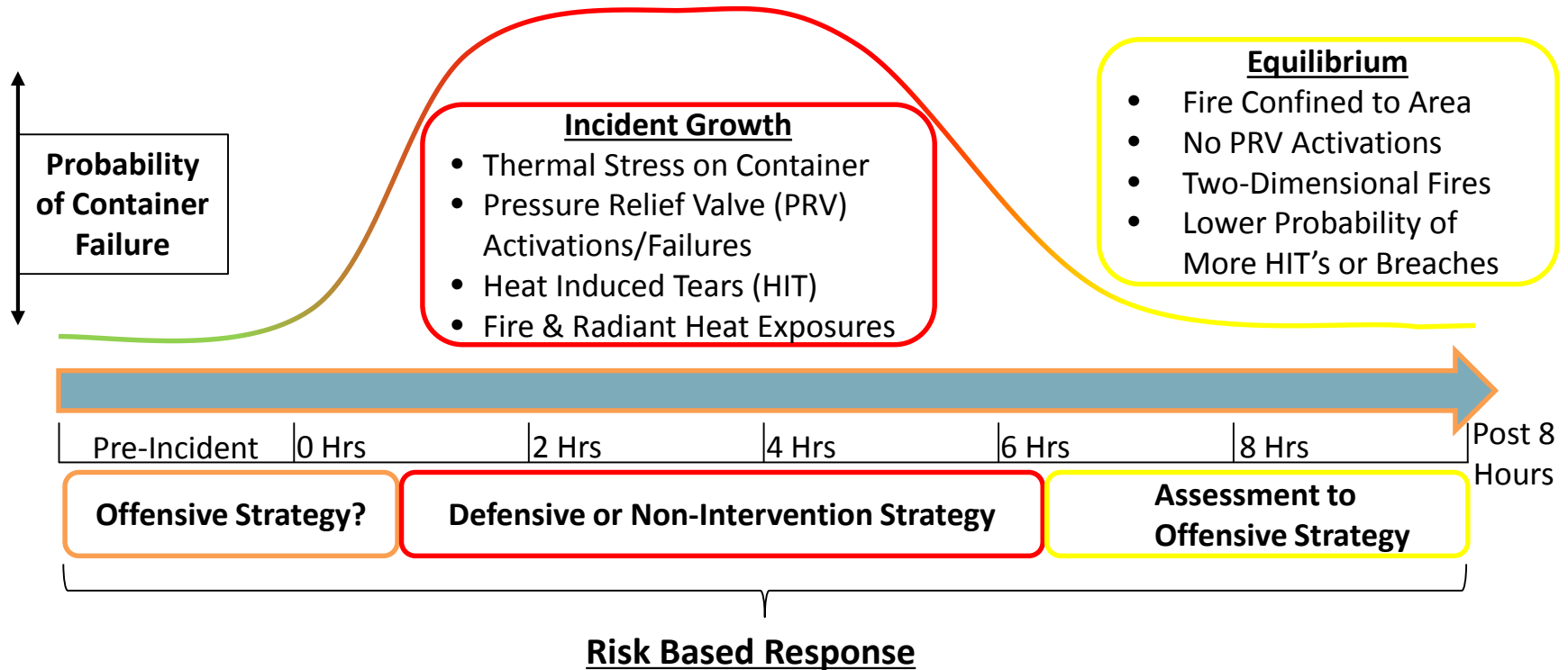
- Fires are hot and intense



Photo Credit: NTSB Arcadia, Ohio

Study Observation #2

11 derailments in study – 9 fires (82%)



Study Observation #2

Planning Assumptions Based on Observation #2:

- Prepare for large ethanol fires involving multiple tank cars; fires typically impinge on other tank cars causing them to eventually fail.



Photo Credit: Tiskilwa Fire Department

Study Observation #3

Average Spill: 212,000 gallons \approx 7 tank cars

- Response strategy: minimize environmental damage.



Study Observation #3

Planning Assumptions Based on Observation #3:

- Anticipate large volumes of ethanol to be released or involved in fire.



Photo Credit: AAR TRB Meeting June 2015

Study Observation #4

Derailment speeds 10 mph to 48 mph



Study Observation #4

Five (5) derailments speed was over 35 mph

- 7 to 31 tank cars may derail (average \approx 17)
- 4 to 31 derailed tank cars breach (average \approx 15)



Study Observation #4

Five (5) derailments speed was 25 mph or less

- Fewer tank cars derail (7 to 18; average \approx 9)
- Fewer derailed cars breach (3 to 12 ; average \approx 6)



Photo Credit: Dakota Aerials

Study Observation #4

Planning Assumptions Based on Observation #4:

- Do not overlook the risk of low speed derailments in built-up areas where track speeds may be regulated to speeds under 10 mph or 25 mph.



Thank you

Questions?

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