

RESEARCH ARTICLE

Lightning Strikes Back: Lightning Fire, Standard Oil, and Anti-monopoly in the Pennsylvanian Oil Fields, 1859–1897

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Abstract

This article examines how lightning fires shaped anti-monopoly sentiment among Pennsylvanian oilmen in the late nineteenth century. Drawing on 138 lightning-fire incidents coded from local periodicals, the study investigates the environmental impacts of Standard Oil's expansion in the Pennsylvania oil fields—particularly how its oil storage infrastructure attracted lightning and thus increased the risk of oil fires. Leveraging its monopsonistic position, Standard Oil sought to financialize this environmental risk and shift it onto independent producers, inventing a quasi-fire-insurance system called the “general average assessment.” Viewing this practice as a major threat to their business, oilmen developed bottom-up antagonism toward Standard Oil. Ultimately, this study offers a new framework for integrating environmental and business history by showing that the financialization of environmental risk acts as a central arena where corporate power is consolidated, contested, and politically reconfigured.

Keywords: lightning; risk; petroleum; Standard Oil; anti-monopoly

Oil and lightning made a dangerous pair. In the late nineteenth century, oilmen who came to Oil Region, Pennsylvania, in search of black gold learned this quickly. Pennsylvanians experienced 30–35 thunderstorms each year, mostly in the warmer months.¹ During this season, lightning lit up the sky. It usually struck remote trees or buildings. Even when hitting town centers, lightning rarely caused spreading fires because of the heavy rain. Lightning was thus viewed not as a major threat but as a

¹ “Pennsylvania State Climate Office,” *The Pennsylvania State University*, <https://climate.met.psu.edu/data/state/>.

“private matter” of “divine punishment.”² That changed in 1859, when oil was first pumped from underground. Large quantities of highly flammable liquid were brought to the surface. If lightning hit the oil, it caused fires that rain could not extinguish. Once burning, the heat caused the oil to expand and vaporize, forcing it to overflow. The oil might flow across the ground and the water while still on fire, destroying nearby buildings and other properties. With these threats, lightning became perilous—in oilmen’s own words, the “Freaks of Electric Current”—in the oil fields.³

Technological artifacts that propelled the petroleum industry intensified this hazard. To extract oil, oilmen constructed tall wooden derricks and storage tanks—structures that, much as lightning rods did, invited strikes. The risk escalated dramatically after Standard Oil began intervening in the Oil Region by the mid-1870s. By then virtually monopolizing the refining sector, the company aimed to purchase crude oil at low, stable prices. To secure its monopsonistic position, Standard built massive storage complexes on the outskirts of the oil fields. These facilities enabled the company to stockpile large quantities of crude and thereby endure producer boycotts, an essential tactic in its price negotiation strategy.⁴ However, constructed in flat, exposed terrain and filled with towering metal tanks, the facilities were susceptible to lightning strikes. The consequences were also severe. Whereas a strike on a small tank or derrick typically resulted in limited damage, a strike on Standard’s closely packed, high-capacity storage units could ignite vast quantities of flammable oil. Owing to the proximity of numerous tanks, such fires often led to cascading infernos. Until 1873, lightning-related damages in the oil fields amounted to an estimated \$328,000. After the first lightning fire at a Standard Oil storage in 1874, damages surged to \$5,254,107 through the remainder of the nineteenth century.⁵

In response to the growing threat, Standard Oil turned to financial instruments to shift the burden of risk onto oilmen. The company claimed that crude stored in its pipelines before being shipped to refineries still legally belonged to oilmen, even though it effectively controlled the oil from the moment it entered the system. By manipulating this legal fiction, Standard claimed that any loss from fires at its storage sites was not the company’s responsibility, but rather a loss of the oilmen’s property. To justify this, Standard invoked the maritime principle of “general average assessment,” a rule that, in sea transport, distributes losses from shared risks—such as jettisoned cargo during a tempest—between shipowners and cargo owners.⁶ In the oil fields, oilmen were treated as the cargo owners, while Standard’s pipelines positioned themselves as the shipowners. But unlike in maritime law, where losses are shared, Standard distorted the principle to impose the full cost solely on the oilmen. After each lightning fire, it calculated the damages and deducted a proportional amount from each oilman’s deposited crude. In so doing, “Standard

² Arwen Mohun, *Risk: Negotiating Safety in American Society* (Baltimore, 2013), 52–68. See also, Stephen Pyne, *Vestal Fire: An Environmental History, Told through Fire, of Europe and Europe’s Encounter with the World* (Seattle, 1997), 5.

³ “General Average,” *Oil City Derrick*, 6 July 1883. See also, Jonathan Wlasiuk, *Refining Nature: Standard Oil and the Limits of Efficiency* (Pittsburgh, 2017), 31–32.

⁴ Christopher Jones, *Routes of Power: Energy and Modern America* (Cambridge, MA, 2014), 133–139.

⁵ The number of fires and the amount of damage cited in this study are based on the dataset described in endnote 16.

⁶ Francis Dennis Rose, *General Average: Law and Practice* (London, 2005).

becomes insured on the general average principle,” externalizing the environmental risks created by its own infrastructure.⁷

By tracing this history, this article examines how Standard’s financialization of lightning risks provoked oilmen’s antagonism. The general average assessments not only strained oilmen’s pockets but also materially shaped their experience of Standard’s presence in the oil fields. Each summer, in the “season of general average,” oilmen anxiously scanned the skies, bracing for lightning strikes and the ensuing financial penalties.⁸ The sense of injustice became visceral when oil fires spread to nearby residential and business areas—yet the losses were still assessed to the oilmen. In these moments, the unfairness was not only economic but embodied. This seasonal spectacle of fires around the general average scheme played a crucial role in inspiring a growing wave of grassroots resistance, as the recurring conflicts fostered a deep anti-monopoly sentiment among oil producers.

This paper proposes a nuanced approach to the relationship between business and environment. Business historians have focused on how corporate actors impacted the natural world.⁹ Far less attention, however, has been paid to the reverse: how environmental actors reshaped the nature of business. To be sure, studies have examined how firms responded to activism, regulation, or market transformations related to environmental concerns.¹⁰ Yet, much of this literature tends to assume that environmental impacts on business are fully mediated through political or economic structures. In contrast, environmental historians have shown that environmental actors—such as dust, waste, or terrain—can rather directly shape the economic aspirations of capitalists.¹¹ Yet, this literature often flattens the internal diversity of business actors, portraying them largely as profit-driven capitalists without attending to their positional differences within the political economy.¹² Bringing these two literatures into conversation, this paper examines how business actors at different

⁷ “A Standard Scheme,” *Pittsburgh Dispatch*, 29 July 1890.

⁸ “On General Average,” *Titusville Herald*, 28 May 1881; “Tanks and Lightning,” *Bradford Era*, 24 May 1881.

⁹ Christine Meisner Rosen and Christopher Sellers, “The Nature of the Firm: Towards an Ecocultural History of Business,” *Business History Review* 73, no. 4 (1999): 577–600; Geoffrey Jones, *Profits and Sustainability: A History of Green Entrepreneurship* (Oxford, 2017); Hartmut Berghoff and Adam Rome, *Green Capitalism? Business and the Environment in the Twentieth Century* (Philadelphia, 2017); Ann-Kristin Bergquist, “Renewing Business History in the Era of the Anthropocene,” *Business History Review* 93, no. 1 (2019): 3–24; Bartow J. Elmore, Rachel S. Gross, and Sherri Sheu, ed., *Big Box USA: The Environmental Impact of America’s Biggest Retail Stores* (Denver, CO, 2024).

¹⁰ Bergquist, “Renewing Business History in the Era of the Anthropocene.” See also, Geoffrey Jones, *Varieties of Green Business: Industries, Nations and Time* (Northampton, MA, 2018).

¹¹ Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (Oxford, 1979); Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (New York, 2001); Carl A. Zimring, *Cash for Your Trash: Scrap Recycling in America* (New Brunswick, NJ, 2005).

¹² For more complicated views, see Kendra Smith-Howard, *Pure and Modern Milk: An Environmental History since 1900* (Oxford, 2013); Bartow Elmore, *Citizen Coke: The Making of Coca-Cola Capitalism* (New York, 2014); Andrew Case, *The Organic Prophet: The Life and Legacy of J. I. Rodale* (Washington, 2018); Emily Pawley, *The Nature of the Future: Agriculture, Science, and Capitalism in the Antebellum North* (Chicago, 2020); Bartow Elmore, *Seed Money: Monsanto’s Past and Our Food Future* (New York, 2021); Rachel S. Gross, *Shopping All the Way to the Woods: How the Outdoor Industry Sold Nature to America* (New Haven, 2024); Daniel Immerwahr, “All That Is Solid Bursts into Flame: Capitalism and Fire in the Nineteenth-Century United States,” *Past and Present* 265, no. 1 (2024): 97–138; Jordan Howell, “Capital Prospects: Jamaica and the Environmental History of Postwar Decolonization,” *Environmental History* 28, no. 1 (2023): 133–159; Cody Patton, “Mites,

levels responded to the same environmental forces: climate and lightning. Every summer, lightning shaped the decisions and practices of oilmen and Standard with minimal mediation from environmental activists, regulators, or even market institutions. By centering this interplay, the paper reveals how lightning fires shaped the power struggle between a monopolistic corporation and independent producers.

This study also examines how finance was involved in this process, suggesting that the financialization of environmental threats was not a smooth or linear process of abstraction.¹³ Financial historians have shown how various perils—such as death, fire, and price volatility—have been transformed into calculable risks.¹⁴ Yet, recent scholarship emphasizes that financialization often remains grounded in material realities that escape from abstraction.¹⁵ Such cases are particularly common with environmental threats. The material experiences of these hazards do not vanish in the process of financialization; rather, they shape how that process is experienced by historical actors. While Standard Oil's general average scheme was seemingly a typical abstraction of fire risks, this was not the case for oilmen. Rather than being absorbed into actuarial calculations, the risk of lightning fire persisted as a lived reality—inscribed in the shifting air, burning rivers, and ruined buildings. By examining how these embodied experiences were translated into political outcomes, the study contends that financialization often did not abstract environmental hazards so much as environments materialized the perception of financial practices. The term “environmental risk,” then, should be understood both financially and materially.

Building on this approach, supplemented by 138 lightning fire data entries encoded from local periodicals, this essay revisits one of the foundational moments in US business history: the struggle between Standard Oil and independent oil producers.¹⁶

Mildew and Anheuser-Busch: How Pests, Big Beer, and Hops Shaped the Craft Brewing Industry,” *Enterprise & Society* 26, no. 2 (2025): 1–26.

¹³ For environment and finance, see Olaf Weber and Blair Feltmate, ed., *Sustainable Banking: Managing the Social and Environmental Impact of Financial Institutions* (Toronto, 2016); Marcel Jeucken, *Sustainable Finance and Banking: The Finance Sector and the Future of the Planet* (London, 2010); Geoffrey Jones, Emily Grandjean, and Andrew Spadafora, “Financing Sustainability,” in *Varieties of Green Business: Industries, Nations, and Time* (Northampton, MA, 2018): 93–121; Bartow J. Elmore, “The Environmental History of an American Bank,” *Environmental History* 27, no. 1 (2021): 113–139.

¹⁴ Jonathan Levy, *Freaks of Fortune: The Emerging World of Capitalism and Risk in America* (Cambridge, MA, 2012); Eli Cook, *The Pricing of Progress: Economic Indicators and the Capitalization of American Life* (Cambridge, MA, 2017); Hannah Farber, *Underwriters of the United States: How Insurance Shaped the American Founding* (Chapel Hill, 2021).

¹⁵ John Handel, “The Material Politics of Finance: The Ticker Tape and the London Stock Exchange, 1860s–1890s,” *Enterprise & Society* 22, no. 4 (2021): 834–868; Bench Ansfield, “Born in Flames: Arson, Racial Capitalism, and the Reinsuring of the Bronx in the Late Twentieth Century,” *Enterprise & Society* 23, no. 4 (2022): 1004–1033; Tim Paulson, “Paper Steaks: Live Cattle Futures Markets and the Financial Revolution of 1964,” *Enterprise & Society* 26, no. 2 (2024): 1–32.

¹⁶ The data used in this study are aggregated from local chronicles printed in *Oil City Derrick, The Derrick's Hand-book of Petroleum: A Complete Chronological and Statistical Review of Petroleum Developments from 1859 to 1898* (Oil City, PA, 1898). This source documented daily events from 1859 to 1898, including fires and lightning strikes. Among those events, I manually coded fires attributed to lightning. Fires that occurred simultaneously at immediately contiguous sites and clearly originated from a single lightning strike (i.e., contagious fires from a single ignition source) are treated as a single event to preserve the independence of observations. Lightning strikes in wilderness areas are excluded. The dataset records

It argues that this confrontation—which defined the modern relationship between large corporations and small businesses—was driven not only by political or industrial forces but also by the environmental and financial dynamics of risk transfer. The visceral and material nature of lightning fires made Standard Oil's general average scheme particularly detested among oilmen. Because these assessments recurred annually, were triggered by spectacular fires, and affected thousands at once, they generated a collective grievance that helped catalyze broad, bottom-up anti-monopoly sentiments. Ultimately, this study offers a new framework for integrating environmental and business history by showing that the financialization of environmental risk acts as a central arena where corporate power is consolidated, contested, and politically reconfigured.

Perils of Lightning

In the early years of the oil boom, from 1859 to the early 1870s, most lightning fires occurred at oil wells in drilling sites. These places had tall wooden derricks, which attracted lightning strikes, and exposed oil storage, which provided the fuel. As oilmen were not prepared, the early damage was immense. In July 1866, lightning struck an oil well in Petroleum Center, and the fire destroyed nearby tanks and 20 surrounding wells. The burning oil overflowed into the river, setting rigs, tanks, engine houses, and barrels of crude oil on fire. The damage reached \$275,000.¹⁷ Such early disasters made oilmen realize that lightning could cause devastating losses.

The first solution oilmen tried was installing lightning rods.¹⁸ These rods were designed to attract lightning and safely guide the current into the ground, much like rainwater drains through pipes. Oilmen placed rods near engine houses and tanks to protect oil wells and crude from the hit. Some commissioned manufacturers in Pittsburgh to build custom rods.¹⁹ Others built tall makeshift structures to attract lightning. They also hired commercial “lightning-rod men” to install them. Each summer, these rod salesmen “annually ravaged” the oil fields, reflecting the high demand.²⁰

the date, month, year, the place of origin, location, and damage for each lightning-induced fire between 1866 and 1897. The places of origin are categorized into pipeline facilities, residential areas, drilling areas, refineries, and manufacturing areas. I excluded the rest years because the records are incomplete. For damages recorded in barrels, I converted volumes into dollar amounts using contemporary crude oil prices at the time of the event. For damages not specified in the record, a value of \$2,500 was assigned, reflecting the typical loss from small fires that burned a house or rig at the time. For the recent scholarship on Standard Oil and independent producers, see Darren Dochuk, *Anointed with Oil: How Christianity and Crude Made Modern America* (London, 2019); Kyle Williams, “Roosevelt’s Populism: The Kansas Oil War of 1905 and the Making of Corporate Capitalism,” *Journal of the Gilded Age and Progressive Era* 19, no. 1 (2020): 96–121. For a broader scholarship on anti-monopoly, see Richard John, *Network Nation: Inventing American Telecommunications* (Cambridge, MA, 2010); Laura Phillips Sawyer, *American Fair Trade: Proprietary Capitalism, Corporatism, and the “New Competition,” 1890–1940* (Cambridge, 2020); and Daniel A. Crane and William J. Novak, ed., *Antimonopoly and American Democracy* (Oxford, 2023).

¹⁷ “Letter from F. E. Hammond,” *The Petroleum Centre Daily Record*, 12 July 1869.

¹⁸ For lightning rods in the nineteenth century, see Mohun, *Risk: Negotiating Safety in American Society*, 53.

¹⁹ “Lightning Rods,” *The Petroleum Centre Daily Record*, 17 June 1872.

²⁰ *Titusville Herald*, 30 Sep. 1871.

In practice, though, lightning rods failed in most cases. Poor materials or sloppy installation were common.²¹ Even when properly built, rods were not effective in protecting drilling sites. This place was full of wooden derricks and tall facilities, often higher than the rods. Even if rods were nearby, the “pipes on top of tanks” were more attractive to lightning, which could burn “much valuable property contiguous thereto.”²² Owing to these limits, oilmen quickly lost trust in this technology. By the early 1870s, some almost despised it. Rod men’s aggressive marketing compounded the discontent. John Meising, an oilman, once had to threaten a salesman who tried to install a rod on his roof without permission: “Come down off them roofs or I’ll shoot you down.”²³

Since technical fixes failed, oilmen turned to structural solutions. By the late 1860s, they noticed a pattern: Most lightning damage came from oil overflowing from tanks built near derricks. These areas were especially risky owing to frequent lightning strikes and the high flammability of crude oil. Storage tanks could also catch fire from direct strikes or ground currents transmitted from the struck derricks. Once ignited, the oil overflowed. The overflow was hard to control before full combustion. Thus, oilmen began moving their tanks away from derricks and hills. Soon, pipeline companies took over this role. This new business gathered crude oil from scattered wells and stored it in large tanks on lower ground, relatively safe from lightning.²⁴ This was due to the physical principle that liquids flow downhill—early pipeline systems relied on gravity, in addition to pump power—and also because oil had to be loaded onto trains at nearby rail depots, which were usually situated in town valleys. Storing crude in safer areas, the pipelines acted like vaults, protecting the oil from lightning.

This shift reduced lightning-related damage around oil wells. To be sure, strikes at drilling sites continued to rise with the increased extraction of crude throughout the nineteenth century. But most crude was now transferred to pipeline facilities, limiting the risk of oil fires. As pipeline operations expanded in the late 1860s, reported losses from lightning fires near drilling sites declined sharply. Aside from a few exceptions in 1876, 1882, and 1886, most fires affected only a handful of derricks or small tanks (Figures 1 and 2). The calamities during the early oil boom were not repeated. By the mid-1870s, such small fires had become somewhat routine, and local newspapers largely ceased reporting their specific costs. The oil fields appeared to have brought lightning under control.

However, lightning struck back as Standard Oil intervened in the Oil Region. The company’s primary strategy in the oil fields was to control the flow of crude by seizing transport bottlenecks. Standard Oil’s aim was to purchase oil at low, stable prices and maximize margins in refining. For that purpose, Standard officials focused on buying out pipeline companies that collected oil from independent wells and transported it to refineries. Starting in 1872, Standard Oil began acquiring pipeline companies, and by 1874, it ran most of the pipeline business. These acquisitions were largely merged

²¹ Mohun, *Risk: Negotiating Safety in American Society*, 62, 67.

²² *Titusville Herald*, 1 June 1867.

²³ *Titusville Herald*, 1 June 1871.

²⁴ Harold Williamson and Arnold Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, 1959), 294–295.

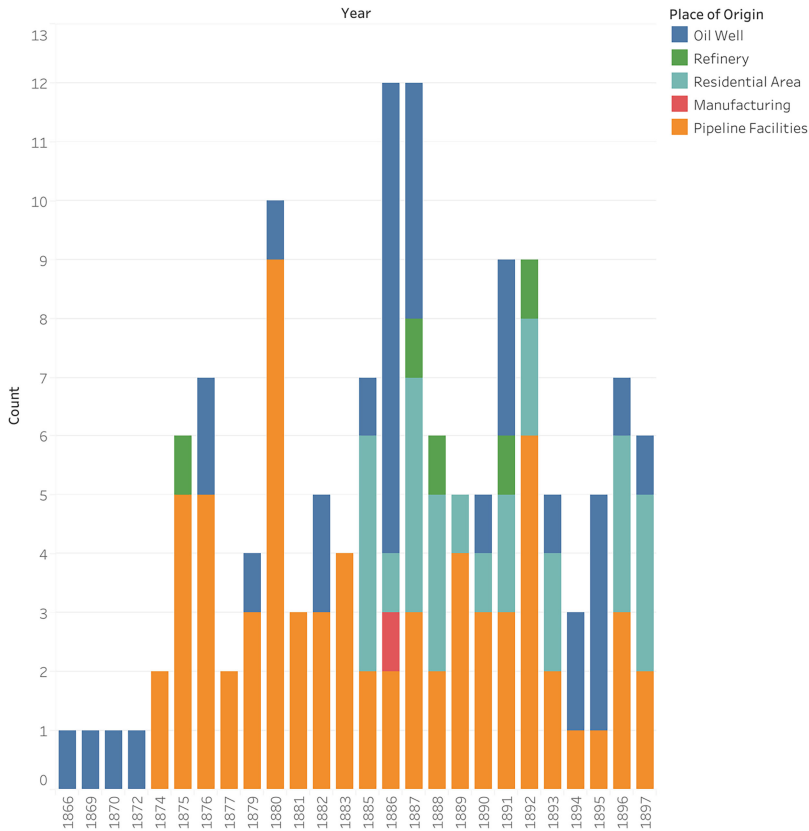


Figure 1. Lightning fire incidents by place of origin, 1866–1897. The graph shows the annual counts of lightning-induced fires categorized by their place of origin. After 1874, pipeline facilities became the most common origin of such fires. (Source: *Oil City Derrick*.)

into two firms: United Pipe Lines and the National Transit Company. The former gathered oil from the drilling sites and delivered it to pipeline facilities that stored large quantity of crude; the latter carried it from those hubs to refineries across the country.²⁵ This system allowed Standard Oil to control the oil flow, and it gained monopsonistic control over the Pennsylvania oil fields.

Yet, the company's maneuver altered the landscape of the pipeline business. The problem lay in Standard Oil's decision to build large storage facilities in remote, open areas. To strengthen its monopsonistic power, the company rapidly expanded its oil reserves. The more it could store, the more the company was able to leverage its position. This drive gained further momentum with new pipeline technology. By the late 1870s, long-distance pipelines were adopted to directly connect oil fields to refineries, bypassing railroads. Consequently, Standard no longer needed to store oil near railroad stations near downtowns. Instead, it built massive pipeline hubs on

²⁵ Jones, *Routes of Power*, 105–109.

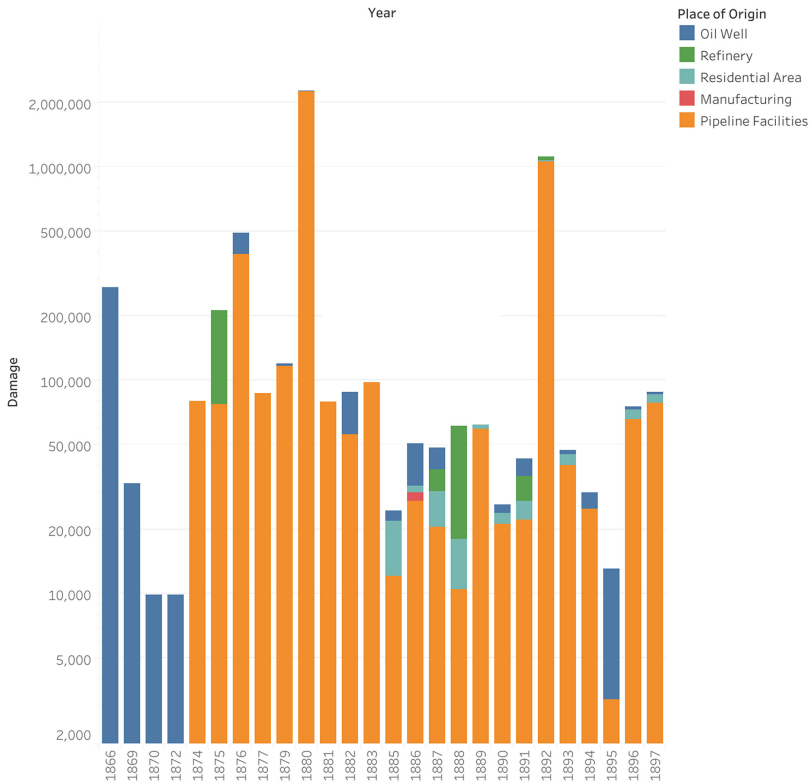


Figure 2. Lightning fire damage by place of origin, 1866–1897. The graph uses a logarithmic scale to compare damage variations across large value differences. After 1874, most lightning fire damage originated from fires at pipeline facilities. (Source: *Oil City Derrick*.)

cheap land in the outskirts of the town.²⁶ By 1883, Standard Oil managed iron tanks with a total capacity of 40 million barrels—equivalent to all crude production between 1859 and 1872.²⁷

As Standard Oil reshaped the spatial configuration of transporting infrastructure, lightning fires emerged as a major threat to the pipeline business. Early pipeline facilities were less exposed to such risk because they were located on lower ground with multiple covers nearby. By contrast, Standard’s later facilities—massive iron tanks lined up across vast open plains—lacked such cover and stood out as prime targets for strikes (Figure 3). While the sheer scale and exposure of metallic structures raised the likelihood of direct hits, the density of storage tanks facilitated the spread of fire once ignited.

Following Standard’s consolidation of the pipeline network in 1874, the frequency of lightning-induced fires at pipeline facilities surged (Figure 1). Among 15 fires

²⁶ Jones, *Routes of Power*, 123–159.

²⁷ Ida Tarbell, *The History of the Standard Oil Company*, vol. 2 (New York, 1904), 26–27.

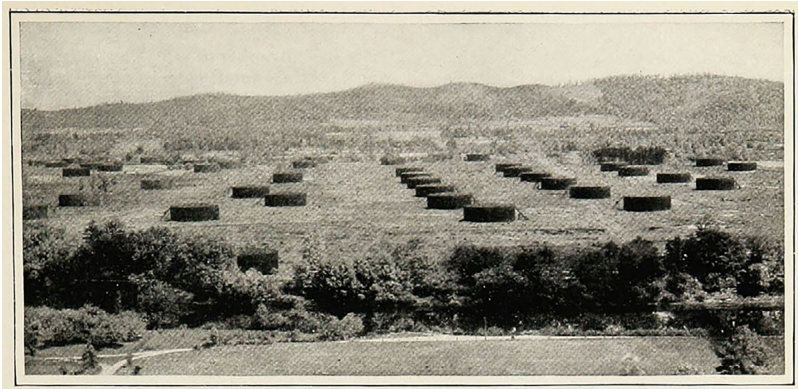


Figure 3. A city of 35,000-Barrel Tanks, owned by the Standard Oil Company. Densely built in open plains without cover, Standard Oil's tanks invited lightning strikes. (Source: *McClure's Magazine* [May 1903]: 73.)

reported at pipeline facilities between 1866 and 1873, not a single such incident was triggered by lightning. Most were started by accidental sparks from lamps or boilers, the total damage of which was \$145,000. Yet, over the next 26 years, 70 out of 93 fires at pipeline facilities were caused by lightning.

This shift in the fire patterns also changed the scale of destruction (Figure 2). The pipeline facilities built under Standard's management concentrated vast amounts of oil in vulnerable locations. Large iron tanks stood side by side in open plains. Many were connected through underground iron pipes. This design introduced two major risks. First, overflow from a single tank could ignite nearby ones (Figure 3). Second, lightning currents could travel through the pipes, spreading fire across facilities (Figure 4). As a result, the damage from lightning fires grew dramatically. Between 1874 and 1897, lightning fires caused \$4,716,966 in damage, accounting for 94.5% of fire losses at pipeline facilities. This was also 86.9% of all reported lightning fire losses in the Oil Region.²⁸

Standard officials did seek to mitigate the risk by implementing a series of technical measures. They constructed tanks equipped with an overflow-prevention mechanism designed to confine fires within individual tanks. In anticipation of scenarios in which the tank roof might collapse or become otherwise blocked, the company installed an emergency outflow pipe near the second ring from the top. This pipe, shielded by a device known as a "rose," allowed oil to be quickly drained into the main pipeline system. Moreover, officials outfitted their tanks with lightning rods extending 60 feet above ground level, "comprising a 25-foot rod atop the tank structure." In 1881, the company invested approximately \$50,000 to implement these fire containment systems. W. T. Scheide, the general superintendent of United Pipe Lines, argued that the company's tank management was so thorough that "no stone has been left unturned that could minimize the danger of

²⁸ As the annual average of lightning damage in the United States was estimated to \$1,500,000 at the time, this was also roughly 13% of the total lightning destruction in the country. "Facts About Lightning," *Oil City Derrick*, 14 July 1895.

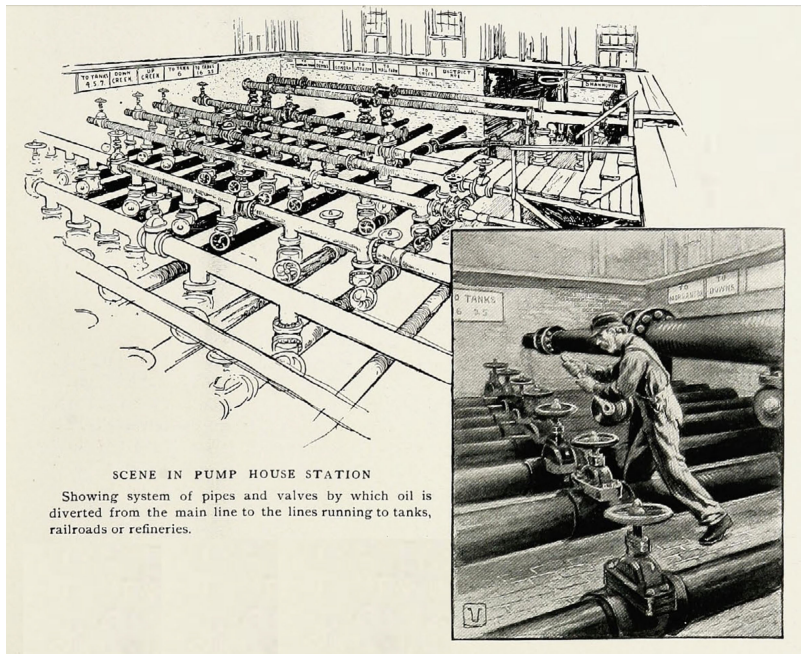


Figure 4. Pipeline hubs. Standard's oil tanks were connected through the web of underground iron pipes, which acted as conductors for lightning currents. (Source: *McClure's Magazine* [Apr. 1903]: 615.)

loss by lightning." He added that Standard's protective infrastructure had been "brought to a state of perfection heretofore undreamed of in the history of the petroleum trade."²⁹

However, the actual effectiveness of these measures proved limited. Just as oilmen had discovered a decade earlier in the oil fields, Standard realized that lightning fires were difficult to prevent with the available technology. Oil inside struck tanks often ignited before it could be drained. Even when lightning hit a rod, the resulting current traveled along the network of buried iron pipes, carrying sparks into adjacent tanks. Despite all the efforts, neither the frequency nor the damage of lightning fires decreased.

Standard Oil, which had amplified those hazards through its expansion, ultimately failed to prevent it. Now, the question was how to deal with its consequences.

General Average Assessment

In the late nineteenth century, Standard Oil's "long-established" principle regarding fire risk was "not carrying insurance." Standard officials believed that investing in their own fire-preventive methods would be more efficient.³⁰ However, when it came

²⁹ "On General Average," *Titusville Herald*, 28 May 1881.

³⁰ Ralph W. Hidy and Muriel E. Hidy, *Pioneering in Big Business, 1882-1911: History of Standard Oil Company (New Jersey)* (New York, 1955), 619-620.

to lightning fires, both technical and administrative methods to control fires proved ineffective, and the scale of losses was too great to absorb internally. In the first 13 years of the twentieth century, Standard Oil's total nationwide fire-related losses amounted to approximately \$5,500,000.³¹ By comparison, over the previous two decades—when the company's operations were much smaller—lightning fires at pipeline facilities in the Oil Region alone had caused at least \$4,716,966 in recorded losses. These figures suggest that lightning fires were unpreventable and rather costly to be managed under Standard's usual self-risk-taking principle.

But still, commercial fire insurance remained unattractive because of its high premium. The flammability of petroleum and the inherent risks posed by the landscape of the Oil Region made insurers wary. Most were reluctant to underwrite oil-related risks, and when they did, "the rates of insurance here are very high . . . and the amounts of the policies are difficult to obtain."³² Among all risks, "loss or damage by lightning" in the oil fields was seen as particularly uninsurable.³³ Lightning was difficult to model probabilistically, and the potential loss was hard to estimate. As a result, a small number of insurance firms offered coverage for lightning-related losses in the Oil Region, and only at steep premiums. For this reason, Standard Oil sometimes insured individual tanks on a case-by-case basis, but it never insured its entire pipeline facilities during the nineteenth century.

Amid these difficulties, a proposal emerged from managers of the small pipeline companies bought out by Standard Oil. These pipeline men introduced a scheme they had previously attempted, albeit unsuccessfully, before joining the Standard group. Although lightning fires at pipeline facilities were not reported until 1874, small-scale fires broke out owing to human error, sparks from pumping engines, or boiler explosions. To compensate for such losses, pipeline operators had proposed a mutual aid to producers who stored oil in their tanks. In 1868, Charles Hatch, one of the pioneers of the pipeline business, introduced what he called the "general average assessment" system.³⁴

Originally, general average assessment was a longstanding principle of maritime trade, developed to equitably distribute losses incurred from shared risks during a voyage. When intentional sacrifices were made or extraordinary expenses incurred to save a vessel and its cargo from peril, the resulting losses were to be proportionally shared between shipowners and cargo owners. This principle was traced back to ancient Rome, particularly within the Rhodian law, where it was codified in rules governing jettison—the act of throwing cargo overboard to lighten a ship in crisis.³⁵ By the seventeenth and eighteenth centuries, the principle had become embedded in the practices of British marine insurers. By the late nineteenth century, it had evolved into an international norm. Oilmen, too, were well acquainted with the concept.³⁶

³¹ Hidy and Hidy, 619.

³² Brian Black, *Petrolia: The Landscape of America's First Oil Boom* (Baltimore, 2000), 77.

³³ *Titusville Herald*, 5 May 1871.

³⁴ For Hatch, see Oil City Derrick, *Derrick's Handbook*, 962–969.

³⁵ David MacLachlan, *Arnould on the Law of Marine Insurance*, vol. 2 (London, 1866), 772.

³⁶ MacLachlan, 771; "Big Liner Pulled Off," *Titusville Herald*, 5 Feb. 1896.

Hatch sought to transplant this rule to the oil fields. His proposal rested on a straightforward analogy between maritime transport and oil logistics: Oilmen were merchants entrusting their cargo—crude oil—to a carrier; pipeline companies were the vessels delivering that cargo to refiners; and fires that broke out during storage were akin to perils encountered during a voyage. Measures taken to stop a fire's spread were comparable to those aimed at saving a vessel because they sought to prevent chain-reaction blazes between clustered tanks and thereby protect the entire body of stored oil. Any crude lost in the process, then, would constitute a deliberate sacrifice or extraordinary expense. Hatch suggested that determining ownership of the lost oil was unnecessary, especially because the crude was liquid and mixed altogether. Instead, all depositors should share the loss equally, in proportion to their holdings. Framing this idea as an alternative to costly commercial insurance, Hatch argued that general average would be “a perfect system of cooperative insurance absolutely without cost.”³⁷

Though appealing in theory, this idea proved difficult to implement. Early pipeline companies lacked the power and authority to enforce such a system. Since oil producers were already paying storage fees, they believed that any losses from fire should be borne by the pipeline companies. As a result, oilmen rejected Hatch's proposal outright. When Hatch first introduced the general average assessment in 1868, it sparked outrage among producers like “throwing oil on fire.” Many denounced the proposal as “robbery.” The producers immediately formed an ad hoc committee and collectively demanded that Hatch “withdraw the general assessment.”³⁸ There was little Hatch could do in response. His pipeline company was successful but small, and the transportation sector was fragmented with multiple pipeline firms and railroads competing against one another. Facing mounting resistance and coordinated boycotts from oil producers, Hatch was ultimately forced to abandon his plan.

A few years later, Hatch sold his business to Standard Oil and was appointed as one of the managers at United Pipe Lines. At the new company, he revived his failed scheme. This time, Hatch had something he had lacked before: monopsonistic power. Standard Oil was purchasing most crude produced in the oil fields. When oilmen delivered crude to Standard's pipeline facilities, the company measured the quantity and issued “certificates of deposit,” essentially acting like a “bank for their oil.”³⁹ Oil producers sold these certificates on the oil market to buyers, and Standard would deliver the oil accordingly. In issuing these certificates, Standard Oil imposed several conditions—deducting storage fees or accounting for evaporation losses. As the near-monopoly transporter, Standard had the power to dictate such contractual terms. Leveraging this position, Standard Oil was able to include a clause requiring consent to general average assessments. As early as October 1872, the company announced:

Notice is hereby given to patrons of the American Transfer Company [a precedent of the National Transit Company] that all losses sustained on oil on account of lightning, fire or other unavoidable causes, will be charged to parties holding oil in the custody of the company, whether said oil is to their

³⁷ Oil City Derrick, *Derrick's Handbook*, 968.

³⁸ Oil City Derrick, *Derrick's Handbook*, 967.

³⁹ Tarbell, *History of Standard Oil*, vol. 2, 27.



Figure 5. Fighting an oil fire. Standard employees fought fires with cannons and other equipment. (Source: *McClure's Magazine* [June 1903]: 205.)

credit on the books of the company or in certificate pro rata upon the principles of general average.⁴⁰

Two years after this announcement, lightning struck a newly built tank on the outskirts of Modoc, operated by Union Pipe Lines, causing \$34,000 in damages.⁴¹ The company announced the first general average assessment to “make good the fire loss by the recent burning.”⁴² Over the next two decades, Standard’s pipeline subsidiaries carried out more than 70 assessments, making it the new norm in the oil business. In recognition of his contribution, Hatch was praised as the “father of the general average assessment system.”⁴³

Then, how was a general average assessment executed? When a fire broke out at a pipeline facility owing to “unavoidable causes”—which included floods or sparks from passing trains, but mostly lightning—Standard Oil’s foremen at the scene would first declare a “general average situation” before initiating firefighting measures.⁴⁴ The top priority of the crew was to prevent the burning tank’s oil from overflowing. Various methods were used, such as firing a cannon at the lower part of the burning tank and using drainage channels to redirect the oil to a safe location, thereby avoiding overflow (Figure 5). To accomplish this, United Pipe Lines operated a “battery consisting of one small piece of artillery . . . as though it were the main support to an advancing army under a heavy fire from the enemy.”⁴⁵ Before firing the

⁴⁰ Charles A. Whiteshot, *The Oil-Well Driller: A History of the World’s Greatest Enterprise, the Oil Industry* (Mannington, WV, 1905), 148.

⁴¹ Oil City Derrick, *Derrick’s Handbook*, 225.

⁴² “Meeting at Parker’s Landing,” *Titusville Herald*, 26 Mar. 1874.

⁴³ Alfred Wilson Smiley, *A Few Scraps: Oily and Otherwise* (Oil City, PA, 1907), 162.

⁴⁴ Whiteshot, *The Oil-Well Driller: A History of the World’s Greatest Enterprise, the Oil Industry*, 148.

⁴⁵ *Bradford Era*, 30 Aug. 1880.

“first shot” toward the burning tank, pipeline managers announced the “start of General Average,” much like a ship captain declaring general average before jettisoning cargo in a violent storm.⁴⁶

After the fire was extinguished, pipeline companies proceeded to assess the damages. Typically, the companies announced the initial assessment on the day the fire was extinguished or the following day, and finalized it after minor adjustments. When lightning fires destroyed tanks, pipeline companies would notify their patrons through local newspapers with statements such as “Holders of oil will undoubtedly be notified to-morrow of a general average assessment to cover the loss.”⁴⁷

The calculation involved two elements: the numerator (total losses) and the denominator (the total assets). Calculating the numerator was relatively straightforward. It was simply adding the amount of oil stored in the tanks that burned to the damage to physical infrastructure. Occasionally, issues arose. When oil that had been drained into lowlands was later pumped back into the tanks, the amount recovered had to be deducted from the original loss.⁴⁸ Nonetheless, the calculation of the numerator was manageable in most cases, as it was based on specific entries recorded in the pipeline companies’ ledgers. What proved more complicated was calculating the denominator. Generally, the denominator was defined as the total volume of crude oil held by the pipeline company at the time of the fire. However, this calculation became difficult because different pipeline firms under the Standard system frequently transferred oil among themselves. If oil had been moved from United Pipe Line’s tanks to those of National Transit but the storage certificates had not yet been updated, how should the denominator be determined?

In one case around September 1884, Standard Oil transferred tens of millions of barrels from United Pipe Lines to National Transit Company, leaving only one million barrels in the former, without updating the certificates for several months. This raised alarms among oilmen, who saw that moment as one of heightened the risk of deduction in the case of a fire. It was suggested that “a loss of even a single tank from the United Pipe Lines’ stocks would create a very heavy general average assessment.”⁴⁹ It appears that Standard Oil did not follow a fixed principle in such cases but instead calculated assessments opportunistically, in the way it was advantageous at the time. If a fire broke out at the facility from which the large portion of the oil had been moved, the company could calculate the denominator on the basis of the remaining stock and demand general average contributions from all certificate holders.⁵⁰

At any rate, once the assessment was finalized, pipeline companies confirmed and publicly announced the deduction rate. This amount was then immediately deducted from the oil certificates held by oilmen and speculators in oil exchanges. The announced general average indicated what percentage would be subtracted from the certificates it had issued, ranging from as little as less than 1 barrel per 100 barrels, to more than 20% of total holdings. When the deduction rate was published, it was

⁴⁶ “Varieties,” *Titusville Herald*, 31 Aug. 1880.

⁴⁷ “Burning Oil,” *Oil City Derrick*, 30 June 1890.

⁴⁸ *Bradford Daily Era*, 22 June 1878.

⁴⁹ J. R. Campbell, “Notice,” *Pittsburgh Post Gazette*, 29 Apr. 1884.

⁵⁰ *Bradford Era*, 12 Dec. 1879.

understood that the value of Standard Oil's certificates circulating on the oil exchange had dropped accordingly.⁵¹

Although the general average assessment procedure in the oil fields appeared similar to that of maritime law, there were clear differences. Most notably, the scale was incomparable. At sea, the general average concerned a single vessel. In contrast, in the oil fields, it involved the vast storage facilities of one of the largest corporations in the country. The assessments in the oil fields thus applied to pipeline facilities storing hundreds of thousands to tens of millions of barrels. Instead of being a matter between several cargo owners and a shipowner, it became a matter between thousands of oil producers and a massive corporation entrusted with their oil.

Despite the expanded scale, the procedural standards became opaque and arbitrary. The most significant issue was that pipeline companies—functioning in the role equivalent to shipowners—were entirely exempt from payment liability. In maritime law, when calculating pro rata rates, not only the cargo owners but also the shipowners shared the burden. In most cases, the total contributory property—that is, the denominator in the assessment calculation—included “all that is ultimately saved out of the adventure,” which meant not just the cargo but also that “consisting of ship” was factored in.⁵² This principle assigned financial responsibility to the shipowner alongside the cargo owners. In fact, it was often the case that the residual value of the vessel exceeded that of the cargo, meaning the shipowner bore a greater portion of the cost. However, in the case of fires at pipeline facilities, all losses were transferred to the oil holders. Standard Oil explained, “the owners lose a percentage of their oil,” but pipeline companies should run at “no risk, as they act as the owner's agent.” “This is called ‘general average,’” they added.⁵³

Through this audacious justification, although the material damages to the pipeline companies were included in the joint loss as the numerator, the total residual value of their facilities was excluded from the denominator. This was an especially unfair arrangement considering the broader context of the oil industry. Unlike loading goods onto a ship, when oilmen entrusted their crude oil to Standard Oil's pipeline facilities, they were, in effect, relinquishing ownership to the company. Since most crude ultimately ended up at Standard Oil's refineries, the moment it was delivered to the pipeline facility, it was treated as company property, even though, contractually, ownership still nominally belonged to the producers. While maintaining *de facto* control, Standard Oil used this legal fiction of retained ownership to shift losses onto the producers.

Moreover, the method used to verify the scale of fire losses was far from fair. In maritime laws, the just assessment of general average had been debated for centuries. Many nations had accumulated empirical conventions on the issues—such as how to define a maritime peril, how to prove that a loss was a deliberate sacrifice, and how to calculate the scale of damage were hotly contested. Because shipowners often attempted to fraudulently claim compensation, these disputes usually took the form of sailors trying to convince insurers or cargo owners to accept their claims. To resolve this issue, merchants and insurers developed a procedure called “general

⁵¹ “Petroleum Markets,” *Titusville Herald*, 22 July 1878.

⁵² MacLachlan, *Arnould on the Law of Marine Insurance*, vol. 2, 799.

⁵³ Whiteshot, *The Oil-Well Driller: A History of the World's Greatest Enterprise, the Oil Industry*, 142.

average adjustment,” which involved the arbitration of “average adjusters” mutually appointed by all stakeholders.⁵⁴ In contrast, Standard Oil made no comparable effort. The company simply “announced” the rate.

This unfair system could persist primarily because the corporation internally carried out all procedures of the general average assessment. This contrasted with the original practice in maritime law. At seas, the process of general average involved participation and mediation by various financial institutions. These included the insurers of the cargo owners and shipowners, as well as the commodity exchanges at the ports where ships docked. These entities cross-checked the shipowner’s execution of general average, appointed adjusters during the loss assessment, and negotiated the cost-sharing ratios between shipowners and cargo owners. It was an open and transparent process. However, in the oil fields, Standard Oil—supposedly playing the role of the shipowner—carried out all procedures exclusively and unilaterally.

Occasionally, external financial institutions did get involved. After the implementation of general average, some oilmen, as cargo owners did, began to take out separate insurance against the risk of general average. Every summer, “[a]s the season [of lightning] is about to open,” the *Bradford Era* observed, “insurance men are on the lookout for general average, no doubt expecting quite a harvest.”⁵⁵ However, despite the expensive premiums, the insurers focused more on finding ways to avoid payouts than on offering actual protection.⁵⁶ Likewise, the oil exchanges at times served as a platform for voicing oilmen’s complaints, but with limited involvement. In a rare case in May 1878, the Oil City Exchange appointed a committee to “investigate” a tank fire at United Pipe Lines and tried to tackle the assessment.⁵⁷ But at nearly all times, the system remained under the complete control of Standard Oil.

Once the general average system was transplanted from sea to land, it lost the finely honed fairness developed over centuries of maritime law. Without meaningful oversight and external checks, Standard Oil was able to shift the risk of lightning fires onto oilmen. By introducing the general average assessment, the company framed it as if it were a kind of fire insurance for oil producers, which would “save” them from “all further trouble.”⁵⁸ In a similar vein, Standard Oil referred to the system as a “pro rata” assessment, invoking the principle of proportional responsibility.⁵⁹ Yet, the assessment functioned as insurance not for oilmen, but for Standard Oil itself. Instead of bearing the risks it had created, Standard Oil used general average to absolve itself. More than that, the scheme gave the company assurance to continue expanding its network of iron storage tanks without concern for the fire risks, which further raised its monopsonistic power. Journalist Ida Tarbell later commented, “There were often great losses by fire, but these were paid by the owners of the oil,” which made “every side the pipe-line business . . . guarded.”⁶⁰

⁵⁴ MacLachlan, *Arnould on the Law of Marine Insurance*, vol. 2, 752–757.

⁵⁵ *Bradford Era*, 19 Apr. 1882.

⁵⁶ *Grandin v. Rochester German Insurance Co.*, 107 Pa. 26 (1884).

⁵⁷ “General Average,” *Titusville Herald*, 17 May 1878.

⁵⁸ Oil City Derrick, *Derrick’s Handbook*, 968.

⁵⁹ Whiteshot, *The Oil-Well Driller: A History of the World’s Greatest Enterprise, the Oil Industry*, 148.

⁶⁰ Tarbell, *History of Standard Oil*, vol. 2, 26.

A Spark to Anti-monopoly

The financialization of lightning fires in the oil fields resulted in a corporate-led, shoddy, quasi-insurance mechanism—a way for a monopoly to offload environmental risks onto others. In response, oilmen voiced fierce discontent. They had already paid for oil storage—\$152 per 1,000 barrels annually in storage fees—plus a shrinkage charge of 3% to cover evaporation and leakage.⁶¹ With such high charges, it seemed fair that Standard Oil should bear the cost of fire losses—or at least share them with oilmen, as in maritime law. But because Standard Oil controlled the flow of oil, oilmen were unable to refuse the scheme. Without using the company's pipelines, it was extremely difficult to do an oil business. Producers had no choice but to accept the contract terms. Discussing the “general average subject” in 1878, one oilman remarked sarcastically, “if the company [Standard Oil] choose so to do in the language of the defunct boss, ‘what are you going to do about it?’”⁶² Yet, on the other side of the coin, the unfairness of the general average system became deeply etched into thousands of oilmen.

Standard Oil's financial scheme was bound up with the dramatic incidence of lightning strikes. Local oilmen used the terms “lightning fire” and “general average” almost interchangeably. As local newspapers observed, the “summer season” of “lightning” had effectively become the “season for ‘general average.’”⁶³ Whenever a “severe thunderstorm” approached, oilmen spoke not only of lightning forecasts but also of “expectations of a general average” or, if a lightning fire occurred, they would say that “general average is reported.”⁶⁴ In the summer of 1878, the *Oil City Derrick* employed a pun to depict general average as a military general, writing, “The thunderstorm last night was the most violent of the season, and it really looked as if General Average proposed to inaugurate the regular campaign with an unusually brilliant display of celestial pyrotechnics.”⁶⁵ As these expressions show, oilmen regarded general average as being inscribed in the shifting air.

Since general average assessments became virtually synonymous with lightning, they took on a pronounced seasonality in oilmen's minds (Figure 6). Every summer, producers “scanned the heavens with anxious glances, expecting to see each forked bolt followed by a fire,” with the “fear of a general average.”⁶⁶ In May or June, local newspapers were already noting the approaching storm season and voicing concerns about general average. In the weeks that followed, as newspapers reported in detail on lightning fires and the ensuing assessments, oilmen came to view the practice as an increasingly intolerable burden. As one paper put it, “A summer season has never come round in the Oil Country but what the bugbear of general average has been uppermost in the mind of the oil men.”⁶⁷ In this way, general average became an anxious summer ritual.

⁶¹ Tarbell, 27.

⁶² “Petroleum Markets,” *Bradford Daily Era*, 17 May 1878.

⁶³ “On General Average,” *Titusville Herald*, 28 May 1881; “Tanks and Lightning,” *Bradford Era*, 24 May 1881.

⁶⁴ “Old General Average,” *Bradford Era*, 6 June 1883.

⁶⁵ *Oil City Derrick*, 21 May 1878.

⁶⁶ *Bradford Era*, 20 July 1880.

⁶⁷ “Petroleum Markets,” *Titusville Herald*, 11 May 1881.

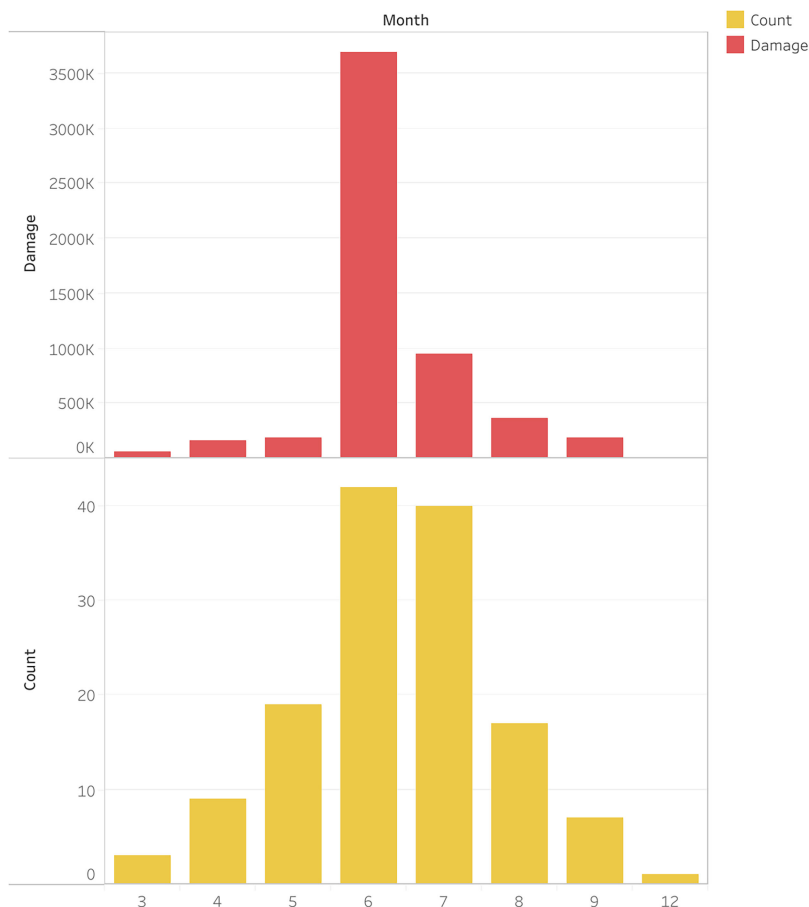


Figure 6. The seasonality of lightning fires. The graph below shows counts of lightning fires in the Pennsylvanian oil fields by month. The graph above shows the damage by month. (Source: *Oil City Derrick*.)

The seasonality also appeared in the oil market. Because general average assessments could instantly depreciate the value of oil certificates, they often threw the oil exchange into turmoil. When a thunderstorm approached the Oil Regions, certificate holders braced themselves, prepared to dump their certificates. Oilman John W. Haworth observed: “[a]s the holders of the certificates were required to pay ... fire loss assessments made by the pipe-lines according to the system of general average,” oilmen disposed of their “certificates for the purpose of avoiding the charges and assessments.”⁶⁸ This “fear of general average” typically “acted as a bear” in the market.⁶⁹ As one market report observed, “When the traders saw the clouds indicating a thunderstorm, the Exchange was almost deserted ... to make

⁶⁸ “Petroleum Market,” *Bradford Era*, 13 May 1880.

⁶⁹ “Petroleum Markets,” *Titusville Herald*, 11 May 1881.

deliveries in case of ‘general average.’”⁷⁰ During the season of general average, oilmen felt compelled to sell their oil below its original value.

Besides seasonality, the resulting fires also gave the general average scheme distinct material connotations. Fires that broke out in Standard Oil’s pipeline facilities often did not remain confined within the company’s property. In June 1880, a lightning strike on a 25,000-barrel tank at Standard’s facilities near Titusville ignited a fire. The blaze then overflowed its containment, spreading the flames to countless nearby tanks, and the enormous quantity of burning oil flowed downriver, devastating the town of Titusville. Roughly \$1,000,000 worth of crude oil was consumed in the fire, and the town sustained an additional \$1,000,000 in property damages. Amid this “reign of terror,” even before the fire was fully extinguished, the pipeline company announced that its losses, estimated at \$750,000–900,000, “will be made up by a general average assessment.”⁷¹ Disasters such as this, followed by the pipeline companies’ ruthless imposition, continued to inflame oilmen. As the *Titusville Herald* wrote, “The grave question of the justice of ‘a general average,’ continues from day to day, as long as a fire may continue.”⁷²

In this way, thousands of oilmen experienced general average year after year, and shared their grievances with one another. Whenever news of an approaching thunderstorm spread, oilmen gathered around pipeline facilities—not only because the following fires, as in other American towns, provided a kind of grim spectacle but also because they feared potential overflows that could destroy their offices and houses. In 1882, when a blaze broke out at the United Pipe Lines’s tanks in Olean, hundreds of oilmen stood across the river, watching anxiously as the flames rose. They looked on with concern as Standard employees struggled to contain the fire. With the “long stand in the dump moist ground,” the oilmen “remained all night” at the riverbank. Fortunately, though it consumed several tanks, the fire was put out before it could spread further. But almost immediately, another worry emerged: the looming general average assessment. When one “urchin” remarked, “I wouldn’t like to have to make up the general average to-morrow [sic],” another quickly added, “Nor I wouldn’t like to have to stand by it, either.” This shared sense of helplessness was sometimes refracted into humor. Sarcastic remarks such as “Now this is what I call getting rid of surplus stock in first-class style,” “Standard fire works,” and “the producers’ treat” mocked Standard Oil’s handling of fire risk and its unilateral shifting of liability. That night, as one local newspaper reported, “a hundred other such observations” echoed along the riverbank.⁷³ While there were little the oilmen could do besides voicing their outrage, the experiences of witnessing numerous fires every summer altogether forged a sense of connectedness.

This collective anxiety evolved into an anti-monopoly sentiment. Oilmen viewed general average as a system through which Standard Oil offloaded risks, which it had created and failed to manage. They understood that the increasing danger of lightning fires derived from Standard’s introduction of large-scale storage facilities located in open plains. The “extensive system of iron tankage,” S. J. Fisher wrote in 1881,

⁷⁰ “Petroleum Markets,” *Titusville Herald*, 22 July 1878; “Petroleum Market,” *Bradford Era*, 13 May 1880.

⁷¹ “Notice,” *Pittsburgh Post*, 12 June 1880.

⁷² “General Average,” *Titusville Herald*, 16 Aug. 1879.

⁷³ “Reducing the Stocks,” *Titusville Herald*, 14 Feb. 1882.

“naturally directed” lightning and created “the season for ‘general average.’” No improvement had been made, Fisher continued, regarding “any suggestions as to the construction of any appliance or the application of any principle by which the desired end may be reached” to protect “oil tanks from lightning.”⁷⁴ Despite this original sin, Standard Oil continued to transfer the burden of risk, even while charging high storage fees and other charges. Accordingly, oilmen came to view lightning fires not as unavoidable disasters but as an injustice imposed by monopoly power.

This awareness gave rise to collective action. As early as 1874, when a lightning strike damaged several oil tanks—triggering one of the earliest general average assessments—80 oilmen gathered in Parker’s Landing “for the purpose of considering the question of general average.” The meeting discussed “the legality of the right of the pipe lines to make general average assessments to cover fire losses.” The oilmen immediately formed a committee, resolving that “the assessment was unjust and would not stand before a court of law.”⁷⁵ Although this effort ultimately failed, the grievances surrounding the system fed into stronger resentment. One oilman proclaimed:

... the company is violating its duty to the public as a common carrier in making the [general average] assessment ... the transportation is fast growing into a monopoly that is to be feared, and producers should resist every encroachment on their rights.⁷⁶

Refueled every summer, oilmen’s grievances over general average persisted, becoming an enduring source of bottom-up political energy whenever issues arose concerning Standard Oil’s monopoly. Around 1878, when Standard Oil consolidated roughly 90% of the refining industry in the country, oilmen grew increasingly fearful that the company, now the sole buyer of crude, would begin to drive prices down. In response, local leaders, such as Benj Campbell and Roger Sherman, organized the Petroleum Producers’ Union and began to draft plans for organized resistance. These included constructing independent long-distance pipelines and refining facilities to counter Standard Oil. But plans alone were not enough. The leaders needed both the financial and grassroots supports, and that meant persuading the broader oil-producing public.

A few months after the first meeting of the Union, in May 1878, the leaders seized their opportunity. A fire broke out at a United Pipe Lines facility, and when the company issued a general average assessment, oilmen in Oil City held a meeting to appoint an investigation committee to again interrogate the “legality of assessing general average” and the potential “negligence of the company.”⁷⁷ Finding their political representatives, oilmen began approaching the Union leaders, asking them to speak for their interests and resolve the matter. Local oilmen insisted that the Union should act as their representative body and publicly “exclaim” the injustice of Standard Oil’s “general average proclamation.” “Why in Halifax don’t the Council move,” they

⁷⁴ “Tanks and Lightning,” *Bradford Era*, 24 May 1881.

⁷⁵ “Meeting at Parker’s Landing,” *Titusville Herald*, 26 Mar. 1874.

⁷⁶ Oil City Derrick, *Derrick’s Handbook*, 225.

⁷⁷ “General Average,” *Titusville Herald*, 17 May 1878.

urged.⁷⁸ In the following months, responding to these grassroots demands, the Union actively worked to recruit oilmen into its ranks.

The Union's leaders used the example of general average to help oilmen more broadly recognize the harms caused by Standard Oil's monopoly. In August of that year, R. B. Brown, one of the Union's founding members, contributed an anti-monopoly proclamation to a local newspaper. In this piece, Brown began by arguing that the root cause of the "general average" was the "bursting of defective tanks" built by Standard Oil. He asserted that "this monopoly now acts as though oil producers have no rights enlisted to respect." Starting with this issue, Brown further pointed to other harms caused by the pipeline monopoly and emphasized the need to construct an independent pipeline system, the Union's primary goal.⁷⁹ Later that August, the Union held a series of mass meetings to sign up local oilmen as members and rally support for investment in an independent pipeline.⁸⁰ These efforts succeeded in drawing the participation of approximately 2,000 oilmen.⁸¹

Ultimately, this "uprising of 1878" bore fruit when the Tidewater Pipe Line Company, an independent firm, successfully completed the construction of a long-distance pipeline extending all the way to the East Coast. By refusing to adopt general average assessments, the company distinguished itself from Standard Oil as a public carrier. Tidewater allocated \$800,000 for "insurance in their own custody," meaning that, in the event of a fire, losses would not be distributed to oilmen but borne entirely by itself. As the company stated, "This is done for the purpose of preventing assessments for general average in case of fire. No such average will be made by this line."⁸² Oil producers hailed this new pipeline, saying that "producers were no longer at the mercy of a heartless monopoly."⁸³ However, Tidewater's operations were soon disrupted and absorbed under pressure from Standard Oil's obstruction.⁸⁴

After the failure of the 1878 movement, oilmen were discouraged, and collective actions largely died down. Nonetheless, lightning continued to strike back, and grassroots discontent toward general average did not diminish. In 1888, one oilman testified before a House Committee, identifying general average as a prime example of Standard Oil's discriminatory practices. Since the losses from fire were "paid by an assessment plan," he argued, independent producers were unable to "do business and successfully compete with them."⁸⁵ Another man claimed that general average was "a very nice scheme of Standard Oil's . . . [which] must put millions into the pockets of the great monopoly . . . instead of carrying the oil at their own risk and expense."⁸⁶ Amid these grievances, in the late 1880s, oilmen collectively drafted the Billingsley Bill, which intended to regulate, among other monopolistic practices, "deductions for losses caused to petroleum in pipelines and storage tanks by lightning, fire, storm, or

⁷⁸ "Yesterday's Meeting," *Bradford Daily Era*, 22 Aug. 1878.

⁷⁹ "The United Pipe Lines and Immediate Shipment Oil," *Oil City Derrick*, 3 Aug. 1878.

⁸⁰ "Yesterday's Meeting," *Bradford Daily Era*, 22 Aug. 1878.

⁸¹ Ida Tarbell, *The History of Standard Oil Company*, vol. 1 (New York, 1904), 257.

⁸² *Titusville Herald*, 12 July 1950.

⁸³ "Question of the Hour," *Bradford Daily Era*, 22 July 1879.

⁸⁴ Tarbell, *History of Standard Oil*, vol. 1, 241–262.

⁸⁵ United States Congress. *The Standard Oil Trust. Committee on Manufactures, House of Representatives, Testimony of Witnesses* (Washington, D.C., 1888), 88.

⁸⁶ "A Standard Scheme," *Pittsburgh Dispatch*, 29 July 1890.

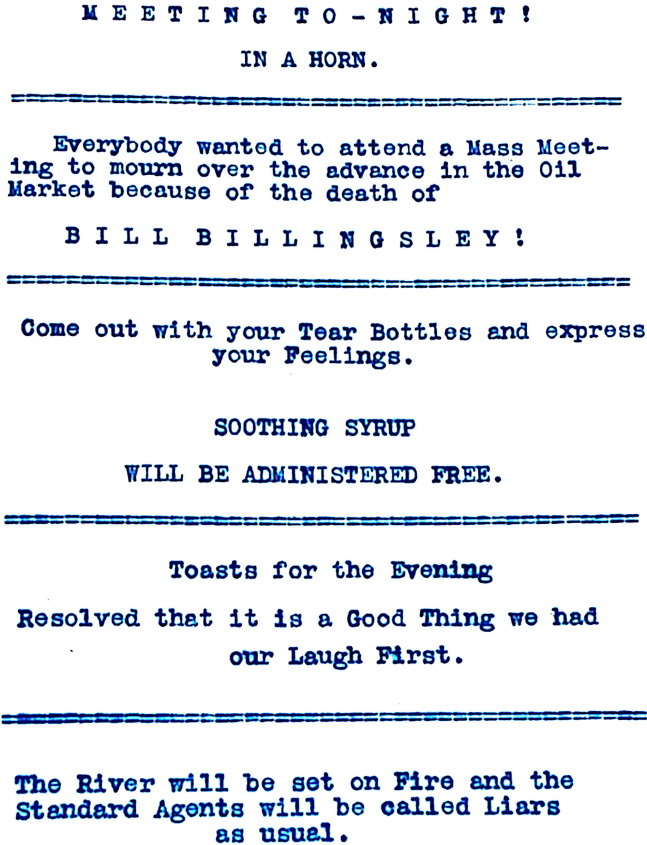


Figure 7. Meeting to-night! A pamphlet convening oilmen after the defeat of the Billingsley Bill. (Source: Box 14, Ida Tarbell Collection, Drake Well Museum, Titusville, PA.)

other unavoidable causes.” This bill also required that pipeline companies “shall be liable for all losses caused by lightning, fire, storm, or other unavoidable causes to the petroleum received, transported, or stored by them,” placing the burden of such losses squarely on the carriers themselves.⁸⁷ For the passage of the bill, oilmen held mass meetings nightly across the region, inundated the Legislature with petitions, and maintained a large delegation in Harrisburg. Although the bill passed in the House, however, it was ultimately rejected in the Senate in 1887.⁸⁸

Nevertheless, in the Oil Regions, the Billingsley Bill fight reignited anti-monopoly fervor, which had been dormant since the Compromise of 1880. Just two weeks after its defeat, oilmen reunited to establish the Producers’ Protective Association, gathering all those who remained opposed to Standard Oil (Figure 7).⁸⁹ With the

⁸⁷ “The Billingsley Bill,” Legislature of Pennsylvania, Files of the House of Representatives, no. 104, 1887.

⁸⁸ “A Victory for Monopoly,” *New York Times*, 27 Apr. 1887.

⁸⁹ “Meeting To-night!,” box 14, Ida Tarbell Collection, Drake Well Museum, Titusville, Pennsylvania.

involvement of 1,000 independent oilmen, the Association raised \$600,000. These funds enabled the construction of another seaboard pipeline system, connecting oil operations in the Oil Regions directly to the Atlantic coast. With this independent infrastructure, the Pure Oil Company was established in 1895, becoming the most formidable domestic competitor to Standard Oil at the turn of the century.⁹⁰

Conclusion

In the early twentieth century, the political significance of general average assessments waned. In newly opened oil fields in Ohio, Texas, and California, Standard Oil adopted a different approach: Rather than purchasing crude from independent producers, it began drilling for oil itself. With no oilmen to pass lightning-fire losses onto, the company had to absorb those costs by itself. Even in Pennsylvania, the use of general average began to disappear. As the Pure Oil Company entered the market and competition intensified, Standard Oil refrained from invoking the practice.

Nevertheless, this shift did not undo the political momentum already set in motion. In the late nineteenth century, oilmen's persistent antagonism against Standard Oil provided political energy for the broader anti-monopoly movements. As Ida Tarbell observed, "Their [anti-monopoly reformers'] power, their means, were derived from this body"—a body of oilmen who "had stood behind them."⁹¹ Local oilmen, of course, had multiple reasons to oppose Standard Oil—freight-rate discrimination, price capping, and more—but many of these claims were technically hard to prove or plausibly attributable to other causes.⁹² By contrast, the general average scheme inflicted explicit, recurrent, and material damages on thousands of oilmen at once. That visibility helps explain why, aside from the 1872 uprising (when the scheme had not yet been adopted), most major anti-Standard grassroots rallies in the Oil Region—especially in 1874, 1878, and 1887—were directly or indirectly related to anger at general average.

In other words, oilmen's grievances ultimately struck back against Standard Oil. The general average system furnished the material contexts and moral vocabulary through which oilmen came to understand monopoly power. These experiences did not merely fuel episodic protest; they produced a durable perception of Standard Oil as willing to externalize risk and responsibility onto small business actors—a perception that anti-monopoly critics readily mobilized. In this light, the history of general average and lightning fires shows how the financialization of environmental risk could be translated into political action and ethical judgment against corporate power, which eventually led to the dissolution of the company in 1911.

This case might seem unique. Most business actors do not have to rush to the riverbank several times every summer to watch fires or issue evacuation orders to their families and employees. Mostly, their lives unfold within office walls. But the climate crisis is changing this assumption. Increasingly, business locations are exposed to miscellaneous environmental threats driven by climate change, much like

⁹⁰ Tarbell, *History of Standard Oil*, vol. 2, 56–91.

⁹¹ Tarbell, *History of Standard Oil*, vol. 1, 257.

⁹² "Questions of the Hour," *Bradford Daily Era*, 22 July 1879.

the erratic lightning strikes faced by oilmen. Following the 2025 Los Angeles wildfires, the Los Angeles County Economic Development Corporation estimated that lost economic output within the fire perimeters would result in \$4.6–8.9 billion over a five-year period.⁹³ While these numbers are staggering, local businesspeople will likely remember the month-long fire not just as a pecuniary loss. The flame cannot opt out, and experiences such as this seem poised to become much more frequent in our time.

This fundamental shift suggests that we should examine the impact of environmental threats on business from a broader perspective. Business actors—especially those operating small enterprises—can no longer expect to experience such risks as something confined beyond their office walls. As Standard Oil once did, large corporations—bearing greater responsibility for the climate change—may deploy financial instruments to mitigate risk and protect profits, thereby shifting burdens onto small businesses. The case of lightning fires in the Pennsylvania oil fields in the late nineteenth century, then, offers an instructive example for thinking about how emerging environmental conditions might reshape the business future.

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⁹³ Los Angeles County Economic Development Corporation, *Economic Impact of the 2025 Los Angeles Wildfires* (Los Angeles, 2025), <https://laedc.org/wp-content/uploads/2025/02/LAEDC-2025-LA-Wildfires-Study.pdf>.

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