

# Private Equity's Chemical Catastrophe in Texas

*Port Neches explosion highlights risks of Wall Street chemical plant ownership*

December 2019

## Roots of a private equity-owned chemical plant disaster

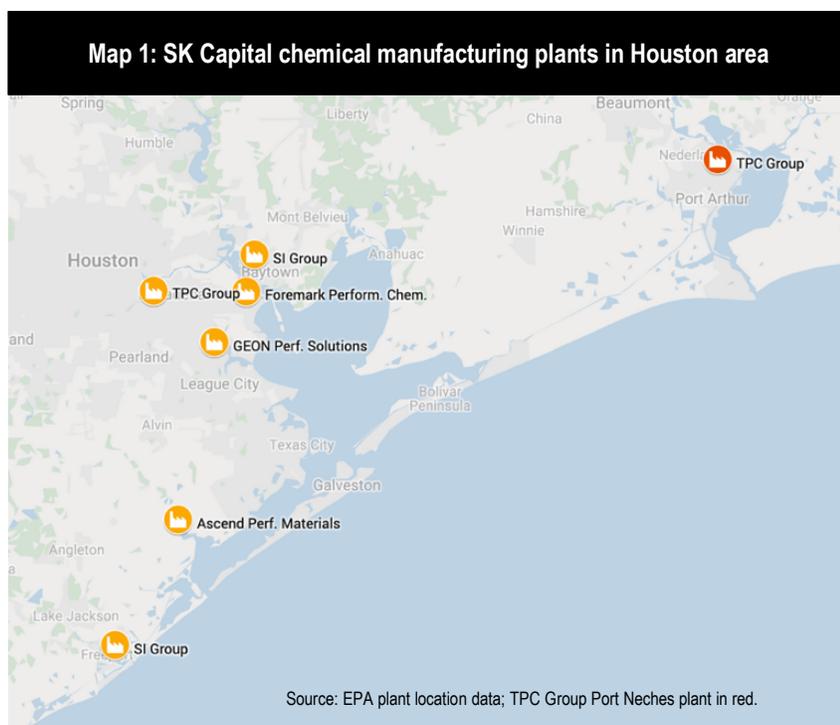
The day before Thanksgiving, a chemical plant operated by the TPC Group exploded in Port Neches, Texas spewing contaminants, forcing over 50,000 people to evacuate, and leaving the community with the lingering aftereffects of an industrial disaster. The TPC Group is owned by two private equity (PE) firms, SK Capital Partners (SK) and First Reserve.<sup>1</sup> SK Capital specializes in investing in chemical and petrochemical manufacturing firms (and a smaller subset of pharmaceutical companies).<sup>2</sup> First Reserve primarily invests in energy companies, especially fossil fuel assets including oil and gas extraction, coal mines, pipelines, power plants, and other petrochemical processing operations.

Many SK Capital chemical plants including the TPC plants in Texas that rely on hydrocarbons like ethane, butane, propylene and other natural gas liquids benefit from the abundant and cheap natural gas driven by the U.S. fracking boom. These industrial chemical and petrochemical manufacturing plants are symbiotically linked to the U.S. fracking industry that delivers natural gas liquids for processing and further manufacturing.<sup>3</sup> First Reserve's oil and gas assets process natural gas into hydrocarbon components, like Blue Racer Midstream that processes fracked natural gas from the Utica and Marcellus shale plays in the Northeast for delivery to the petrochemical processing industry.<sup>4</sup>

In 2019, SK Capital had \$4.6 billion assets under management, including 86 plants in 25 countries with 10,000 employees that generated \$9 billion in annual revenues.<sup>5</sup> It owns 8 chemical manufacturing plants in Texas, including 7 in the Houston and Beaumont Gulf Coast region (including the TPC Group plants in Port Neches and Houston) (see Map 1) as well as another plant 35-miles east of College Station. These 8 Texas factories represent one fourth of SK's U.S. chemical manufacturing plants. Much of the discussion of the Port Neches explosion has failed to note the ultimate ownership of the plant or the other plants controlled by the same firm.

The private equity owned chemical plants in Texas held by SK Capital have a long record of environmental violations — not just the TPC Group factories but other SK Capital portfolio firms. According to EPA data, the SK Capital-owned chemical plants in the Houston area have increased greenhouse gas emissions by nearly 20 percent over the past 5 years to 1.58 million metric tonnes of carbon dioxide — about the same as burning 1.7 billion pounds of coal (see Figure 1).<sup>6</sup>

The pollution from these plants disproportionately burdens communities of color and lower-income areas. This private equity toxic footprint matches the longstanding environmental injustice of chemical and petrochemical plants being located in these areas, especially along the Gulf Coast. At least 225,000 people live within 3 miles of the SK-owned plants in the



petrochemical facilities that could pose potentially deadly risks to nearby communities. The private equity industry purchases target companies with funding from institutional investors (like pensions, endowments, wealthy families, and others) as well as large amounts of debt. Typically, private equity firms aim to generate 20 percent returns or more. Often times, the profit extraction can come through severe cost cutting, including staff reductions and deferred maintenance and upkeep.<sup>8</sup>

The private equity industry currently owns or has stakes in approximately 175 chemical

Houston area: 70 percent of the population is Latinx or Black and nearly half (49 percent) lives below the poverty line (see page 8).<sup>7</sup>

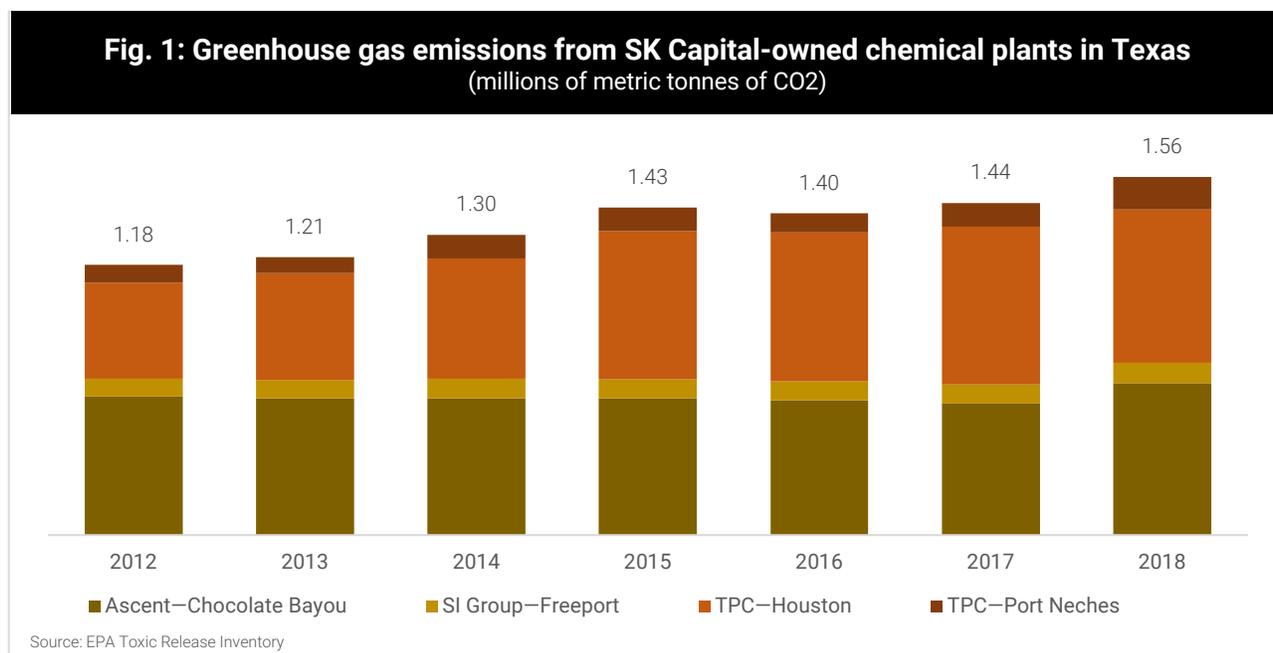
The SK-owned Texas chemical plants have paid about \$1.9 million to settle U.S. Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) violations over the past five years. The EPA has found that 6 of the 7 Houston area SK Capital-owned chemical plants were in repeated violations of either the Clean Air Act, Clean Water Act, Safe Drinking Water Act or the hazardous waste Resource Conservation and Recovery Act (see Table 2 at page 7).

### **Distorted incentives for PE may pose unique risks for chemical plants**

The private equity industry's distorted financial incentives encourage using financial engineering and excessive risk-taking that could be a recipe for disaster at chemical and

and petrochemical companies across the United States, according to Pitchbook data.<sup>9</sup> The TPC Group Port Neches explosion was the second private equity-owned petrochemical plant disaster in the past six months. In June 2019, the Carlyle Group-owned Philadelphia Energy Solutions refinery exploded in South Philadelphia injuring 5 workers.<sup>10</sup>

Because the private equity owner is largely shielded from downside risks of bankruptcy or environmental disaster, it can effectively transfer value from the target firm to the private equity owner, even at the cost of the long-term productivity or sustainability of the target firm. Private equity takeovers rely on leveraged buyouts that load target firms with debt that diminishes their resiliency and capacity to respond to market shifts, and can drive them into bankruptcy. And, the PE firms often extract substantial value from target firms through excessive fees, dividends, and other tactics.



The SK Capital purchases were often backed with large amounts of debt. The SK Capital-First Reserve 2012 takeover of the TPC Group was backed by \$655 million in debt – about 60 percent of the \$1.1 billion total purchase costs.<sup>11</sup> SK Capital's 2015 add-on purchase of BASF's textile chemical business into its Archroma portfolio firm was financed with a \$515 million loan that also repaid some of the debt that financed the Archroma takeover.<sup>12</sup> Other deals also were backed by loans, including the takeover of the specialty chemical manufacturer Tri-Tex, chemical intermediate firm SI Group, and the polyvinyl chloride subsidiary of PolyOne.<sup>13</sup>

SK Capital has also extracted debt-financed dividends from its portfolio companies. In 2016, its target textile chemical manufacturer Archroma borrowed \$200 million to fund a dividend payment to SK Capital.<sup>14</sup> It ultimately had to abandon an effort to pay itself a \$922 million dividend from Ascend Performance Materials, a company it acquired with only a \$50 million equity stake.<sup>15</sup> The high levels of debt and the extraction of additional value may discourage the chemical companies from investing in

safety and maintenance as revenues are directed to service high debt loads.

### ***The private equity-driven bankruptcy of Philadelphia Energy Solutions and subsequent disaster***

The private equity takeover of the Philadelphia petrochemical refinery presents a cautionary tale. In 2012, private equity firm the Carlyle Group took a two-thirds stake in partnership with Sunoco (and a \$25 million taxpayer investment) in a leveraged buyout to take over Philadelphia Energy Solutions (PES), a refinery that could process over 330,000 barrels of oil per day.<sup>16</sup> Carlyle and Sunoco's parent company, Energy Transfer Partners, took \$146 million in debt-funded dividends and payments from PES in 2013, adding to the refinery's debts.<sup>17</sup> In early 2018, PES went into bankruptcy as revenues failed to cover costs, including its \$600 million debt burden.<sup>18</sup> A major factor in the bankruptcy were the debt-financed payments from the refinery to Carlyle just as profits began evaporating with the oil price slump, including \$120 million in annual payments to the railyard terminal also owned by Carlyle.<sup>19</sup>



(The 2018 bankruptcy pushed Carlyle’s stake in PES to less than 20 percent.<sup>20</sup>)

In June 2019, a propane tank fire at the PES refinery rapidly spread and caused 3 explosions that injured 5 workers.<sup>21</sup> The PES complex is the oldest East Coast refinery and had a history of environmental violations, including nearly \$650,000 in environmental penalties over the past 5 years and “high-priority” violations in 75 percent of the quarterly Clean Air Act assessments over the past 3 years.<sup>22</sup> The U.S. Chemical Safety Board preliminary investigation found that a section of piping installed in 1973 failed, which led to the explosion that released 5,200 pounds of the deadly chemical hydrofluoric acid; the Chemical Safety Board recommended that all refineries inspect similar pipes for corrosion that could cause accidents after a 2012 explosion at a refinery in California, the year Carlyle bought PES.<sup>23</sup> By July, PES had filed bankruptcy again after the fire shuttered the plant and forced more than 1,000 workers out of their jobs.<sup>24</sup>

Private equity firms that own portfolio companies are typically not held responsible for the misdeeds or liabilities of the target company, meaning that SK Capital or First Reserve are unlikely to be held accountable for the Port Neches disaster.<sup>25</sup> Current law permits and even encourages private equity firms to be structured in such a way that the general partners — the key individuals controlling the fund and holding decision making power over portfolio firms owned by the private equity fund — are rewarded for maximizing immediate returns to themselves, and shielded from liability, accountability, and transparency for the decisions they make. This means that it is likely that the TPC Group will be solely responsible for any environmental penalties even though the firm is owned and directed by the private equity firms. For example, SK Capital’s managing director Jack Norris is on the board of directors of the TPC Group (as well as several other SK Capital-owned chemical companies with facilities in Texas like the SI Group, Ascend Performance Materials, Foremark Performance Chemicals, and GEON).<sup>26</sup>

## **The TPC Group's Port Neches Thanksgiving disaster**

After midnight on the Wednesday before Thanksgiving, an explosion rocked the SK Capital-owned TPC Group's Port Neches petrochemical manufacturing plant; that afternoon a second blast launched a fireball and plumes of smoke.<sup>27</sup> The explosions ignited 3 chemical tanks, injured 3 workers, spewed columns of smoke, and cut off power, preventing the company from monitoring the chemical volumes and burn rates.<sup>28</sup>

The Port Neches plant was built during the 1940s and sits within a residential community, with some houses within half a block of the facility fence line.<sup>29</sup> The detonation blew out doors and windows in nearby houses and caused extensive damage to the nearby community. Five local residents were injured by broken glass.<sup>30</sup>

The second blast caused Jefferson County, Texas, to impose a mandatory evacuation order for everyone within four miles of the plant — over 50,000 residents, including the cities of Port Neches, Groves, Nederald and part of Port Arthur — because officials were worried other chemical storage tanks could explode.<sup>31</sup> The mandatory evacuation was lifted for most areas by November 28, but the voluntary evacuation lasted until December 5 because of concerns about air quality and butadiene.<sup>32</sup>

The local government and the company allowed the fire to continue to burn to reduce the pressure in the chemical storage system.<sup>33</sup> The Port Neches facility had been ablaze for a week when the majority of the fire was finally extinguished on December 3.<sup>34</sup> Ultimately, 12 chemical storage tanks were damaged by the fire.<sup>35</sup> On December 6, TPC admitted that small fires continued to burn inside the facility.<sup>36</sup> There were still small fires burning in the plant on December 13 nearly two and a

half weeks after the initial explosion, which authorities said continued to be “contained and have not increased in intensity.”<sup>37</sup>

### **Port Neches environmental fallout**

The explosion released butadiene as well as volatile organic compounds (VOCs).<sup>38</sup> Butadiene is a known human carcinogen and can affect the nervous system and irritate eyes, nose and throat.<sup>39</sup> The authorities initially downplayed the risks. The day after the explosion, the Texas Commission on Environmental Quality (TCEQ) reported that the butadiene levels 4 miles from the plant were “well below concentrations of health concern or odorous levels.”<sup>40</sup> The TCEQ also reported that it only found trace amounts of VOCs at two locations, the U.S. EPA did not detect VOC levels above the action levels of 5 parts per million and the County Sheriff said the explosions did not pose long-term air quality risks.<sup>41</sup>

But even the TPC chemical safety director initially admitted the day of the explosion that the smoke could cause irritated breathing and noted that “you don't want to be downwind from this.”<sup>42</sup> And evidence mounted that the disaster did release dangerous chemicals. The EPA reported butadiene levels above 17 parts per million inside the plant within a day of the explosion and over 12 parts per million in the community outside the fence line — well above the 0.5 parts per million action level.<sup>43</sup> A week after the accident, the local emergency officials said that while the butadiene leak from the accident would not cause irreversible damage, even smaller leaks could cause headaches, eye and throat irritation, and nose bleeds.<sup>44</sup>

The accident posed additional environmental risks. The explosion launched pieces of TPC equipment beyond the facility's fence line and some of the debris included asbestos insulation which residents were urged not to touch.<sup>45</sup>

Jefferson County told the community that that one of the containers that exploded contained asbestos that may have contaminated the area, according to the *Houston Chronicle*, and that residents should report white, chalky residues to local authorities.<sup>46</sup> The TPC Group-financed environmental testing reported no significant concentrations of airborne asbestos.<sup>48</sup>

**Private equity flatfooted response fails to reassure local community**

The TPC Group could not identify the cause of the explosions or how badly the plant was damaged in the days after the explosion.<sup>49</sup> In early December, the independent Chemical Safety Board agency reported that vaporized butadiene likely ignited the blast that released even more butadiene as well as asbestos due to a “fundamental failure of the system.”<sup>50</sup>

Residents remained skeptical and confused about the impacts of the chemical accident and were eager for an independent assessment of the potential health and environmental effects — not from the company or state environmental regulators that had long turned a blind eye to problems at the plant.<sup>51</sup> A week after the fire started, TPC had not released a full inventory of the chemicals stored at the Port Neches site.<sup>52</sup> The government and company assurances followed by acknowledgement of the potential risks of the explosion from butadiene releases and asbestos debris sowed distrust.<sup>53</sup>

The latest disaster response may not improve public confidence. The second week of December, the TPC Group began using the chemical DEHA (diethylhydroxylamine) to stabilize the butadiene before transport and assured

the public that “no off-site impacts or public health concerns are anticipated as part of the DEHA process.”<sup>54</sup> The TPC Group did not acknowledge that DEHA poses some human health risks, is acutely environmentally toxic, and is highly flammable, although it is being used on a site with ongoing small fires.<sup>55</sup>

**SK Capital’s chemical manufacturing empire focused on Texas**

SK Capital owns over 30 chemical plants in the United States and nearly 60 more plants worldwide (see Table 1). It owns 8 chemical manufacturing plants in Texas, including 7 in the Houston and Beaumont Gulf Coast region (including the Port Neches plant) and one

**Table 1: Location of SK Capital-owned chemical manufacturing plants<sup>47</sup>**

| State          | Plants | Chemical company (location)  |
|----------------|--------|--|
| Alabama        | 3      | Ascend Performance Materials (Decatur, Foley)<br>SI Group (Bay Minette)  |
| California     | 3      | GEON Performance Materials (Long Beach)<br>Perimeter Solutions (Rancho Cucamonga)<br>Tri-Tex (Commerce)  |
| Florida        | 1      | Ascend Performance Materials (Pensacola)   |
| Idaho          | 3      | Perimeter Solutions (Moreland, Pocatello, Post Falls)  |
| Illinois       | 1      | Perimeter Solutions (Sauget)   |
| Indiana        | 1      | GEON Performance Materials (Terre Haute)   |
| Kentucky       | 1      | GEON Performance Materials (Louisville)  |
| New York       | 2      | SI Group (Rotterdam Junction, Schenectady)   |
| North Carolina | 2      | Archroma (Charlotte)<br>Tri-Tex (Charlotte)  |
| Ohio           | 1      | GEON Performance Materials (Avon Lake)   |
| South Carolina | 2      | Ascend Performance Materials (Greenwood)<br>SI Group (Orangeburg)  |
| Tennessee      | 3      | GEON Performance Materials (Clinton, Dyersburg)<br>SI Group (Newport)  |
| Texas          | 8      | TPC Group (Houston, Port Neches)<br>Ascend Performance Materials (Alvin/Chocolate Bayou)<br>GEON Performance Materials (Pasadena, Seabrook)<br>Foremark Performance Chemicals (La Porte)<br>SI Group (Baytown, Freeport) |
| West Virginia  | 1      | SI Group (Morgantown)  |
| Wisconsin      | 1      | Perimeter Solutions (Green Bay)  |
| Total          | 33     | TPC Group (2)<br>Ascend Performance Materials (5)<br>Archroma (1)<br>GEON Performance Materials (8)<br>Foremark Performance Chemicals (1)<br>Perimeter Solutions (6)<br>SI Group (8)<br>Tri-Tex (2)                      |

Source: SK Capital Partners portfolio listing, corporate websites.

**Table 2. SK Capital's environmental violations and fines at chemical plants in Texas**

| Company                                      | Texas location        | 3-year Clean Air Act (CAA) violations (% quarters in violation) | 3-year Clean Water Act/ Safe Drinking Water Act (SDWA) violations (% quarters in violation)   | 3-Year Resource Conservation and Recovery Act (RCRA) violations (% quarters in violation) | TCEQ 5-year informal enforcement actions | 5-Year EPA formal enforcement | 5-year TCEQ formal enforcement |
|--|-----------------------|---|---|---|--|-------------------------------|--------------------------------|
| TPC Group <sup>56</sup>                      | Port Neches           | 100%: 12 of 12 quarters with "High Priority" CAA violations     |   |   | CAA: 5; RCRA: 1                          | \$488,000 CAA                 | \$104,000 <sup>57</sup> CAA    |
| TPC Group <sup>58</sup>                      | Houston               | 100%: 12 of 12 quarters with "High Priority" CAA violations     |   |   | CAA: 1                                   | \$214,000 <sup>59</sup> †     | \$31,000 CAA                   |
| SI Group <sup>60</sup>                       | Baytown               |   | 58%: 7 of 12 quarters CWA violations, including 6 with "Significant Category I Noncompliance" |   |  |                               |                                |
| SI Group <sup>61</sup>                       | Freeport              | 25%: 3 of 12 quarters with CAA violations                       | 33%: 4 of 12 quarters CWA violations, including 1 with "Significant Category I Noncompliance" |   | CAA: 2                                   |                               | \$5,000 CWA                    |
| Foremark Performance Chemicals <sup>62</sup> | La Porte              |   | 58%: 7 of 12 quarters CWA violations, including 6 with "Significant Category I Noncompliance" |   |  |                               | \$12,000 CWA                   |
| Ascend Performance Materials <sup>63</sup>   | Chocolate Bayou/Alvin | 100%: 12 of 12 quarters with "High Priority" CAA violations     | 83%: 10 of 12 quarters with SDWA violations   | 100%: 12 of 12 quarters with RCRA violations  | CAA: 1<br>RCRA: 5<br>SDWA: 49            | \$60,000 CAA<br>\$987,000 CWA | \$28,000 CAA                   |
| <b>Total</b>                                 |                       |   |   |   | <b>CAA: 9<br/>SDWA: 49<br/>RCRA: 6</b>   | <b>\$1.7 million</b>          | <b>\$180,000</b>               |

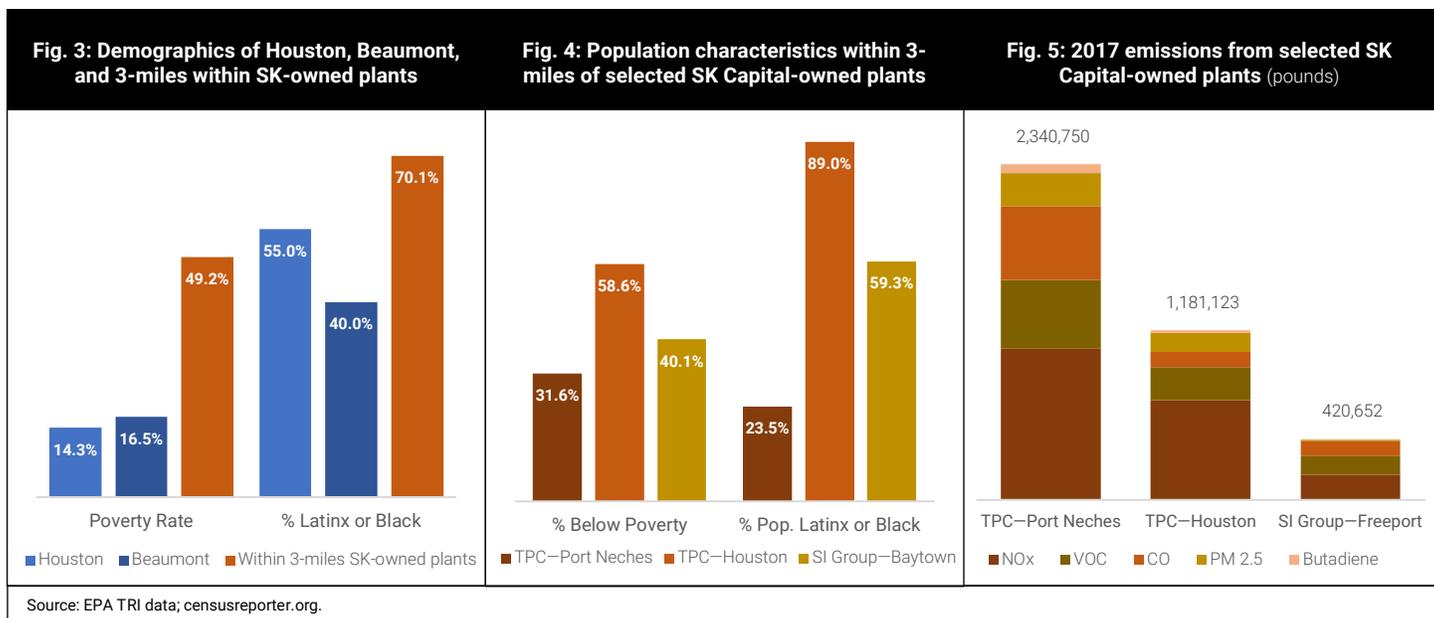
Source: EPA Enforcement and Compliance History Online Echo database; 3-year compliance for most recent 12 quarters reported as of December 10, 2019; † NPR November 27, 2019; ‡ Houston Chronicle December 9, 2019.

more east of College Station. These 8 factories represent one fourth of SK Capital's U.S. chemical manufacturing plants.

In 2012, SK Capital Partners and First Reserve bought TPC Group (formerly Texas Petrochemical Company), a petrochemical manufacturer that processes natural gas and oil products into industrial chemicals in a \$706 million deal that took the company private.<sup>64</sup> The TPC group manufactures chemicals used to make rubber, plastics, fuel and lubricant additives, including butadiene.<sup>65</sup> It operates manufacturing plants in Port Neches and Houston as well as shipping terminals at the Houston docks and in Lake Charles, Louisiana.<sup>66</sup>

Other SK assets have added to the private equity firm's Texas footprint. SK Capital

bought the SI Group and its 20 chemical manufacturing plants in 2018.<sup>67</sup> The SI Group was a century-old, family-owned upstate New York chemical company (formerly Schenectady International).<sup>68</sup> The SI Group manufactures chemical additives and intermediate products for the plastic, rubber, fuel, and other industries.<sup>69</sup> SK bought a portion of Chemtura in 2013 and renamed the chemical company Addivant, which claims to be the world's biggest producer of liquid phosphite, specialty antioxidant and non-dust additives for the chemical industry.<sup>70</sup> Addivant had 11 worldwide manufacturing plants before being folded into SK's SI Group in 2018.<sup>71</sup> Two of the SI Group's plants are in Texas: one in Baytown and one in Freeport.



SK Capital created Ascend Performance Materials from its \$50 million purchase of chemical company Solutia’s nylon manufacturing segment in 2009, including the Chocolate Bayou plant in Alvin, Texas.<sup>72</sup> In 2017, SK bought one of the largest formaldehyde manufacturing plants in La Porte, Texas from D.B. Western Inc.—Texas that it renamed Foremark Performance Chemicals.<sup>73</sup> In 2019, SK Capital created GEON Performance Solutions from its purchase of PolyOne Corporation’s eight polyvinyl chloride manufacturing plants for \$775 million, including plants in Pasadena and Seabrook, Texas.<sup>74</sup>

### SK Capital’s record of environmental violations in Texas

The SK Capital portfolio of Texas petrochemical and industrial chemical plants includes many plants with substantial and persistent environmental violations that predate — and perhaps foreshadowed — the TPC Group’s Thanksgiving explosion in Port Neches. Although there has been some attention to the TPC Group’s environmental record, the other SK Capital-owned chemical plants in the Houston area also have a record

of environmental violations and fines (see Table 2). SK Capital-owned Texas chemical plants have paid more than \$1.7 million to settle U.S. Environmental Protection Agency (EPA) violations and an additional \$180,000 in fines to the Texas Commission on Environmental Quality (TCEQ).

### SK Capital-owned chemical plants pose health risk, especially to communities of color and lower-income areas

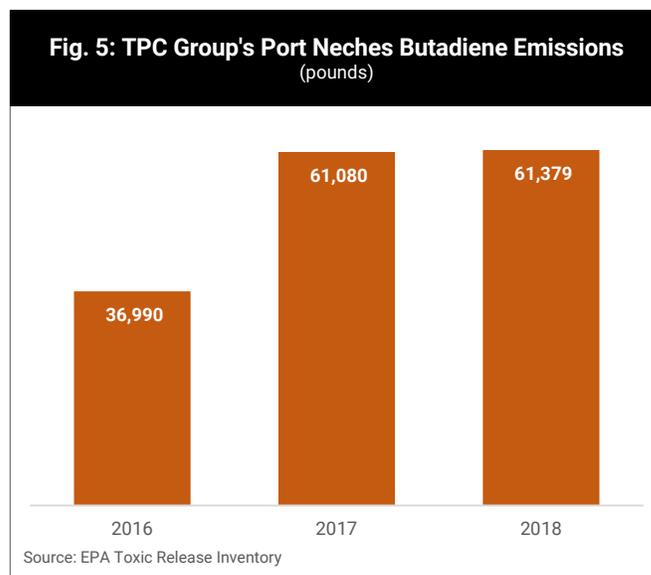
Polluting plants like chemical and petrochemical facilities have long been located in or near communities of color and lower-income areas that face unequal and higher pollution burdens than wealthier and whiter areas. A mountain of academic literature has repeatedly demonstrated that communities of color and low-income communities are disproportionately exposed to dangerous pollutants from these toxic facilities.<sup>75</sup>

Long-term exposure to pollutants such as volatile organic chemicals, carbon monoxide, nitrogen oxides, particulate matter and more from chemical and petrochemical plants is associated with higher cancer risks, nausea,

eye and throat irritation, and respiratory-related illnesses, especially for children.<sup>76</sup> In the Houston area, the poorest areas and the communities with the highest Latinx population faced much higher cancer risks than the overall population (10 and 6 times higher, respectively).<sup>77</sup> A University of Texas study found that children living within two miles of the Houston Ship Channel were 56 percent more likely to contract acute lymphocytic leukemia than children living at least 10 miles away and that children living near areas with high butadiene emissions from petrochemical plants were more likely to develop any type of leukemia.<sup>78</sup>

The vast majority of the 225,000 people living within three miles of the SK Capital-owned chemical plants are people of color (70 percent Latinx or Black compared to 55 percent in the Houston and 40 percent in the Beaumont metropolitan area). Those living within 3 miles of these plants are also more likely to have lower incomes — the poverty rate is 49 percent near SK-owned plants compared to 14 percent in Houston and 16 percent in the Beaumont metro area (see Figure 2).<sup>79</sup> A number of SK Capital-owned plants with particularly high emissions of dangerous air pollutants are also near substantial populations of people living below the poverty line and people of color (see Figure 3 and Figure 4).

**Port Neches history of environmental violations:** The Port Neches and Houston plants date back to World War II and primarily manufacture butadiene and the gasoline additive MTBE (methyl tera-butyl ether).<sup>80</sup> The Port Neches plant processes chemicals found in oil and natural gas to manufacture plastic and rubber making chemicals and compounds, like butadiene, and has 900-million-pound annual chemical production capacity.<sup>81</sup> In 2015, the TPC Group announced it would increase the Port Neches capacity with a new production unit to



produce more rubber-manufacturing polyisobutylene chemicals that was expected to go online in 2017.<sup>82</sup> Today, the Port Neches plant produces one-sixth of the U.S. butadiene and one-eighth of the MTBE.<sup>83</sup>

The plant has a long history of environmental violations. The EPA determined the Port Neches facility was in “high priority” violation of the Clean Air Act every calendar quarter from January 2017 through September 2019 — two months before the blast.<sup>84</sup> Lone Star Legal Aid reported that the TCEQ levied 19 fines against TPC dating back to 2008.<sup>85</sup> Over the past five years, the EPA reports that the Port Neches facility paid about \$570,000 to settle and address state and federal environmental violations.<sup>86</sup>

In 2017, the TPC Group entered into a consent decree with the EPA for failing to maintain good air pollution practices between 2011 and 2014, in which it agreed to pay a \$72,000 fine and spend an additional \$275,000 on a supplemental environmental upgrade and monitoring, including for butadiene emissions.<sup>87</sup> Also in 2017, the Port Neches boilers shut down during Hurricane Harvey, causing the release of substantial amounts of toxic nitrogen oxides and carbon

monoxide.<sup>88</sup> That followed another consent decree in 2016 where TPC agreed to pay nearly \$31,000 for alleged Clean Air Act violations at the Port Neches facility for failing to maintain a safe facility, keep maintenance records, and make repairs that allowed chlorine discharges.<sup>89</sup>

The TCEQ had repeatedly visited and fined the Port Neches facility, but nonetheless gave the facility a “satisfactory” compliance rating.<sup>90</sup> The TCEQ fined Port Neches \$45,000 in 2015 for air emissions violations for failing to meet carbon monoxide limits between 2011 and 2013.<sup>91</sup> The TCEQ recently cited it for failing to meet pollution limits and keep records between 2014 and 2019.<sup>92</sup>

The butadiene that the Chemical Safety Board suspected of being the source of the Thanksgiving blast has been a long-standing problem at the Port Neches plant. In late 2019, TPC settled Port Neches’ air emissions violations with the TCEQ for \$22,000 for 5 events that released 7,000 pounds of butadiene and 17,000 pounds of volatile organic chemicals – releases TCEQ stated could have been prevented with better maintenance and procedures.<sup>93</sup> The plant’s total butadiene emissions were far higher, exceeding 60,000 pounds in 2017 and 2018, according to EPA Toxic Release Inventory data (see Figure 5).<sup>94</sup>

**TPC’s Houston plant:** The Houston facility near the ship channel is the TPC Group’s largest operating facility, producing 1.5 billion pounds of butadiene, butene-1, isobutylene, diisobutylene, and other chemicals annually.<sup>95</sup> The facility abuts a residential neighborhood on one side and a park on another.<sup>96</sup>

The Houston plant has a similar history of environmental lapses. It has had “high priority” Clean Air Act violations every calendar quarter for the past three years.<sup>97</sup> In



January 2019, the U.S. Environmental Protection Agency fined the Houston TPC Group facility \$214,000 for releasing more VOCs than its permits allowed and excess nitrogen oxides and carbon monoxide discharges.<sup>98</sup>

In 2018, one of the Houston TPC chemical storage containers caught fire; a TPC spokesperson assured local officials that there was no threat to public safety that “would cause any unsafe conditions to the community or employees.”<sup>99</sup> During Hurricane Harvey, the TPC Houston plant lost its boilers due to the storm and flared much more gas than allowed under the company’s permits.<sup>100</sup>

The Houston plant also has a long-standing problem with butadiene releases. In 2009, the TPC Group (then still Texas Petroleum Corporation) voluntarily agreed to spend \$20 million to upgrade the Houston plant to

substantially reduce volatile organic compound emissions (aiming especially at the VOC butadiene releases) to less than 35,000 pounds per year for the five-year duration of the agreement.<sup>101</sup> But by 2017 (the latest data available), the EPA reported the Houston TPC Group plant released 230,000 pounds of VOCs including nearly 14,000 pounds of butadiene — the same as of the plant's emissions 230,000 pounds of VOC emission the early 2000s that drew the TCEQ's regulatory scrutiny.<sup>102</sup>

***Ascend Performance Materials' Chocolate Bayou plant:*** The SK-owned Ascend Performance Materials Chocolate Bayou plant in Alvin, Texas, has 750 workers that manufacture plastics, chemicals and artificial fibers that are used widely in the automotive and textile industries, among others.<sup>103</sup> Ascend has been expanding the Chocolate Bayou plant capacity, building one of the biggest propane dehydrogenation projects in the country in 2015 and a \$47.2 million capital investment in partnership with Cyanco in 2011.<sup>104</sup> The plant produces the highly toxic hydrogen cyanide and the plastic ingredient acrylonitrile, which can cause nervous system damage and breathing problems and at high concentrations can be fatal.<sup>105</sup> In 2019, the Chocolate Bayou plant completed a multi-million dollar capacity expansion to produce nitrilotriacetic acid, a probable cancer causing substance according to the National Institutes of Health.<sup>106</sup>

In the past three years, the EPA found it was in “high priority” violation of the Clean Air Act every calendar quarter and in violation of the Safe Drinking Water Act every quarter as well.<sup>107</sup> In 2018, Ascend paid \$60,000 to settle EPA Clean Air Act violations including failing to test and inspect the mechanical integrity of equipment, failing to train staff, and failing to make sure that its procedures were updated to reflect current hazardous processes.<sup>108</sup> In 2019, Ascend paid nearly \$977,000 to settle

hazardous waste violations under the Resource Conservation and Recovery Act including discharging pollutants, having valves without backup containment for dangerous materials, and for storing “hazardous waste in a three-sided wooden box,” a roll-off dumpster, and backhoe bucket.<sup>109</sup>

***Foremark Performance Chemicals La Porte formaldehyde plant:*** The Foremark plant is the largest formaldehyde manufacturer and marketer in North America, with its product largely destined for use in the oil and gas exploration and fossil fuel power plant industries.<sup>110</sup> Exposure to formaldehyde can cause respiratory and eye irritation and has been determined to be a human carcinogen by the Department of Health and Human Services.<sup>111</sup> According to the EPA, the plant released 7,900 pounds of formaldehyde between 2011 and 2017.<sup>112</sup> Over the past 3 years, the La Porte plant has been in violation of the Clean Water Act more than half the calendar quarters, including 6 quarters when the plant was in significant noncompliance.

## **Conclusion and recommendations**

The Port Neches plant explosion was the third Texas petrochemical or refinery fire in the past year.<sup>113</sup> The distorted incentives of the private equity industry may pose unique risks to chemical plants, as the private equity firms' reliance on high debt loads and financial engineering combined with cost-cutting can compromise industrial plant safety. The TPC Group Port Neches and Philadelphia Energy Solutions disasters suggest that more oversight of the private equity industry and stronger environmental regulatory consideration of the private equity parent companies may be warranted. Stricter standards of liability would help address the problem of misaligned incentives that allow private equity firms to benefit from short-term upsides of reduced

attention to environmental compliance while escaping responsibility for damages that may be caused as a result.

Any environmental lapses are greatly facilitated by the rapid erosion of environmental enforcement. Regulatory oversight – inspections and enforcement – and corporate accountability are essential to deter violations of environmental laws and prevent environmental disasters.<sup>114</sup> As the *Houston Chronicle* noted on its editorial page, “Companies accustomed to low fines and settlements for behavior that threatens people’s lives will simply write off those amounts as another cost to do business in Texas. That cost must be higher to get them to change their ways.”<sup>115</sup>

The Trump administration and Texas have dramatically pared back environmental enforcement, giving private equity owners and others a free pass on environmental lapses. According to the Environmental Integrity Project, over the past decade, funding for the TCEQ has declined 35 percent, while overall state spending rose by 41 percent, and staffing at the agency declined by 9 percent.<sup>116</sup> The U.S. Environmental Protection Agency inspections and enforcement actions have dropped sharply, with 2018 inspections and civil penalties at the lowest levels in at least a decade.<sup>117</sup> The Trump administration also recently rolled back regulations that required chemical plants investigate near-miss chemical accidents, implement third-party audits for reportable incidents, and provide some publicly accessible information about a plant’s accident records and which chemicals were stored on site.<sup>118</sup>

It is vital that the TCEQ and the EPA assess the impact of the private equity ownership of these chemical plants on environmental violations, pollution, and the health of people in surrounding communities, including in particular the disproportionate pollution

burden on communities of color and low-income areas. The Port Neches disaster demonstrates the substantial risk the growing development of petrochemical and chemical plants pose to communities and the environment. The TCEQ and EPA should:

***Appoint totally independent investigators to determine the cause as well as health and environmental impacts of the Port Neches disaster:***

Texas must appoint independent investigators to determine the cause of the Port Neches blast and assess the environmental and human health risks posed by the Port Neches disaster. These investigators should be totally unaffiliated with the TPC Group (unlike many of the current monitoring operations) or the TCEQ which has failed to adequately police the Port Neches and other chemical plants.

***Launch industry-wide safety and environmental disaster preparedness examinations to reduce the risk of future industrial accidents:***

There have been at least three chemical plant fires in Texas in the past year. It is time for the TCEQ and EPA to rigorously investigate these plants and hold the petrochemical and chemical industry accountable for these disasters.

***Assess the disparate impact of hazardous pollution emissions on communities of color and low-income areas:***

The TCEQ and EPA should assess the pollution burden posed by holding companies and private equity owners of their entire portfolio of regulated facilities.

***Assess the total environmental record of private equity owners and other corporate parents in assessing fines and devising remediation plans:***

The SK Capital example demonstrates that environmental regulators can fail to rigorously investigate and hold firms accountable in the face of persistent

environmental violations by a portfolio of chemical companies. The TCEQ and EPA must evaluate the patterns of environmental violations by parent companies, including private equity owners of chemical and petrochemical plant portfolios, when investigating and penalizing polluters for violations of environmental laws.

**Release an index of private equity owned chemical, petrochemical, and fossil fuel plants that are regulated as point source facilities under environmental laws:** The private equity industry ownership of polluting and potentially risky facilities has been largely hidden from view and regulatory scrutiny. The EPA must create a public index of regulated facilities that are owned by private equity firms.

## Endnotes

- <sup>1</sup> SK Capital Partners (SK Capital). [Portfolio](#). Accessed December 2019; First Reserve. [Current Portfolio](#). Accessed December 2019.
- <sup>2</sup> SK Capital. [Press release]. “[SK Capital closes acquisition of Performance Products & Solutions from PolyOne, creating new leader in plastic compounds named GEON Performance Solutions](#).” October 28, 2019.
- <sup>3</sup> See Food & Water Watch. “[How Fracking Supports the Plastics Industry](#).” February 2017.
- <sup>4</sup> Adams-Heard, Rachel and Kiel Porter. “[Pipeline Company Blue Racer to Weigh \\$2.5 billion IPO](#).” *Bloomberg*. June 24, 2019; Blue Racer Midstream. [Fractionation & NGL Handling](#). Accessed December 2019.
- <sup>5</sup> SK Capital. ([October 28, 2019](#)).
- <sup>6</sup> Americans for Financial Reform Education Fund and Food & Water Watch (AFREF/F&WW) analysis of U.S. Environmental Protection Agency (EPA) Toxic Release Inventory (TRI) data from Enforcement and Compliance History Online (ECHO) database. Comparison to coal from EPA’s [Greenhouse Gas Equivalencies Calculator](#). Accessed December 2019.
- <sup>7</sup> AFREF/F&WW analysis of EPA demographic data from the ECHO database for SK Capital Partners-owned chemical plants where data is available. Includes [TPC Group Port Neches](#). FRS ID No. 110000404801; [TPC Group Houston](#). FRS ID No. 110000461134; [SI Group Baytown](#). FRS ID No. 110000501519; [SI Group Freeport](#). FRS ID No. 110000463427; [Foremark Performance Chemicals/D.B. Western—Texas](#). FRS ID No. 110009770667; [Ascend Performance Materials—Chocolate Bayou Plant](#). FRS ID No. 110000503722. Accessed December 2019.
- <sup>8</sup> Kelly, Jason. “[The magic formula is leverage...and fees](#).” *Businessweek*. October 3, 2019.
- <sup>9</sup> Pitchbook private equity-owned or backed agricultural chemical, commodity chemical, industrial chemical, multi-line chemical, other chemicals, and specialty chemicals. December 2019.
- <sup>10</sup> Gambardello, Joseph A., Andrew Maykuth, and Patricia Madej. “[Explosions rip through South Philadelphia refinery, triggering major fire and injuring 5](#).” *Philadelphia Inquirer*. June 21, 2019.
- <sup>11</sup> “[TPC Group announces \\$655 million of secured bonds to back LBO](#).” *S&P Global*. December 4, 2012.
- <sup>12</sup> SK Capital Partners. [Press release]. “[Archroma successfully completes USD 515 million credit facilities offering](#).” July 2, 2015.
- <sup>13</sup> Beltran, Luisa. “[SK Capital buys majority of Tri-Tex Co.](#)” *PE Hub*. June 1, 2017; Dorbian, Iris. “[SK Capital buys SI Group](#).” *PE Hub*. June 1, 2018; SK Capital Partners. [Press release]. “[SK Capital announces agreement to acquire Performance Products & Solutions business from PolyOne](#).” August 19, 2019.
- <sup>14</sup> Ruckin, Claire. “[LPC-Bankers prepare €1bn financing for potential Archroma sale](#).” *Reuters*. February 8, 2017.
- <sup>15</sup> Sifert, Timothy and Fiona Maharg-Bravo. “[Investors forget lending lessons](#).” *New York Times*. November 2, 2010.
- <sup>16</sup> Key, Peter. “[Venture that saved a Philadelphia refinery launched](#).” *Philadelphia Business Journal*. September 19, 2012.
- <sup>17</sup> Renshaw, Jarrett and Jessica Resnick-Ault. “[Four years after rescue, U.S. refinery reels as investors profit](#).” *Reuters*. November 7, 2016.
- <sup>18</sup> “[Philadelphia Energy Solutions to file for bankruptcy: Memo](#).” *Reuters*. January 22, 2018; Meyer, Gregory. “[Carlyle loses control of bankrupt US oil refinery](#).” *Financial Times*. January 22, 2018.
- <sup>19</sup> Renshaw, Jarrett. “[Refiner goes belly-up after big payouts to Carlyle Group](#).” *Reuters*. February 20, 2018.
- <sup>20</sup> Meyer.
- <sup>21</sup> Gambardello, Maykuth, and Madej.
- <sup>22</sup> *Ibid.*; Kummer, Frank. “[Officials say air tests from refinery fire showed no immediate danger. EPA data show company has past high-priority violations](#).” *Philadelphia Inquirer*. June 21, 2019.
- <sup>23</sup> Maykuth, Andrew. “[S. Philly refinery blast released 5,000 pounds of a deadly chemical, federal investigators say](#).” *Philadelphia Inquirer*. October 16, 2019.
- <sup>24</sup> Kearney, Laila. “[Philadelphia Energy Solutions files for bankruptcy after refinery fire](#).” *Reuters*. July 22, 2019.
- <sup>25</sup> Morton, Matthew D. “[Strategies to protect your fund from portfolio company environmental liability](#).” *Global Private Equity Watch*. March 28, 2016.
- <sup>26</sup> SK Capital. [Team: Jack Norris, Managing Director](#). Accessed December 2019.
- <sup>27</sup> Toal, Margaret, Nicholas Bogel-Burroughs, and Manny Fernandez. “[Thousands evacuated in Texas after explosion at Port Neches chemical plant](#).” *New York Times*. November 27, 2019.
- <sup>28</sup> Simon, Darran, Faith Karimi, and Elliott C. McLaughlin. “[Hours after explosions rocked a Texas chemical plant, a chemical fire continues to burn](#).” *CNN*. November 28, 2019.
- <sup>29</sup> Adams-Heard, Rachel. “[Still no ‘all clear’ after chemical blasts, but town moves on](#).” *Bloomberg*. December 4, 2019; Collins, Christopher. “[As Port Neches plant smolders, Trump rolls back safety rules for chemical plants](#).” *Texas Observer*. December 3, 2019; Ramirez, Rachel. “[A chemical plant exploded in this Texas town. Some residents want to ‘show grace’](#).” *Grist*. December 9, 2019.
- <sup>30</sup> Simon, Karimi, and McLaughlin; Toal, Bogel-Burroughs, and Fernandez.

- <sup>31</sup> White, Dawson, Mark Price, and Chacour Koop. "[Mandatory evacuation ordered after second blast in Texas plant explosion, officials say.](#)" *Fort Worth Star-Telegram*. November 27, 2019; Ortiz, Jorge L. "[Unhappy Thanksgiving: Explosions at Texas chemical plant keep more than 50,000 out of their homes.](#)" *USA Today*. November 29, 2019; Seba, Erwin. "[Texas chemical plant that caught fire to close for extended period—document.](#)" *Reuters*. December 2, 2019.
- <sup>32</sup> Dick, Jacob and Jasper Scherer. "[Most residents allowed to return to homes as Port Neches plant continues to burn.](#)" *Houston Chronicle*. November 28, 2019; "[Officials: Chemical in Texas blast posed no serious risks.](#)" *Associated Press*. December 5, 2019; "[Texas: City residents urged to evacuate after chemical plant explosions.](#)" *The Guardian (UK)*. December 5, 2019.
- <sup>33</sup> Ortiz.
- <sup>34</sup> Seba; Dick, Jacob. "[Officials: TPC Group fire is out.](#)" *Houston Chronicle*. December 3, 2019.
- <sup>35</sup> Dick, Jacob. "[Vapor cloud cited in TPC explosion by chemical safety board.](#)" *Beaumont Enterprise*. December 5, 2019.
- <sup>36</sup> "[Saturday morning update on aftermath of TPC plant explosion.](#)" *KBMT-TV ABC Channel 12 Beaumont*. December 7, 2019.
- <sup>37</sup> Port Neches Response. U.S. EPA, Texas Commission on Environmental Quality (TCEQ), Jefferson County, Texas, and the TPC Group. [Press release]. "[News release #30 — Friday morning update.](#)" December 13, 2019.
- <sup>38</sup> Kennedy, Merrit. "[Massive explosion rips through Texas chemical plant.](#)" *MPR*. November 27, 2019; Dick and Scherer.
- <sup>39</sup> U.S. Department of Health and Human Services (HHS). Agency for Toxic Substances and Disease Registry (ATSDR). "[1,3-Butadiene ToxFAQs.](#)" CAS No. 106-99-0. October 2012.
- <sup>40</sup> Simon, Karimi, and McLaughlin.
- <sup>41</sup> "[Chemical plant explosion in South Texas forces evacuation of 50,000 as fire rages.](#)" *Time*. November 29, 2019.
- <sup>42</sup> Toal, Bogel-Burroughs, and Fernandez.
- <sup>43</sup> Murrell, I.C. "[Further accountability from TPC, agencies demanded in Port Arthur.](#)" *Port Arthur News*. December 7, 2019.
- <sup>44</sup> Bain, Kaitlin, Chris Moore, and Isaac Windes. "[Information whiplash stokes post blast worry.](#)" *Houston Chronicle*. December 5, 2019.
- <sup>45</sup> "[No significant measurements of airborne asbestos found around TPC explosion site.](#)" *KRIV-TV Fox Channel 26 Houston*. November 30, 2019.
- <sup>46</sup> Dick and Scherer.
- <sup>47</sup> SK Capital Partners. Portfolio. Locations based on portfolio company websites: [Ascend Performance Materials](#), [Archrome](#), [GEON Performance Materials](#), [Foremark Performance Chemicals](#), [Perimeter Solutions](#), [SI Group](#), [TPC Group](#), [Tri-Tex](#). Accessed December 2019.
- <sup>48</sup> *KRIV-TV Fox Channel 26 Houston*.
- <sup>49</sup> "[The latest: Second blast hits Texas chemical plant.](#)" *KAUZ-TV Channel 6 CBS News Wichita Falls*. November 27, 2019.
- <sup>50</sup> Dick (December 5, 2019).
- <sup>51</sup> Murrell.
- <sup>52</sup> Dick (December 5, 2019).
- <sup>53</sup> Bain, Moore, and Windes.
- <sup>54</sup> Port Neches Response. U.S. EPA, TCEQ, Jefferson County, Texas, and the TPC Group. [Press release]. "[News release #24 — Monday evening response update.](#)" December 9, 2019.
- <sup>55</sup> Chevron Phillips Chemical Co. LLP. "[DEHA \(N,N-Diethylhydroxylamine\), 85% safety data sheet.](#)" Revision date October 14, 2019; Arkema Group. "[GPS Safety Summary N,N-diethylhydroxylamine.](#)" November 30, 2014.
- <sup>56</sup> EPA. ECHO database. [TPC Group Port Neches. FRS ID No. 110000404801](#). Accessed December 2019.
- <sup>57</sup> Includes ECHO data and more recent TCEQ fines; Dick, Jacob. "[TPC, other Port Neches Plant face fines for 2018 issues.](#)" *Houston Chronicle*. December 9, 2019.
- <sup>58</sup> EPA. ECHO database. [TPC Group Houston. FRS ID No. 110000461134](#). Accessed December 2019.
- <sup>59</sup> Kennedy.
- <sup>60</sup> EPA. ECHO database. [SI Group Baytown. FRS ID No. 110000501519](#). Accessed December 2019.
- <sup>61</sup> EPA. ECHO database. [SI Group Freeport. FRS ID No. 110000463427](#). Accessed December 2019.
- <sup>62</sup> EPA. ECHO database. [Foremark Performance Chemicals/D.B. Western—Texas. FRS ID No. 110009770667](#). Accessed December 2019.
- <sup>63</sup> EPA. ECHO database. [Ascend Performance Materials—Chocolate Bayou Plant. FRS ID No. 110000503722](#). Accessed December 2019.
- <sup>64</sup> SK Capital Partners. [Press release]. "[SK Capital Partners completes acquisition of TPC Group Inc.](#)" December 20, 2012; TPC Group, Inc. [Press release]. "[First Reserve and SK Capital complete acquisition of TPC Group.](#)" December 20, 2012; Adams-Heard (December 4, 2019).
- <sup>65</sup> Ortiz; Dick and Scherer.
- <sup>66</sup> Feser, Katherine. "[SI Group buys Baytown chemical plant from TPC Group.](#)" *Houston Chronicle*. September 15, 2016.
- <sup>67</sup> "[SI Group to be sold.](#)" *Orangeburg (SC) Times & Democrat*. June 5, 2018.
- <sup>68</sup> Foss, Sara. "[Foss: SI Group story isn't over.](#)" *Schenectady Daily Gazette*. July 31, 2019.
- <sup>69</sup> "[SK Capital Partners to combine SI Group. Addivant.](#)" *European Rubber Journal*. October 19, 2018.
- <sup>70</sup> Esposito, Frank. "[PolyOne sells PP&S unit to SK Capital in \\$775M all-cash deal.](#)" *Plastics News*. August 19, 2019; Addivant. [Press release]. "[Polyolefin efficiently replaces PVC in flame retardant wire and cable thanks to new PolyBond polymer modifiers.](#)" June 3, 2013.
- <sup>71</sup> *European Rubber Journal*.
- <sup>72</sup> Bantillo, Pearl. "[US Solutia completes sale of nylon business to SK Capital.](#)" *ICIS News*. June 2, 2009.
- <sup>73</sup> SK Capital. [Press release]. "[SK Capital acquires D.B. Western Inc.—Texas; changes name to Foremark Performance Chemicals.](#)" June 1, 2017.
- <sup>74</sup> Esposito; facilities in Carson (CA), Terre Haute (IN), Louisville (KY), Avon Lake (OH), Clinton and Dyersburg (TN), and Pasadena and Seabrook (TX) as well as Canada, China and Mexico.
- <sup>75</sup> Konisky, David M. "[Inequities in enforcement? Environmental justice and government performance.](#)" *Journal of Policy Analysis and Management*. Vol. 28, No. 1. 2009 at 104; Lynch, Michael J. et al. "[Slippery business. Race, class, and legal determinants of penalties against petroleum refineries.](#)" *Journal of Black Studies*. Vol. 34, No. 3. January 2004 at 423; Bell, Michelle L. and Keita Ebisu. "[Environmental inequality in exposures to airborne particulate matter components in the United States.](#)" *Environmental Health Perspectives*. Vol. 120, No. 12. December 2012 at 1699 and 1702; Pace, David. "[Minorities suffer most from industrial pollution.](#)" *Associated Press*. November 14, 2005; Clark, Lara P. et al. "[National patterns in environmental injustice and inequality: Outdoor NO<sub>2</sub> air pollution in the United States.](#)" *PLOS ONE*. Vol. 9, Iss. 4. April 2014 at 1 and 2; Wilson, Sacoby M. et al. "[Assessment of the distribution of toxic release inventory facilities in metropolitan Charleston: An environmental justice case study.](#)" *American Journal of Public Health*. Vol. 102, No. 10. October 2012 at 1974 to 1978.

- 76 Salam, Muhammad T. et al. "[Birth outcomes and prenatal exposure to ozone, carbon monoxide, and particulate matter: Results from the Children's Health Study.](#)" *Environmental Health Perspectives*. Vol. 113, No. 11. November 2005 at 1638 and 1643; Bravender, Robin. "[Study links smog exposure to premature death.](#)" *New York Times*. March 12, 2009; Yang, Chun-Yuh et al. "[Respiratory and irritant health effects of population living in a petrochemical-polluted area in Taiwan.](#)" *Environmental Research*. Vol. 74, No. ER973762. 1997 at 145, 147 and 148; Belli, S. et al. "[Case-control study on cancer risk associated to residence in the neighborhood of a petrochemical plant.](#)" *European Journal of Epidemiology*. Vol. 19. 2004 at 49, 50 and 53; Wichmann, Fernando A. et al. "[Increased asthma and respiratory symptoms in children exposed to petrochemical pollution.](#)" *Journal of Allergy and Clinical Immunology*. Vol. 123, No. 3. 2009 at 632; Chen, Mei-Hsia, Chung-Shin Yuan, and Lin-Chi Wang. "[A feasible approach to quantify fugitive VOCs from petrochemical processes by integrating open-path Fourier transform infrared spectrometry measurements and industrial source complex \(ISC\) dispersion model.](#)" *Aerosol and Air Quality Research*. Vol. 15. 2015.
- 77 Linder, Stephen H. et al. "[Cumulative cancer risk from air pollution in Houston: Disparities in risk burden and social disadvantage.](#)" *Environmental Science & Technology*. Vol. 42, No. 12. 2008 at 4312 and 4314.
- 78 Horswell, Cindy. "[Study: Children living near Houston Ship Channel have greater cancer risk.](#)" *Houston Chronicle*. January 18, 2007.
- 79 AFREF/F&WW analysis of EPA ECHO database demographic data. [Houston-The Woodlands-Sugarland and Beaumont-Port Arthur](#), Texas, metropolitan area data from Census Reporter. Accessed December 2019.
- 80 Blum, Jordan. "[Houston company TPC Group has long history, spotty environmental record.](#)" *Houston Chronicle*. November 27, 2019.
- 81 Feser.
- 82 TPC Group, Inc. [Press release]. "[TPC Group announces progress on Polyisobutylene Capacity.](#)" February 12, 2015.
- 83 Blum.
- 84 EPA. ECHO. Three-year Clean Air Act Compliance by Quarter. TPC Group Port Neches facility. Source ID [TX0000004824500715](#).
- 85 Murrell.
- 86 EPA TRI. TPC Group LLC. [Port Neches. FRS ID No. 110000504801](#). Available at ECHO database. Accessed December 2019.
- 87 EPA. Region 6 Dallas. Consent Agreement. [In the Matter of TPC Group LLC](#). EPA Docket No. CAA 06-2017-3361. July 2, 2017 at 10 to 12 and 18 to 19.
- 88 Blum.
- 89 EPA. TPC Port Neches facility. Case No. 06-2016-3354. August 12, 2016. Available at [ECHO](#). Accessed December 2019.
- 90 Seba.
- 91 Dick (December 9, 2019); Seba.
- 92 Seba.
- 93 Dick (December 9, 2019).
- 94 EPA TRI. TPC Group LLC. [Port Neches. FRS ID No. 110000504801](#).
- 95 TPG Group. Location. Available at <https://www.tpcgrp.com/contact>. Accessed December 2019.
- 96 TPC Group. "[Emissions Reduction: TPC Group Houston Plant Experience.](#)" EPA Clean Air Act Advisory Committee presentation. June 7 to 8, 2011 at 4.
- 97 EPA. ECHO database. [TPC Group Houston. FRS ID No. 110000461134](#). Accessed December 2019.
- 98 Kennedy.
- 99 Jordan, Jay R. and Robert Downen. "[Storage tank catches fire at east Houston chemical plant.](#)" *Houston Chronicle*. April 6, 2018.
- 100 Mosier, Jeff. "[Refineries, chemical plants spewed tons of pollutants when Harvey forced them shut.](#)" *Dallas Morning News*. August 29, 2017.
- 101 TCEQ. [In the Matter of and Enforcement Action Concerning Texas Petrochemicals LLC](#). Docket No. 2009-022-AIR-E. March 17, 2009 at 3 to 4.
- 102 EPA TRI. TPC Group LLC. [Houston. FRS ID No. 110000461134](#); TCEQ (2009) at 2.
- 103 Sixel, S.M. "[No. 4 private: High temps under the hood drive Ascend growth.](#)" *Houston Chronicle*. June 15, 2018.
- 104 Wooten, Christy. "[Alvin draws new businesses.](#)" *Houston Chronicle*. November 22, 2011; Chang, Joseph. "[Commentary: US project headwinds.](#)" *ICIS*. September 20, 2015.
- 105 Bomgardner, Melody and Jyllian Kemsley. "[Harvey stalls chemical, university activities on the Gulf Coast.](#)" *Chemical & Engineering News*. August 28, 2017; Centers for Disease Control. National Institute for Occupational Safety and Health. [Hydrogen Cyanide: Systemic Agent CAS#74-90-8; ATSDR. Public Health Statement Acrylonitrile CAS#107-13-1](#). December 1990.
- 106 Ascend Performance Materials. [Press release]. "[Ascend completes investment in reliability, capacity of NTC chelate production.](#)" June 18, 2019; U.S. Department of Health and Human Services. National Toxicology Program. National Institutes of Health. "[14th Report on Carcinogens.](#)" November 3, 2016.
- 107 EPA. ECHO database. [Ascend Performance Materials—Chocolate Bayou Plant. FRS ID No. 110000503722](#). Accessed December 2019.
- 108 U.S. EPA. Region 6 Dallas. In the Matter of Ascend Performance Materials Texas, Inc. Consent Agreement and Final Order. EPA Docket No. CAA-06-2018-3331. September 11, 2018.
- 109 U.S. EPA. Region 6 Dallas. In the Matter of Ascend Performance Materials Texas, Inc. Consent Agreement and Final Order. EPA Docket No. RCRA-06-2019-0918. June 25, 2019 at 6, 8, 15, and 22.
- 110 SK Capital Partners (June 1, 2017).
- 111 ATSDR. "[Public Health Statement Formaldehyde CAS # 50-00-0](#)." September 2008 at 6.
- 112 EPA TRI. ECHO database. [SI Group Freeport. FRS ID No. 110000463427](#). Accessed December 2019.
- 113 Martin, Florian. "[Refinery plant explosion in Texas poses questions about chemical safety rules.](#)" *NPR All Things Considered*. November 27, 2019.
- 114 Shimshack, Jay P. Prepared for U.S. Environmental Protection Agency's Office of Research and Development and Office of Enforcement and Compliance Assurance. "[Monitoring, Enforcement & Environmental Compliance: Understanding Specific & General Deterrence.](#)" October 2007; Organization for Economic Cooperation and Development. "[OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response.](#)" 2003.
- 115 Editorial board. "[Texas isn't policing petrochemical plants.](#)" *Houston Chronicle*. December 10, 2019.
- 116 Kelderman, Keene et al. Environmental Integrity Project. "[The Thin Green Line.](#)" December 5, 2019 at 6 and 8.
- 117 Eilperin, Juliet and Brady Dennis. "[Under Trump, EPA inspections fall to 10-year low.](#)" *Washington Post*. February 8, 2019.
- 118 Kennedy; Collins.