Exhibit 1

Matthew P. Johnson

Black Gold of Paradise: Negotiating Oil Pollution in the US Virgin Islands, 1966–2012

Abstract

In 1966, North American oilman Leon Hess built a large petroleum refinery on the south shore of St. Croix, in the US Virgin Islands. Once expanded in 1975, the refinery became the largest in the world and provided decent-paying jobs to local and immigrant workers and filled government coffers with tax revenue. Environmental protection measures loomed large in the agreement to build and expand the refinery, but such safeguards did not prevent pollution. The refinery destroyed the territory's largest mangrove forest, fouled coastal waters, contaminated groundwater, and sent clouds of carcinogens into neighboring communities. This article argues that the government of the US Virgin Islands viewed the south shore as a sacrifice zone, an area where severe environmental degradation was an acceptable tradeoff for economic progress. Hess took advantage of this attitude and was able to get away with heavy pollution so long as the worst offenses were contained within

Matthew P. Johnson, "Black Gold of Paradise: Negotiating Oil Pollution in the US Virgin Islands, 1966–2012," *Environmental History* 24 (2019): 766–792

doi: 10.1093/envhis/emz031
Advance Access Publication Date: 18 June 2019

the south shore industrial zone or towed offshore. For a time, this strategy worked to satisfy many residents and government officials, who valued the economic benefits that refining brought. However, after the turn of the century, the refinery's reputation soured. Its environmental footprint widened as accidental releases of airborne pollutants that engulfed nearby communities became more frequent. Then, in 2012, Hess Corporation closed the refinery, eliminating all of its benefits. These concurrent developments led many US Virgin Islanders to reconsider their cost-benefit accounting, as it became apparent that the refinery's extensive environmental costs were more enduring than its economic benefits.

INTRODUCTION

On August 18, 1965, a concerned US citizen named Wardwell Howell wrote a letter to Secretary of the Interior Stewart Udall and First Lady Claudia Alta "Lady Bird" Johnson. In the letter, Howell lamented the construction of an oil refinery that oilman Leon Hess was planning to erect on St. Croix in the US Virgin Islands. He worried that the refinery would pollute the environment and disrupt tourism, and he asked Udall and Johnson to halt construction. Howell complained that "the refineries will be so situated that their refuse and fumes will be blown by the trade winds down the southern side of the island where there are now magnificent beaches. This cannot help but reduce its appeal as a vacation resort, its principal economic function." This was the second letter Udall and Johnson received that week on the subject. The first, written by Dana Emmons, also stressed the danger that oil refining posed to the island's natural landscapes. Howell concluded that "we who love St. Croix want to keep it as unspoiled as can be in this day and age. It is a natural playground in a world that is fast losing its open spaces."[1] For the local government that had recruited Hess, petroleum refining promised to bring in much needed revenue, but, for Howell and Emmons, the refinery threatened to degrade the island's stunning natural environment.

Johnson and the Department of the Interior thought otherwise. Both believed that oil refining and preservation were compatible, and both supported Hess. Johnson responded optimistically, remarking that "as America grows, private industry will work with local officials and interested citizens to assure the preservation of choice spots of natural beauty and to avert some of the unfortunate forms of

destruction which you describe."[2] Acting Director of the Office of the Territories John Kirwan, responding on behalf of Udall, was cooler in his response, but he came to the same conclusion. Kirwan stressed that, as part of the agreement, Hess would invest in conservation measures and adhere to regulations designed to curtail pollution. To further reassure Howell, Kirwan noted that the Virgin Islands' legislature had recently sent four representatives to a Hess Oil refinery in Perth Amboy, New Jersey. The legislators concluded that the environmental protection measures in place were sound and that Hess could refine oil in St. Croix without heavy pollution.[3] On September 1, 1965, the US Virgin Islands legislature voted unanimously to approve the refinery.

The tension between oil refining's benefits and its environmental costs deepened after Hess completed his refinery in 1966. Once expanded in 1975, the refinery became the largest in the world, and it provided decent-paying jobs to local and immigrant workers, whose spending helped stimulate the economy. Additionally, the Hess Oil Virgin Islands Company (HOVIC) paid taxes, which the territorial government used to expand its bureaucracy, making it the territory's largest employer.[4] The government also used the revenue to create the Department of Conservation and Cultural Affairs (DCCA), which monitored water and air pollution and carried out conservation projects throughout the territory. On the other hand, the refinery replaced the island's largest mangrove forest, fouled the coastal waters along the south shore, created one of the largest inland oil spills in United States' history, and released clouds of pollutants that sickened nearby communities.

The government of the US Virgin Islands viewed the south shore as a sacrifice zone, an area where severe environmental degradation was an acceptable tradeoff for economic progress.[5] Hess took advantage of this attitude and was able to get away with heavy pollution so long as the worst offenses were contained within the south shore industrial zone or towed offshore. For a time, this strategy worked to satisfy many residents and government officials, who valued the economic benefits that the refinery brought. However, after the turn of the century, the refinery's costs began to outweigh its benefits, and its reputation soured. The refinery's environmental footprint widened as aging equipment and cuts to maintenance budgets led to egregious releases of pollutants. Just when the government and residents were growing increasingly weary of the refinery's ecological costs, Hess Corporation (Hess Corp) eliminated all of its benefits; the refinery's closure in 2012 shocked the territorial government and made it apparent that the long-term environmental changes unleashed along the south shore would be more enduring than the economic benefits that the refinery had generated.

THE ECOLOGY OF OIL REFINING

Environmental historians studying the modern Caribbean have not given sufficient attention to industrialization.[6] Most study sugarcane and its attendant environmental consequences, but fossil fuel-powered industrialization has had as great an impact on the modern Caribbean as sugar. In the second half of the twentieth century, many Caribbean governments set out to diversify their economies through industrialization. The US Caribbean territories and their oil refineries provide ideal case studies because refineries had large environmental footprints, threatened to foul landscapes that were vital to sustaining tourism—another important form of economic diversification—and flooded the territories with cheap petroleum that governments needed to power electrical grids and desalination plants.[7] Petroleum revolutionized life in the Caribbean, and oil refineries were at the heart of the environmental controversies that surrounded fossil fuel-led growth.

Most environmental historians who study the oil industry have focused on extraction rather than on refining, and there is as yet no work that studies refineries at the same depth as Myrna Santiago's *The Ecology of Oil* (2006).[8] The ecology of oil refining differs from the ecology of oil extraction in important respects. Many histories of extraction document oil booms in the late nineteenth or early twentieth centuries, when gushers and oil spills located far from population centers were not mourned as environmental disasters but, rather, celebrated as harbingers of progress and material wealth.[9] In contrast, Hess erected his large refinery during the emergence of the modern environmental movement, an era in which environmentally conscious citizens and politicians paid attention to the health impacts of oil refining. Moreover, Hess built his refinery on two thousand acres of land zoned for industry, but the island of St. Croix is small enough that growing neighborhoods soon abutted the industrial complex (figure 1). As a result, Hess, like other operators of twentieth-century refineries, had to work to contain the deleterious impacts of his operations within very specific sacrifice zones.

There is little consensus, however, about what constitutes an acceptable tradeoff within such zones. Martin Melosi and Joseph Pratt, for instance, have argued that, despite having withstood severe pollution, Houston's metropolitan area has largely benefited from oil-driven growth because it experienced spectacular and sustained economic growth as a result.[10] For most of Houston's history, there was little effort to mitigate pollution because there was a broad agreement among the business and political elite that controlling pollution was a secondary concern to economic growth. In St. Croix, however, there was no such consensus. On the one hand, the island stood to benefit immensely from oil-led growth, but, on the other, pollution

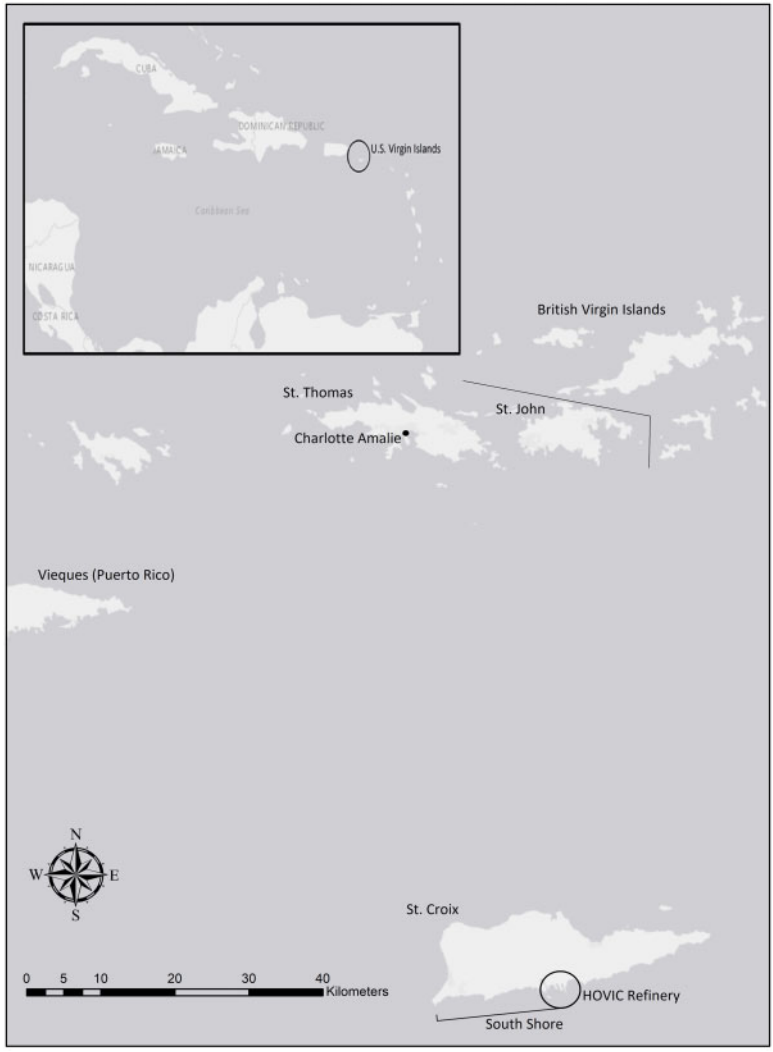

Figure 1. Map showing the location of the HOVIC refinery and south shore. Credit: Map produced by author using ArcGIS.

from refining threatened tourism, the islands' leading economic activity. Rather than prioritizing economic growth outright, as Houston had, the US Virgin Islands tried to balance the exigencies of economic growth and conservation.

The US Virgin Islands' liminal position in the United States' political economy constrained the territorial government's options as it attempted this balancing act.[11] As Melosi, Pratt, and Kathleen

Brosnan have shown in their study of cities tightly tied to the global energy market, cities that benefited most from energy production were those that had a strong government that could invest in energy-related infrastructure, negotiate tax policies to retain a large portion of the revenue for local development, and regulate the worst environmental costs.[12] In the US Virgin Islands, Hess took advantage of the ambiguous political situation to gain massive tax and oil quota exemptions, which brought his company tremendous profit. The territorial government had neither the strength nor the resources to negotiate a more equitable deal and hold the refinery accountable for its environmental damage. However, the refinery generated enough revenue for the territory that the government reluctantly accepted its pollution so long as it was confined to an informal sacrifice zone. The federal government helped mitigate the worst of refining's environmental footprint, but it did not stop the refinery from fouling the south shore. Refining in the US Virgin Islands brought with it both costs and benefits, and imperial politics shaped their uneven distribution.[13]

CREATING A CARIBBEAN BAYONNE

The territorial government enticed Leon Hess to build his oil refinery in St. Croix as part of an economic diversification strategy.[14] Sugarcane had long been the centerpiece of the Virgin Islands economy and remained important in the early postwar period. But, by the late 1940s, the sugar-based economy was stagnating, and Governor William Hastie proposed industrialization as a means of broadening the territory's economic base.[15] However, his reforms, and those of subsequent administrations, did little to attract industry during the following decade, and tourism became the linchpin of the economy.

Beginning in the early 1960s, Governor Ralph Paiewonsky, former businessman and the islands' last federally appointed governor, successfully engendered an industrial boom that revolutionized the Virgin Islands. Paiewonsky oversaw the passage of two laws that attracted industrialists to St. Croix. In November 1961, Paiewonsky approved the Industrial Incentive Law, which allowed the government to grant substantial tax breaks to corporations investing in the Virgin Islands, and, in December of that same year, he signed a zoning and subdivision law that designated much of St. Croix's flat and fertile south shore to industry.

These tax incentives sweetened an already attractive deal. Businesses operating in the US Virgin Islands were exempt from the Jones Act (1920) requirement that only US vessels could be used to transport goods between US ports, which allowed them to use foreign tankers with lower rates to ship products to the mainland.[16]

Moreover, section 301 of the US Tariff Act of 1930 allowed industries operating in the US Virgin Islands to export products duty free to the mainland so long as 50 percent or more of the production cost was added in the US Virgin Islands.[17] These favorable economic conditions attracted the attention of aluminum producer Leo Harvey and oilman Leon Hess, and the territorial government went even further to court them.

In September 1965, the Virgin Islands legislature ratified an agreement that Paiewonsky and Hess negotiated, in which Hess got complete exemption from all property taxes, license fees, import duties, and excise or gross receipt taxes on exports and only had to pay 25 percent of the company's income tax liability for sixteen years.[18] The resulting savings were massive. In 1981, when the sixteen-year tax exemption period ended, the company negotiated with the government to extend it (which they extended again in 1990 and 1998). Following the second extension, the Department of Interior's Office of Inspector General (DOI OIG) audited HOVIC, and their findings illustrated how lucrative the tax concessions were for the company. The DOI OIG found that the company was saving $3.61 for every one dollar it paid in taxes to the territorial government, which amounted to a total savings of $6.2 billion since the agreement was first negotiated.[19]

Loopholes in the Mandatory Oil Import Program (MOIP) provided two final incentives that made the US Virgin Islands even more attractive. The MOIP was a program that the federal government implemented in 1959 to help domestic oil producers remain competitive against cheap foreign oil by limiting the amount of foreign oil to 12.2 percent of domestic production.[20] However, the US Virgin Islands' position on the periphery of the US empire, and outside of customs zones, meant that oil imported to the territory was not limited by the MOIP's restrictions.[21] Thus, refineries there had ready access to cheap foreign oil that was not available to other refineries on the mainland.

The second and more important loophole was that, although oil exported from the US Virgin Islands to mainland markets was still subject to the MOIP's restrictions, these quotas were negotiable for refineries in the Caribbean territories. Consequently, Hess lobbied Udall for an exemption from the MOIP's restrictions, and the territorial government supported him. Paiewonsky, along with over thirty senators, politicians, and businessmen, testified before Congress on the benefits that refining would bring to the territory.[22] Their arguments persuaded Udall, who awarded Hess an import quota of fifteen thousand barrels per day in 1967, which allowed him to expand his refinery.[23]

Although Udall's decision to grant an exemption that would widen the refinery's environmental footprint seems to be at odds with his environmentalist reputation, two sentiments compelled him to

support the US Virgin Islands' economic growth over the protests of domestic refiners and even his own advisors. First, Udall sincerely lamented the dramatic inequalities that characterized the federal government's relationship with the Caribbean territories and strove to improve the standard of living for people there. Second, the fear of socialism also pressured Udall to prioritize economic growth in the United States' Caribbean territories over the goals of the MOIP. After the Cuban revolution, the United States looked toward its Caribbean territories as models for the promises of development under the capitalist model. In a speech dedicating the Philips Petroleum Refinery in Puerto Rico in 1967, Udall argued that the Puerto Rican refinery's greatest export would not be refined petroleum but, rather, the example of a capitalist success story.[24] Together, Udall's desire to improve the standard of living for those in the US Virgin Islands and to prove the superiority of the capitalist model over socialism led him to approve Hess's application for an exemption from the MOIP.

Udall accepted the anticipated environmental damage as a necessary tradeoff for material progress and political advantage, but he argued that the industrial advance should stop with Hess. Udall justified his support for the MOIP quota by arguing that the south shore had already been zoned for industry and that Hess would pay into a conservation fund.[25] Yet these measures alone were not sufficient to ease his conscience for approving the destruction of an environment he would have preferred to protect.[26] After granting Hess his quota, Udall pronounced that he would firmly reject any further quota applications for the US Virgin Islands. His decision was made with the explicit intent "to protect and conserve the incomparable reefs and beaches which represent the finest asset of these beautiful but fragile islands."[27] Udall hoped his declaration would help contain the damage from industrialization within the confines of the refinery.

Support for the MOIP exemption brought further financial benefits to the territorial government, which were used to protect the environment. In return for government support, Paiewonsky charged Hess fifty cents per barrel of oil exempted under the quota, which amounted to an additional $2.7 million annually. Paiewonsky used the money to create the DCCA, the predecessor to the Department of Planning and Natural Resources (DPNR), which was charged with monitoring and preventing water and air pollution.[28] The irony that the principal source of funding used to protect the islands' environment came from legislation designed to accelerate industrialization and its attendant environmental problems along the south shore was not lost on environmentalists.[29]

Having secured generous tax exemptions from the territorial government and a favorable quota allocation from the Department of the Interior in the early 1970s, Hess embarked on an ambitious

Year	Throughput capacity for crude oil measured in barrels per day (BPD).
1966	50,000 BPD
1967	70,000 BPD
1968	100,000 BPD
1969	220,000 BPD
1970	250,000 BPD
1971	440,000 BPD
1972	418,000 BPD
1973-74	590,000 BPD
1975-80	728,000 BPD[a]
1981	640,000 BPD
1982-83	600,000 BPD[b]
1984	545,000 BPD
1985-86	600,000 BPD
1987-98	545,000 BPD
1999-2001	525,000 BPD[c]

Figure 2. Annual refining capacity of Hess Oil Virgin Islands Co. refinery in St. Croix, 1966-2001. Credit: Figure produced by author based on data from *Oil and Gas Journal*'s Annual Reports on Worldwide Refining.

[a]In 1975, the HOVIC refinery surpassed Venezuela's Amuay Refinery, which had a 600,000 BPD throughput, to become the largest oil refinery in the world. *Oil & Gas Journal*, December 29, 1975, 158.

[b]In 1982, Venezuela's Amuay Refinery, with a 630,000 BPD throughout, surpassed the HOVIC refinery to become the largest oil refinery in the world. *Oil & Gas Journal*, December 27, 1982, 171. Refineries in India and South Korea have since outstripped the Venezuelan refinery, but the Paraguaná Refinery Complex, of which it is a part of, remains one of the largest refining areas in the world.

[c]The HOVIC refinery's throughput capacity for crude oil remained roughly 500,000 BPD until it closed in 2012.

program to expand his refinery's production capacity. By 1975, the HOVIC refinery boasted a throughout capacity of 728,000 barrels per day, making it the world's largest until Venezuela's Amuay refinery surpassed it in 1981 (figure 2). As the refinery grew in size, so did its potential to destroy the fragile coastal environment that many ecologically minded politicians, residents, and mainland visitors sought to preserve. In response to Emmons and Howells's worries, acting Director of the Territories Kirwan had remarked that the office did not "expect St. Croix to become another Bayonne. But if the people of Bayonne are free to make a Bayonne out of Bayonne, I guess the

Virgin Islanders are entitled to the same choice."[30] Though these politicians may not have realized the full implications of their decisions at the time, the government was indeed well on its way to turning the south shore into a Caribbean Bayonne.

LOSING A CARIBBEAN EVERGLADE

One of the first environmental consequences of the oil refinery's construction was the displacement of Krause Lagoon, the island's largest mangrove lagoon. As a child, ecologist George Seaman frequented the marsh to explore and hunt, and his later writings provide vivid descriptions of the lagoon and the abundant wildlife that it once supported. In 1974, he reflected on Krause Lagoon in front of a conference on environmental protection in the US Virgin Islands: "Do you know what Krause Lagoon was? Let me tell you: our only Everglade. A sea, sand and mangrove wilderness of such ecologic value and nostalgic beauty that it could take your breath away."[31] Seaman recalled an afternoon when he was startled by the sound of what he thought was thunder, but, upon looking up, found thousands of ducks soaring into the sky, and remembered marine life of such abundance that he could catch dozens of lobsters and fill a large bag with oysters in an hour.[32] He wrote: "The harmonious and symbiotically interwoven universe of this tropical tideland exuded emotion and staggered comprehension … to those of a theological bent the creator was not far away."[33] For Seaman, Krause Lagoon radiated magic that was worth saving.

Policy-makers, however, held a rather different view of the lagoon and contended that refineries would be in the interest of the greater good. In 1962, for instance, Paiewonsky approved construction of a bauxite refinery and reflected in his memoirs that "the area I had in mind was located in Krause Lagoon on St. Croix's South Shore; most of it was swampland infested with mosquitoes and sand flies that could be a menace to health."[34] Environmentalists asserted that the area was a habitat for vibrant plant, bird, and fish life and home to rare species such as the bonefish.[35] But, upon inspection, Paiewonsky declared that he "found it to be a city dump; I did not see any bone fish, but only fish bones, which I did not consider worth saving."[36] Three years later, the government and local landowners ceded the eastern half of Krause Lagoon to Leon Hess. After construction began in 1965, Hess dredged the lagoon, filled it in with sand, and replaced the mangrove trees with a forest of smokestacks and storage tanks (figure 3). Voices of the lagoon—birds, rainstorms, and the silences that followed them—were replaced by voices of industry, such as the sounds of blaring car horns, grinding machinery, and busted mufflers.[37]

Figure 3. HOVIC refinery, St. Croix. View showing western refining complex. Credit: Photography by author, May 2018.

The destruction of Krause Lagoon was foreordained by the local government's decision to zone the south shore for heavy industry, but its loss was intentional and accepted to protect environmental quality elsewhere. Hess's first choice was to build his refinery on St. Thomas, near Charlotte Amalie, a deep-water port considered one of the best harbors in the Caribbean. However, Charlotte Amalie was the capital and a burgeoning tourist hub, and Paiewonsky decided that St. Thomas's southern shoreline was too great a resource to risk fouling with refining refuse.[38] Instead, Paiewonsky deemed St. Croix's south shore, far from the heart of the islands' tourist industry, suitable to industrialization and its attendant environmental consequences.

BLACK AND MILKY WHITE WATERS

Krause Lagoon's transition from mangrove swamp to industrial forest was only the first in a series of environmental transformations unleashed along the south shore. Dredging for the port and shipping channels destroyed marine life and created a biological dead zone along much of the south coast. In 1970, the newly created Environmental Protection Agency (EPA) became involved in a lawsuit in which a local landowner from the south shore brought charges against HOVIC for dredging-related pollution. As the case unfolded,

experts from various departments testified about the ecological conditions along the south coast. For instance, Rudolph Shulterbrandt, acting commissioner for the US Virgin Islands Department of Agriculture and Recreation, argued that pollution from HOVIC dredging created a "marine desert" along a large part of the south shore. He cited studies done by marine biologists after the refinery's construction in the late 1960s that found silting had killed coral reefs and all other marine life along fourteen miles of coastline.[39] Subsequent studies found that the south shore's reefs and most of the marine life never recovered.[40]

For a number of reasons, the industrial development of the south shore led to silting that kept sunlight from reaching underwater plants and coral, undercutting the food chain and leading to the disappearance of entire fish communities.[41] The demise of coral reefs brought the additional consequence of changing the character of the shoreline. Without reefs to absorb and slow the impact of the tides, currents and waves cut into shorelines and eroded beaches (further contributing to water turbidity). Krause Lagoon itself used to slow the velocity of storm waters and waves, which crashed with greater intensity along the south shore in the wake of construction, further eroding the shoreline.[42] Both the oil and bauxite refineries continued to dredge their ports and shipping channels to maintain their sixty-foot depth, and much of the dredging waste continued to wash down the south shore, leaving sediment that might remain trapped in the water for as long as two years.[43] Furthermore, Krause Lagoon had previously drained twelve thousand acres and functioned as a trap for sediments carried southwards by the island's small streams. Without the lagoon, these sediments flowed directly into the ocean where the current pulled them westward down the coast.[44] The combination of these factors turned once clear blue waters along the south shore milky white and once glistening sandy beaches into rocky cliffs (figure 4).

The expansion of the refinery also brought more tanker traffic, which increased the potential for oil spills. Hess was more successful in mitigating this damage. Oil tankers did pollute the coastal waters, but the spills remained contained to the south shore, and the refinery responded with well-publicized cleanup efforts that showed residents they were working to ameliorate the problem. The local press generally lauded the company's cleanups, and coastal oil spills, though common enough, were not high on the list of complaints environmentalists leveled against the refinery. US Virgin Islanders accepted small spills so long as they were confined to the already-degraded south shore and cleaned up promptly. Moreover, when refinery managers caught leaks in time, they succeeded in removing spilled oil from the south shore altogether. On January 22, 1975, the supertanker *Michael C. Lemos* ran aground on a reef off the south shore of St. Croix and started to leak. When the breach was discovered after

Figure 4. Ecologist Olasee Davis looks out over a once glistening beach on St. Croix's south shore. Credit: Photograph by author, May 2018.

the ship reached the HOVIC harbor, refinery officials immediately ordered that the tanker be towed forty-five miles out to sea so that its leaking oil would not foul the shoreline.[45] As the ship moved offshore, it left an oil slick fifteen miles long and three miles wide in its wake. Out at sea, the supertanker spilled between roughly three thousand and nine thousand barrels of oil, but none of it ever washed up onshore.[46] Refinery workers thereby spared the coastline from one of the largest oceanic oil spills in the south shore's history.

By the early 1970s, businessmen began arguing that the damage along the south shore's coastline justified further development in the area. Oilman Gideon Hadary applied to build a second refinery next to HOVIC, but local residents and the government worried about the venture's environmental footprint. Hadary protested that his operation could do no further harm because damage had already been done. The south coast, he claimed, was already "biologically dead" because of the dredging undertaken by the neighboring bauxite and oil refineries.[47] His argument was unconvincing, however, and successive federal environmental regulations delayed and ultimately undermined the project.[48]

The failed refinery affirmed that limits to the sacrifice zone had been drawn around the industrial forests already erected on the south shore and their damage along the coast. However, as the HOVIC refinery expanded, its environmental footprint threatened to break free from the

confines of Krause Lagoon and the south shore's coastal marine environment and compromise the health of nearby communities.

OIL ATOP THE AQUIFER

HOVIC managers also attended to underground spills. Slow leaks from HOVIC's underground oily water sewers, pipelines, and storage tanks, created one of the largest inland oil spills in US history. In 1982, HOVIC began installing wells to monitor for groundwater pollution in order to comply with the new EPA regulations under the Resource Conservation and Recovery Act (RCRA).[49] To the drilling technicians' surprise, Well no. 7 in the gasoline-blending area of the southwest side of the refinery struck a six-foot-deep plume of oil floating on top of the groundwater. Subsequent wells found that this huge oil plume was not isolated. HOVIC hired a consulting company to investigate and report on the extent of pollution and the company drilled more than sixty wells, consistently finding oil plumes between one- and ten-feet thick sitting atop the water table.[50]

The amount of petroleum contaminating the groundwater turned out to be colossal. In 2010, the EPA estimated that HOVIC's leaky pipes and storage tanks had released roughly 43.4 million gallons of oil into the groundwater below the refinery, over four times the amount of petroleum released into the ocean by the *Exxon Valdez* in 1989. Between 1987 and 2010, HOVIC removed 42.3 million gallons of this oil from atop the water table, though much of the remaining million gallons was unrecoverable, and some of the chemicals in the petroleum had dissolved into the groundwater, permanently contaminating the aquifer beneath the refinery.[51]

The potential leakage of oil offsite predictably emerged as an ongoing source of tension between the surrounding community and the refinery. The HOVIC refinery sits atop the southernmost end of Kingshill Aquifer, St. Croix's only major aquifer. Residents of the US Virgin Islands get freshwater from both groundwater and desalinization, but most comes from the former source. In 2004, groundwater accounted for 60 percent of the roughly 3.6 million gallons of water per day consumed in the US Virgin Islands, and the Kingshill Aquifer alone was responsible for 67 percent of all groundwater withdrawals. Replacing groundwater with desalinated water would be prohibitively expensive and environmentally harmful because desalinization is energy intensive.[52] Therefore, the Kingshill Aquifer is a critical resource for the island, and residents worried about threats such as hydrocarbon pollution.

Despite egregiously contaminating the subsurface below the refinery, HOVIC was able to contain the oil spill onsite and has thus far avoided polluting public drinking water wells. The Kingshill Aquifer

flows slowly from north to south, and this flow gradient pushes much of the oily water released into the ground below the refinery toward the sea rather than north, west, or east toward the pumping fields. [53] Moreover, HOVIC's pumping system helped prevent oily effluents from migrating by creating cones of depression that drew contaminated water toward the pumps rather than allowing it to drift offsite.[54] Thus, both geologic conditions and pumping limited the extent to which pollution from the refinery traveled offsite and contaminated local water supplies and marine life.

Yet the oil remains a threat to the aquifer. Should the refinery cease pumping and should pumping accelerate at nearby public wells, the gradient of the aquifer could be temporarily reversed, and pollutants could contaminate drinking water. Such a scenario might occur because of population pressures, drought, an increase in the price of fuel oil that makes desalinization too expensive, or, more likely, in the aftermath of a hurricane. For three months following Hurricane Hugo in 1989, power outages rendered groundwater the only source of water for most of the population on St. Croix.[55] One of the consequences of the tenure of the HOVIC refinery is a permanent threat to a very scarce and important resource on St. Croix.

On May 5, 2005, the DPNR filed a civil lawsuit against both south shore refineries for damage to the local environment, with groundwater pollution as a major part of the lawsuit, and HOVIC was able to convince the court that their actions did not merit punishment. In 2014, after a long period of discovery, the defendants filed for summary judgment.[56] The judges agreed with the DPNR that oil refining was abnormally dangerous because some pollution is inevitable and freshwater is a scarce resource. However, outweighing these factors was the fact that the refinery could and did mitigate the risk by maintaining equipment and monitoring for contamination. Most telling, however, was the sixth and final criterion by which the judges made their decision. The court concluded: "While we do not minimize the dangerous attributes of a refinery and its storage facilities, they do not outweigh the substantial benefit and value the refinery and its storage facilities brought to the community of the Virgin Islands."[57] The court ruled in favor of the refinery for summary judgment and did not hold them accountable under strict liability. For the court, the subsoil beneath the refinery and the threat it posed to community health was an acceptable tradeoff for the greater good of the US Virgin Islands.

A FORBIDDING FOREST OF SMOKESTACKS

The HOVIC facility threatened the island's air quality as well as its water resources. In the late 1960s, residents in communities

surrounding the refinery began complaining about emissions from the refinery.[58] On St. Croix, trade winds blow predominantly westward across the island. These wind patterns shift slightly throughout the year, but because the south shore is protected by hills from the northerly winds, winds blow from the southeast, east, and northeast 93 percent of the year.[59] This means that pollution released by the refinery's smokestacks is blown across communities northwest, west, and southwest of the refinery. For the first two decades of the oil refinery's operation, it proved difficult for residents to determine where the discharges they complained about were coming from. The neighboring bauxite plant released airborne pollutants, and the south shore was also home to many small manufacturing plants and a large landfill. When residents complained about air pollution, the industrial plants along the south shore often blamed one another, and the local government seldom investigated further.[60]

In the late 1980s, this pattern changed. In 1987, the EPA began requiring HOVIC to release annual reports about airborne pollutant emissions.[61] These annual reports provided sufficiently precise records that allowed residents to determine culpability and file complaints against the refinery. The company's reports confirmed local residents' fears that the refinery had been contaminating the air. In 1989, HOVIC reported that it had released 700,000 pounds of benzene, a carcinogen produced as a by-product of oil refining, that year.[62] The report raised concern among nearby residents who had long worried that vapors released by the refinery were connected with health problems they had been experiencing. Lawsuits and pressure from the federal government forced the refinery to comply with stricter emissions standards, and benzene emissions declined. Between 1989 and 1990, the refinery reduced its benzene releases from 378,000 pounds to 166,652 pounds, a dramatic cut of more than half of its emissions.[63]

This decrease led the refinery to boast that since the 1990s it had maintained a relatively clean air pollution record.[64] The annual reports on atmospheric emissions of the refinery, which had sold half of its shares to Petróleos de Venezuela and begun operating as Hovensa in 1998, are unavailable to historians, so it is difficult to determine the veracity of these claims. Certainly, pollution escaped the refinery's smokestacks. But it appears that, generally speaking, the refinery did well to curtail its normal emissions of airborne pollutants. In the 1990s, the DPNR found that the overall air quality in the south shore industrial area was better than in most urban areas in industrialized countries.[65]

Unfortunately, the refinery's record was not so glistening for accidental releases. Between October 2008 and May 2011, a series of accidents sent clouds of pollutants across neighboring communities.[66] The worst incident occurred on the morning of December 9, 2010,

when a valve on a coking unit malfunctioned. The eight-minute release sent a pall of liquefied petroleum gas, naphtha, diesel, and gas oil over nearby neighborhoods. The local high school had to close at 10:00 a.m. because hundreds of students had become ill, and locals reported that a visible haze and foul odor hung over the school grounds.[67] After subsequent investigations, the EPA determined that the refinery had released 5,000 pounds of hydrocarbons and eighty-five pounds of hydrogen sulfide.[68]

Such accidents were nothing new for south shore residents. The number of accidental releases had increased over the previous decade and were frequent by the late 2000s. In October 2008, an accidental release coated nearby homes and cisterns with oil, contaminating drinking and bathing water.[69] After one such incident in 2010, one resident, Elvira Cruz, could not breathe, passed out, and was taken to the intensive care unit at the local hospital where she stayed for four days. She was hospitalized three more times as a result of the exposure and eventually had to move. More common symptoms included headaches, nausea, vomiting, coughing, difficulty breathing, chest pain, sore throat, and burning eyes. When local resident Melinda Venture and her son J'Quan Jones were exposed to hydrocarbons inside their home, they could not breathe and soon developed headaches and blurry vision.[70] Exposure to refinery pollution and its attendant health consequences became an unfortunate reality for hundreds of people.

The federal government helped hold the refinery accountable. In response to the December 2010 incident, the EPA sued the refinery for violating the Clean Air Act.[71] The US Supreme Court ruled against the refinery and required that Hovensa pay more than $5.3 million in civil penalties for the incident and invest more than $700 million in additional pollution controls.[72] The settlement was decades in the making and part of a national wave of similar settlements. In the early 1990s, the EPA implemented the National Petroleum Refinery Initiative, under which the EPA gave refineries a choice: either settle with them in court and agree to upgrade pollution control measures or face the prospect of EPA inspections likely to uncover violations and lead to formal citations with hefty fines. Many chose the former. In St. Croix, discussions for a settlement began in 2004 but dragged on for years. The December 2010 incident violated the Clean Air Act and gave the EPA the leverage it needed to pressure Hovensa for a settlement.[73]

For the territorial government and local residents, the pollution that escaped the confines of the refinery and poisoned nearby communities eventually proved intolerable. In 2011, Louis Patrick Hill, senator and chairman of the Committee on Planning and Environmental Protection, wrote a letter to the St. Croix Environmental Association (SEA), in which he complained that "our

people's confidence in their corporate neighbor is waning, as is their assurance that the Virgin Islands government can protect their health and the health of their families."[74] In addition to jeopardizing the health of nearby residents, the refinery's string of accidental releases undercut its reputation as a company that could contain its pollutants within the informal sacrifice zone surrounding its property.

BLACK GOLD OF PARADISE?

The territorial government and local residents had reluctantly tolerated pollution up to this point because cheap petroleum had greatly enhanced life in the US Virgin Islands. Heavy fossil fuel use since 1945 facilitated unprecedented levels of population growth and material improvements worldwide. In the 1960s, Paiewonsky's industrial incentives and a concurrent tourist boom set these trends in motion in the US Virgin Islands. Between 1960 and 1973, the population of the islands increased from roughly thirty-two thousand to eighty-four thousand and between 1960 and 1980, the population of St. Croix grew from roughly fifteen thousand to fifty thousand. Immigration drove most of this population growth, as families from elsewhere in the Caribbean and the mainland moved to the US Virgin Islands for jobs in the tourist and manufacturing industries.[75]

The standard of living improved alongside population growth. US Virgin Islanders found decent-paying jobs in government, tourism, and industry that gave them a larger disposable income. Between 1960 and 1973, vehicle registration exploded from 2,264 to 24,396, and the government paved nearly all of the islands' roads. The government improved and expanded their electric grid, and televisions spread widely. Within two decades, the US Virgin Islands had transformed from a sleepy island territory to a society flush with all of the amenities of modern society and its attendant socioeconomic and environmental problems.[76]

Affordable petroleum undergirded the entire enterprise. Oil-powered jets and cruise ships brought tourists, whose spending stimulated the economy. Between 1960 and 1973, people visiting the islands by airplane increased from 124,000 to 743,000, and those visiting by cruise ship increased from 56,000 to 365,000. In addition to facilitating transportation to the islands, oil also powered economic growth in industrial countries that gave people more disposable income and leisure time to spend vacationing in the Caribbean.[77]

Cheap oil also helped electrify the island. Over the course of the 1960s and 1970s, electricity production—100 percent reliant on petroleum—increased tenfold.[78] Indeed, the Virgin Islands Water and Power Authority (WAPA) had been able to provide affordable electricity and water because the territorial government and Hess had

negotiated a deal by which HOVIC sold the public utility fuel oil at lower-than-market rates. This energy regime worked for a time, but it was vulnerable to the vagaries of Hess Corp. Access to discounted oil disappeared in 2012, after Hess Corp closed the Hovensa refinery and terminated its contract with WAPA, and US Virgin Islanders now face some of the highest energy rates in the United States.[79]

The refinery did more to benefit the economy than just supply subsidized petroleum to WAPA. During the 1990s and 2000s, the refinery employed more than two thousand direct and contract workers, whose paychecks not only supported their own families but had an important ripple effect throughout the entire economy. In 2011, the active workforce in the US Virgin Islands totaled 20,500 people, which meant that the refinery accounted for roughly 15 percent of the island's active workforce.[80] In addition to salaries, the refinery paid taxes and export fees, though these gains were not as much as they might have been without the refinery's massive tax breaks. In 1992, petroleum products from HOVIC accounted for $2 billion of the $2.3 billion generated from the territory's exports. One newspaper article that year argued: "Most agree that at least in the Virgin Islands, petroleum products can truly be called the gold of paradise as the refinery paid close to $350 million in salaries last year alone."[81] When the refinery closed in 2012, its operations made up 20 percent of the territory's gross domestic product.[82]

For much of its history, many residents believed these benefits outweighed the refinery's damage to the south shore. During the negotiations to renew HOVIC's tax concessions in 1981, for instance, the Ariel Melchor Sr. Foundation, a philanthropic agency that funded students interested in studying journalism, commissioned a survey to assess residents' attitudes toward the negotiations with the refinery and other pressing problems.[83] The results showed that two-thirds of US Virgin Island residents believed the refinery provided the territory with a net benefit, even if most of the respondents also believed that one refinery was sufficient.

The benefits of refining were appealing but not long lasting. Hovensa's abrupt closure in 2012 sent shockwaves through the US Virgin Islands. For some, the threat of unemployment and lost tax revenue was as foreboding as the announcement of an approaching hurricane. Senator Hill remarked that the closure would be comparable to a natural disaster, and one refinery worker said that the shutdown would be worse than Hurricane Hugo.[84] Churches published special editorials urging community members to maintain their faith during the coming economic storm. Even some environmentalists lamented the closure of the refinery. In 2013, the territorial government proposed a fourth amendment to the refinery's tax agreement intended to encourage Hovensa to sell the property to a company that would restart refining rather than convert it into a storage

facility.[85] SEA Director Paul Chakroff weighed in on the negotiations in support of restarting refining, expressing his faith that the requirements of the Clean Air Consent Decree negotiated between the EPA and Hovensa would satisfactorily ameliorate the refinery's air pollution problems. Chakroff argued that the site could not return to a pristine lagoon and appreciated the revenue used to fund environmental protection throughout the islands.[86]

The legislature eventually ratified the Fourth Amendment Agreement, but Hovensa never sold the refinery. The territorial government abruptly sued them for breaching their contract to continue running the refinery through 2022 and eventually reached a settlement.[87] In January 2016, the government sold the property to Limetree Bay Ventures LLC, which currently operates the refinery as an oil storage facility and plans to restart refining by December 2019.[88]

CONCLUSION

Oil refineries remain essential, but understudied, nodes in the modern industrial world's energy regime. The ecology of oil refining differs from the ecology of oil extraction insofar as the impacts of refineries are generally less extensive, but more threatening to large population centers. St. Croix's oil refinery is an especially captivating case study because it was built during the emergence of the environmental movement and on an island whose government invested in both heavy industry and tourism. The tensions between both paths are exemplified by Udall, who supported the MOIP's exemptions that allowed the refinery to expand its environmental footprint and also published essays that helped ignite the modern environmental movement. In the US Virgin Islands, the federal and territorial governments both struggled to reconcile the interests of large oil companies, territorial economic development, and environmental conservation. The outcome highlights the legacy of inequality that has resulted from the US Virgin Island's political status as an overseas territory, which limited the resources and options available to the territorial government as it sought to balance the exigencies of economic growth and environmental safety.

Environmental protection loomed large in the decisions to build and expand the refinery, but such attention to safeguards did not prevent contamination. HOVIC's refinery replaced the island's largest mangrove forest; its construction materials and petroleum fouled the coastal waters along the south shore; it accidentally leaked massive amounts of oil into the groundwater; and its smokestacks sent clouds of carcinogens into neighboring communities. The territorial government and the island residents reluctantly accepted such pollution so

long as it was contained onsite or along the coastal waters of the south shore and the refinery continued to provide the territory with economic benefits. When contamination escaped this informal sacrifice zone and the refinery closed abruptly, residents began to assess the refinery's legacy differently. Left to deal with environmental contamination without the refinery's financial benefits, US Virgin Islanders have begun to wonder if the refinery's black gold had in fact been pyrite.

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Notes

I would like to thank the following people for their help with this article. For reading and commenting on earlier drafts, J. R. McNeill, David Painter, Alison Games, Stephen Brain, Mark Hersey, two anonymous reviewers, and students at the Department of History at Georgetown University. For pointing me in the direction of some important sources, David Bond. For helping me locate important documents, Haley Maynard and other archivists at the National Archives in College Park, Maryland, Dana Aronowitz and Amanda Rudd at Georgetown University's Interlibrary Loan division, Kimberly Ramsey at the University of Arizona's Special Collections, David Abrines at the Environmental Protection Agency's (EPA) Region II Resource Conservation and Recovery Act office in New York City, Jennifer Valiulis at the St. Croix Environmental Association, Tamara Charles and Joseph Gasper at the US Virgin Islands Superior Court, and Syed Syedali, Verline Marcellin, and Norma Jackson at the US Virgin Islands Department of Planning and Natural Resources. Finally, for talking with me about the island's history and ecology, sharing his refinery-related documents with me, and welcoming me to St. Croix and showing me the south shore, Olasee Davis at the University of the Virgin Islands.

1 Wardwell Howell to Claudia Alta Johnson, August 18, 1965, Central Files of Office of the Territories (CF), Record Group (RG) 126, Box 483, Folder Industrial Development-Petroleum (IDP), National Archives II (NARA II), College Park, MD.
2 Claudia Alta Johnson to Wardwell Howell, September 9, 1965, CF, RG 126, Box 483, Folder IDP, NARA II.
3 John J. Kirwan to Wardwell Howell, August 20, 1965, CF, RG 126, Box 483, Folder IDP, NARA II.
4 In 1998, the Hess Oil Virgin Islands Company (HOVIC) sold half their company to Petróleos de Venezuela to create Hovensa. This article uses HOVIC to reference the refinery except when referring specifically to events after 1998.
5 According to historian Christopher F. Jones, the term "sacrifice zone" first came into popular use in the late 1980s, when US Department of Energy officials reportedly used the phrase to describe "nuclear laboratories in superfund sites that were too expensive to clean up." See Christopher F. Jones, *Routes of Power: Energy and Modern America* (Cambridge: Harvard University Press, 2014), 243.

6 David Watts, *West Indies: Patterns of Development, Culture, Environmental Change since 1492* (New York: Cambridge University Press, 1987); Richard Tucker, *Insatiable Appetite: The United States and the Ecological Destruction of the Tropical World* (Berkeley: University of California Press, 2000); Reinaldo Funes Monzote, *From Rainforest to Cane Field in Cuba: An Environmental History since 1492* (Chapel Hill: University of North Carolina Press, 2008); Stuart B. Schwartz, *Sea of Storms: A History of Hurricanes in the Greater Caribbean from Columbus to Katrina* (Princeton: Princeton University Press, 2015).

7 David Bond provides an excellent starting point in David Bond, "Oil in the Caribbean: Refineries, Mangroves, and the Negative Ecologies of Crude Oil," *Comparative Studies in Society and History* 59, no. 3 (2017): 600–28.

8 Myrna Santiago, *The Ecology of Oil: Environment, Labor, and the Mexican Revolution, 1900–1938* (New York: Cambridge University Press, 2006). Christopher Sellers provides an excellent start in "Petropolis and Environmental Protest in Cross-National Perspective: Beaumont-Port Arthur, Texas versus Minatitlan-Coatzacoalcos, Veracruz," *Journal of American History* 99, no. 1 (June 2012): 111–23.

9 Nancy Quam-Wickham, "'Cities Sacrificed on the Altar of Oil': Popular Opposition to Oil Development in 1920s Los Angeles," *Environmental History* 3, no. 2 (April 1998): 189–209; Nikolas Kozloff, "Maracaibo Black Gold: Venezuelan Oil and Environment in the Era of Juan Vicente Gómez, 1908–1935" (PhD diss., Oxford University, 2002); Brian Black, *Petrolia: The Landscape of America's First Oil Boom* (Baltimore: Johns Hopkins University Press, 2003); Paul Sabin, *Crude Politics: The California Oil Market, 1900–1940* (Berkeley: University of California Press, 2004); Santiago, *Ecology of Oil*.

10 Martin Melosi and Joseph Pratt, eds., *Energy Metropolis: An Environmental History of Houston and the Gulf Coast* (Pittsburgh: University of Pittsburgh Press, 2007); see also Joseph Pratt, *The Growth of a Refining Region* (Greenwich: JAI Press, 1980).

11 Most environmental historians of US imperialism study the ecological impact of companies and government initiatives in areas of informal influence, especially those germane to Cold War competition. Yet Caribbean territories were also important proving grounds for exporting capitalist-driven industrialization overseas, and territorial policies incentivized US corporations to establish industrial plants on these islands at a tremendous environmental cost. See Tucker, *Insatiable Appetite*; John Soluri, *Banana Cultures: Agriculture, Consumption, and Environmental Change in Honduras and the United States* (Austin: University of Texas Press, 2006); Nick Cullather, *The Hungry World: America's Cold War Battle against Poverty in Asia* (Cambridge: Harvard University Press, 2010), 108–34; Bartow J. Elmore, *Citizen Coke: The Making of Coca-Cola Capitalism* (New York: W. W. Norton & Company, 2014); Christopher Sneddon, *Concrete Revolution: Large Dams, Cold War Geopolitics, and the US Bureau of Reclamation* (Chicago: University of Chicago Press, 2015).

12 Joseph Pratt, Martin Melosi, and Kathleen Brosnan, eds., *Energy Capitals: Local Impact, Global Influence* (Pittsburgh: University of Pittsburgh Press, 2014).

13 Racism has been an enduring characteristic of US imperialism in the Caribbean that has influenced how the costs and benefits of industrial growth have been distributed. HOVIC was unexceptional in this regard. The greatest benefits of refining went to white company owners and managers from the mainland, while mostly black and Hispanic residents suffered the worst of the refinery's environmental consequences. However, racism does not seem to have influenced the territorial government's choice to zone the south shore for heavy industry, and the refinery's sacrifice zone was not racially biased at the territorial level. Racism was

rampant within the refinery, and I hope to discuss the racial tensions and environmental hazards that plagued the refinery's workscape in a future book-length publication. For representative explorations of the ways in which the environmental consequences of oil and industry have been inequitably spread across racial lines, see Revathi Hines, "African Americans' Struggle for Environmental Justice and the Case of the Shintech Plant: Lessons Learned from a War Waged," *Journal of Black Studies* 31, no. 6 (July 2001): 777–89; Barbara Allen, *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes* (Cambridge: MIT Press, 2003); Steve Lerner, *Diamond: A Struggle for Environmental Justice in Louisiana's Chemical Corridor* (Cambridge: MIT Press, 2005); Steve Lerner, *Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States* (Cambridge: MIT Press, 2010); Craig E. Colten, "An Incomplete Solution: Oil and Water in Louisiana," *Journal of American History* 99 (June 2012): 91–99.

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17 Ralph M. Paiewonsky and Isaac Dookhan, *Memoirs of a Governor: A Man for the People* (New York: New York University Press, 1990), 221. Tariff Act, March 13, 1930, 46 Stat. 590.

18 For the Hess negotiation, see "To Authorize the Governor of the Virgin Islands to Execute a Certain Agreement Relating to the Construction of an Oil Refinery and Other Related Facilities in the Island of St. Croix, Virgin Islands, and for Other Purposes," September 1, 1965, Bill 2639, No. 1524, US Virgin Islands Legislature (accessed through the Session Laws Library within the Hein Online Database).

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