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Radioactive Contamination, Superfund Remediation, and Green Gentrification in San Francisco's Hunters Point

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Abstract

Bayview-Hunters Point, a neighborhood in southeastern San Francisco, has long been one of the most impoverished and polluted areas in the city. In an example of environmental racism, much of the African American community in San Francisco was segregated to Bayview-Hunters Point by racist housing policies and practices. This neighborhood was home to the Hunters Point Naval Shipyard (HPNS), which was widely polluted with hazardous wastes from shipyard operation as well as radioactive contamination from the Navy Radiological Defense Laboratory established on this property. The former HPNS was made a federal Superfund site in 1989 and has been in remediation by the Navy since, with the goal of eventual transfer of the land to the city of San Francisco for redevelopment into residential and commercial areas. Throughout the history of the HPNS, government agencies have obscured both radioactive contamination and the nearby disadvantaged community in pursuit of military and economic power. As a result, the forces of redevelopment have outpaced remediation in Hunters Point. In this thesis, I argue that in continuing the environmental racism marginalizes the community in Bayview-Hunters Point and working to hide the contamination at the nearby Superfund site government agencies, primarily the Navy and city government, have fostered the conditions for green gentrification to occur, which could have ill effects on both the longstanding community and new residents.

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Preface:

Driving through the Bayview-Hunters Point neighborhood is a disorienting experience. In an effort to become more familiar with the neighborhood I was researching, I drove into San Francisco on a sunny July day to explore this area. After exiting the 101 freeway that borders the neighborhood I maneuvered through a few winding streets on the side of Hunters Point Hill, which faces the San Francisco Bay. These streets are lined with low-income housing units with idyllic names, like Mariner's Village and Shoreview Apartments. Many of the duplexes and apartments are clearly old and poorly maintained. As I drove down the hill and towards the water I passed a bright pink billboard, above a chain link fence, which announced, "Welcome to the SF Shipyard."

Figure 1: Sign welcoming visitors to the new SF Shipyard development.

This sign is not referring to the former Hunters Point Naval Shipyard, a place so contaminated it is being cleaned up as a federal Superfund site, but a few blocks of new

apartment buildings, which represent the start of a massive redevelopment project, intended to transform the entire area. The city and developers have dubbed this new neighborhood "the SF Shipyard," to recognize and celebrate the history of this section of San Francisco. I parked in this new development, suddenly engulfed in an entirely different atmosphere.

Figure 2: New homes in the SF Shipyard development. Photo courtesy of Suzanne Mankoff

After requesting a tour at the "Welcome Center," I was led into a two-bedroom apartment complete with shiny new appliances, staged with sleek blue and gray furniture, and an already installed Amazon Alexa system, ready for any music or lighting requests. The just over 1,000 square foot apartment I visited costs just under $1 million. After exiting the residence, standing amidst the sleek, and modern buildings surrounded by beautifully maintained lawns, native plants and art installations, it was difficult to remember I had just passed through what has long been one of the poorest, most disadvantaged communities in San Francisco. While within this brand new and manicured block, it can be easy to feel safe and clean. However, this illusion was quickly

shattered when I approached one of the several viewpoints set at the far end of this new development.

Figure 3: Apartment Buildings at the SF Shipyard development. Photo courtesy of Suzanne Mankoff.

Figure 4: Benches in the SF Shipyard development overlooking the San Francisco Bay.

Benches and signage encourage visitors and residents to enjoy the scenery of the bay, and the clear view of the East Bay hills on the other side. However, if you shift your eyes just slightly downward to the land that stretches out into the bay, you will see the remains of the original shipyard. Massive slabs of concrete, numerous crumbling warehouses and building full of broken windows, and perhaps, if you look closely enough at the chain link fence, signs with the symbol indicating radiation, are a part of this touted view.

Figure 5: The former Hunters Point Naval Shipyard, now in remediation as a Superfund site.

Perhaps to a prospective or current resident of the new Shipyard development this sight represents a temporary nuisance, soon to be redeveloped and beautified, sending their apartment values skyrocketing. However, to one with a more intimate knowledge of the level of toxic and radioactive contamination at this site, its proximity to these homes is troubling. As I stood overlooking a highly toxic site with the brand-new neighborhood

at my back, and the much older one just behind, I wondered how exactly this arrangement of people and pollution came to be, and how it would transform in the future.

Figure 6: Additional portions of the Hunters Point Naval Shipyard Superfund Site.

Introduction:

In January 2018, the Navy confirmed that one of their contractors working at the former Hunters Point Naval Shipyard (HPNS) had intentionally falsified data on soil samples at the site (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review"). The contractor, called Tetra Tech, was tasked with testing the soil for radioactive contamination and then completing the necessary cleanup work to remove or isolate it. For years prior, whistleblowers had alleged that when working for Tetra Tech at the HPNS supervisors had instructed them to discard samples that surpassed safe levels of contamination, label samples collected from

areas known to be clean as from location known to be radioactive, and otherwise fraudulently cover up the extent of radioactivity at the shipyard (Nguyen et al., "Contractor Submitted False Radiation Data at Hunters Point"). The Navy review confirmed these accounts; for years much of the cleanup had been faked. After the extent of data falsification at the HPNS became clear, the remediation, which had been ongoing for decades, received a new level of focus and scrutiny from the media. But this scandal was just one new chapter in a long history of the pollution in Hunters Point, and the people who live next door.

The Navy operated the HPNS from 1940 until 1974, using the shipyard particularly intensely during World War II. After the end of the war, the Navy established the Navy Radiological Defense Laboratory (NRDL) at the shipyard, where they decontaminated ships covered in radioactive material during nuclear weapons tests in the Marshall Islands and conducted experiments with radioactive elements. These operations extensively polluted the site with radioactive contaminants. The NRDL was cloaked in secrecy given its involvement in the Cold War and role in the development of military power, and so the toxic and radioactive contamination released there was also concealed (Dillon, "Crossroads in San Francisco"). The Navy is cleaning up the HPNS as a federal Superfund site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The former HPNS is located in the Bayview-Hunters Point neighborhood, in the southeast corner of San Francisco, which is one of the most impoverished areas in the city. As a result of racist housing policies and practices, a large population of African American residents has lived in the area for decades, many in public housing developments at the edge of the shipyard (Brahinsky). This neighborhood

has historically been defined and developed as separate from San Francisco as a whole, and the disadvantaged community hidden from view.

The segregation of African Americans in San Francisco to Bayview-Hunters Point, the location of not only the HPNS but also may other polluting industrial facilities, is an example of environmental racism. The concept of environmental racism was first widely recognized with the publication of *Toxic Wastes and Race* by the United Church of Christ's Commission for Racial Justice in 1987. The report found that waste facilities were much more likely to be located in nonwhite communities, and displayed the disproportionate effect of environmental burdens on nonwhite people (Bullard et al.). Environmental racism is not confined to discrete instances of the location of industrial facilities, but rather is much larger result of the structural racism ingrained in political and economic systems in the US, which privileges white people and leaves nonwhite people vulnerable to the health impacts of environmental degradation (Pulido). Since the publication of *Toxic Waste and Race,* the link between waste and the situation of various environmentally harmful factors has been extensively explored and documented (Bullard et al.). The environmental justice movement emerged in response to the prevalence of environmental racism. The EPA defines environmental justice as:

> The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies (US EPA).

In Bayview-Hunters Point, like many urban setting, environmental racism is tied to patterns of residential and industrial land use, the segregating effects of housing policies, and the process of suburbanization.

The environmental racism that shaped this community and led to its situation in the industrial center of San Francisco, exposed to all means of pollution, has continued throughout the Superfund remediation process. The still primarily African American community that lives next to the shipyard has also been excluded from the process of remediation through a lack of community involvement and consideration for their safety (Muhammad). In addition of the failures of the cleanup in relation to the nearby community, there have been many questions in terms of the extent the site has been tested and remediated. The revelation of fraud at the shipyard has led to a closer scrutiny of the Navy's practices throughout remediation, which have displayed the widespread use of questionable methods for evaluating the extent of radioactive contamination (Roberts, "New Reports Suggest Navy Likely Spread Radiation All over Hunters Point, Never Checked for Contamination"). In restricting soil sampling, utilizing low cleanup standards, and failing to remedy these issues when directed to by overseeing agencies, the Navy continues to hide the extent of radioactive contamination from public view. An understanding of the radioactive contamination at the shipyard is important not just to the current Bayview-Hunters Point community, but also those who now live on top of a part of the former HPNS, and others who potentially will in the future.

The eventual goal of remediation is the transfer of the shipyard property to San Francisco for redevelopment and multiple parcels of land formerly included in the Superfund site have already changed hands. The redevelopment plan is the largest the

city has undertaken since the 1906 earthquake and an entire new neighborhood, complete with residential areas, retail space, and acres of parks. The vision for this new use of the shipyard includes a focus on environmentally friendly features including the use of clean energy, green spaces, and a greentech incubator ("Hunters Point Shipyard and Candlestick Point"). On a portion of the shipyard declared clean and transferred to the city in 2004 this redevelopment is already well underway, with residents living in newly constructed apartment buildings. The majority of the housing created in the redevelopment will be market-rate apartments, condominiums and townhomes out of the price range of low-income residents of Bayview-Hunters Point (Dineen, *SF City Panel OKs Redesign of Giant Hunters Point Shipyard Project*).

As a result of the high cost of housing built at the former HPNS, its reliance on the cleanup of contaminated land and the environmentally conscious features and green spaces integrated into the redevelopment plan, the project has the potential to cause green gentrification. Gentrification has been an issue throughout San Francisco as the demand for housing in this relatively small city has increased and real estate values have skyrocketed with the late 1990s "dotcom" bubble and more recently the tech bubble. High rents have pushed many low-income nonwhite people out of San Francisco, especially in the historically Latinx Mission District (Mirabal). Green gentrification is the process in which urban greening initiatives and other environmental amenities result in an increase in surrounding property values, and the displacement of low-income residents (Gould and Lewis). As wealthier white people move in to be close to new parks or live in sustainable buildings, renters can be priced out of their homes. The concept of green gentrification is directly connected to environmental justice scholarship in that it not only

finds that environmentally degrading land uses are disproportionately found in disadvantaged communities, but also that with privilege, especially white privilege, comes access to environmentally conscious, green land uses (Anguelovski et al.). Therefore, the introduction of environmental amenities to the newly remediated HPNS with redevelopment is likely to become a catalyst for an increase of nearby property values and the displacement of people in the Bayview-Hunters Point community. In this case, green gentrification also extends a risk to people who have moved into the redeveloped shipyard and those who will do so in the future, given the problems with testing and cleaning up radioactive contamination in the Superfund site remediation.

Throughout the history of the HPNS, the drive to gain military and economic power has led government agencies to obscure both radioactive contamination at the shipyard and the nearby disadvantaged community. As a result, the forces of redevelopment have outpaced remediation in Hunters Point, putting current disadvantaged and future more privileged residents in danger of exposure to decades-old contamination. A continuation of this flawed redevelopment plan could lead toxic and radioactive pollutants to be further paved over rather than thoroughly cleaned up, endangering the health of those living and working in this new neighborhood and threatening to push out the community that has long existed in Hunters Point and suffered these effects. In this thesis, I argue that in segregating the African American community to Bayview-Hunters Point in an instance of environmental racism and working to hide the contamination at the nearby Superfund site during remediation government agencies, primarily the Navy and city government, have fostered the conditions for green

gentrification to occur, which could have ill effects for both the longstanding community and new residents.

I begin by delving into the history of both the HPNS, and the Bayview-Hunters Point community in Chapter 1. In describing the history of the shipyard, I uncover the origins of radioactive contamination at the shipyard and how it related to the pursuit of military goals. The history of the community nearby reveals how systemic racism evident in government actions resulted in environmental injustice in Bayview-Hunters Point, and the consequent obscuring of the neighborhood and people living there contributed to exposure to pollution and public health issues. In Chapter 2, I explore the remediation and redevelop that have occurred at the HPNS. I focus on the ways Navy plans and procedures have worked to hide the extent of radioactive contamination at the shipyard. I then explore the lack of community involvement in remediation has continued to marginalized Bayview-Hunters Point residents and perpetuated the effects of environmental racism. In Chapter 3, I argue that if the redevelopment proceeds in its current form, as more areas of the shipyard are declared clean, the SF Shipyard development will likely become an example of green gentrification. However, I show this example is different from other instances of green gentrification in that it may also be detrimental to privileged residents moving in as a result incomplete remediation. Overall, I link the past of environmental racism and hidden radioactive contamination with the future potential consequences of displacement in the longstanding community, and potential exposure for new residents.

Chapter 1: The History of Contamination and Community in Hunters Point

The creation of the toxic and radioactive contamination at the Hunters Point Naval Shipyard (HPNS) and creation of the Bayview-Hunters Point community occurred in tandem, and are intertwined in ways that continue to shape the neighborhood today. This area is rarely mentioned in discussions of the city's history, but is central in San Francisco's past of military usage, industrial waste, and racial discrimination. At the HPNS, the property was radioactively contaminated by activities at the Navy Radiological Defense Laboratory (NRDL), which sought to develop information on nuclear weapons while veiled in secrecy. At the same time African Americans in the city, many of whom found work at the HPNS, were segregated to the Bayview-Hunters Point neighborhood. Living there, the community was exposed to pollution from the HPNS and other industrial facilities in an example of environmental racism. In the history of Bayview-Hunters point, both radioactive contamination and the African American community were kept invisible.

The Hunters Point Naval Shipyard's History of Contamination

Bayview-Hunters Point was first designated as an industrial space in the 1860s when the section of southeast San Francisco still consisted of marshes and mudflats. Butchers first established industry in the area, after an ordinance prevented the slaughtering of animals, and thereby the unpleasant sounds, sights and smells that came with it, in the more central regions of the city. The availability of water from the bay, as well as the ability to dispose of waste in its tides, made the location additionally appealing (Casey). More noxious industrial facilities clustered nearby, including related meatpacking business and tanneries, iron foundries, and shipbuilding operations. The first

dry dock on the west coast of the US was soon constructed at the eastern tip of Hunters Point in 1866, by the California Dry Dock Company (*Bayview-Hunters Point Area B Survey*).

Figure 7: Hunters Point Naval Shipyard on September 30th, 1966, with the aircraft carrier USS Hornet.(US Navy)

In 1908, the dry docks at Hunters Point were purchased by Bethlehem Steel and greatly expanded (*Bayview-Hunters Point Area B Survey*). The property was then purchased by the Navy in 1940, and transformed into the Hunters Point Naval Shipyard (HPNS), to be used primarily for submarine and warship repair. During World War II, the San Francisco Bay Area became the largest shipbuilding and repair hub in the country, and the new HPNS grew to be one of the largest wartime employers in San Francisco. At its peak, 17,000 people worked at the shipyard (Lemke-Santangelo and Wollenberg). After Pearl Harbor, the Navy expanded the shipyard to cover 979 acres, with six dry docks and over 200 buildings (*Bayview-Hunters Point Area B Survey*). Once

the war ended, traditional shipyard activity was significantly decreased, but the Navy found a new use for its property.

In 1946, the Navy began Operation Crossroads, the first postwar military nuclear tests in the Bikini Atoll in the Marshall Islands, setting off two atomic bombs. To understand the effect of such a bomb on naval vessels, the Navy placed almost one hundred ships in the atoll's lagoon as targets, twenty-two of which contained live animals as a proxy for human crew (Dillon, "Crossroads in San Francisco"). After the first atomic bomb, called Shot Able, was set off midair, the second, called Shot Baker, was detonated ninety feet underwater in the lagoon of Bikini Atoll. The massive column of seawater and dome of ocean mist expelled by the explosion contaminated the surrounding ships with radioactive fallout, and the effect of this contamination was so extensive the third planned test had to be cancelled (Dillon, "Crossroads in San Francisco"). After efforts to decontaminate the ships at the atoll failed, the Navy sunk many of the most radioactive ships. However, the Navy towed some contaminated ships back to west coast naval bases. The majority, seventy-nine ships in total, made their way to the HPNS from Bikini Atoll to be further studied and decontaminated (Hirsch, Altenbern, Caine, Williams, Gortner, et al.).

Figure 8: Shot Baker is detonated in the lagoon of Bikini Atoll on July 24th, 1946. (U.S. Army Photographic Signal Corps)

In 1947, the Navy established the Naval Radiological Defense Laboratory (NRDL) at the shipyard to work on cleaning the irradiated ships with the stated goal of studying atomic warfare. The process of decontaminating ships primarily included blasting them with a mixture of sand, and steam cleaning to remove but not neutralize radioactive contamination. Fuel oil from the ships was also radioactively contaminated, and over 600,000 gallons were burned in boilers at the shipyard (Hirsch, Altenbern, Caine, Williams, Gortner, et al.). The majority of the radioactive materials created in this process was packed up in drums and sunk in the ocean off the Farallon Islands (Davis). The Navy conducted additional research on nuclear weapons and radiation at this facility, including tests that gave animals lethal doses of radiation. The Navy stored radioactive elements including uranium, plutonium, thorium, cesium and strontium, on the premises, and stored drums of radioactive waste nearby (Fagone and Dizikes, "Amid a Toxic

Landscape, SF Found a Home for Its Elite Cops"). In addition to the waste the NRDL itself created, the lab also handled waste from other military related operations conducting similar testing including the McClellan Air Force Base in Sacramento and the University of California (Davis). Safety regulations for the handling of radioactive materials were minimal at the time, leading to potential widespread contamination of the area surrounding the NRDL.

When the NRDL began operation, knowledge about radiation, its effects, and the measures necessary to safely handle radioactive materials were still in the early stages of development. The radiological safety measures that were in place were derived primarily from the handling of x-rays and radium before the war (Dillon, "Crossroads in San Francisco"). In the 1940s, the plutonium contained in the two bombs detonated was a new element, and its specific effect on the human body was not fully understood. Even the project of decontaminating a ship was an entirely new one; therefore, few safety standards tailored to the process were in use (Dillon, "Crossroads in San Francisco"). Even instruments to detect radiation brought to Bikini Atoll were inadequate, especially as they only detected beta and gamma radiation, not the alpha particles released by plutonium. Radioactivity cannot be seen or smelled, a fact that greatly influenced the ways in which those involved with Operation Crossroads and the NRDL interacted with radioactive contamination and elements. Crewmembers in Bikini Atoll boarded the ship soon after the test, tracking radioactive materials around on their shoes and smearing fallout on their clothes and skin (Dillon, "Crossroads in San Francisco"). When the ships first reached Hunters Point, the lack of protective measures continued, but the Navy

quickly began to focus on creating technology and gathering information that would allow for safe handling of radioactivity.

In her chapter "Crossroads in San Francisco" Lindsey Dillon, a researcher who often focuses on Hunters Point, argues that the primary function of the NRDL was "defending the US military's nuclear weapons program through the production of knowledge and technologies supporting the idea that nuclear weapons could be safely tested" (Dillon, "Crossroads in San Francisco," 75). At the NRDL, scientists developed new radiation monitoring instruments including ones that could detect alpha particles, and wrote radiological safety manuals based on the application of different decontamination methods. Gaining an understanding of radioactive elements and developing technologies and procedures to safely handle these materials was part of the project of pursuing military power in that it allowed the continuation of these tests. Nuclear weapons tests, including the detonation of Shot Baker, were as much a display of military muscle as an effort to develop defenses. Therefore the secrecy characteristic of the Cold War was a key part of the operation of the NRDL, and the Navy kept the existence of the laboratory a secret for the first four years of its operation until 1950 (Davis). Unfortunately, in the pursuit of expertise of radiological safety, the area of the Hunters Point Naval Shipyard became contaminated with radioactive waste, and secrecy hid the danger from the public view.

The Hunters Point Naval Shipyard has historically been a significant source of land and water pollution in the Bayview-Hunters Point neighborhood and the most dangerous releases at this site came from the NRDL. As a result of the handling of radioactive elements and waste at the NRDL, the site is contaminated with radionuclides.

Radionuclides came in the form of radium dials, which were painted with a radioluminescent paint containing radium-226, atomic fallout from ships contaminated at Bikini Atoll, or radioactive elements used in experiments. These elements include cesium 137, which emits damaging beta and gamma-rays, and strontium-90 which can lead to human cancers by imitating calcium which harms bone marrow (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite Cops"). The other industrial processes that occurred at the HPNS polluted the area with a number of other hazardous wastes. A Navy survey from 1984 identified sites of possible contamination, which included oil reclamation ponds, a garbage burning disposal site, an industrial landfill, abandoned 55-gallon chemical drums, a scrap yard, a steel pickling yard, and bay fill containing sandblast waste (*Initial Assessment Study of Hunters Point Naval Shipyard*). The operations conducted at the NRDL released petroleum fuels, pesticides, heavy metals, polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs). These hazardous substances made their way into soil, dust, sediments, surface water and groundwater. The soils underneath the former shipyard also contain naturally occurring asbestos and metals, which can become dangerous to human health when unearthed (*Treasure Island Naval Station-Hunters Point Annex Site Profile*).

The NRDL eventually shut down in 1969, as did the HPNS in 1974, marking the rapid decline, post-Vietnam War, of the Navy's need for shipbuilding capacity in the San Francisco Bay. By the time of the formal closure of the shipyard and the NRDL, many more industrial facilities had been established in Bayview-Hunters Point, including a Pacific Gas and Electric (PG&E) power plant and the largest wastewater treatment plant in the city. These facilities contributed to the pollution of the land, air and water

surrounding residential communities, but the radioactive materials left by the NRDL imposed an additional level of danger to the human and ecological health in the area.

The History of the Bayview-Hunters Point Community

The area known as Bayview-Hunters Point was uninhabited when early industry was established there in the mid-1860s, but new homes followed industrial facilities and workers soon settled nearby. For many years, the majority of the population was working class whites, but the demographics of the neighborhood drastically changed during World War II. In relocation called the Great Migration, African Americans from the rural South who faced violent racism, segregation and a lack of economic opportunity moved West, seeking jobs in wartime industries. They found employment at the shipyards throughout the San Francisco Bay. From the time the Navy acquired the shipyard in 1940, to the end of the war five years later, the African American population in San Francisco rose from about 4,800 to 32,000, and by 1950 had reached 43,000 (Brahinsky). As the Hunters Point Naval Shipyard had become a major wartime employer the city, many of these black migrants were able to find jobs there. To accommodate the swelling shipyard workforce, the Navy quickly created racially segregated barrack-like housing developments to accommodate about 12,000 new workers (*Bayview-Hunters Point Area B Survey*). Of these new developments, about 4,000 family units and 7,500 single worker units were built on Hunters Point Hill (Brahinsky). A few thousand African Americans moved in to this temporary war housing on the hill, which overlooks the shipyard itself. By the end of the war, 42 percent of the 26,000 people living on Hunters Point Hill were African American (*Bayview-Hunters Point Area B Survey*).

While this influx of workers transformed the population of Bayview-Hunters Point during the war, the majority of African Americans migrating from the south moved into another neighborhood of San Francisco, the Fillmore. In most predominantly white areas of the city, a racially discriminatory housing market, including the use of racially restrictive covenants, prevented African Americans from buying or renting homes even if they had the means. San Francisco neighborhoods with a high proportion of nonwhite residents were declared "financially unstable" by the Homeowners Loan Corporation,in a widespread practice known as redlining, which led banks to deny loans to residents in these communities (Murray). Both the Western Addition and Bayview-Hunters Point were colored red, significantly contributing to the segregation of these areas. As a result of the racist practices, African Americans were limited to these two neighborhoods when they moved to San Francisco. The Fillmore, then called the Western Addition, was the first Japantown in the US, with about 4,000 Japanese people living there in 1940 (Kamiya). When the Japanese Americans living in San Francisco were forcibly removed and interned during World War II, about 12,000 African American migrants moved into their vacant homes (Kamiya). As the neighborhood had already been by far the most diverse in the city, landlords did not have a problem renting out their buildings to black people. The Fillmore eventually became home to a rich jazz and R&B scene, and for years was known as the "the Harlem of the West" (Kamiya).

At the end of World War II, the 1949 Housing Act dedicated $1.5 billion for the cleanup of "blighted" areas. These projects, which was termed "negro removal" by opponents at the time, destroyed working class communities of color throughout the country (Brahinsky). Despite protests from both the black and Japanese Americans who

lived in the Fillmore, the neighborhood was designated as a "blighted area" in June 1948 and slated for redevelopment. Although the San Francisco Redevelopment Agency was created in response to this decision, the project was delayed for ten years. In 1960, the city obtained properties in the Fillmore through eminent domain and they were demolished. In total, 2,500 homes and 883 businesses were closed and between 20,000 and 30,000 residents were displaced (Kamiya). The man responsible for the actualization of this project was Justin Herman, who became the head of the San Francisco Redevelopment agency in 1959. Herman himself stated "Without adequate housing for the poor, critics will rightly condemn urban renewal as a land-grab for the rich and a heartless push-out for the poor and nonwhites" (Kamiya). Unfortunately, Herman's prediction proved true, as the city failed to provide housing to those whose homes had been destroyed.

Meanwhile the San Francisco Housing Authority (SFHA) took over the wartime housing constructed by the Navy in Hunters Point, and began a number of additional public housing projects. In general, SFHA matched their public housing with the surrounding ethnic makeup of an area, continually racially segregating the city. As a result, Hunters Point was one of the only options for African Americans in need of public housing. Therefore, the displaced black residents of the Fillmore had little choice but to either leave San Francisco entirely or move into Hunters Point. While more African Americans were moving in to Bayview-Hunters Point, white residents of the neighborhood, who primarily lived in single family homes in the Bayview section were moving out. Postwar racially discriminatory housing policies provided loans to white people, which drew white San Franciscans out to purchase property in the suburbs,

participating in the national trend of "white flight" (Dillon, "Race, Waste, and Space"). As a result, there was a 59 percent decline in the white population of the neighborhood in the 1960s, while African American populations rose to comprise 69 percent of its population (Dillon, "Race, Waste, and Space"). With this shift in demographics came a change in the racial geography of Bayview-Hunters Point. Before the exodus of white residents, the African American population in the neighborhood was concentrated in the public housing units on Hunters Point Hill, but afterwards some of those who could, moved into the single-family units in the Bayview area (Brahinsky). The policies of urban renewal, segregated public housing, and discriminatory loan programs worked together to clearly delineate Bayview-Hunters Point as a black neighborhood. The long term effect of these policies has persisted, and in 2010 the population of Bayview-Hunters Point was 33.7 percent African American, whereas the population of city of San Francisco at large is six percent African American (Murray). Through these various means, the city of San Francisco had effectively and deliberately segregated the African American population into this contaminated neighborhood, endangering the community.

The Bayview-Hunters Point community was further marginalized with the Hunters Point Naval Shipyard's closure in 1974 and the subsequent loss of thousands of jobs. Even prior to this closure, as the shipyard's operations slowed in 1968 the unemployment rate in the neighborhood was estimated to be 15%, while at the time the entire Bay Area region had a rate of 4.4% (Dillon, *Redevelopment and the Politics of Place in Bayview-Hunters Point*). Former workers were unable to find jobs in the expanding service industries that were unwelcoming to black people, and as a result the neighborhood faced high unemployment (Murray). The paucity of jobs, terrible housing

conditions and racial discrimination led residents of Bayview-Hunters Point to take part in perhaps the most significant civil rights demonstration in the history of San Francisco. The 1966 shooting of an unarmed 16-year-old by a police officer in the neighborhood led to 128 hours of protests and violent confrontations between black San Franciscans and the California National Guard (*Bayview-Hunters Point Area B Survey*). After this uprising, a group of local female activists known as "the Big Five" travelled to Washington D.C. to secure funding for the construction of new low income housing to replace the old war barracks when the city once again sought to redevelop (Brahinsky) . Despite this success, the Bayview-Hunters Point community has remained one of the most disadvantaged in the city of San Francisco. The presence of environmental hazards is coupled with other factors of structural racism, such as police violence, high rates of incarceration, and a lack of economic opportunity, to continually repress the community (Brahinsky).

Environmental Justice Consequences of Segregation

The concentration of the African American community in Bayview-Hunters Point and their resulting exposure to pollution from the industrial facilities situated there clearly displays the impact of environmental racism. Environmental racism is the concept that nonwhite people are disproportionately affected by environmental hazards including air pollution, water pollution and toxics releasing facilities (Bullard et al.). Environmental racism was often perceived in early scholarship as limited to the product of individual and malicious acts in terms of the siting of environmentally harmful facilities and other land uses. Environmental justice scholar Laura Pulido argues that instead, the increased exposure of nonwhite communities to pollution is a result of broader, structural racism

that supports and perpetuates white privilege (Pulido). Industries positioning their polluting facilities in proximity to black communities may be seen as making a logical choice rather than one motivated by racist intent given the low cost of land and position of industrial zones. However, the conditions for the siting of these facilities are produced by historically racist political and economic structures (Pulido). The same perspective can be utilized in analyzing the formation of communities of color in urban spaces. Pulido writes, "The full exploitation of white privilege requires the production of places with a very high proportion of white people. 'Too many' people of color might reduce a neighborhood's status, property value, or general level of comfort for white people" (Pulido, 16). The creation of the Bayview-Hunters Point neighborhood as an African American community in San Francisco resulted from racist housing policies and practices that reinforced white privilege in the city. These two functions of environmental racism, both concentrating the black community near industry and continuing to situate industry in the black community, have taken clear effect in Bayview-Hunters Point.

The racism ingrained in the policies carried out by the city of San Francisco at the time of the formation of Bayview-Hunters Point directly led to the situation of toxic wastes and other pollutants in the same neighborhood, burdening the lives of black people. In her article titled exploring the connection between waste and environmental justice in Hunters Point, Lindsey Dillon writes

> "The link between race and waste-able urban space was made clear by a 1968 city report which referred to Bayview-Hunters Point as San Francisco's 'dumping ground.' The report referred not to the shipyard's toxic landfills, the auto-wrecking yards along the waterfront, particulates from the aging power plant, or any of the

other heavy industrial operations in the area, but to the public housing residents who were, by that time, largely African-Americans" (Dillon, "Race, Waste, and Space," 1213)

The location of the disposal of industrial waste is predicated on a consideration of this place as outside the realm of valued land, and the value of land was historically explicitly defined by the race of those living there. More than half of the land zoned as industrial in the city of San Francisco is located in this neighborhood, so polluting facilities have consistently been established there over the past 150 years. Not only was a large portion zoned for industrial purposes, Bayview-Hunters Point contains a patchwork of residential and industrial areas. As a result, residents faced harmful exposure as a result of the unhealthy proximity of residential areas to polluting facilities, and these zoning policies have not been reevaluated until recent efforts to redevelop the neighborhood (Dillon, *Redevelopment and the Politics of Place in Bayview-Hunters Point*). For the majority of the lifetime of this neighborhood, regulations on industrial waste and toxic pollution were minimal. As a result, the level of contamination has built up over time to be hazardous to human and ecological health.

The continuation of polluting activities and the creation of industrial waste in Bayview-Hunters Point was supported by the demarcation of the neighborhood as a racialized space and an area separate from the rest of San Francisco. Bayview-Hunters Point has been both geographically and discursively isolated from the city as a whole. The neighborhood has consistently been discussed as a "ghetto," a community physically attached to but culturally different from the city (Dillon, *Redevelopment and the Politics of Place in Bayview-Hunters Point*). The neighborhood is also bordered to the west by

the 101 freeway, and the bay to the east, which creates a distinct set of barriers between Bayview-Hunters Point and the rest of the city, in addition to polluting the air residents breathe. Even San Francisco's public transportation system did not connect Bayview-Hunters Point to the rest of the city until the 1940s, and still is sparse and unreliable in the area, further isolating the residents (Naiden). With this distinction between Bayview-Hunters Point and the city made clear, it becomes easy for more privileged residents of San Francisco as well as the city government to ignore those living in this place.

In a documentary that follows writer James Baldwin in his visit to Bayview-Hunters Point and discussions of racism with residents there in 1963, Baldwin states "This is the San Francisco Americans pretend does not exist" (*Take This Hammer (the Director's Cut)*). The geographic siting of this community based on and continually impacted by blatant racism starkly contrasts with the conception of San Francisco as one of the most liberal cities in the US. In short, the historic actions of the city have worked to make Bayview-Hunters Point distinct from San Francisco, and to hide it from view of a privileged general public constituted by white residents of the city, who can continue to think of themselves as liberal and free of racism. Pulido writes, "Because most white people do not see themselves as having malicious intentions, and because racism is associated with malicious intent, whites can exonerate themselves of all racist tendencies, all the while ignoring their investment in white privilege" (Pulido, 15). The Bayview-Hunters Point community has made extensive efforts through environmental justice activism and other strategies to make themselves seen and heard and to bring much needed attention. Yet, not for lack of trying, they have had difficulty getting the city government to respond to and address their needs (Dillon, *Redevelopment and the*

Politics of Place in Bayview-Hunters Point). The physical and economic marginalization of this community from San Francisco has continually kept residents from receiving the resources they desperately need, including protection from environmental degradation. The fact that those living in this community are not of concern to the city government further obscures the presence of toxic and hazardous waste from public and political view.

The impact of environmental racism is evident in the quantity and location of industrial facilities that pollute the Bayview-Hunters Point community. These effects can be seen in the maps generated by CalEnviroScreen, which display the high burden of pollution releases and population factors such as health issues and socioeconomic status. Faced with a lack of documentation on the extent of environmental hazards in their neighborhood, a group of mothers from the Huntersview Tenants Association collaborated with the organization Greenaction for Health and Environmental Justice to write a report on the presence of environmental hazards. These mothers formed the Bayview Mothers Environmental Health and Justice Committee, and with the training from Greenaction in areas such as computer and research skills, environmental health, and working with government agencies, were able to produce a study which clearly displayed the disproportionate effect of environmental degradation on the Bayview-Hunters Point community as compared with the city of San Francisco as a whole. According the study, published in 2004 this relatively small, disadvantaged neighborhood has four times as many contaminated industrial sites per capita, four times as many polluted air dischargers, five times as many storage sties for acutely hazardous materials,

and ten times as many contaminated water dischargers as the rest of San Francisco. (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.).

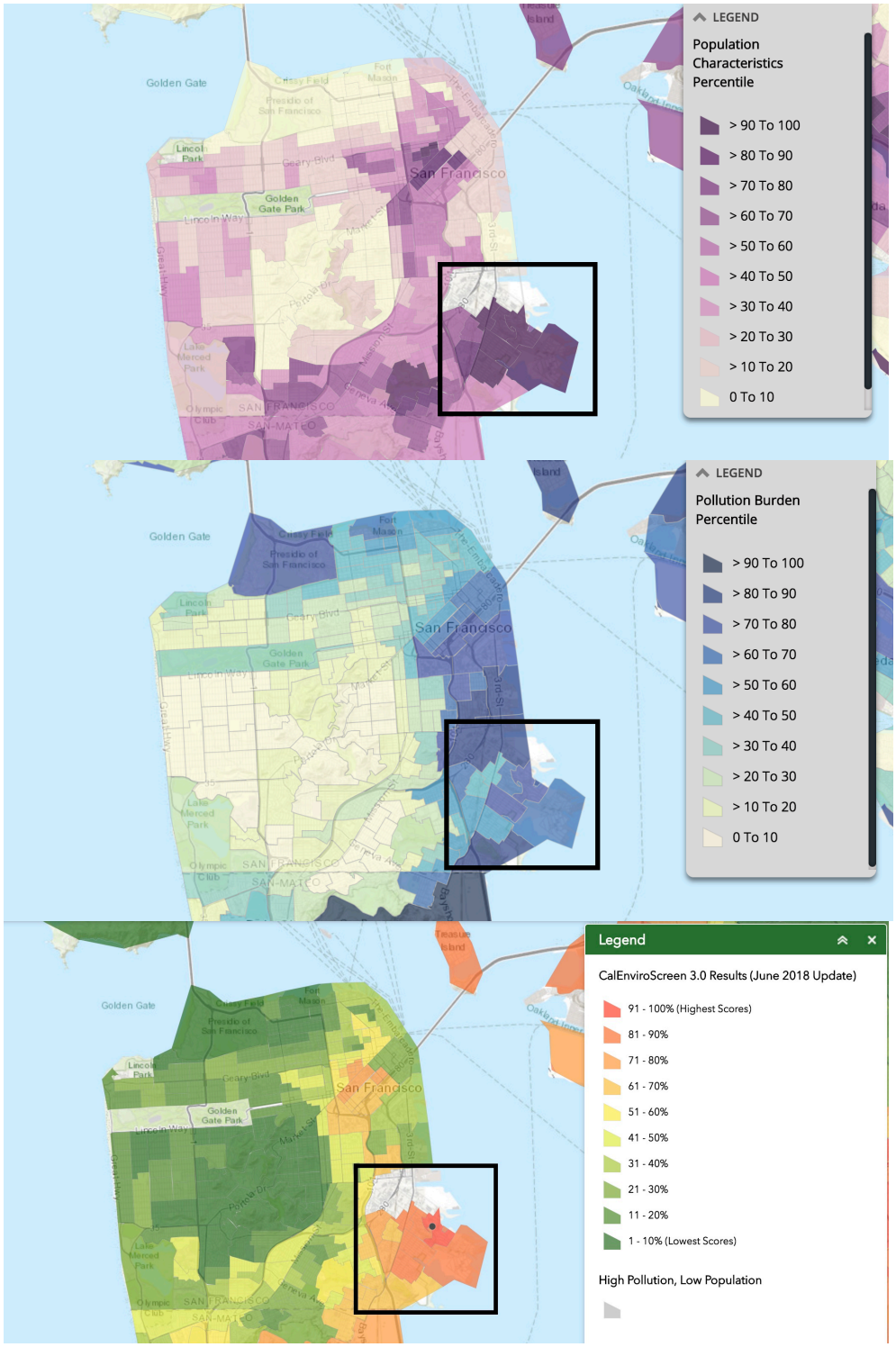

Figure 9: Maps generated by CalEnviroscreen 3.0. The Bayview-Hunters Point neighborhood is contained in the black box. Top shows the population characteristics

*percentile, which represents the vulnerability of census tracts based on health and socioeconomic factors. The middle map shows the burden of pollution on census tracts. The bottom combines the two previous factors into a single CalEnviroscreen Score, which indicates the overall vulnerability of census tra*cts. ("CalEnviroScreen 3.0")

The study goes on to detail the industrial facilities that have polluted the Bayview-Hunters Point community. The Hunters Point Naval Shipyard was one of many facilities that posed a danger to Bayview-Hunters Point residents as it released numerous hazardous materials into the air, soil and water including radioactive contaminants. From 1929 to 2006, PG&E's gas-fired Hunters Point Power Plant degraded the air quality of the area. During its operation, the PG&E power plant released 600 tons of air pollutants each year, making it the area's largest stationary source of air pollution (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.). The San Francisco Southeast Water Treatment Facility, which processes 80% of the sewage in San Francisco is another major polluter, and has been in operation since 1952. Other industrial facilities that have previously polluted the area include a meat byproduct processing plant, a leather tannery, a sand and gravel dredging operation, a company that cleaned drums that had previously stored various chemicals, and a metal production plant (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.). The presence of these polluting facilities and many other industrial plants and dumps has resulted in 100 Brownfield sites, 187 leaking underground fuel tanks, and over 124 hazardous waste handlers (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.).

The Bayview-Hunters Point community has been contaminated with over 200 toxic chemicals and materials(Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.). Air quality in the neighborhood has historically been some of

the worst in San Francisco as a result of not only stationary sources but also the two major highways that pass through the area. Air pollutants that have been discharged from the facilities around Bayview-Hunters Point include particulate matter, sulfur dioxide, nitrous oxides, volatile organic compounds, ammonia and carbon monoxide (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.). Air pollution is not only a threat to residents when they go outside, indoor pollution is also a particularly salient issue for people who live and work in Bayview-Hunters Point. Pollutants are able to migrate into homes from the outside (Bayview-Hunters Point Mothers Environmental Health & Justice Committee et al.). The presence of each of these harmful toxic and pollutants in Bayview-Hunters Point pose a real danger to the community living there.

The impact of overall poor environmental quality from the numerous sources of pollution in Bayview-Hunters Point compounded with the potential exposure to hazardous and radioactive waste from the Hunters Point Naval Shipyard have been linked to a number of health problems among Bayview-Hunters Point residents. In Bayview-Hunters Point, the rates of emergency room visits and hospitalizations related to pediatric and adult asthma, heart attacks and congestive heart failure are triple the statewide average (Sumchai). Asthma is a common problem in Bayview-Hunters Point as a result of the low air quality in the neighborhood. About 10% of the population in Bayview-Hunters Point suffers from asthma, with 15.5% of children suffering from the respiratory illness (Katz). This percentage is well above the nationwide asthma rate of 5.6%. Cancer is one of the major causes of death in Bayview-Hunters Point, with lung cancer the most prevalent form, followed by breast cancer in women and prostate cancer in men. Lung

cancer rates in the area are primarily linked to smoking, although air pollution and exposure to asbestos may play a role. A study on breast cancer rates in the neighborhood that used data from 1988 to 1992 showed higher incidences of invasive breast cancer than in San Francisco or the Bay area as a whole. However, a later study using data from 1993 to 1995 showed no difference, and the earlier discrepancy could have resulted from increased screenings (Katz). Reproductive health issues have also been very common in this community. The rate of birth defects in Bayview-Hunters Point is 44.3 per 1,000 births, whereas the rate for San Francisco County as a whole is 33.1 per 1,000 (Katz). Half of all infant deaths in San Francisco occur in this neighborhood (Bayview Hunters Point Mothers Environmental Health & Justice Committee et al.).

The blame for some of these health issues can be assigned at least in some part to the PG&E power plant in Hunters Point which closed in 2006, which released large quantities of numerous air pollutants while operating. A study published in May 2018 in the *American Journal of Epidemiology* found that fewer babies were born preterm in communities, which formerly contained coal or gas fired power plants after the closure of these facilities (Jochem). The Hunters Point operation, which was shut down in part as a result of community activism, was responsible for a significant amount of air pollution in the community and likely resulted in some of the respiratory issues such as asthma. However, more broadly the health issues residents of this neighborhood confront represent the confluence of numerous sources of industrial pollution many of which continue today in addition to the other effects of poverty and racism.

In Bayview-Hunters Point, the long terms consequences of environmental racism are made evident in the numerous health issues present at disproportionately high levels

in the community. These problems have not received necessary attention as this neighborhood has been continuously characterized and treated as an area apart from the city of San Francisco. However, this neighborhood has been central to San Francisco's past of racist segregation as well as its involvement in US military history through the HPNS. Exposure to toxic and radioactive contamination from the HPNS, where many people in the community worked likely played a role in some of the health problems residents have faced. Although a cleanup of the shipyard that should make for a cleaner, safer community has followed this history of extensive pollution, the issues of environmental injustice and radioactive contamination have continued.

Chapter 2: The Failures of Superfund Remediation in Hunters Point

In May 2014, Bert Bowers, a former radiation safety officer working for the contractor Tetra Tech at the former HPNS, first told NBC Bay Area that the cleanup there was being botched. Bowers told interviewers that by mishandling of soil at the site Tetra Tech was "playing Russian Roulette with the health and wellbeing of the general public, the people that handle it, and the environment" (Nguyen et al., "Former Contractors Claim Hunters Point Cleanup Is Botched"). In the past several years, the allegations of Bowers and other whistleblowers have proved true and turned into a data falsification scandal invalidating much of the information collected on the radioactive contamination of soils at the HPNS. While Tetra Tech's fraud has been the most publicized element of the remediation of the HPNS, it is only one of the many problems with the cleanup of this Superfund site, that have made the extent of radioactive contamination at the site unclear. During the cleanup, Navy decisions and plans have failed to fully test the HPNS for

radioactive contamination and continued environmental injustice with lacking community involvement in the Superfund remediation.

Superfund Site Creation, Remediation Progress, and Beginnings of Redevelopment

In 1986 the Navy reclaimed the Hunters Point Naval Shipyard as an annex to Naval Station Treasure Island after it had been leased for several years to a commercial operator. Between 1984 and 1988, investigations conducted by the Navy revealed the presence of hazardous chemicals and radioactive materials on the property. As a result, the U.S. Environmental Protection Agency (EPA) placed the site on the National Priorities List (NPL) in 1989 (*Treasure Island Naval Station-Hunters Point Annex Site Profil*e). With this listing, the former shipyard became a federal Superfund site, slated for remediation under the Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA). Under CERCLA, the party responsible for releases of hazardous waste is financially liable for the cleanup of the site. As the Navy is the sole responsible party for the contamination of the HPNS Superfund site, it has taken charge of the cleanup. The EPA oversees the remediation of the site by the Navy. The California Department of Toxic Substances Control (DTSC) participates in the cleanup by supervising the handling of hazardous substances and the San Francisco Bay Regional Water Quality Control Board oversees activities that affect water quality. In 1991, the Navy listed the HPNS for closure under the Base Realignment and Closure (BRAC) Program (*Former Naval Shipyard Hunters Point*). The Superfund site consists of 866 acres, 420 of which are on land and the other 446 acres are underneath the waters of the San Francisco Bay(*Treasure Island Naval Station-Hunters Point Annex Site Profile*).

The Navy's investigation and remediation of this site is occurring under three concurrent cleanup programs. The Installation Restoration Program was created by the Department of Defense (DOD) to clean up contamination from a wide array of chemicals at Navy and Marine Corps bases. The Petroleum Program specifically deals with the removal of leaked fuels left by historical activities. Navy operations spilled diesel, gasoline and motor oil at the Hunters Point site, and contaminate soil and groundwater. Finally, the Radiological Program deals with the cleanup of items that have become radioactive during the activities of the NRDL, including glow in the dark dials and buildings, storm drain lines and sewers (*2018 Annual Update of Cleanup Achievements*).

Early in the remediation process the Navy removed and closed fifty underground storage tanks (USTs) and 100 aboveground storage tanks (ASTs). They also removed 5,000 tons of sandblast grit, which was sent to an asphalt plant for reuse (*Draft Fourth Five Year Review: Hunters Point Naval Shipyard*). The Navy later divided the former Hunters Point Naval Shipyard site into five parcels, labeled with letters A through E in 1992 to facilitate remediation activities. In 1996, the Navy added Parcel F to the site, which contains the area of the San Francisco Bay adjacent to the shoreline of the shipyard. The original maps designated these original parcels and they have been further divided for the purpose of directing cleanup efforts. The Navy conducted a number of investigations of these sites to identify specific locations and the extent of contamination. Since the definition of parcels, the remediation plans have been tailored to the contamination at those sites and involve a wide array of processes.

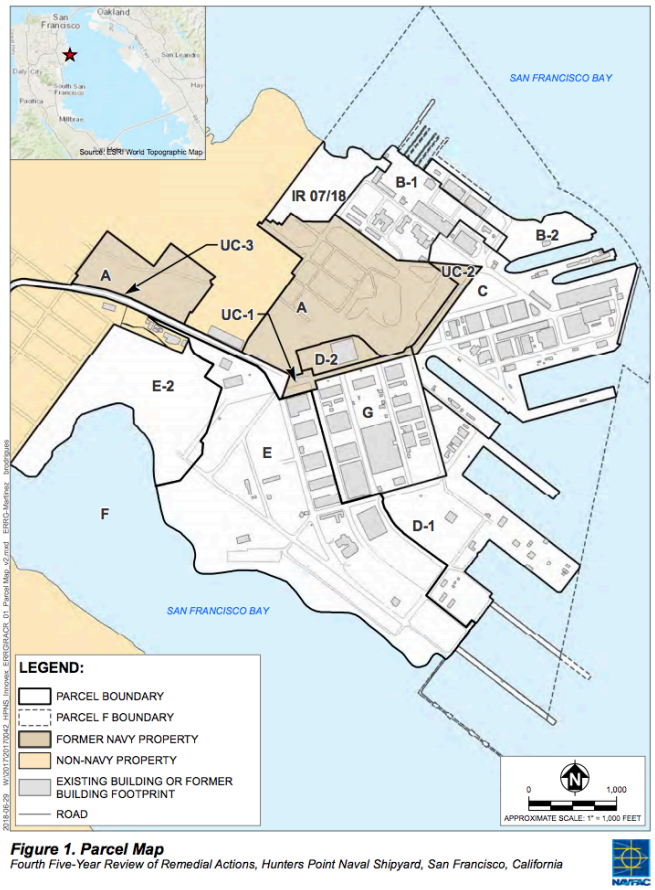

Figure 10: Map of the Hunters Point Naval Shipyard Superfund site with parcel divisions. (*Draft Fourth Five Year Review: Hunters Point Naval Shipyard*)

A number of different cleanup strategies have been utilized to clean up the soil sediments and groundwater at the site. In many locations, soil continues to be excavated and removed from the site, which is then transported to a landfill or other destinations. Excavation and removal are the remediation strategy employed to address radioactive contaminants at the site. The Navy also commonly utilizes remediation technologies such as soil vapor extraction (SVE), bioremediation, in-situ chemical reduction, and thermal remediation at this site (*2018 Annual Update of Cleanup Achievements*). In SVE, a vacuum is applied to the soil and the steady flow of air removes volatile organic contaminants. During bioremediation, microorganisms are introduced into soil and

groundwater to break down contaminants. Chemicals can serve a similar purpose in the strategy of in situ chemical reduction, in which additional chemicals are inserted in the ground which then react with toxic organic compounds to form nontoxic or less toxic substances. In thermal remediation, heat is applied to either immobilize or destroy contaminants. Remediation also relies on time to reduce toxic contamination at the site, as natural processes eventually reduce pollution in a process technically called natural attenuation. Finally, the Navy will also place durable cover over contaminated soil to contain pollution (*2018 Annual Update of Cleanup Achievments*). These technologies are only a few of the most frequently used at the shipyard for remediation.

The Navy completed a historical radiological assessment (HRA) of the site in 2004 to identify locations potentially contaminated with radionuclides and to assess the risk of exposure to radiation of the local community. In the HRA, "radiologically impacted" sites are defined as those with a history of radiological operations, where "the use, handling, packaging, or disposal of radioactive materials" occurred (*Hunters Point Shipyard Historical Radiological Assessment*). This assessment found that of the 882 sites surveyed at the shipyard, 91 were radiologically impacted. Two of those sites had already been cleared as safe, 29 were recommended for clearance since no contamination was found or remediation was declared complete, and sixty impacted sites required further investigation or remediation. Eleven of these sixty sites are known to have been contaminated, and access to the sites is restricted. According to a Navy factsheet, as of April 2015, 92% of these radiologically impacted sites had been tested (*More Information on Radiation*). The Navy reported that the potentially contaminated media included surface soils, subsurface soils, structures and drainage systems, but found no

risk of airborne contamination. The HRA concluded that low levels of radiation do exist within the shipyard site, but did not identify any threat to those living in proximity to the site or the environment as a result of this radiation (*Hunters Point Shipyard Historical Radiological Assessment*).

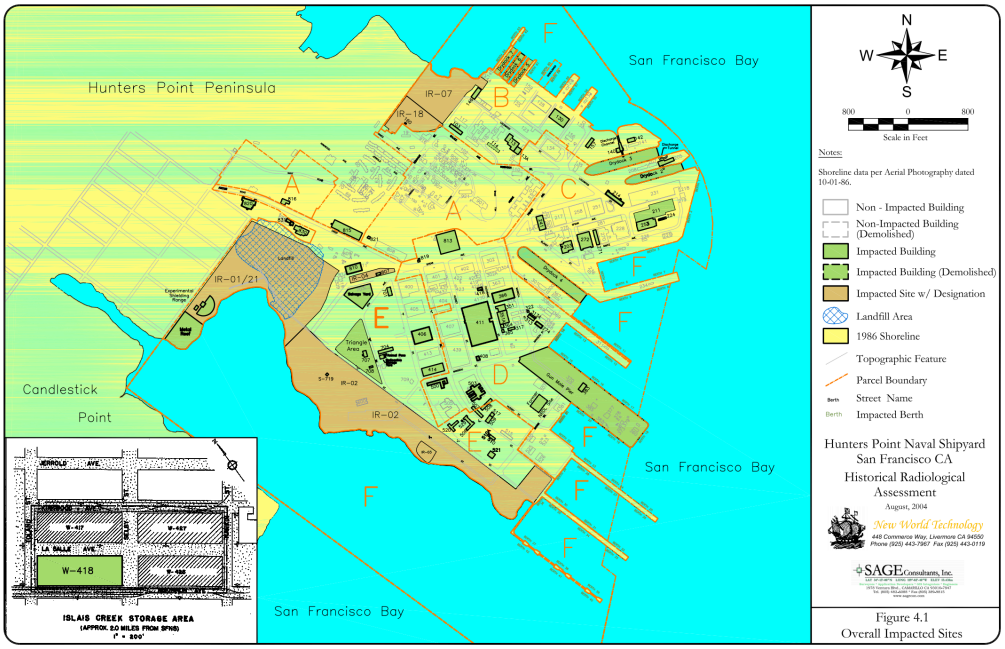

Figure 11: Locations impacted by radioactive materials at the Hunters Point Shipyard Naval according the HRA prepared by the Navy. (*Hunters Point Shipyard Historical Radiological Assessment*)

In the Navy's 2018 Progress report on the remediation of the Hunter Point Naval Shipyard, it listed some of the program successes of the cleanup. During the 26 years the Navy has been remediating this site, they have removed 28 miles of sewer and storm drain lines, which required the removal of 21,000 truckloads of soil, removed 10,000 truckloads of soil from parcel E-2, treated 8.6 million gallons of groundwater, and closed 52 petroleum sites (*2018 Annual Update of Cleanup Achievements*). One of the largest markers of progress for the Navy has been the transfer of some of the land in the shipyard out of their hands and to the City of San Francisco. Since remediation began in the early

1990s, over $1 billion dollars have been spent on cleaning up the contamination (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review").

After the completed remediation of this Superfund Site, the Navy intends to hand over the land to the City of San Francisco for further use. Transfer of portions of Superfund sites on federally owned properties was not always possible. The Superfund Amendments and Reauthorization Act of 1986 required that the entirety of a federal Superfund site be cleaned up before any transfer of property to a non-federal entity could occur. Then in 1996, this rule was changed so parts of a Superfund site on federal property could be transferred when "suitable for the intended use," which would allow for "concurrent cleanup and reuse of the property"(U. S. Government Accountability Office). Four parcels of the site have already been declared sufficiently clean and free of contaminants and the city has taken control of this land. Parcel A was transferred to the San Francisco Redevelopment Agency (SFRA) in 2004, and is by far the largest piece of land that has been transferred to the city. The EPA had previously removed Parcel A from the NPL in 1999. This parcel is the farthest inland, somewhat uphill from the rest of the shipyard. Historically, this land was used more for office spaces and residences than industrial activities. According to Navy statements, testing of this site has shown no radiation in excess of health-based standards, and, when scanned, potentially radiologically impacted buildings did not have radiological contamination above required cleanup levels (*Hunters Point Shipyard Parcel A*). Parcels D-2, UC-1, and UC-2, which are smaller sections alongside Parcel A, were transferred to the Office of Community Investment and Infrastructure (OCII), the successor to SFRA in 2015 (*Figure 9*). UC

stands for utility corridor, and these two parcels were formerly a part of Parcel A, which were divided from the larger parcel before its transfer as they were found to contain storm and sewer lines contaminated with radiation and other hazardous materials (Roberts, "Hunters Point Shipyard Housing"). Before the transfer of these two parcels, the lines were removed. The other primary remediation activities at these three parcels included the installation of soil and asphalt covers to contain contamination from VOCs in soil. On other parcels, remediation continues with the goal of eventual transfer.

The city of San Francisco has eyed the property and broader Hunters Point neighborhood as a site for redevelopment since the closure of the Hunters Point Naval Shipyard. The city has long been dealing with a housing crisis and the unused land of the former shipyard represents a major opportunity for the construction of numerous residential and commercial properties. Since 1997, the city has planned to redevelop 500 acres at the former HPNS. In 2010 the redevelopment plan was amended to include 280 acres of the adjacent Candlestick Point, the previous location of the Candlestick Park, home to the San Francisco 49ers. The project will be the largest redevelopment effort in the city of San Francisco since the aftermath of the 1906 earthquake. The plan involves the construction of 12,000 housing units, two million square feet of office space, other commercial areas and acres of parks. Of the housing units 3,345 will be below-market-rate units, for lower income residents (Dineen, *SF City Panel OKs Redesign of Giant Hunters Point Shipyard Project*). The city hired property developer Five Point Holdings for this massive undertaking. Five Point Holdings is a subsidiary of Lennar Corporation, a large real estate and home construction company based in Miami. The redevelopment plan is projected to cost as much as $8 billion dollars. Despite the high price tag, this

redevelopment is overall portrayed as an exciting revitalization of an area currently vacant, creating a vibrant and modern new neighborhood for San Franciscans to enjoy and economic benefit for the city as a whole.

The redevelopment project that would transform Hunters Point has been lauded as an effort that will bring significant economic growth in San Francisco. During the groundbreaking ceremony for the construction of the first new housing units in Hunters Point in 2013, Willie Brown was quoted saying, "The investment opportunity here represents something that's unique in America…There is no other piece of soil as potentially lucrative and profitable for the public sector and private sector than this spot is going to be" (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite Cops"). Brown has been involved in an investment firm that partners with Lennar, which has worked to obtain tens of millions of dollars from foreign investors, mostly Chinese. These investors give money in exchange for EB-5 visas, a program which allows those who invest $1 million or more in a United States commercial enterprise to receive green cards (Smith). According to OCII, the project will not only create hundreds of construction jobs in the many years of development, but will also lead to 10,000 new permanent positions (*Hunters Point Shipyard and Candlestick Point*). The international investment, job creation, and future tax revenues generated by this project have created a major economic incentive for the city of San Francisco to redevelop this land as soon as possible. The city's motivation to accomplish this project has been highlighted by their involvement at the Superfund site thus far.

The City of San Francisco's eagerness to take control of and capitalize on the shipyard was made clear before the main redevelopment plan was put into motion. In

1994, a list of vacant buildings on the Superfund site was sent to the city offices, stoking the excitement of city officials at the possibility of revitalizing this land. San Francisco Mayor Willie Brown was a major proponent of the shipyard redevelopment plan during his tenure from 1996 to 2004.[1] In 1996, Brown announced the SFRA would lease three building on at the shipyard site, one of which, Building 606, would house a police unit (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite Cops"). This building was constructed on top of land formerly occupied by the laundry used to clean the cloths of crewmembers that came in contact with fallout from nuclear tests in the Marshall Islands. Five feet of soil underneath the building was excavated and the land covered with concrete before the cops occupied the building (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite Cops"). The Navy and the city declared it safe to serve as headquarters for several specialized police units. However, issues with water and air quality, as well as concerns about the danger of the toxic chemicals and radioactive contaminants being discovered and excavated nearby persisted throughout the operation of this unit, especially as many of the first officers to work at Building 606 have reported various illnesses including a number of cancers. These officers remember feeling perplexed as they moved around the shipyard without protection and witnessed workers nearby wearing masks, white suits, and even full hazmat gear. When areas nearby the building were flagged as radiologically contaminated and the Navy became concerned by the proximity of remediation activities and the police unit, they moved to end the city's lease. The city, reticent to vacate

[1] Critics have since pointed to Brown's connections to the corporate actors in the redevelopment, as he is a principal in an investment fund that finances Five Point. One of his former advisers, Kofi Bonner worked on shipyard leases and is now the co-chief operating officer at Five Point.

Building 606, asked to continue leasing the property and the Navy allowed it (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite Cops"). The city's first move into the Shipyard, stationing police officers and civilians at an office in the center of an active Superfund site, highlights the enthusiasm for taking over the site in the face of risks posed by contamination

Since the City of San Francisco's first move into the Shipyard, significant progress has been made in developing Hunters Point. The redevelopment plan is already in progress on the transferred Parcel A, where 309 new housing units have already been completed and 138 more are in construction as of 2018 (Fagone and Dizikes). At the moment this community is inaccessible by public transportation and does not have any grocery or other stores in the close vicinity, although the developers have installed a corner store with snacks and necessities nearby. Demand for these apartments has been high and several of the new apartment buildings have already sold out. New residents who have purchased homes at the Shipyard are praised by the developers and the city as brave and visionary, capable of overlooking the current rough exterior of Hunters Point and see the potential of the future. Those who purchased homes at the Shipyard were assured they were safe despite the Superfund site next door, but those claims were called into question as a data falsification scandal has developed at the site.

Data Falsification Scandal

The major redevelopment plan that would transform the former Hunters Point Naval Shipyard was put on hold in 2016 when a Navy contractor was found to have falsified soil samples. While the Navy is responsible for the cleanup of this site under CERCLA it hired several contractors to complete testing for contaminants and cleanup

activities including soil removal. One contractor, Tetra Tech was awarded over $300 million in contracts by the Navy (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review"). Tetra Tech is a Pasadena-based company with a long history of winning such government contracts. The Navy hired Tetra Tech to take soil samples from the site using standard sampling procedures and send the samples to an offsite lab to be tested for the presence of radionuclides. If the test results displayed a level of radionuclides higher than a certain standard, additional remediation of the site would be required (Waxmann, "Tetra Tech Employees Get Prison Time in Hunters Point Cleanup Fraud Case").

The Navy first found evidence of data falsification in 2012, when they ascertained that soil samples that were supposedly taken from an area under the former lab utilized for testing the effects of radiation on animals had come from an entirely different, previously cleaned location (Tetra Tech). The samples had shown low levels of multiple radiological contaminants, which were at odds with previous data from the same location. When Tetra Tech retested these locations per the Navy's request, some samples showed levels of radiological contamination exceeding the standard of the remediation. Despite multiple theories on how anomalous results could have come from another issue such as instrument error, Tetra Tech concluded the only possible explanation for this situation was that workers had removed the sample from another location on the site (Tetra Tech). However, following this issue, the Navy concluded Tetra Tech had taken sufficient corrective action and the company continued work at the site (Roberts, "Faked Cleanup at Hunters Point Shipyard Much Worse than Navy Estimates").

Tetra Tech continued to cause problems in the cleanup efforts after this first incident. As a result of deviations from the approved work plans in their radiological testing, Tetra Tech was only allowed to retest previously evaluated soil at the Shipyard between 2015 and 2016 (*Hearing Statement to Board of Supervisors Hunters Point Naval Shipyard*). Then former employees of Tetra Tech came forward and stated the company had intentionally and systematically falsified soil samples and committed fraud. One of these whistleblowers, Bert Bowers, was the former chief radiation safety officer at the shipyard for Tetra Tech and claims he was fired for discussing these violations (Roberts, "Hunters Point Shipyard Housing"). As a result of these revelations, the EPA put a hold on transfers of land to the City of San Francisco. The allegations also prompted the Navy to review the data collected by Tetra Tech - over a decade's worth of tests. Contractors hired by the Navy for this review found that almost half of the data collected by Tetra Tech was potentially falsified. Tetra Tech did work at the shipyard on 853 discrete units, individual buildings or specific tracts of land, and the Navy found testing at 414 of these units to be "suspect." The Navy found cause to resample 49% of the work done by Tetra Tech on Parcel G and 15% of Parcel B (Roberts, "Faked Cleanup at Hunters Point Shipyard Much Worse than Navy Estimates"). However, an independent review published by the EPA showed the Navy was actually understating the severity of the falsification. The EPA stated that as much as 97% of the data collected in Parcel G and 90% collected in Parcel B by Tetra Tech are unreliable, so the vast majority of the area they sampled needed to be retested (Roberts, "Faked Cleanup at Hunters Point Shipyard Much Worse than Navy Estimates").The two parcels on which retesting is necessary are

both adjacent to tracts of land previously cleared by the Navy and EPA and transferred to the city for redevelopment.

According to a draft Navy report, Tetra Tech employees manipulated data in several ways to allow the shipyard to appear cleaner than it actually was. When the soil samples showed levels of contamination too high, Tetra Tech workers would obtain a sample from a location known to have low radioactivity and report that clean sample as having come from that location (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review"). They also might simply move five to ten feet away from the location of a sample that came back dirtier than desired to obtain a cleaner result. If an area were previously known to have relatively high radioactivity, they would sample from nearby areas and claim those samples came from the contaminated location. Dirty or radioactive samples were also simply discarded, without replacement, or were blocked from being sent to an offsite lab for testing. Tetra Tech workers would run machines used for testing too quickly to detect radiation (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review"). In May 2018, two former Tetra Tech supervisors were sentenced to serve eight months in federal prison after admitting to falsifying soil samples and directing other employees to do the same (Waxmann, "Tetra Tech Employees Get Prison Time in Hunters Point Cleanup Fraud Case"). Despite the results of Navy and EPA review, Tetra Tech contests the statements of whistleblowers and continues to argue that any falsification that occurred resulted from a few bad actors (Roberts, "Almost Half of Toxic Cleanup at Hunters Point Shipyard Is Questionable or Faked, According to Initial Review"). While individuals have been

convicted in this case, the company itself has not faced any direct repercussions for these actions aside from a $7,000 fine from the Nuclear Regulatory Commission that was waived on appeal (Roberts, "Faked Cleanup at Hunters Point Shipyard Much Worse than Navy Estimates").

As a result of the data falsification scandal, San Francisco's redevelopment plan was put on hold. Despite this setback, the city clearly plans to move swiftly forward once this supposed roadblock is cleared. In April 2018, a city commission approved a plan to reshape some of the land use plans for the future of the shipyard, integrating a large hotel, several educational institutions and more "maker spaces" (Dineen, *SF City Panel OKs Redesign of Giant Hunters Point Shipyard Project*). Although the city has outwardly maintained its confidence in the redevelopment plan and its continuation after this conflict is resolved, Hunters Point residents and environmental organizations responded with outrage and continuing suspicion of the Navy. Longtime Hunters Point residents and homeowners living at the new SF Shipyard development filed lawsuits as a result of the revelation of the extent of data falsification at the shipyard. A class action lawsuit was filed on behalf of 40,000 Bayview-Hunters Point residents, seeking $27 billion in damages from Tetra Tech (Hom). The plaintiffs have stated that their health problems including cancers have resulted from exposure to the shipyard's waste due to Tetra Tech's intentional mishandling of samples and soil. In July 2018, residents who purchased newly developed homes on the former Parcel A of the shipyard site filed lawsuits against both Tetra Tech and Five Point. Two couples alleged that homeowners' properties lost value due to the developer, Five Point, not disclosing the level of contamination at the Superfund site along with the fraud committed by Tetra Tech. One

of the plaintiffs, Theo Ellington said in a statement to the San Francisco Chronicle "At this point, I need more certainty that the site is safe, but I'm left with no other options. Who in their right mind would purchase a unit here right now? I feel like I'm being held hostage with very few options" (Dineen, *Hunters Point Shipyard Residents Sue Developer, Citing Contamination, Loss of Value*)

After the revelation of Tetra Tech's fraudulent practices, the Navy published a plan for retesting Parcel G where the company did much of its work. Parcel G contains several sites where radioactive materials were handled including a building that stored radioluminescent dials that contained radium-226, another that stored an X-ray machine and radioactive materials, and three separate structures that were formerly the sites of radiological laboratories (Fagone and Dizikes, *Navy's Hunters Point Retesting Plan Draws on Questionable Cost-Cutting Study*). The release of a new draft of this plan in June 2018 received a swift backlash from experts and environmental activists, as well as the agencies overseeing the Navy. The EPA clearly expressed to the Navy that their retesting plan for Parcel G had numerous issues, and directly asked that the plan be revised to include improved testing measures (Dizikes and Dineen). In a letter detailing the issues with the work plan, Angeles Herrera, Assistant Director of the Superfund Division at the EPA notes that the comments and directives of the EPA for this draft largely reflect the same comments the agency has previously made on a previous draft published in February 2018, and recommendations made since fall of 2016 (Herrera). However, the Navy had yet to make changes consistent with these recommendations, put forward by not only the EPA but also the California Department of Public Health (CDPH) and DTSC. In a statistical analysis attached to Herrera's letter, the reviewer

writes “the current Navy Draft Work Plan does not include a sufficient number of samples nor appropriate statistical testing to provide enough proof to refute the assumption that Parcel G soils are in compliance...The proposed Draft Work Plan is not a conservative plan that is protective of human or ecological health”(Herrera). Herrera went so far as to suggest that should the Navy fail to make the necessary changes the EPA would invoke the dispute clause in the agreement between the EPA and Navy created at the beginning of the remediation (Herrera). The public and stern warning indicates the extent and danger of issues with the Navy’s retesting plan.

While the plan for retesting Parcel G is riddled with shortcomings, as of November 2018 the Navy has published no plans for the other parts of the shipyard where Tetra Tech did work. The Navy has claimed it will retest parcels where the contractor was involved, and Tetra Tech worked on remediating and testing Parcels E-2 and D-1. Parcel E-2 is one of the most contaminated in the entire shipyard as it contains the landfill where the Navy dumped waste, including materials contaminated with radioactive elements, over the forty years of the shipyard’s operation. From 2005 to 2007, Tetra Tech worked on removing radioactive and chemical contamination from Parcel E-2. Parcel D-1 contains a building used by the NRDL, and Tetra Tech was responsible for radiological testing, safety oversight and data-keeping while another contractor did work on the parcel (Roberts, “Hunters Point Re-Testing Plan Doesn’t Include Toxic Areas ‘Tested’ by Firm at Center of Scandal”). Their responsibilities included checking soil removed from the parcel for radioactivity, and whistleblowers claim this testing was faked, allowing potentially contaminated soil to be dumped in landfills throughout California. However, the Navy did not include these parcels in their original review of

Tetra Tech's work, which revealed fraud had occurred, and has stated these parcels are not involved in the data falsification scandal. A spokesperson from Tetra Tech went so far as to state outright that Tetra Tech did not complete work in these parcels although another representative soon contradicted the claim. The DTSC has clear record of Tetra Tech completing the previously outlined work on both parcels (Roberts, "Hunters Point Re-Testing Plan Doesn't Include Toxic Areas 'Tested' by Firm at Center of Scandal"). A report sent to the DTSC by BRAC detailing the excavation of Parcels E and E-2 was created by Tetra Tech and makes clear that the remediation in this area was based off both initial investigations and a later work plan both completed by Tetra Tech (*Final Removal Action Completion Report*). If the Navy does plan to retest the parcels where Tetra Tech completed work, it has yet to make public its plans for Parcel E-2 and D-1.

The data falsification scandal has also called into question the safety of the parcels of the shipyard transferred to the city in 2015. According to the Navy, construction on parcels D-2, UC-1, and UC-2 was stopped upon the discovery of fraud, "pending additional radiological evaluation"(*2018 Annual Update of Cleanup Achievments*). The Navy routinely dumped wastes from tests down storm and sewer lines in the UC parcels, leaving them potentially contaminated with a number of radionuclides. Tetra Tech was responsible for removing these lines from the UC parcels in 2009, which is during the time whistleblowers claimed falsification was occurring (Roberts, "Hunters Point Shipyard Housing"). After removing 876 cubic yards of soil contaminated with "low level radioactive waste" from these two parcels Tetra Tech installed a hard cap, which consists of soil and asphalt (Roberts, "San Francisco Accepted Hunters Point Shipyard Land That May Still Be Radioactive"). When the transfer of these parcels to the

city occurred in 2015, the Navy had already been made aware of some level of data falsification by Tetra Tech employees, while allegations of fraud by whistleblowers had made the nightly news (Nguyen et al., "Contractor Submitted False Radiation Data at Hunters Point"). Evidence of data manipulation was found by third party reviewers on both UC parcels, including 75% of the data gathered on Parcel UC-2 (Roberts, "San Francisco Accepted Hunters Point Shipyard Land That May Still Be Radioactive"). The Navy has stated that there are still probably locations on this parcel that contain elevated levels of radioactive contaminants. Neither the Navy nor its overseers the EPA, DTSC or CDPH raised any concerns about the safety of these parcels as the city accepted them for redevelopment. These parcels are adjacent to Parcel A, where redevelopment has already occurred, and where homeowners now live, many concerned for their safety from remaining radioactive contamination.

In response to concerns about safety at the new housing development as a result of this scandal, the California Department of Public Health (CDPH) conducted basic scanning of the transferred Parcel A. Although Tetra Tech did not complete testing on this parcel, two whistleblowers who worked with the contractor claimed to have found data that indicates potential radioactive contamination on portions of the land, which they were instructed to ignore(Roberts, "Hunters Point Shipyard Housing"). The scanning procedures CDPH utilized came under fire for being insufficient to understand if there is radioactive contamination on Parcel A. The CDPH only ran scanners over publicly accessible areas around the housing development including roads, sidewalks, landscaped areas and open spaces with uncovered ground. However no scanning occurred within the homes themselves (Roberts, "Hunters Point Shipyard Contamination Testing Won't

Include Housing"). The scan also only picked up gamma radiation, and not the alpha and beta radiation that is emitted by some radionuclides that contaminate the shipyard. The CDPH also will not be sampling any of the soil on Parcel A to test for radioactivity. Although the CDPH stated that areas inside homes were not in the scope of their rescanning procedures and that the scanning technology utilized was sufficient to demonstrate the safety of Parcel A, homeowners have expressed their concern over the seemingly hasty and restricted nature of the scans (Roberts, "Hunters Point Shipyard Contamination Testing Won't Include Housing").

Environmental activists including numerous current and former Hunters Point residents have clearly expressed their anger and frustration over the CDPH's approach to retesting the Parcel A. The environmental justice organization Greenaction, which is based in San Francisco, has been one of the most vocal critics of the Navy and the city government throughout the Superfund remediation process, particularly as the data falsification scandal has developed. On July 16th, 2018, at the time CDPH was set to start their scanning of Parcel A, Greenaction led a protest with numerous current and former Bayview-Hunters Point residents. Protesters gathered outside the Lennar Welcome Center and speakers detailed the insufficiency of CDPH's testing plans including the limited location of scanning, lack of soil samples, and elevation of the standard for radiation anomalies above background levels (Roberts, "Hunters Point Shipyard Housing"). The group approached the office where CDPH officials were meeting, chanting the phrases "cleanup not cover up," "test it all and clean it up," and "we pay your salaries." Many of the same residents at the protest attended a public meeting with city officials on the subject, tearing into the lack of protections for those who live at and

around the shipyard (Dineen, "Bayview Residents Blast SF Officials over Shipyard Cleanup"). The fact of the extensive fraud at the shipyard along with the insufficient response from government agencies are yet another frustration for neighborhood residents and activists who have demanded a response to the shipyard's impact on their health and wellbeing for years.

Figure 12: Protesters at the SF Shipyard speaking out against retesting plans by the Navy and CDPH

Issues with Navy Remediation Plans:

While the data falsification scandal has made clear Tetra Tech was not completing an honest testing and cleanup of the Superfund site, the revelation of fraud also brought many of the Navy's previous claims about the portion of the shipyard contaminated with radiation and the severity of that contamination into question. Information on the level of radiological contamination in the shipyard published by the Navy has been sparse since the shipyard was declared a Superfund site. In the Historical Radiological Assessment (HRA) published in 2004, the Navy stated that less than 10% of sites in the shipyard were

radiologically impacted, meaning that radioactive materials were handled in some manner at the location (*Hunters Point Shipyard Historical Radiological Assessment*). In the remediation, the Navy only slated these sites to be tested for radioactive materials and cleaned accordingly. However, researchers led by Daniel Hirsch, a former lecturer in nuclear policy at the University of California Santa Cruz, have contested this approach. They argue that the radioactive contamination would have likely spread throughout the shipyard during the years the NRDL operated. In the process of sandblasting radioactive materials off the exteriors of contaminated ships, sandblast grit and dust was likely spread throughout the shipyard by wind (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). This process also suspended radioactive contaminants in the air, which later could have settled on surrounding land. Similar suspension of radionuclides also would have occurred through the burning of 600,000 gallons of irradiated fuel oil in burners on the shipyard (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). Even remediation activities like excavating and transporting soil could have spread contamination beyond the boundaries of sites considered impacted. The Navy selected sites for testing and then cleanup by reviewing historical record rather than investigation into the extent of contamination at the shipyard through scientific examination, causing concern over how much contamination is being overlooked at the more than 90% of sites the Navy has not tested.

In addition to the insufficiency of testing solely these selected sites, the same group of researchers criticized the methods the Navy utilized for evaluating the extent of

radioactive contamination as lacking. In the initial HRA, the Navy identified 108 radionuclides used at the shipyard. They then reduced that number to 33 radionuclides of concern, removing many shorter-lived radionuclides, which would have decayed at a rate that made cleanup unnecessary. However, Hirsch's report notes that some of these radionuclides would be replenished by the decay of others, and also a number of radionuclides were taken off the list without specific justification (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). From Navy documents, it appears they actually tested for fewer radionuclides. In the retesting plan for Parcel G, cleanup standards were only set for four of these radionuclides. The Navy's testing protocol, includes only scanning for gamma rays, which cannot detect radionuclides that emit only alpha and beta rays, such as strontium-90 (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). Strontium-90 is one the four radionuclides supposedly included in Parcel G retesting, but testing for strontium-90 only occurred in 10% of soil samples. The Navy may also be comparing samples for radioactive contamination to an elevated "background" level. Contractors are required to take a soil sample from a nearby area that has "no reasonable probability" of contamination in order to evaluate whether potentially impacted locations contain an elevated level of radioactivity. Tetra Tech took background measurements from plots of land in central areas of shipyard, which therefore could contain abnormally high levels of radiation themselves, and disguise the extent of contamination (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*).

Not only have there been numerous flaws with cleanup procedures performed, approved or ignored by the Navy, but the safety standards the Navy is utilizing themselves are also decades old and considered obsolete. To complete this remediation under CERCLA, the Navy is legally required to clean up the site to up-to-date standards set by the EPA's Preliminary Remediation Goal (PRG) calculator. Hirsch and his team of researchers found that the Navy has instead been using standards for building cleanups based on a 44-year-old regulatory guide created by the Atomic Energy Commission, an agency which no longer exists (Hirsch, Altenbern, Caine, Williams, and Gortner, *Hunters Point Shipyard Cleanup Used Outdated and Grossly Non-Protective Cleanup Standards*). The standards for soil cleanups the Navy has been using comes from PRGs created in 1991, at the start of the Superfund remediation. The EPA has directed the Navy to update its cleanup standards in general and specifically in the retesting plans after the Tetra Tech data falsification scandal. The Navy has ignored these EPA directives. The researchers utilized the EPA calculator to create PRGs for the site and found they are far more restrictive than those the Navy has utilized throughout the remediation. With these soil cleanup standards, the Navy is allowing for 897 times higher concentrations of radium-226, 971 times higher concentrations of thorium-232, and 421 times higher concentrations of plutonium-239 (Hirsch, Altenbern, Caine, Williams, and Gortner, *Hunters Point Shipyard Cleanup Used Outdated and Grossly Non-Protective Cleanup Standards*). If cleaned up to the standards employed by the Navy, an average of one in 380 people exposed to this soil would get cancer as a result of solely this exposure. One in 37 people exposed to buildings cleaned up to another set of Navy standards would get cancer from the exposure (Hirsch, Altenbern, Caine, Williams, and Gortner, *Hunters*

Point Shipyard Cleanup Used Outdated and Grossly Non-Protective Cleanup Standards). These rates drastically exceed the minimum allowed by the EPA, which is a rate of one cancer in 10,000 people. The EPA goal for Superfund cleanups is one person in a million getting cancer from the site alone. In comments on the Navy's Draft Fourth Five-Year Review of the shipyard cleanup the EPA directed the Navy to update its PRGs, stating "the EPA has previously commented that this fourth FYR should include updated risk evaluations for existing remediation goals (RGs) using the current versions of the EPA's PRG Calculators, but this is not addressed in the FYR" (*EPA Comments on the Draft Fourth Five-Year Review*). The revelation of these lax standards does not imply that contamination throughout the shipyard is above or even at a level that would create this risk of cancer. However, given the lack of available information on radioactive contamination at the shipyard, the data falsification that has occurred, and fact that the Navy continues to only remediate to a level of "clean" specified by these now obsolete standards, the risks are unknown and could far exceed the maximum set by the EPA.

The numerous ways in which the Navy's remediation plans and processes have acted to potentially obscure the extent of contamination also cast doubt on the safety and risks of the parcels of the shipyard that have already been transferred to the city. In September 2018, when the CDPH completed their scanning of Parcel A in the wake of fraud revelations, they discovered a radioactive object (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). They found a deck marker, one of many utilized to light up the shipyard at night decades ago, which are small disks, just an inch and a half in diameter, filled with glow in the dark paint containing radium-226. Since the beginning of the cleanup, hundreds of these disks have been unearthed. The

deck marker was buried 10 inches underground, 50 yards away from the new homes. The amount of radium contained in one of these dials is sufficient to contaminate 3,000 tons of dirt above EPA cleanup standards if it leaks outside of the disk (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). In their letter to the public announcing this find, a CDPH representative wrote "Radiation readings before removal indicate that there would not have been any health or safety hazard to anyone who happened to be at that spot previously" (Starr). However, the actual radiation readings from the marker indicate that statement may not be entirely true. A person standing directly above the buried marker would have received a dose of about 0.9 millirems per hour, which is ten times background radiation levels. Temporary exposure to this level of radiation would not result in health consequences, and this particular object did not pose a major risk to those living in the new development. However, if new homes were built on top of this land after the transfer of Parcel A, continuous exposure of from this dial would become a problem. A person on top of the buried dial 24 hours a day for an entire year would be exposed to 788 millirems, or the equivalent of 526 dental x-rays. The safety limit for radiation at Superfund sites set by the EPA is 12 millirems per year. Once unearthed, the dose of radiation from the dial on contact jumped to 3.4 millirems per hour, or 30,000 millirems annually (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). Although these values only have hypothetical impact, the discovery of this radioactive object starkly contrasts with the continually repeated assurance from government agencies involved in the cleanup that Parcel A contained no radioactive contamination and therefore could be developed without any further testing.

The Navy, DTSC, EPA, and CDPH agreed that Parcel A was clean and cleared for transfer in 2004 based on both historical record of the Navy activities that occurred in this portion of the shipyard and a scan of the area completed in 2002. In 2002 the EPA utilized a scanner van to drive on navigable roads in and adjacent to Parcel A as well as Parcels B and C and some much smaller portions of Parcels D and E. This scan found no anomalies of concern that could be attributed to anything but naturally occurring sources on any of the parcels. However, it is now known that Parcels B, C, D and E contain radioactive contamination despite the readings from the scanner van (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). Despite these findings the 2002 scan was referenced as a clear indication that Parcel A did not contain radioactive contamination and could be transferred. The original scanning technique has the same issues as the more recent rescanning on Parcel A by CDPH in that only gamma radiation can be detected, and as a result, important radionuclides such as strontium-90 and plutonium -239 were not detected. This technology certainly cannot detect contamination at PRG levels, if the Navy were using these remediation goals, and will only detect radiation at levels far higher. According to Hirsch, scanner vans and other similar hand held devices are generally not intended to serve as a definitive test for radioactive contamination but rather as a screening tool useful for targeting soil sampling in addition to random testing (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). However, the scanners did detect the deck marker on Parcel A, which should not be seen as a show of the

functionality of this technology for testing purposes but rather as indicating the need for further testing beyond scanning.

The presence of this radioactive object could indicate the ramifications of Tetra Tech's fraud rather than a failure of pre-transfer EPA scanning. Soil from other parcels of the shipyard thought to be clean were used as backfill in excavated areas of Parcel A, and should the soil have been mislabeled as clean by Tetra Tech it could have been dumped at this location along with the deck marker. However the deck marker certainly could also have been on the parcel at the time of the original scan. Whistleblower Bert Bowers claims that a former shipyard worker told him that during the years of Navy operation he and other workers tasked with disposing of deck markers would chuck them through the windows of their car as they drove out of the shipyard at the end of the day on roads that now pass through Parcel A (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). The presence of a singular radioactive object may seem like a small and chance finding, unlikely to significantly harm anyone. However, the implications of this finding go beyond the direct impact to those living and working at the shipyard. In addition to indicating potential issues with Parcel A, the finding of the deck marker also more broadly contradicts the premise that radioactive contamination solely exists on sites defined by the Navy as "radiologically impacted" in the HRA, indicating radioactive contamination could have been missed elsewhere if this approach to testing continues.

Through these various actions the Navy has manipulated their testing and remediation protocols, which are then carried out by contractors, in ways that could lead to an underestimation of the location and intensity of radioactive contamination on the

property. According to Hirsch, these actions are not standard in radiological remediation by any means, and therefore indicate a reluctance to fully evaluate and understand the extent of radioactive contamination at the shipyard (Fagone and Dizikes, "Navy Used Obsolete Safety Standards in Shipyard Cleanup, Researchers Say "). As a result of the restricted area of sampling, and the fraudulent activities by Tetra Tech, there is no publicly available, accurate information detailing the severity of pollution. The Navy's efforts to obscure the contamination at the HPNS Superfund site are aided by the nature of radioactive contamination. Unlike many other forms of hazardous waste, radioactivity cannot be seen or smelled and is only detected through instrumentation designed for that purpose. In addition, the health effects of radiation are very difficult to link directly to exposure. The primary health problem associated with radiation exposure is cancer. One in three people in the United States will develop cancer in their lifetime, and one in five will die of the disease, regardless of their exposure to the type of radioactive contamination present at the shipyard (American Cancer Society). However, the difficulty of scientifically connecting the ailments of Hunters Point community members, shipyard workers, and police officers stationed at Building 606 directly to exposure to the Superfund site's radioactive waste does not discount the danger posed by this contamination and the importance of accurately quantifying it.

The technical terms the Navy utilizes to describe the waste at the shipyard site also may be misleading to the general public. For example, the Navy consistently refers to the contamination present at the site as "low-level radioactive waste" (Roberts, "New Reports Suggest Navy Likely Spread Radiation All over Hunters Point, Never Checked for Contamination"). The deck marker located on Parcel A was referred to as a "low-

level" by the Navy after it was found by the CDPH, and its detection cited as a testament to the sensitivity of their equipment (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). The way in which the Navy utilizes this term could lead some to believe that this waste contains a low-level of radiation but that is not the case. However, according to the Nuclear Regulatory Commission, "low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation….The radioactivity can range from just above background levels found in nature to very highly radioactive in certain cases" (United States Nuclear Regulatory Commission). Therefore, the term in no way implies a low level of danger from the contamination at the shipyard.

The motive for expediting the cleanup of this Superfund site has been economic gain on the part of the city through redevelopment and minimizing economic losses on the part of the Navy. A report by the Government Accountability Office encouraged the use of this early transfer mechanism as a means to speed up cleanups and reduce remediation costs, stating "A primary advantage of using the early transfer authority is that it makes property available to the future user as soon as possible, thus allowing environmental cleanup and redevelopment activities to proceed concurrently. This can save time and costs and provide users with greater control over both activities" (U. S. Government Accountability Office). This suggestion in effect can be seen in the Navy and the city's receptiveness to the transfer of Parcel A without any soil sampling or thorough scanning, and the transfer of Parcels UC-1, UC-2 and D-2 in the midst of questions about Tetra Tech's fraud. The Navy's desire to cut cleanup costs can also be seen in their continuing use of a 2012 report, which they commissioned to find a way to avoid supposedly

unnecessary expenses in their remediation. The Navy requested this report from a third party as they had found that clean soil was being marked as contaminated with radium-226, and was incurring the costs associated with excavating and disposing of it (Fagone and Dizikes, *Navy's Hunters Point Retesting Plan Draws on Questionable Cost-Cutting Study*). The report then, based on Tetra Tech's data on soil at the shipyard, made recommendations to reduce these unnecessary costs. It found that the Navy's readings of radium in soil had been exaggerated by the presence of naturally occurring uranium and suggested more selective measurements for radium, but the uranium in soil actually comes from the fallout created in nuclear weapons testing. The Navy included this method of testing for radium in their Parcel G work plan, despite its reliance on data from Tetra Tech, and incorrect assumption on the presence of uranium (Fagone and Dizikes, *Navy's Hunters Point Retesting Plan Draws on Questionable Cost-Cutting Study*). The Navy's continued use of this report indicates their reticence to conduct work through methods that will ensure accuracy and safety in the face of increased costs.

The Navy sought to develop expertise on radioactivity during the operation of the NRDL, and in the process greatly contaminated the shipyard with radionuclides. Now, the Navy mobilized that expertise to assure the public their cleanup procedures and standards are suitable to protect human and environmental health from this contamination. On the role of experts in determining the safety of a space, scholars Brinda Sarathy and Vivien Hamilton write, "In the course of passing judgment, developing protocols, and shaping regulations, these experts often unintentionally obscured all that was still unknown about a particular toxic agent. Such actions led to an appearance of safety, certainty and consensus even when none existed" (Sarathy and

Hamilton, 8). The Navy has been unequivocal in its statements to the public on the sufficiency of its testing and cleanup actions, alleging they are based on the input of numerous authorities on public health and remediation. Through these positions, the Navy has hidden the uncertainty present in its work at the shipyard, particularly in the methods utilized for testing including reliance on above ground scanning and overly selective soil sampling. However, their misuse of expertise in cutting corners on numerous fronts in the remediation of the shipyard has led outside experts such as Hirsch to vocally criticize the Navy's methods, criticism that has been brought to the attention of the public through journalism (Roberts, "New Reports Suggest Navy Likely Spread Radiation All over Hunters Point, Never Checked for Contamination"). The Navy's efforts to reduce cleanup costs, and the city of San Francisco's eagerness to obtain economic benefit from redevelopment have worked to obscure the extent of radioactive contamination at the shipyard, but the untenable level of uncertainty in their work has gained attention nonetheless.

Community Involvement in Remediation

In the process of remediating the Hunters Point Naval Shipyard Superfund site the Navy and city of San Francisco have continued to obscure Bayview-Hunters Point residents through a lack of community involvement. The Navy's lack of regard for the voices of community members was highlighted by their dissolution of the Restoration Advisory Board (RAB). The RAB, which was created in 1994, was a board of community members who could ask questions about the Superfund remediation and raise concerns about their health and environmental quality (Muhammad). The goal of an RAB is to communicate the details of a hazardous waste cleanup to the community and answer

related questions in a participatory format, and are co-led by a community member and a Navy representative. Toward the end of the RAB's years of functioning, the community became very concerned with exposure to dust from the Navy's remediation activities and Lennar's construction on Parcel A. Residents claimed the dust was causing rashes, asthma, nosebleeds and other health issues. The focus in meeting was therefore consistently shifted to this topic, and the Navy and Lennar were perceived to be moving the blame onto one another rather than taking responsibility for this potential health hazard. The Navy dissolved the RAB in May 2009, stating the board was no longer serving its purpose of fostering dialogue with the Bayview-Hunters Point community. To support this decision, the Navy stated that political concerns such as Lennar's development projects and its related public health impacts, and the availability of jobs for community members at Hunters Point were not in the scope of technical topics related to the remediation (*Proposal to Dissolve the Hunters Point Restoration Advisory Board*).

According to Leon Muhammad, co-chair of the RAB during its operation, the group was ended by the Navy because of the community members' continuing insistence that the Navy address their concerns about the environmental quality impacts of remediation, particularly poor air quality (Muhammad). Muhammad argues, "The RAB's primary function is for the public to participate. Therefore, RABs should only go away when they are no longer needed or desired by the community. So in a case like this, where the community is clamoring for the RAB, there is no excuse to refuse to provide this minimal concession. There will always be differences of opinion and potential for mistrust, but these conditions only magnify the need for the RAB process" (Muhammad). The RAB meetings were replaced with "Community Informational Meetings" which are

centered around power point presentations led by Navy representatives rather than a participatory forum (Dillon, *Waste, Race, and Space*). The dissolution of the RAB was a complex decision which, according to the Navy, resulted in part from disagreements between community members that could not be reconciled, as well as the RAB's seemingly drastic votes to remove the City of San Francisco and Navy representatives to the RAB and halt all work at the HPNS (*Proposal to Dissolve the Hunters Point Restoration Advisory Board*). Nevertheless, in the over nine years since the RAB was ended, the Navy has failed to put in place another method for a similar method of public participation.

Another major issue with the Navy's relationship with the Hunters Point community has been an absence of detailed information for residents on the remediation, even when cleanup issues could have an impact on their health. This issue with the availability of information is evident in the lack clear communication on the extent of radioactive contamination at the shipyard, although given the Tetra Tech scandal, the Navy itself may be quite unsure of the facts in this matter. The Navy's lack of communication on the hazards at the shipyards was highlighted by a complete mishandling of an underground fire at the site. In 2000, the primary landfill of the shipyard in Parcel E, which contained an array of toxic and radioactive materials, caught on fire (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). The landfill smoldered for three weeks before the Navy notified the EPA, the public, or those working at the police unit only 2,000 feet away who had been concerned about the smoke and colorful flares (Fagone and Dizikes, "Amid a Toxic Landscape, SF Found a Home for Its Elite

Cops"). When tested, the smoke emitted from this fire was shown to contain arsenic and chloroform. The Navy only released a factsheet for nearby residents and installed air quality monitoring equipment after receiving criticism from the EPA. The fire burned for over a month. Community members saw this fire as an indication the remediation was not being conducted in an informed, controlled manner as was claimed and the Navy's hesitance to address it publicly on reinforced this perception (Dillon, *Waste, Race, and Space*).

Community involvement and proper communication in Superfund remediation has been found to be an important component of a successful cleanup that centers the needs of nearby communities. The 1986 Superfund Amendments and Reauthorization Act (SARA) specifically required the EPA to improve its community relations program (Daley). A 2017 study looked at the impact of both community advisory groups (CAGs) put in place by the EPA, and local groups in place funded by the EPA through technical assistance grants (TAGs) in communities near Superfund sites on the remediation at Superfund sites. Both avenues for public participation often allowed for communities to voice their support for cleanup strategies that were protective of public health and permanently detoxify sites, although in some places, the groups to function to convince residents of the decisions of the EPA. This research showed that at Superfund sites that involved a CAG or TAG in remediation the EPA was more likely to select a more health protective cleanup strategy than at those without (Daley). Strong community involvement programs and information at Superfund sites can result in increased satisfaction among residents with the Superfund site remediation overall (Charnley and Engelbert). The absence of avenues for involvement similar to a CAG or TAG, or in the case of HPNS a

RAB, has fueled the anger and dissatisfaction of the Bayview-Hunters Point community with the remediation process, and the actions of the Navy and the city of San Francisco. Removing the RAB as an avenue for community involvement, and failing to replace it with another group that similarly centers the voices of the community represents another effort on the part of the Navy to obscure these people and their firsthand knowledge in terms of the public health impacts of pollution.

Although the Navy has not created avenues for public participation for the Bayview-Hunters Point community, they have made their dissatisfaction with various parts of the remediation process clear through environmental justice activism. At the July 16th protest, Greenaction representatives spoke to the lack of public participation, expressed their frustration that time after time they felt their voices had not been heard. Both California Department of Health and Lennar employees were inside the Lennar Welcome Center on Parcel A, ostensibly to discuss the rescanning to begin that day. Standing outside, members of the Bayview-Hunters Point community and other environmental activists shouted at the people inside to come out and face them, to recognize their grievances and explain their actions. As one might expect, nobody came out for an impromptu talk with the protesters. But the cluster of reporters covering this protests indicated that regardless, the frustrations of the community would be heard (Waxmann, "Shipyard Residents Call Radioactivity Scan Launched by State Health Department 'Inadequate'").

The Navy's failure to sufficiently involve and inform the Bayview-Hunters Point community in the remediation of the HPNS displays continuing environmental injustice during the Superfund remediation. The absence of a forum that allows the community to

voice their concerns and offer their knowledge, and well as the lack of information provided to the community on environmental hazards make clear this cleanup has not sufficiently centered the needs of those living in Bayview-Hunters Point. The deficiency of community involvement along with problems with data falsification and Navy protocols for cleaning up radioactive contamination has made the Superfund remediation unsuccessful thus far on multiple fronts. As the sale of homes and construction of apartment buildings continues of Parcel A, these issues call into question the decision to redevelop on one part of the site even as remediation continues. Despite the uncertainty regarding the extent of radioactive contamination, plans remain to redevelop the rest of the shipyard and create a new neighborhood seen as an economic boon for the city of San Francisco. However, given the problems with remediation of radioactive contamination there could be negative consequences of the redevelopment project for both the Bayview-Hunters Point community, and the new residents of the SF Shipyard.

Chapter 3: The Redevelopment of Hunters Point and Green Gentrification

The massive gantry crane that still towers over Hunters Point was completed in 1947 for the purpose of maintaining warships. At 730 feet long, and 450 feet tall, it was the largest of its kind at the time (Short). On a playground in new the SF Shipyard development, there is a set of monkey bars fashioned after the Hunters Point gantry crane. This playground is a part of the Innes Court Park, one green spaces already constructed in the redeveloped Parcel A. Parks like this one are a major component of the redevelopment project at the former shipyard, as the city and developers present a vision for an open, natural landscape in this new neighborhood. Along with the many acres of

green space, the development also integrates environmental concerns into residential and commercial areas with a number of sustainable features. While these green features may excite potential homebuyers looking at the shipyard, many in the Bayview-Hunters Point community are concerned that the redevelopment, parks and all, will result in the gentrification of the surrounding neighborhood. Gentrification has been an issue in many neighborhoods in San Francisco, such and the Mission and South of Market (SOMA), as real estate values have skyrocketed in the city over the past few decades (Mirabal). Because the government agencies involved in the Superfund cleanup and redevelopment have worked to obscure radioactive contamination at the former shipyard and segregated Bayview-Hunters Point by race, separating it from the city as a whole, the community is currently at risk of green gentrification.

Figure 13: A miniature gantry crane shaped monkey bars on a playground in the SF Shipyard. Photo courtesy of Suzanne Mankoff.

Defining Green Gentrification

The term green gentrification describes the process in which urban greening initiatives or the production of other environmental amenities results in the displacement

of nearby, low-income communities as wealthier residents move into newly greened areas (Gould and Lewis). The concept of green gentrification is rooted in the literature of environmental justice, which establishes that environmental "bads" are disproportionately sited in marginalized minority and low-income communities (Pulido). The inverse of this statement is also true, in that environmental "goods," including green spaces are more often found in high-income, white neighborhoods. The locations of environmentally hazardous, undesirable land uses and environmental amenities are rooted in historical processes of racial segregation and tend to exacerbate existing inequalities (Gould and Lewis). Therefore, when green gentrification occurs as environmental "goods," are introduced in a working-class area, the inequalities produced by environmental racism are reinforced when disadvantaged communities are forced out and don't receive the benefits of environmental improvements. The process of green gentrification can be seen as a "contemporary process of inverted suburbanization" which mirrors the past in which white middle-class residents left the city seeking open and natural spaces and escaping dense, industrial development (Anguelovski et al.). After industry and its accompanying pollution is removed white, and upper income people can seek these clean and green spaces within an urban setting, thereby pushing out disadvantaged residents left in the city after white flight (Anguelovski et al.).

The concept of gentrification challenges the idea that urban greening results in an equally distributed inherent good. The construction of parks in urban spaces do have several benefits, including the absorption of carbon emissions, increasing contact with nature and social interactions, and overall improved physical and mental health of city dwellers (Anguelovski et al.). However, the gentrifying effects of past urban greening

initiatives suggest that these benefits are not equally distributed to disadvantaged, and ultimately displaced, people. Similarly, Superfund cleanups that are thought of as a positive process for both the natural environment and nearby residents can prove detrimental in this way. Superfund site remediation has been cited as a cause of green gentrification, as it increases property values and makes land available for redevelopment. One study found housing values within one kilometer of a Superfund site increased 18 percent with a cleanup (Gould and Lewis). Communities where Superfund site cleanups have been completed have on average seen an increase in mean household income of 26 percent, and the local proportion of college educated residents has risen 31 percent (Anguelovski et al.). Not only are green developments potentially detrimental to local residents, the environmental benefits of new green developments may also be mitigated by the lifestyles of residents, as their surrounding green spaces and sustainable buildings put environmental pollutants and dangers out of site and mind. Living in such a space can reduce incentives for them to improve their behaviors in ways protective of the natural environment or lower their carbon footprint (Gould and Lewis).

The impacts of green gentrification have been made evident and explored in literature in several locations in New York City. One frequently discussed example is the High Line; an abandoned railroad trestle in Manhattan turned into a long and narrow park, which has become a major tourist attraction. This environmental reuse project has quickly spurred a rise in property values in surrounding areas (Gould and Lewis). Brooklyn, in particular has been identified as a center of both environmentalism and widespread gentrification in New York City, and the two have been linked in several places there. By the 1970s, Prospect Park in Brooklyn had been neglected and run down,

and gained a reputation for crime, and drug dealing. In the 1990s the newly formed Prospect Park Alliance successfully worked to restore the park to its former status as an attractive environmental amenity, away from its image as an urban liability. This restoration along with Brooklyn's booming real-estate market made surrounding neighborhoods a target for developers. The population of white people increased in three of five neighborhoods surrounding the newly restored Prospect Park while it decreased borough-wide from 1990 to 2009 (Gould and Lewis). Meanwhile, the population of black residents dropped in all five neighborhoods in that time frame, at a far greater rate than Brooklyn as a whole. The two whitest neighborhoods, and the neighborhood with the greatest overall whitening saw an increase in median household income, which runs counter to the trend for the rest of the borough. The restoration of Prospect Park also appears to have, overall, raised rents in surrounding neighborhoods (Gould and Lewis). The case of Prospect Park displays the potential of urban greening to foster gentrification, affording more access to the environmental amenity to more privileged people.

Green Gentrification in Hunters Point

Both the basis of the project in the cleanup of hazardous waste, and the environmentally conscious elements of city plans has led some to argue that the redevelopment of the former HPNS could become an example of green gentrification (Harshaw; Dillon, "Cleaning up Toxic Sites Shouldn't Clear out the Neighbors"). While the redeveloped shipyard's sustainable features and acres of green spaces make it an attractive place to live, for the most part it will not be available to many in the Bayview-Hunters Point community. Seventy-five percent of the well over 12,000 housing units in these plans will be sold as market-rate homes. The roughly 3,345 affordable housing

units that are a part of this plan include public housing developments that will be demolished and reconstructed, so the net gain of low-income housing will actually be lower (Brahinsky). Potential buyers of the market-rate apartments, condominiums and townhouses are clearly a wealthier and whiter group than the current residents of Bayview-Hunters Point. Price tags on apartments at the SF Shipyard are advertised as low in comparison to costs throughout the rest of San Francisco, with the least expensive apartments starting around $600,000, but are still well out of reach for most people in the nearby community (Pender). These redevelopment plans have led many to ask the question: Who is this cleanup really for? Will the local community reap the benefits of land free from toxic pollution and industrial activity, or will a new more privileged group of residents enjoy them?

The SF Shipyard development has been portrayed as a space both environmentally friendly in its construction and a location for green innovation. The head architect of the shipyard redevelopment, David Adjaye, who is known for designing the National Museum of African American Culture and History in Washington DC, expressed his desire for the development to have a "more natural" feeling, especially at the edge of the bay (Brinklow). The redevelopment of Parcel A, which has already been partially completed, in Phase 1 of the redevelopment plan already includes several small "pocket parks". However, a much greater amount of greening is a part of Phase 2, which includes the redevelopment of the rest of the shipyard along with Candlestick Point. The description of this project published online by OCII states

> "The Phase 2 plan also includes 3+ million square feet of research and development uses centered around 'green' and clean technology uses on the

> Shipyard with a clean tech business incubator and the headquarters for the United Nations Global Compact Sustainability Center located in Building 813 on the Shipyard, over 300 acres of parks and open space between the two sites" (*Hunters Point Shipyard and Candlestick Point*).

A large portion of the parks envisioned in Phase 2 of the redevelopment plan link with a larger project called the Blue Greenway. The Blue Greenway in a planned thirteen-mile stretch of walking trails, bike paths, and green spaces along the shore of the bay stretching from the downtown SOMA baseball stadium, AT&T Park, south to Candlestick Point. This plan includes the restoration of the productive wetlands ecosystem along this shoreline, and the extensive incorporation of native plants (Harshaw). There are big hopes for the future of the Blue Greenway, highlighted by a 2018 KQED headline that asked, "Could an Overlooked Cove in San Francisco's Bayview Become the Next Golden Gate Park?" (Harshaw) These green spaces are a key element of the redevelopment of the former shipyard in terms of its appeal to future residents and its construction as a sustainable project.

In addition to the many acres of parks included in the redevelopment plan, the project integrates environmental consciousness into the residential and commercial areas. Sustainability is portrayed as a hallmark of the redevelopment project on the developer Lennar's SF Shipyard website, which states, "Good for people, good for the planet. The SF Shipyard is leading a major movement in sustainable urban design, and we're dreaming in green. Think tree-lined streets; miles of interconnected bike and walking paths throughout; and a cutting-edge infrastructure system" ("Community"). The city of San Francisco is also working with Leadership in Energy and Environmental Design

(LEED), a popular and globally used rating system for green buildings, in the redevelopment plan. The project is receiving the LEED for Neighborhood Development (LEED – ND) certification, which recognizes that a development effort meets a certain level of overall sustainability and environmental responsibility. To satisfy the requirements for the LEED-ND certification, the redevelopment plan includes energy saving appliances, LED street lights, the use of solar energy, and a reclaimed water system (U.S. Green Building Council). In the city of San Francisco, where many identify as environmentalists concerned with their impact on the planet, these sustainable features are an appealing selling point to potential homebuyers. Claims of sustainable development and a natural appearance also work counteract the previous public perception of Hunters Point as an industrialized, heavily polluted space.

According to city officials and developers, the redevelopment of the former HPNS is both economically and environmentally positive for San Francisco as a whole. However, given that most of the housing at the new SF Shipyard is out of reach for current Bayview-Hunters Point residents and has the potential to have a gentrifying effect on the neighborhood, its supposed contributions to economic prosperity for the community are questionable. The project could of course present an opportunity for financial gain from rising property values for homeowners in the area, but 48 percent of Bayview-Hunters Point residents are renters and are susceptible to being priced out of their homes (Harshaw). If these residents do leave Hunters Point, they won't receive the benefits of newly created green spaces. The creation of jobs has been an essential selling point for the redevelopment project, especially in terms of appealing to nearby residents and improving their economic situation. The Hunters Point Redevelopment Plan contains

a provision that the project should create jobs for economically disadvantaged Bayview-Hunters Point residents. This provision is related to the San Francisco Redevelopment Agency's workforce policy, which requires that employers in Bayview-Hunters Point make a good faith effort for fifty percent of their workers to be neighborhood residents. However, a Civil Grand Jury report found that contractors have not adhered to this policy, and according to union representatives these hiring goals are all but meaningless (Civil Grand Jury). The promise of jobs is a powerful one in this impoverished community, but it is one that will not necessarily materialize.

In addition to the uncertainty of economic benefits for the community, the intentions of redevelopment have also been questioned by members of the Bayview-Hunters Point community who don't see themselves or their interests represented in the new development. Longtime environmental justice activist and former Hunters Point resident Marie Harrison was quoted in an article on the redevelopment and potential gentrification saying that although she supports the creation of parks and open space for local children,

> "Unfortunately, the plan is to tear down and make walkways. To tear down all of the old buildings, to partially clean—or clean what they only have to. Put grass over it. And make a few docks and restaurants where people with boats from as far away as Oakland, Richmond, and San Jose can sail up and pull over at Innes Avenue and have lunch or dinner. Nice restaurants and music areas, stroll through the wetlands and that kind of thing. And I'm thinking, 'Wow. How many folks do you know that live in public housing, personally? And how many of them do you know own boats?'" (Harshaw)

The parks in the redevelopment plan appear to many in Bayview-Hunters Point as amenities for the wealthy moving into luxury waterfront condos and townhomes, not resources designed to fit their needs. This sentiment aligns with the notion put forward by proponents of redevelopment that the project reconnects and integrates the neighborhood with the rest of San Francisco, which furthers the historical narrative of Bayview-Hunters Point as distinct from the city at large (Dillon, *Redevelopment and the Politics of Place in Bayview-Hunters Point*). The SF Shipyard development is portrayed by developers and the city as celebrating and centering the lands history as an industrious naval shipyard and the center of military history in San Francisco. But in failing to center the needs of the community disenfranchised by many actions perpetrated by the city government, it continues to hide the vast history of racism in Bayview-Hunters Point and does little to combat its effects.

In addition to the damage of the potential displacement of the black and low-income community, the green gentrification of the former HPNS could prove harmful to those moving into newly constructed apartment buildings. As previously illustrated, there is a possibility that homes have been and will continue to be built on top of still radioactive or otherwise toxically contaminated soil (Fagone and Dizikes, *Radioactive Find Raises Doubts about Safety of Shipyard Home Site*). Although the specially engineered caps that are a part of planned remediation contain these pollutants to some extent, much of the shipyard lies within an earthquake liquefaction zone, which given the San Francisco area's seismic activity, could prove a major danger ("San Francisco Seismic Hazard Zones"). In addition, sea level rise resulting from global warming will likely impact this area at the shoreline, and could also play a role in distributing toxins

(King). Ironically, green gentrification can prove detrimental to those who inhabit new developments by selling desirable waterfront property, which will lose value as the impacts of climate change continue to materialize. The safety of the homes on Parcel A has already been called into question as the means of scanning before transfer and after the Tetra Tech scandal are not sensitive or thorough enough in they eyes of outside radiation experts (Hirsch, Altenbern, Caine, Williams, and Gortner, *The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination*). As other shipyard parcels are remediated and transferred to the city of San Francisco, this uncertainty in terms of the safety from radiation may well continue into other newly redeveloped areas given the previously discussed problems with Navy plans.

The endangerment of current and future shipyard residents is directly tied to the continual disguising of the extent of radioactive contamination by the Navy in their use of manipulated testing practices and insufficient safety standards. According the city of San Francisco and developers, in Hunters Point extensively polluted and environmentally hazardous land is being transformed into a space clean from contamination and environmentally conscious, drastically increasing the value of land. But the combination of incomplete testing and cleanup by the Navy, and the aggressive push for redevelopment by the city has allowed the new residents to move onto land that may not truly be clean. The lawsuit filed by current shipyard residents against Tetra Tech and developer FivePoint for the loss of value of their homes associated with the continuing contamination and remediation displays negative effect of green gentrification on former hazardous waste sites for the gentrifiers (Dineen, *Hunters Point Shipyard Residents Sue Developer, Citing Contamination, Loss of Value*). The land under new shipyard residents

is not definitively dangerous and cancer causing, but the lack of thorough testing leaves potential presence of radioactive contamination uncomfortably unknown. If the Navy does not change its current practices at the shipyard to fully test for radioactive contamination and ensure the site is remediated to residential standards, future residents moving into additional shipyard parcels could find themselves in a similar situation should residual radioactive contamination be found. Given the closer examination of the cleanup since the data falsification scandal in the media and pressure from the overseeing EPA, in large part as a result of presence the new shipyard residents and publicized economic potential of the redevelopment, the risks of current remediation practices will hopefully change.

At the former HPNS, green gentrification could become increasingly detrimental to both the longstanding Bayview-Hunters Point community, and new residents moving into the SF Shipyard as redevelopment continues. For the longstanding community of low-income, black residents, the cleanup of the former HPNS Superfund does not represent environmental justice, as the increase in property values that accompanies the redevelopment project, clearly not designed with their interests in mind, will result in displacement. For new shipyard residents who have moved into Parcel A or will move into other transferred parcels in the future, the numerous issues with the Superfund remediation could prove dangerous to their health if the site is not properly tested and radioactive contamination remains buried. As remediation and redevelopment continue concurrently in Hunters Point, these problems will persist without a significant shift in the practices of both the Navy and city government and a greater focus on pursuing environmental justice at the shipyard.

Conclusion:

At the former Parcel A of the Hunters Point Naval Shipyard Superfund site, the construction of new homes continues while the scandal and suspicion surrounding the redevelopment and remediation remains. The modern apartment buildings and manicured parks already built there contrast sharply with the area's history of military usage, racist segregation and hazardous waste. While the HPNS and NRDL were in operation, the radionuclides that polluted the shipyard were hidden by both the secrecy that accompanied the military lab, and the unknown nature of radioactive contaminants at the time. Around the same time, African American migrants to San Francisco faced racist housing policies and practices that concentrated a large population of African Americans next to the shipyard and other polluting industrial facilities that damaged their health. During the Superfund remediation in progress, the extent of radioactive contamination was obscured not only by the data falsification by Navy contractor Tetra Tech, but also the Navy's own plans which fail to thoroughly test the property. Throughout the cleanup, the Navy has not sufficiently involved the Bayview-Hunters Point community, in a continuation of environmental injustice at the shipyard. The city's Hunters Point redevelopment project perpetuates historical patterns of environmental racism by disguising the potential that radioactive contamination remains throughout the shipyard, even on Parcel A, and catalyzing the gentrification of the neighborhood, displacing residents who have long lived in the community.

The cleanup of the shipyard is far from over, so there is still time to improve the thoroughness of testing for radioactive contamination and ensure its removal before more parcels are transferred to the city, and more townhomes and parks sit on top of the soil.

To do so, the Navy must amend testing plans throughout the Superfund site in compliance with EPA directives and safety standards, and more thorough testing must occur on Parcel A. The continued redevelopment will make the safety of new residents in Hunters Point an essential concern, but attention must also be given to residents of the Bayview-Hunters Point community and the green gentrification they will face. After cleanups like the remediation at the HPNS, green gentrification is not inevitable. Green gentrification researchers have argued for the use of the "just green enough" strategy, which incorporates local communities into cleanups and urban greening in a manner that serves their needs and does not involve large scale real estate development with green spaces as amenities (Gould and Lewis) The housing shortage in San Francisco and the amount of potential economic gain redevelopment presents for the city and developers make such an approach seem unlikely at this point in Hunters Point. However, the power and passion of environmental justice organizers and activists in the Bayview-Hunters Point community is undeniable, and they continue to stand up against the incomplete shipyard cleanup and the gentrification of their neighborhood. The future of San Francisco's shipyard remains uncertain, but as more sustainable buildings and green spaces are built it is important to remember their environmentalist appeal does not mean they are built on clean and just grounds.

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