FROM CLEANUP TO COVERUP

How the Navy Quietly Abandoned Commitments to Clean Up Hunters Point Naval Shipyard and is Instead Covering Up Much of the Contamination

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EXECUTIVE SUMMARY

The Navy originally promised that it would clean up the contamination at the Hunters Point Naval Shipyard Superfund site to standards safe enough for people to live on without the need for land use restrictions or physical barriers such as covers.

In 2000, San Francisco voters overwhelmingly approved Proposition P supporting a full cleanup to the most protective standards, those for unrestricted residential release, with no barriers or land use restrictions. The following year, the San Francisco Board of Supervisors adopted Prop P as official City Policy and called on all City agencies to carry it out.

Indeed, as recently as this year, the San Francisco Department of Public Health has repeatedly asserted that the site is being returned to its natural state, i.e., all contamination is in fact being removed.

HOWEVER, what has never been made clear to the public is that the Navy long ago shifted from cleaning up to merely covering up much of the contamination. Furthermore, the City, despite the official City Policy and what it has told the public, has cooperated with the change.

The Navy shifted course because it found that contamination was far more widespread and would be more expensive to clean up than it had initially assumed.

With reduced cost, however, comes a reduction in safety. Covers are ineffective at preventing migration of and exposure to contaminants. Burrowing animals can bring contaminated soil to the surface. Plant roots penetrate far deeper in soil than the covers and can similarly bring contaminants to the surface. Erosion will also reduce the effectiveness of the cover.

The Navy has asserted that the covers would be "long-lasting" and kept in place after cleanup concludes. For this purpose, the Navy is relying on "Institutional Controls" that supposedly would prohibit any:

> "Land disturbing activity which includes but is not limited to:
> (1) excavation of soil
> (2) construction of roads, utilities, facilities, structures, and appurtenances of any kind
> (3) demolition or removal of 'hardscape' (for example, concrete roadways, parking lots, foundations, and sidewalks)
> (4) any activity that involves movement of soil to the surface from below the surface of the land."

However, these are precisely the activities necessary for the redevelopment project to go forward. **The institutional controls are therefore fictions: the covers would have to be destroyed and the contaminated soil beneath them excavated, creating potential exposure to the public.**

Failing to clean up the contamination as promised, relying instead on ineffective thin covers and Institutional Controls—which have to be breached in any case in order to undertake the massive construction project—is at odds with the Navy's public promises, the position of San Francisco voters, the official Policy of the City, and what is needed to protect public health.

FOREWORD AND ACKNOWLEDGMENTS

This is the fourth in a series of reports about the Hunters Point Naval Shipyard. In early 2016, the Program on Environmental and Nuclear Policy at the University of California, Santa Cruz, initiated a project to review a series of issues associated with the cleanup of Hunters Point. Completion of that work was delayed by difficulties in getting necessary data and information from the Navy, EPA, and state agencies, and thus not concluded by the time the Program's Director, Daniel Hirsch, retired from the University in June of 2017. Since then, Hirsch and a team of former and current UCSC students have continued to work on the matter through a nonprofit organization, the Committee to Bridge the Gap.

We gratefully acknowledge the following past and present UCSC students for their assistance in this project: Daniela Aguilar, Julia Appelrouth, Candice Benhamou, Lilia Brunsman, Dezi Bunio, Sophie Chertok, Janice Davis, Alhad Dighe, Lauren DiQuattro, Madeleine Easthouse, Janie Flores, Liora Huebner, Daniel Kim, Lucien Martin, Faylenn McDonough, Vincent Molina, Paige Pearson, Cori Strell, Echo Vanier, Jillian White, and Haneen Zain.

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Two companion reports are also being issued at this time: one by Dr. William Bianchi, a soil physicist and the retired Director of the Groundwater Recharge Research Station of the U.S. Department of Agriculture - Agricultural Research Service, and one by Dr. Howard Wilshire, a retired Senior Geologist of the U.S. Geological Survey.

For access to other reports on HPNS in this series: http://www.committeetobridgethegap.org
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Source of cover photograph: US Navy.[1] **Note: The photo is of the soil cover being placed at IR-7 and -18 at Hunters Point Naval Shipyard. The orange fabric in the foreground of the photograph is a permeable "demarcation layer" to warn that the soil beneath is radiologically impacted. It is not designed to prevent migration of contaminants or penetration by plant roots or burrowing animals and will not be used for most of the site**.

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INTRODUCTION

In the prior reports in this series,[2] we showed that nuclear activities at the Hunters Point Naval Shipyard (HPNS) were far more extensive than previously understood; that they had the potential to contaminate much if not all of HPNS;[3] that nonetheless the Navy arbitrarily exempted 90% of the site and 90% of the radionuclides of concern from being sampled at all;[4] and that the cleanup standards the Navy employed were decades out of date and far less protective than required by EPA guidance.[5] On top of all these problems, the Navy's contractor Tetra Tech has been found by the EPA to have fabricated or otherwise falsified measurements in 90-97% of the HPNS survey units.[6] Serious questions have also been raised about the adequacy of plans for retesting.[7]

This report deals with a new, fundamental matter: The public has been under the impression that the longstanding cleanup plan for HPNS has been to remove the extensive radioactive and chemical contamination present at this Superfund site. Indeed, that was the core of the Navy's original commitment for the Shipyard. However, over time, those promises eroded, and what is now planned is markedly less protective. **Rather than removing contaminated soil, the Navy has quietly but dramatically shifted its approach so that it will leave significant amounts of the contamination in place and merely cover it with a layer of two to three feet of soil or four inches of asphalt.**

Furthermore, rather than make HPNS safe for unrestricted use, the Navy's intention now is to rely heavily on land use restrictions, also called "Institutional Controls" (ICs). All of this is directly at odds with what the people of San Francisco voted for when they overwhelmingly approved Proposition P in 2000, which called for cleanup to the most protective standards so that the site could be released for unrestricted residential use, without reliance on barriers like covers.[8] Furthermore, in 2001 the San Francisco Board of Supervisors adopted Prop P as official policy of the City and County of San Francisco (hereafter referred to as "the City").

To this day, the San Francisco Department of Public Health has repeatedly claimed that *all* contamination at HPNS is being cleaned up, that it is being returned to its natural state.[9] **However, the public has never been candidly informed that the Navy long ago switched from cleaning up to merely covering up much of the contamination, which would be ineffective at protecting public health, and that the covers would have to be torn up in any case for the massive planned redevelopment.**

WHAT WAS PROMISED

Hunters Point Naval Shipyard was placed on the National Priorities List (NPL) in 1989, designating it a Superfund site.[10] Superfund sites, by definition the most polluted locations in the country, are to be cleaned up pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Under CERCLA §120(a)(2), federal facilities that are on the NPL are forbidden from being remediated in a fashion inconsistent with EPA CERCLA guidance.

The Navy is the lead agency for remediation of its contamination at HPNS. The Navy's proposed cleanup actions are subject to review and approval by the U.S. EPA, the California Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board, pursuant to a Federal Facilities Agreement between the agencies.

The Navy's promises from the outset were to remediate HPNS to the most protective standards, ones that would allow the site to be released for unrestricted residential use. In other words, after removal of the contamination, remaining concentrations would be so low that people could live safely anywhere on the site, without any limits such as Institutional Controls or physical barriers.

Early on, the Navy divided HPNS into several parcels and made remediation decisions on a parcel-by-parcel basis. The first, Parcel A, was released for transfer to the City for *unrestricted* residential use,[11] purportedly safe to live on without covers or Institutional Controls.[12]

The second parcel for which a cleanup remedy was chosen, in 1997, was Parcel B. There too, the Navy committed to achieving an end state of no contamination remaining anywhere on the parcel at levels exceeding those allowing unrestricted residential use: "Although only certain portions of Parcel B are slated for residential use under the current reuse plan, the Navy proposes to clean up the entire parcel to residential risk-based standards."[13] No restrictions, Institutional Controls, or covers were to have been required for the soil remedy.[14] The Navy committed to cleanup standards, for this and all other parcels, for both radioactive and chemical contamination, based on unrestricted residential exposure pathways, including consumption of produce from a backyard or community garden.[15]

THE NAVY CONTEMPLATES BREAKING THE PROMISES

Fairly quickly into its excavations at Parcel B, **the Navy discovered much more contamination than anticipated, and found that it was more widespread, existing in places where the Navy didn't expect it.** As is discussed in more detail later in this report, the cost and time necessary for remediating Parcel B turned out to be much greater than the Navy had initially assumed. Consequently, in 1999, the Navy suspended work on Parcel B while it tried to figure out what to do.

One might think that the discovery of more extensive contamination than initially presumed would spur intensified cleanup efforts. However, it had the opposite effect. The Navy began to consider

breaking its commitment to clean up HPNS to unrestricted release levels—and to instead leave much of the contamination not cleaned up, relying on restrictions and physical barriers.[16] The following year, Prop P was placed on the San Francisco ballot to oppose such a change.

THE PUBLIC OVERWHELMINGLY VOTES IN SUPPORT OF THE PROMISED FULL CLEANUP

The prospective reversal of the Navy's cleanup commitments caused significant concern in the community and among members of the San Francisco Board of Supervisors. Therefore, in August of 2000, then-San Francisco Supervisors Tom Ammiano, Sue Bierman, Mark Leno, and Michael Yaki proposed a Declaration of Policy be placed on the November ballot. Supervisors Amos Brown, Mabel Teng, and Leland Yee joined the other four in submitting the ballot arguments in favor of the proposition. The ballot measure, Proposition P, was approved by the voters with 86% in favor.[17]

Proposition P was summarized on the ballot[18] as follows:

> Shall it be City policy to support a **full clean-up** by the Navy of the Hunters Point Shipyard, to allow **unrestricted use of the entire site** in the future?
>
> **The Navy has proposed that it limit the clean-up of certain contaminated areas**.
>
> THE PROPOSAL: **Proposition P would make it City policy to urge the Navy to follow the highest standards for cleaning up hazardous materials and toxic contamination at the Hunters Point Shipyard, so that any area could be used for housing.**
>
> A "YES" VOTE MEANS: If you vote yes, **you want it to be City policy to support a full clean-up of the Hunters Point Shipyard**.
>
> (emphasis added)

The full text of the Proposition is as follows:

> DECLARATION OF POLICY; SUPPORTING ENVIRONMENTAL CLEANUP TO RESIDENTIAL LEVELS FOR THE HUNTERS POINT SHIPYARD
>
> The People of the City and County of San Francisco find and declare that: The current Hunters Point Shipyard was built and operated under United Suites Navy ownership for its entire history. Under the Navy's ownership, **the Shipyard became so contaminated as to require its placement on the National Priorities List; the list of the most polluted facilities in the nation.** Today, the **Hunters Point Shipyard is the most contaminated portion of San Francisco and the only federal Superfund site in the City.** Residents of the Hunters Point Bayview District, the neighborhood immediately surrounding the former base, are **afflicted with the highest levels of cancer, respiratory diseases and other illnesses in San Francisco.**

> In 1991, the Base Realignment and Closure Commission voted to close the Hunters Point Shipyard. The Shipyard's closure and its transfer back to civilian use in San Francisco will bring **tens of thousands of people into direct contact with a federal Superfund site**. Once the site is redeveloped, many thousands of people will find a home on the Shipyard as well. The City and County of San Francisco is currently negotiating with the Navy over the cleanup standards and the transfer of the property. However, two of the six parcels of land making up the Shipyard and the surrounding Bay are not part of this round of talks, primarily as a result of the cost of cleanup.
>
> While the federal government is required by law to clean up the Shipyard, the **Navy says it will cost too much to do a thorough job**. **Instead, the Navy plans to leave behind so much contamination that it will increase the risk for cancer resulting from exposure to the property, requiring the construction of barriers and the restriction of future land uses.**
>
> The United States government **should be held to the highest standards of accountability** for its actions. San Franciscans can, under federal law, express their preference in this debate. **The National Contingency Plan, the guiding principles under which the cleanup plan is regulated, establishes community acceptance as one of its nine principle criteria for setting the cleanup standards for a toxic site.** The Hunters Point Bayview community wishes the Hunters Point Shipyard to be **cleaned to a level which would enable the unrestricted use of the property - the highest standard for cleanup established by the United States Environmental Protection Agency.**
>
> Therefore, it is the policy of the People of the City and the County of San Francisco that **we oppose increasing the risks for cancer as a result of using lower standards for cleanup**; and support the Hunters Point Bayview community's request that the Federal government, through its Department of the Navy, allocate funds sufficient to clean the Shipyard to a **level that will enable unrestricted use.**
>
> (emphasis added)

Thus, 86% of San Francisco Proposition P voters made clear that the Navy should live up to its initial promises and use the most protective cleanup standards, those that would allow residential use throughout the site without restrictions or physical barriers.

THE CITY ADOPTS PROPOSITION P AS OFFICIAL POLICY: FULL CLEANUP WITH NO RESTRICTIONS OR COVERS

The following year, the Board of Supervisors passed, and the Mayor signed, a resolution entitled "Adoption of Proposition P as Official City Policy for the Environmental Remediation of Hunters Point Shipyard." The full resolution is found in an appendix of this report. Among the key aspects of the resolution are the following findings:

> **WHEREAS, If the Shipyard is not adequately remediated, thousands of residents, tenants, workers, visitors and neighbors will be exposed to residual toxic hazards from an incomplete cleanup; and**
>
> …

WHEREAS, Although the federal government is required by law to clean up the Shipyard, the Navy says it will cost too much money to do a thorough job. Instead, the Navy plans to leave behind so much contamination that the property may expose occupants and visitors to an unacceptable risk of cancer unless the Navy imposes legal restrictions on land use and constructs physical barriers; and

…

WHEREAS, The United States government should be held to the highest standards of accountability for its actions; and

WHEREAS, The United States Navy has demonstrated that it is not committed to responsible site management or cleanup and many in the Bayview Hunters Point community believe the department's disdain for its duties in this neighborhood stems from the racial make-up of its residents;

The Board of Supervisors Resolution thus called for HPNS to "**be cleaned to a level which would enable the unrestricted use of the property** - t**he highest standard for cleanup established by the United States Environmental Protection Agency."** It further set as official City policy that HPNS should be cleaned up fully so that it is safe to live there with **no need to rely on land use controls or physical barriers such as covers.** Finally, it called on "**all participating City agencies including the Departments of Health, Environment, and Planning, the City and District Attorney, and the San Francisco Redevelopment Agency, to ensure full federal compliance with Prop P**."

COMMUNITY ACCEPTANCE AS ONE OF THE CERCLA CRITERIA FOR CLEANUP DECISIONS

Community acceptance is one of the nine criteria for establishing cleanup requirements under the National Contingency Plan (NCP), the primary regulation governing Superfund cleanups.[19] Thus, the full cleanup to unrestricted residential release standards called for in Proposition P represents not only the will of the people but a consideration the Navy and EPA are legally required to take seriously.[20] Proposition P and the City resolution adopting it as official policy directly cite the community acceptance provision of the NCP. These were extraordinary acts by the residents and Supervisors of San Francisco: an overwhelming vote of the people and a formal policy of the City making clear what the community would and would not accept. We are unaware of any Superfund site in the country where there has been such a clear and formal demonstration of community position on acceptable cleanup standards.

THE NAVY BREAKS ITS PROMISES

The Navy's actual actions have been directly contrary to its initial commitments, the vote of San Francisco residents, the official City policy adopted by the Board of Supervisors, and what the public continues to be told. The Navy has quietly switched from the promised removal of contamination above remediation goals for unrestricted residential release to instead leaving much of the contamination behind, and merely covering the pollution with a thin layer of soil or asphalt.

PARCEL B, THE FAILURE OF THE "SPILL MODEL," AND THE DISCOVERY OF UBIQUITOUS CONTAMINATION

From the outset, the Navy had relied upon what it called the "spill model," which assumed that contamination would only be found where the Navy had records of radioactivity and toxic chemical use and spills, and would be restricted to the immediate area around the spill. As we demonstrated in an earlier report, the Navy simply declared about 90% of HPNS "non-impacted," based solely on a records search and interviews, and did not test the great majority of the site for radionuclides.[21] Parcel A was thus transferred to the City and homes built upon it with essentially no radioactivity measurements, based on this assumption.[22]

The cleanup plans for Parcel B were similarly based on the spill model, assuming that contamination would be limited to known, discrete locations. The Navy's 1997 Record of Decision (ROD)[23] for Parcel B thus selected as the remedy the removal of all contamination above remediation goals for unrestricted residential use—i.e., excavation to levels safe for people to live on with no Institutional Controls and no barriers such as covers.[24] However, the Navy subsequently found far more contamination than it anticipated and halted the excavations in 1999.[25]

In 2000, the Navy modified the ROD with an Explanation of Significant Differences (ESD) which dramatically weakened the cleanup standards. For nearly 70% of the chemicals of concern the cleanup levels were weakened, often by a factor of ten or more.[26] The Navy restarted the Parcel B excavations in 2000, and found that, even with the markedly weakened cleanup levels, there was still much more contaminated soil requiring remediation than it had anticipated.

So, in 2001 the Navy once again stopped cleanup.[27] Years later, in 2009, the Navy issued an Amended ROD for Parcel B in which the fundamental nature of the HPNS cleanup was changed. Rather than removing soil contaminated above cleanup levels, however weak they may be, the Navy now decided to leave behind much of the contamination and rely instead on restrictions and covers and thus no longer clean up to unrestricted residential release standards.[28]

The purported basis for this seismic shift in cleanup plans was the Navy's acknowledgment that its spill model was wrong, and that contamination was "ubiquitous." The Navy tried to claim that the widespread presence of toxic materials in Parcel B was due to high levels of certain toxic metals already present in materials used as fill to construct parts of the Shipyard.[29] These

assertions were based on a report by Tetra Tech, the very company that has been found to have fabricated much of the radiation measurements at HPNS.

However, the regulators disagreed with the Tetra Tech/Navy claims. As the Navy stated, "The Navy further acknowledges that the regulatory agencies do not agree with the Navy's position that ubiquitous metals are naturally occurring."[30] In fact, the Navy conceded "that industrial sources of metals exist at HPNS and that there is a potential that some concentrations of metals could have sources other than naturally occurring materials."[31] In addition to the widespread toxic chemical contamination, the Navy also found significant radioactive contamination in places in Parcel B it had not expected.[32]

Despite the disagreement by the regulatory agencies with the Navy's claims about the source of the contamination and the Navy's admission that some of it was not due to natural levels of these materials, the Navy shifted its remediation approach in 2009 from excavating all contaminants at concentrations that are above cleanup levels to a new approach of merely covering up much of the contamination. As the Navy stated in the Amended Parcel B ROD documenting this shift, "all other areas that present potential unacceptable incremental risk from potential exposure to COCs [chemicals of concern] in soil [reference to Figure omitted] **will be left in place and addressed through covers and Institutional Controls**"[33] (emphasis added). As discussed later in this report, covers and ICs are ineffective at protecting the public from the extensive contamination that exists at Hunters Point.

THE PATTERN CONTINUES

The following section details the way in which soil covers and Institutional Controls replaced excavation as the remedy for much of the contamination at each subsequent parcel. Though this section focuses on chemical contamination, the pattern applies to radioactive contamination as well, with radionuclides above acceptable levels being left beneath a thin cover layer.[34]

The next parcel to receive a remedy determination was **Parcel G**. Similar to Parcel B, Parcel G's cleanup plan became less protective over time, ultimately relying on a thin cover rather than contaminant removal. Initially, most of Parcel G had restrictions on future reuse outlined in the 2009 ROD, with some areas being limited to industrial use, some to open space, and only one set for mixed use.[35] Therefore, with the exception of that one area, the cleanup which took place at Parcel G used cleanup standards that are far weaker than residential standards.[36]

Despite this, it was decided years later, in 2017, that residential development should be permitted throughout almost all of Parcel G, and therefore the end use was shifted from industrial to residential (with the exception of a few redevelopment blocks).[37] However, **no further cleanup of contamination was carried out to achieve this radical shift in land use**,[38] despite residential cleanup standards being much tighter than industrial ones. Instead, the Navy created "Action Levels," inflated values generally 5 times higher than the screening levels for residential release.[39] Only when chemical concentrations exceeded these inflated Action Levels did a small portion of the parcel remain restricted against industrial use, as initially intended.[40] All other areas will rely on a cover and Institutional Controls to compensate for the residual risk from those remaining contaminants.[41] As stated in the Parcel G ESD, "**long-term cancer and non-cancer risks**

associated with COCs in soil will be mitigated through the implementation of measures required by the ROD Selected Remedy. These measures include placement of durable covers...."[42]

Just months after the original Parcel G ROD, a joint ROD for **Parcels UC-1/D-1** was published, which, like the preceding parcels, set forth plans to leave behind contamination beneath a thin cover. The ROD states that the chemical remedy for soil at Parcels UC-1 and D-1 will be to industrial standards,[43] thus relying on Institutional Controls, and will only actually remove a specific category of chemicals called polycyclic aromatic hydrocarbons (PAHs).[44] In the actual cleanup only benzo(a)pyrene was excavated.[45] For any other contaminants, the ROD states that **residual risks** "**would be mitigated through the use of durable covers and access restrictions to restrict exposure**."[46]

That same year, the **Parcel UC-2** ROD was published. It stated that the predominant chemicals of concern in soil were toxic metals, which, rather than being excavated, will be left in place beneath a cover and with ICs.[47]

In 2010, the year following the Parcel UC-2 ROD's publication, the **Parcel C** ROD was released. It established plans to excavate and dispose of soil with toxic chemicals in concentrations that exceeded the remediation goals.[48] However, four years later, in 2014, an Explanation of Significant Differences was released which discarded that cleanup plan and replaced it with one much less protective. The ESD stated that rather than cleaning up chemicals in concentrations above the remediation goals, the Navy will instead only clean up certain chemicals such as polychlorinated biphenyls (PCBs) and metals, with the exception of mercury, if they are 5 or 10 times the remediation goals.[49] According to the ESD, **this will amount to 16,000 cubic yards of soil contaminated above remediation goals left behind, saving the Navy $4,000,000 in cleanup costs**.[50] The Navy justifies this through the implementation of a cover and ICs.[51] The Navy states, "The cover remedy addresses unacceptable risk posed by residual contamination."[52] However, as will be addressed subsequently, the cover is inadequate in numerous ways.

In 2012, the remedy for **Parcel E-2** was established. Like Parcel C, the Parcel E-2 cleanup plan also created Action Levels for the cleanup of chemicals inflated far above the remediation goals. However, this time it was taken a step further—**no chemicals would be removed unless their concentrations reached levels either 10 or 100 times the remediation goals, depending on the chemical**.[53] The Parcel E-2 remedy therefore relies on the soil cover and ICs to compensate for what is left behind.[54] The ROD makes this reliance clear by stating that a cover would "prevent unacceptable exposures to remaining concentrations of COCs."[55]

The following year, the cleanup plan for **Parcel E** was released. In this plan, no toxic chemical would be cleaned up unless its concentration was at least 5 or 10 times its remediation goal.[56] The ROD identifies numerous areas where chemical concentrations exceed remediation goals, but nonetheless will not be removed because they do not exceed 5 or 10 times those levels.[57] Rather than removing this contamination, the Navy has chosen, once again, to rely instead on adding two feet of soil on top and applying ICs.[58]

The ROD published in 2014 for **Parcel UC-3** followed this same pattern. Rather than removing chemical concentrations that exceeded remediation goals, they instead ignored those standards and only required removal if chemicals were 5 times the remediation goals.[59] Again, rather than removing contamination, the Navy intends to rely on a soil cover and ICs, stating that a cover is needed at Parcel UC-3 to meet the remedial action objectives, and does so by "breaking the exposure pathway for contamination left in place."[60] However, what the Navy fails to be candid about are the various pathways for exposure that exist despite the presence of a soil cover. As discussed below, and in the companion reports by Drs. Wilshire and Bianchi, there are numerous mechanisms which allow contamination beneath the cover to reach the surface, negating any purported benefits of the cover relied upon by the Navy to avoid full cleanup.

Thus, in parcel after parcel, the remedy has become reliance on covers and restrictions such as Institutional Controls, rather than the full cleanup to unrestricted release originally promised and which had been called for by the voters and the City.

DESPITE THE CERCLA REQUIREMENT TO CONSIDER COMMUNITY ACCEPTANCE, THE NAVY IGNORED PROP P AND THE BOARD OF SUPERVISORS RESOLUTION

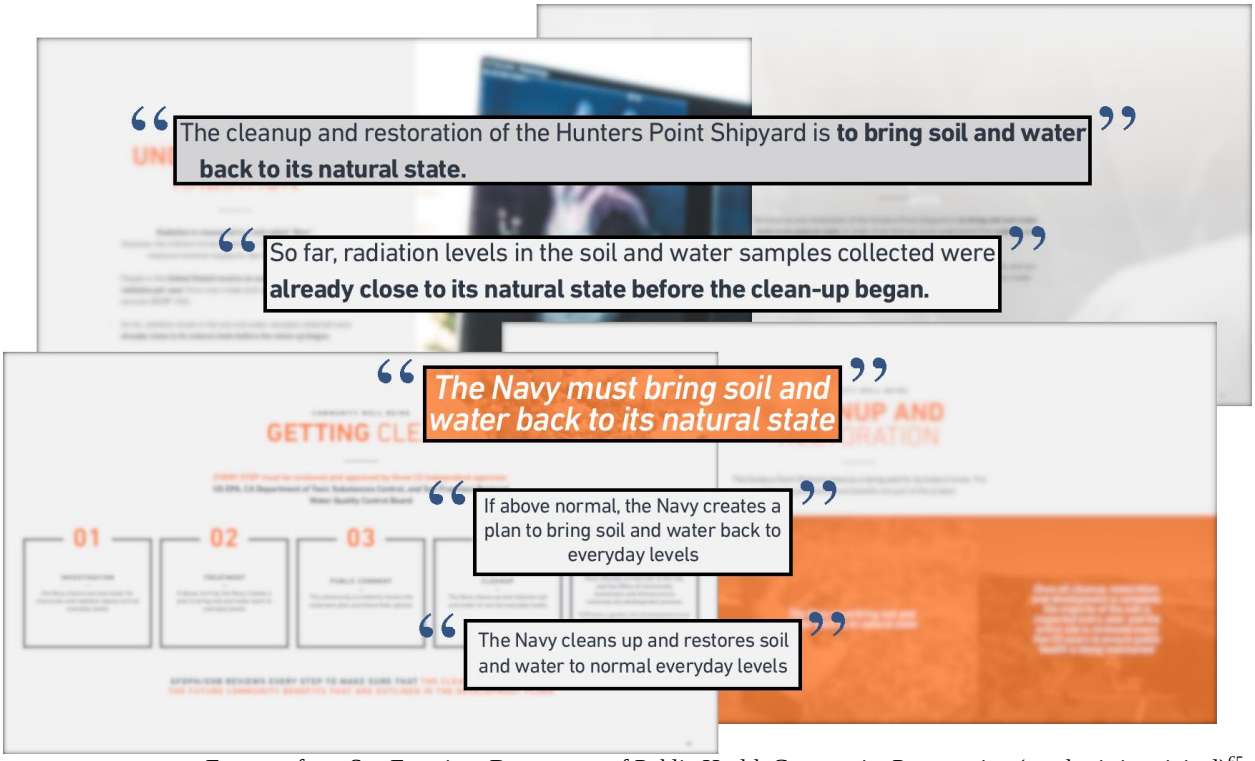
As indicated earlier, CERCLA establishes community acceptance as one of the nine criteria to be employed in making cleanup decisions. In the HPNS case, there is Prop P overwhelmingly adopted by the City's voters, calling for full cleanup to unrestricted residential standards, so that there would be no dependence upon Institutional Controls or physical barriers such as covers. Furthermore, the Board of Supervisors formally adopted Prop P as official City Policy.

Nonetheless, in almost all cleanup decisions made by the Navy, there is not even acknowledgment of the *existence* of Prop P or the Board Resolution, let alone serious consideration of them as the primary indicators of community acceptance. (In one case, the Navy does mention Prop P, but then misrepresents it as calling for cleanup to unrestricted residential standards only if technically feasible.[61] There is no such language in Prop P. In any case, the Navy has never claimed that cleanup to unrestricted release levels is not technically feasible; it just doesn't want to carry it out because of the cost.[62]) The Navy's actions of relying on Institutional Controls and physical barriers such as covers directly violate Prop P and its adoption as the official Policy of the City.

THE CITY ALSO HAS IGNORED PROP P AND ITS OWN OFFICIAL POLICY WHILE TELLING THE PUBLIC THE SITE WAS BEING RETURNED TO ITS NATURAL STATE

One might expect, given Proposition P and the Board of Supervisors Resolution making it official City Policy and calling on all City agencies to follow it, that the City would have resisted the Navy's new strategy of covers and ICs every step of the way. The evidence does not bear this out, however, as the City's comments on nearly every document cited in this section neglect to mention Proposition P or to take issue with the Navy's strategy to cover up rather than clean up contamination and to rely on ICs. Indeed, the comments clearly indicate intimate awareness of the mechanisms used by the Navy to bypass the promised cleanup but fail to offer the opposition one would expect from a City representative.[63]

While the City has long known that the Navy was not cleaning up much of the contamination that was above remediation goals but leaving it and relying on covers and ICs instead, contrary to Prop P and City Policy, it has at the same time told the public just the opposite. Indeed, as of the date of this report, the San Francisco Department of Public Health (SFDPH) has a presentation on its website that repeatedly claims that the "cleanup and restoration of the Hunters Point Shipyard is to bring soil and water back to its natural state."[64]



Excerpts from San Francisco Department of Public Health Community Presentation (emphasis in original)[65]

As we have shown in detail, these claims made by SFDPH are simply not true. By definition, returning HPNS to its natural state would require removing all the contamination (i.e., all the pollutants that were added to the site by the Navy). Even for the metals that Tetra Tech claimed were "ubiquitous," the Navy acknowledged that its regulators disagreed that these were naturally occurring levels and admitted that in fact they were not. Furthermore, other toxic materials and radioactivity (such as the radionuclides being covered up at IR-07 and IR-18) are conceded to be above background. The Navy's approach, parcel after parcel, is to cover up contamination that exists at levels many times its remediation goals. The City well knows this and has acquiesced to it. At the same time, the City has been misleading the public with statements about returning the site to its "natural state," when in fact much of the contamination is just being covered up.

As discussed in the following sections of this report, covers and Institutional Controls are ineffective means of protecting the public from contamination that was supposed to have been cleaned up.

COVERS AT HUNTERS POINT

As indicated in the previous sections, the Navy's current approach to the contamination at HPNS is to, rather than clean it up, rely on covers over much of the site.[66] In the Navy's HPNS documents, a cover typically entails two feet of soil or four inches of asphalt.[67] Buildings, building foundations, and pavement already present on the site are allowed to be counted as covers as well.[68] For many buildings, however, the Navy has not ensured that the soil beneath them is free of contamination.[69]

The main function of covers for the Navy is to justify weaker cleanup standards. The Navy has asserted that covers are necessary to prevent "unacceptable risk posed by residual contamination," i.e., from the contamination they are now choosing to not clean up.[70] As this report and the companion papers by Drs. Bianchi and Wilshire demonstrate, the cover offers little actual protection from the harmful materials that lie just beneath it.

Many covers or caps at other sites consist of multiple layers and materials such as clay, gravel, and sand, and still have problems.[71] However, at HPNS, covers generally consist solely of either soil or asphalt. There are select locations at HPNS where the Navy is proposing adding a thin layer of plastic (0.06 in) or fabric beneath the soil cover.[72] However, even with this addition, the California Department of Fish and Wildlife (CDFW)[73] expressed concern in 2013 over the integrity of these covers, saying it **"still disagrees that the 'durable covers,' consisting of a 2-foot thick soil cover or the 2-foot soil cover over geosynthetic material, will be sufficient to prevent burrowing animals from breaching the cover and exposing the remaining contaminants."**[74] In the same comment, CDFW asked the Navy to provide evidence that covers would not be compromised by plants and burrowing animals. The Navy refused to provide such evidence and instead reiterated its unsupported claim that covers, in tandem with its proposed Institutional Controls, would be a sufficient remedy at HPNS.[75]

In a comment dated January 2018, CDFW further criticized the use of ICs at Hunters Point asking the Navy to:

> Please note, ICs do not prevent exposure of ecological receptors, such as burrowing animals and deep-rooted plants under various pathways (i.e., inhalation, ingestion, dermal, root uptake), to contaminants remaining under the soil cover. **ICs also do not prevent burrowing animals from digging up contaminants and creating a complete exposure pathway to human and ecological receptors. Exposed contaminants may also be transported by wind and storm water runoff into surrounding areas, where exposure to both human and ecological receptors may occur.**
>
> (emphasis added)

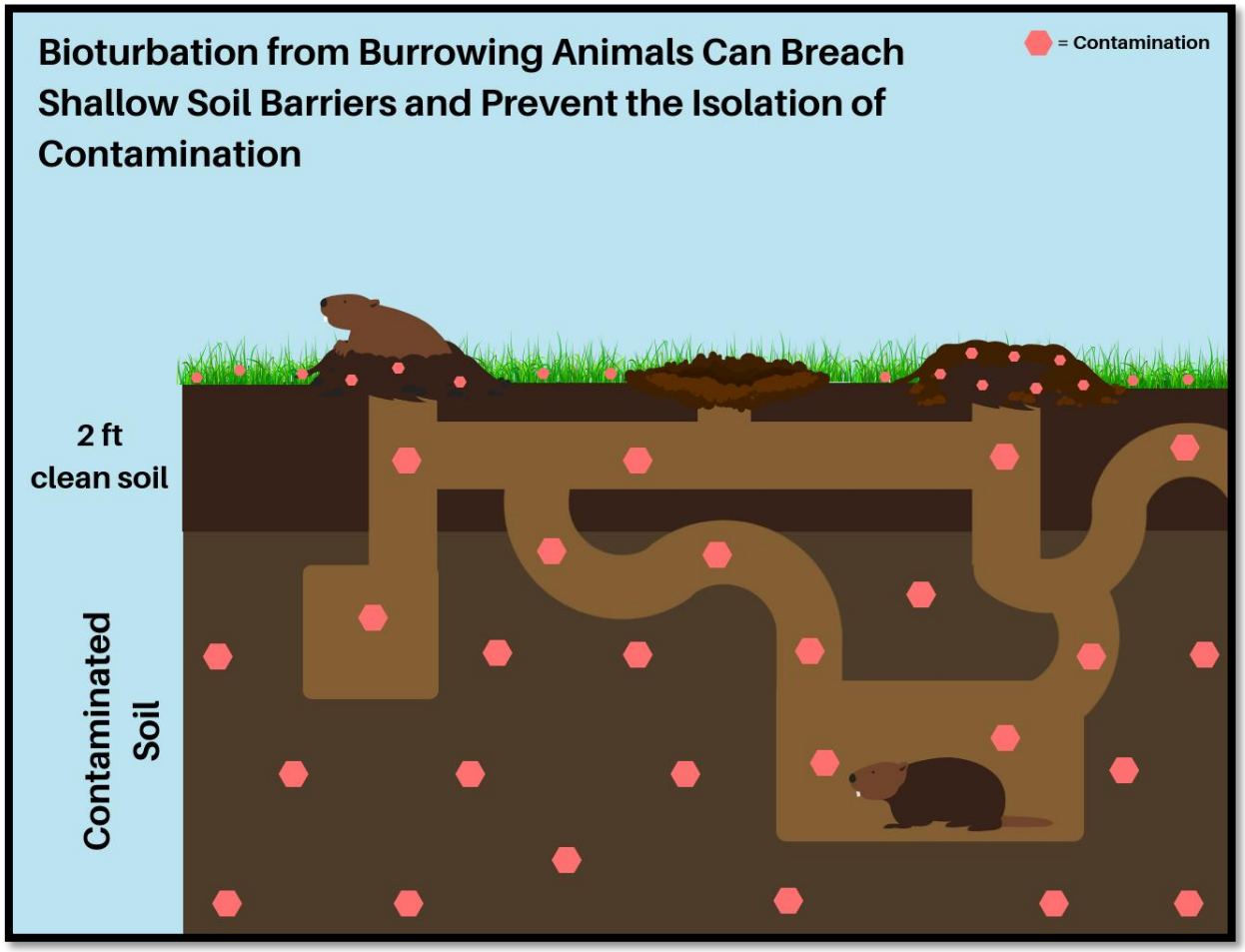
Rather than addressing this comment by modifying the remedy to be protective, the Navy responded with a simple "comment acknowledged."[76]

PROCESSES WHICH MAKE COVERS INEFFECTIVE

There is a wealth of evidence from multiple hazardous waste sites, as well as from Hunters Point itself, that supports CDFW's concerns. **Soil covers can degrade or be otherwise rendered non-protective** by factors such as burrowing animals, plant roots, erosion, and upward soil gradients. Hunters Point will be no exception. Further detailed information on these topics may be found in the companion reports by Drs. Wilshire and Bianchi.

BURROWING ANIMALS

Burrowing insects and mammals, also known as "biointruders," have been known to cause damage to caps and covers at hazardous waste sites that rely on them.[77] For example, one study on the effects of biointrusion at hazardous waste sites states that such phenomena "can become a problem at burial sites regardless of the sophistication of the barrier design."[78] As biointruders create their burrows, they transport soil throughout the soil profile, excavating and depositing soil in loose mounds on the surface.[79]



At numerous waste sites, a clear link has been established between burrowing activity and the "upward movement of radionuclides" through the soil.[80] One study states that "**soil bioturbation is the most likely explanation for the frequent and widespread discovery of radiological contamination on surface soils**" at the Hanford Nuclear Reservation site in Washington.[81] At HPNS, biointruders have the potential of exposing residents to chemicals and radiological contamination the Navy is intentionally leaving behind.

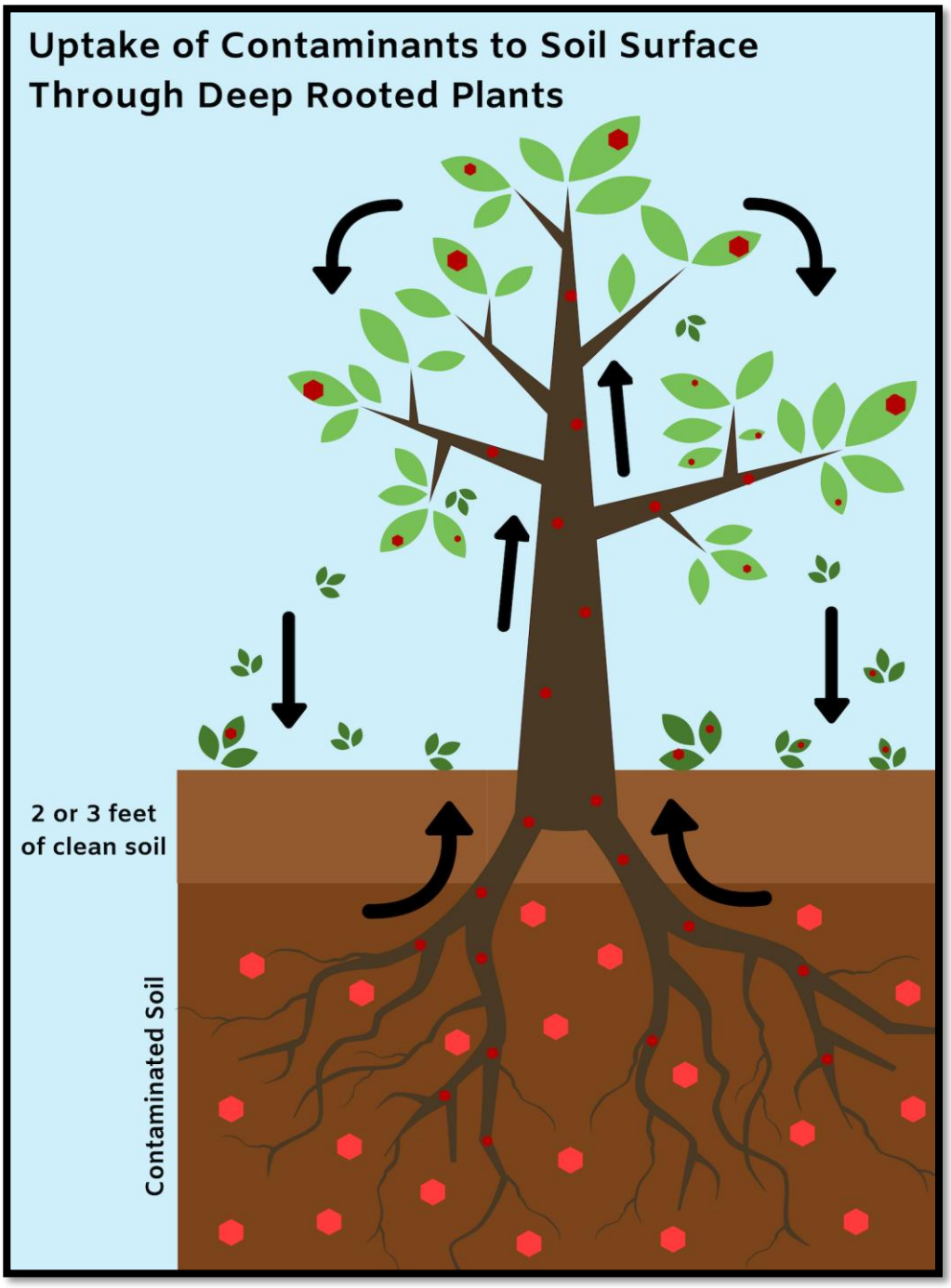
Several species of burrowing animals have a documented presence at HPNS. A *Biological Resources Technical Report* for the City's Planning Department and the San Francisco Redevelopment Agency (now known as the Office of Community Investment and Infrastructure, or OCII) identifies the California ground squirrel, Botta's pocket gopher, and Norway rat at Yosemite Slough, which is located directly adjacent to parcels E and E-2 of HPNS. All of these animals burrow to depths of 4-6 feet.[82] The Navy has confirmed the presence of ground squirrels[83] and pocket gophers[84] at HPNS, and has stated that "evidence of a burrowing animal, probably a mammal, has been seen in nearly every portion of Parcel E."[85]

Furthermore, soil covers placed at HPNS have *already* been infiltrated by burrowing mammals. Following the installation of the cover at IR sites 07/18 in 2011, for example, burrow holes were discovered in it just two years later in 2013,[86] again in 2014,[87] and yet again as recently as 2018.[88] In each case but the last (for which they did nothing but recommend monitoring), the hole was merely filled with dirt, leaving in place any contaminated soil that may have been pushed upward by the burrower.[89] The 2018 observation is accompanied by the statement that "no holes extending through the soil cover were observed," a remarkable claim for which no basis is given.[90]

Mammals like gophers and squirrels are not the only burrowers of concern at HPNS. Numerous Californian ant species burrow to depths greater than the proposed soil cover, with some burrows reaching down 10 feet and beyond.[91] As bioturbators, ants "mix deep and upper layers of soil,"[92] and can move significant volumes of soil to the surface. For example, a Department of Energy study found that the California native ant *Pogonomyrmex owyheei* was responsible for transporting 150.7 kg of soil per year across 5 of its burial sites.[93] Harvester ants, a broad category with at least 17 species native to California,[94] "favor disturbed areas that are often associated with areas of waste burial."[95] Harvester ants have demonstrated their ability to penetrate through a variety of cover types.[96] Burrowing creatures thus pose a threat to the integrity and ability of the cover to provide continued protection from the hazardous substances contained beneath.

PLANT CONTAMINANT UPTAKE

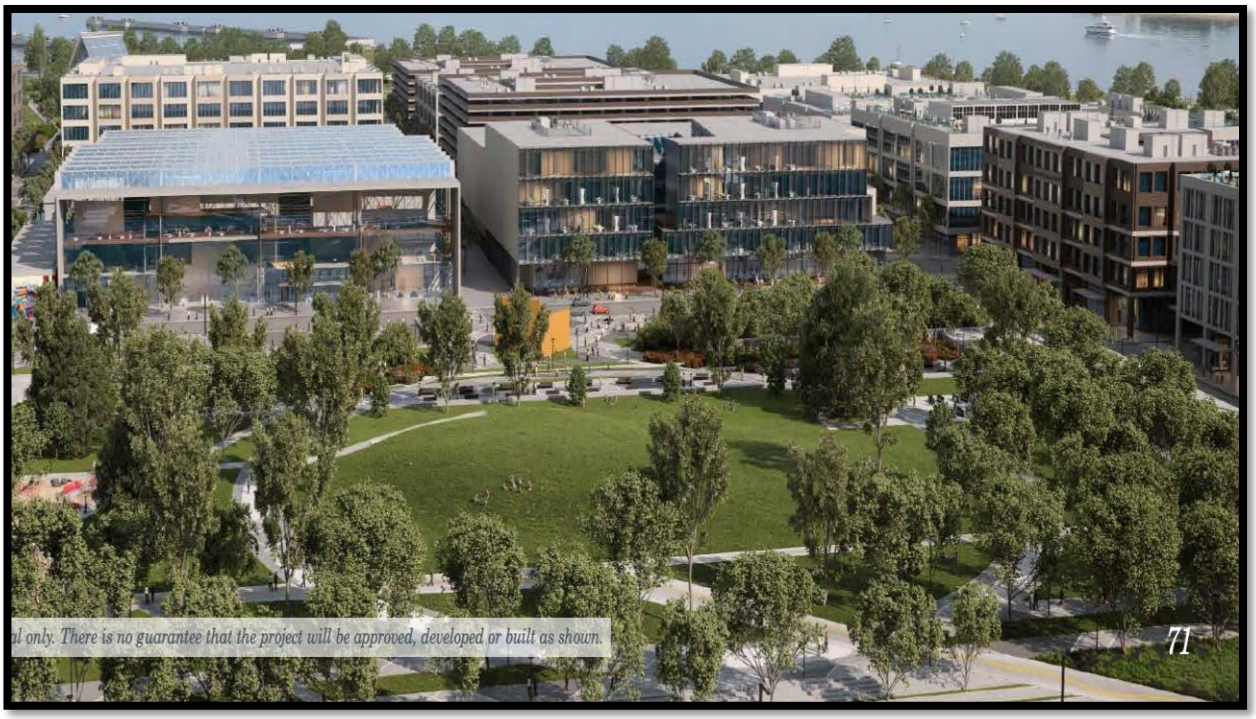
Plants are yet another major threat to the integrity of the covers at the shipyard. The roots of many plants extend much deeper than the two-foot (or occasionally, three-foot) soil cover the Navy is relying on for HPNS. Plants can take up contamination along with water and nutrients from the surrounding soil. This is cause for concern at HPNS, where significant contamination lies in the soil beneath the cover. When plant roots absorb contaminants, numerous exposure pathways can be created as these plants bring the contaminants to the surface and drop organic matter on the ground to decay. Further, plants may even access contamination located beyond the depths of their roots, as processes of root uptake create upward gradients in the soil profile that facilitate the migration of contaminants toward the surface. These processes are discussed in detail below.



The uptake of contaminants by plants has been well-established. In 1984, the U.S. Nuclear Regulatory Commission concluded that "plants redistribute radionuclides from the buried wastes by uptake through the root system."[97] A literature review on the subject from Stockholm University extensively documents the process by which "all elements of the periodic system" can be taken up by roots and transported into the plant body and leaves.[98] Some plants, known as "hyperaccumulators," display a preference for certain contaminants. Oak trees, for instance, have been found to take up large amounts of radium-226.[99] In another study, Eucalyptus trees exhibited

preferential uptake for uranium-238, thorium-230, radium-226, and lead-21.[100] Indeed, some plants are so good at pulling contamination out of the ground that they are used intentionally at polluted sites for a remediation process called "phytoextraction."[101] This is not the intent for plants at Hunters Point. The difference between phytoextraction and what is planned for HPNS is that, in phytoextraction, the contaminated plants are removed and disposed of as toxic waste, whereas in the development at HPNS, they are being planted for aesthetic purposes and will remain on site as an ongoing mechanism for bringing contamination up to the surface where people can be exposed to it.

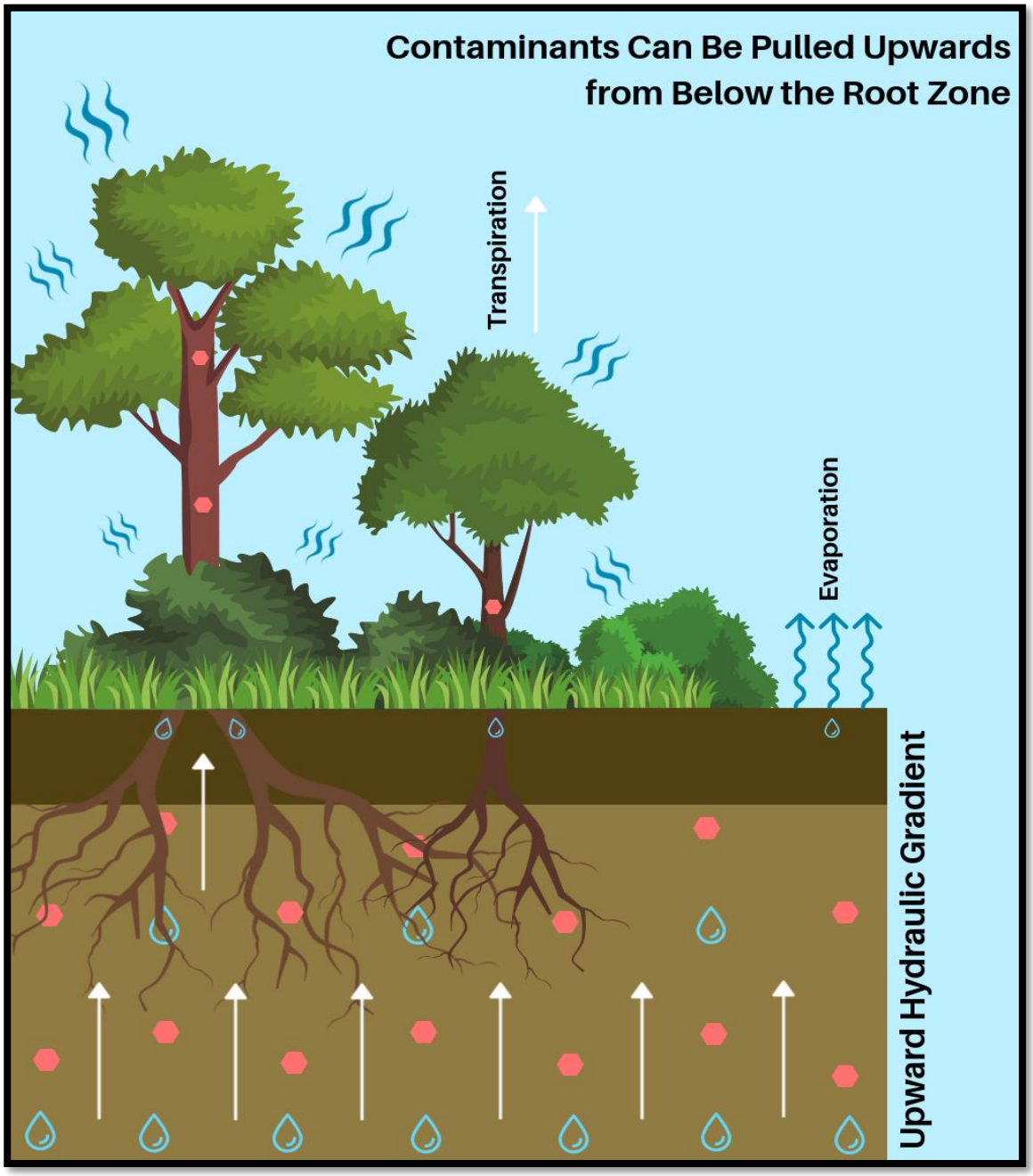
Native plant gardens and large plants such as shrubs and trees will be a significant component of the redevelopment**,** as is abundantly clear from plans by OCII. The figure below is one example showing that redevelopment plans include abundant vegetation.[102]



These plants will damage and grow through the soil cover, setting up several exposure pathways in the process. Areas such as IR sites 07 and 18 (which border the Bayview community), Parcel E, and Parcel E-2, which are all known to have radiological contamination, are being made into public parks. Vegetation already planted at the completed development at Parcel A[103] includes a number of deep-rooted plants: Manzanita, with roots depths of 8.2 - 17 feet, Coyote Brush, the roots of which reach down 10.5 feet, and the Coast Live Oak, which has roots that extend to a depth of 35 feet. Eucalyptus trees, popular throughout the San Francisco Bay Area, are growing at Parcel A, and root to depths of 8.9 - 131 feet.[104] Nearly all of these plants are being considered for the rest of the HPNS redevelopment.[105] The EPA's guidance document for covers recommends that "the establishment of deep-rooted shrubs and trees on a cover system should be prevented…unless the cover system has been specifically designed to accommodate the deep roots."[106] We have seen no evidence of such cover design accommodations for deeply rooted plants at HPNS.

UPWARD GRADIENTS PULL UP DEEPLY-LOCATED CONTAMINATION

As we have demonstrated thus far, root uptake of contamination can pose fundamental problems for the integrity of a soil cover. However, as discussed further in the Bianchi report, the potential for upward migration of contamination into and through the soil cover layer is not limited to contamination the roots can reach. As plants take up water, nutrients, and contaminants, the soil in the root zone becomes depleted of these substances, creating pressure and concentration gradients that, in effect, suck additional quantities of soluble substances toward the roots from the soil adjacent to the root zone.

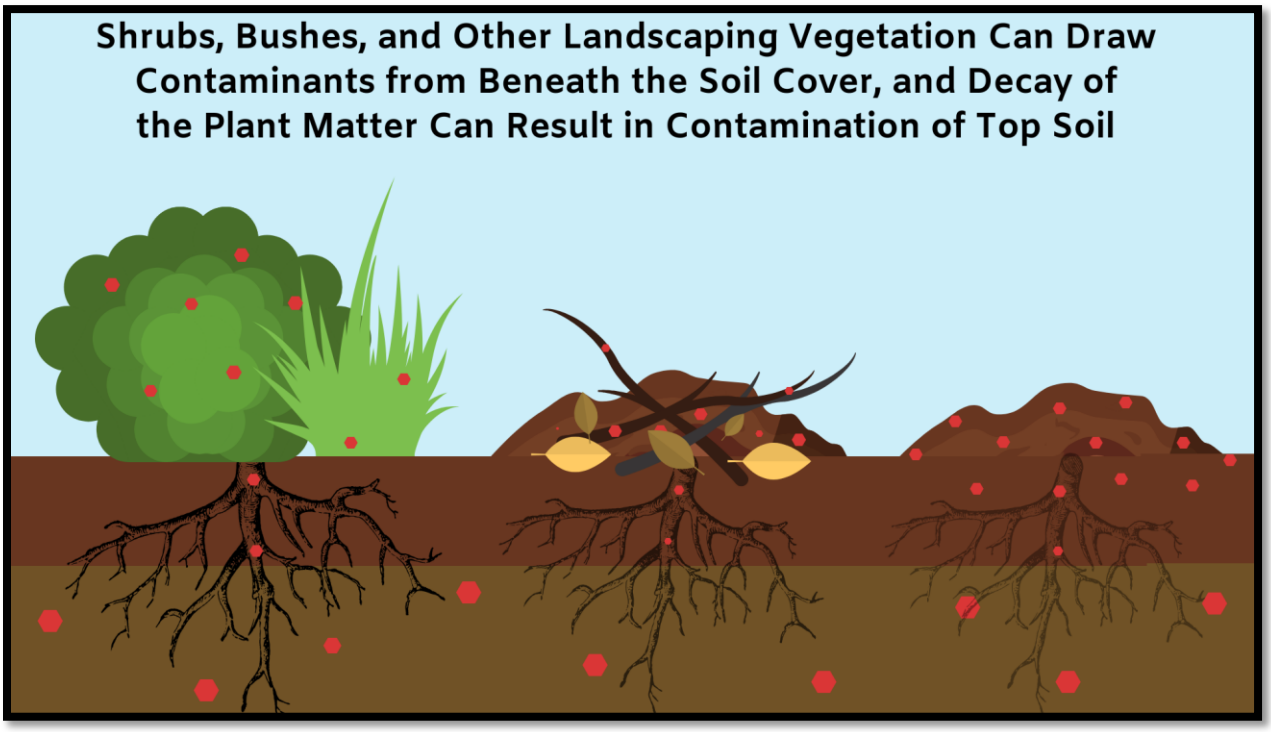


Additionally, evaporation is another process that pulls water up from below the root zone. As water evaporates from the surface, the soil dries out, resulting in a gradient that induces the upward movement of water from deeper, wetter layers to make up for the depletion at the surface. Transpiration, the release of water through plant surfaces, only enhances this process in vegetated areas (and, incidentally, presents another pathway for humans to be exposed to contamination). As water moves, so do water-soluble substances contained in that water, such as strontium-90.[107] Therefore, there are several mechanisms such as evapotranspiration that can pull up contamination from relatively deep within the soil profile and bring it to the surface.

PATHWAYS BY WHICH HUMANS COULD BE EXPOSED TO CONTAMINANTS IN PLANTS

Once contamination has been brought up into the plant body, there are various pathways by which those contaminants can integrate into topsoil, increasing the likelihood of exposure. As leaves drop and plants die and decay, this plant material falls to the ground and decomposes, becoming part of the surface soil. This would effectively negate the function of a soil cover, as there would no longer be a barrier separating contamination from humans, other biota, and dispersal mechanisms such as wind and rain. This process presents numerous pathways for exposure to contamination, which is concerning not just for humans but for the other creatures for whom this plant material is food.

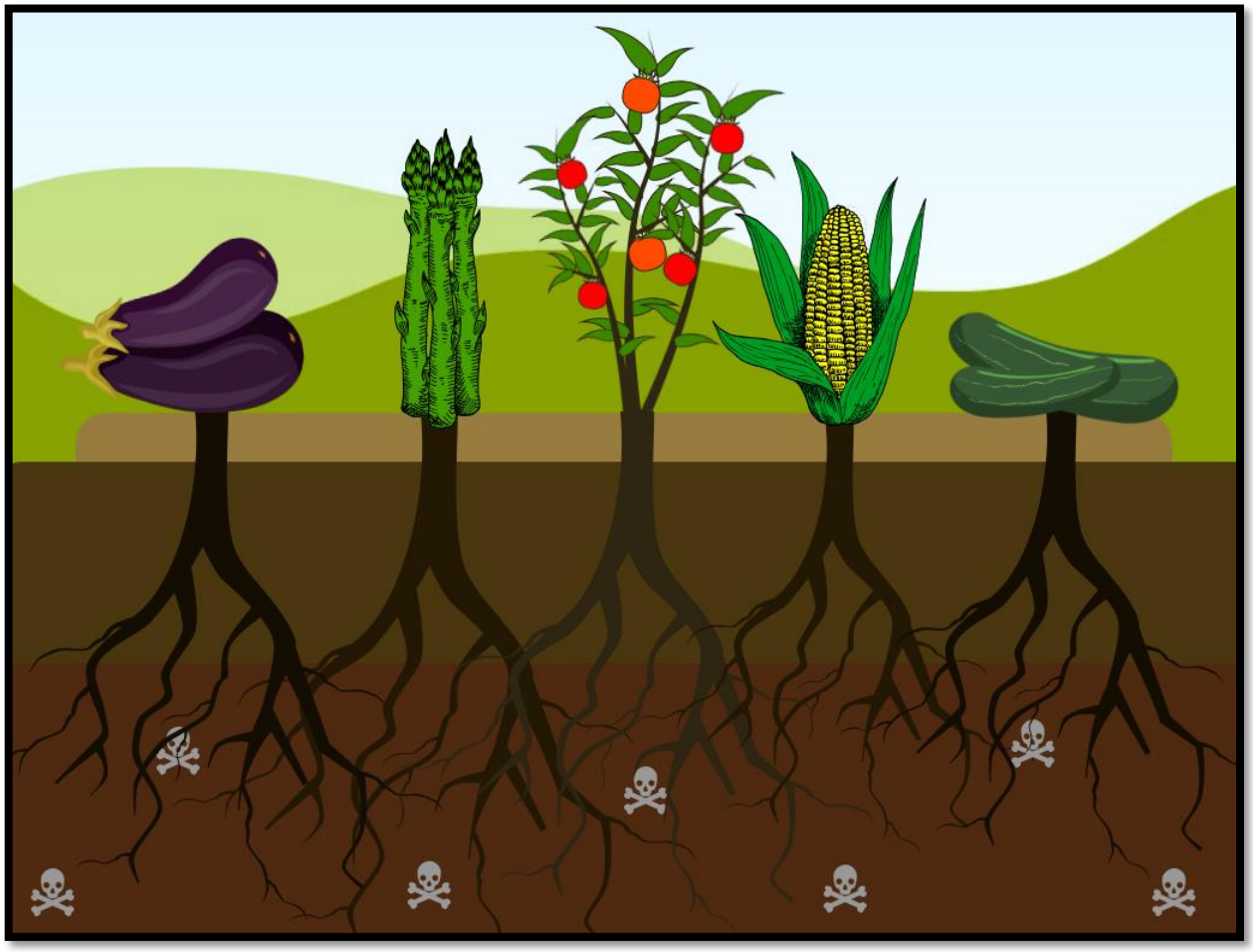
As the Navy has noted in an Ecological Risk Assessment document for HPNS, "many organisms present at [HPNS] either feed on decaying organic material in soil or burrow through soil. This pathway represents the entrance of soil contamination into the terrestrial food web."[108]



Furthermore, certain contaminants may be released directly from plant surfaces, emitted as gases through plant pores known as stomata. In one study, plants grown in soil contaminated with Ra-226 were found emitting radon gas (Rn-222) as part of their normal transpiration.[109] Rn-222 is a daughter product of Ra-226, which is a primary contaminant at HPNS; the Navy currently plans to leave significant quantities of radium at HPNS, ensuring a constant supply of radon gas in the soil for plants to potentially emit through their leaves. Tritium (H-3) is another radionuclide found at HPNS that may be emitted through plant stomata, as EPA has determined.[110]

EDIBLE PLANTS

Like the landscaping plants described above, fruits and vegetables grown in backyard and community gardens transport contamination from deeper in the soil to the surface and into produce that people consume. Reports by the U.S. Department of Agriculture,[111] the University of California,[112] and a widely-cited agricultural science reference[113] are in agreement that the roots of many common garden crops can extend to depths greater than the two-foot cover upon which the Navy proposes to rely. This is explained in detail in the companion paper by Dr. Bianchi. Edible plants at HPNS could thus present risk to humans because they concentrate contaminants from depths beneath the cover, are ingested as food, bringing contaminants into the body.



As we demonstrated in a previous paper,[114] backyard and community gardens are common in the Hunters Point-Bayview area. Furthermore, despite some misleading statements by the Navy to the contrary, backyard and community vegetable gardens *are* allowed under the HPNS Institutional Controls. It is true that the Navy has proposed ICs for most of the parcels that purport to ban the growing of vegetables or fruits in *native* soil.[115] However, the surface soil at HPNS will not be considered native soil because the surface will consist of soil imported to the site for use as covers.[116] Thus there would be nothing prohibiting people from planting produce directly in the ground, and nothing preventing the roots of those plants from extending down through the covers into zones of contaminated soil. The ICs for a few areas of HPNS do require produce to be grown in a raised bed,[117] but this is useless as a protective measure since raised beds generally add only 1-8 inches of extra dirt and compost to the soil surface,[118] so the roots could still readily penetrate into contaminated soil beneath the raised bed and cover.[119]

On August 8th, 2019, the Navy released its long-delayed draft evaluation of radiological remediation goals for soil at HPNS.[120] Up to this point, the Navy had repeatedly stated that the soil cleanup standards it is employing at HPNS were based on exposure pathways that include consumption of produce grown in that soil.[121] However, the Navy HPNS cleanup standards, as we detailed in our previous report,[122] are decades out of date and inconsistent with the current, far more protective EPA standards required under CERCLA to be used. The Navy's conundrum is that if it uses the current, more protective EPA standards, far more cleanup would be required than the Navy wants to do. So, in this new evaluation, the Navy has removed the garden pathway entirely from its Remediation Goal calculations, even though it promised to include that pathway when setting cleanup standards and such gardens are permitted under the ICs. This results in a gross underestimation of risks from contamination at the cleanup levels the Navy has used at HPNS. Even so, the Navy's own estimates of risk are hundreds of times higher than what it initially promised and exceed the upper limit of what EPA generally sets as its acceptable risk range.

At this juncture, with gardening permitted site-wide, such gardening already widespread in the area immediately around HPNS, and the Navy's cleanup levels under scrutiny,[123] the Navy can take one of two paths. It can keep its promise to the people of San Francisco and clean up contamination at the site to levels allowing for unrestricted use; or it can break this promise and try to make it illegal to grow anything edible in the soil anywhere at HPNS because the site remains heavily contaminated and the Navy insists on not cleaning it up.[124] **The latter approach would make developing and selling property at HPNS quite a challenge—a place so polluted that it would be unsafe for your child to eat a tomato or strawberry grown in the soil there.**

It is important to note that when performing its recent risk calculations, the Navy said it was basing them on the existing stated ICs.[125] Those, as we have indicated, allow growing vegetables. Despite this, it nonetheless turned off the garden inputs in the calculation.

There would be several troubling implications for public health were the Navy to attempt to change the cleanup plans and impose a ban on such gardening at HPNS. The inclusion of the garden scenario is the EPA default for calculating preliminary remediation goals for radioactivity at Superfund sites,[126] and yields cleanup levels that are considerably more protective than if one excludes the garden pathway from the calculation.[127]

Were the Navy to attempt to make such gardening illegal, in the real world the ban is unlikely to be enforced. Furthermore, the contamination in the soil includes radionuclides, heavy metals, and other chemicals which will persist far longer than any Institutional Control, even if followed in the near term, can be expected to be carried out.

To attempt to change the HPNS cleanup remedy at this late date to allow much higher levels of contamination by a supposed new IC that would make it illegal to grow anything edible in the ground at HPNS would violate the CERCLA requirements that cleanup remedies be based in part on community acceptance criteria. As demonstrated earlier, those criteria for HPNS are quite clear, from Prop P and the official City Policy: the site needs to be cleaned up to levels that require no physical barriers like covers and no Institutional Controls like prohibitions on gardening.

EROSION AND LIQUEFACTION

As detailed in the companion report by Dr. Wilshire, geological processes also pose a significant threat to the protective integrity of a soil cover. First, HPNS is situated between two active fault lines,[128] increasing its vulnerability to seismic shaking and liquefaction, processes that would inevitably damage the covers. In fact, the United States Geological Survey (USGS) found the entire Shipyard to be in its highest category of risk for liquefaction.[129] Additionally, erosion from the winds and rains of the San Francisco Bay region will create further challenges in maintaining the soil cover. A report by EPA found that over 60% of landfill cover systems in the United States experienced moderate or severe erosion.[130]

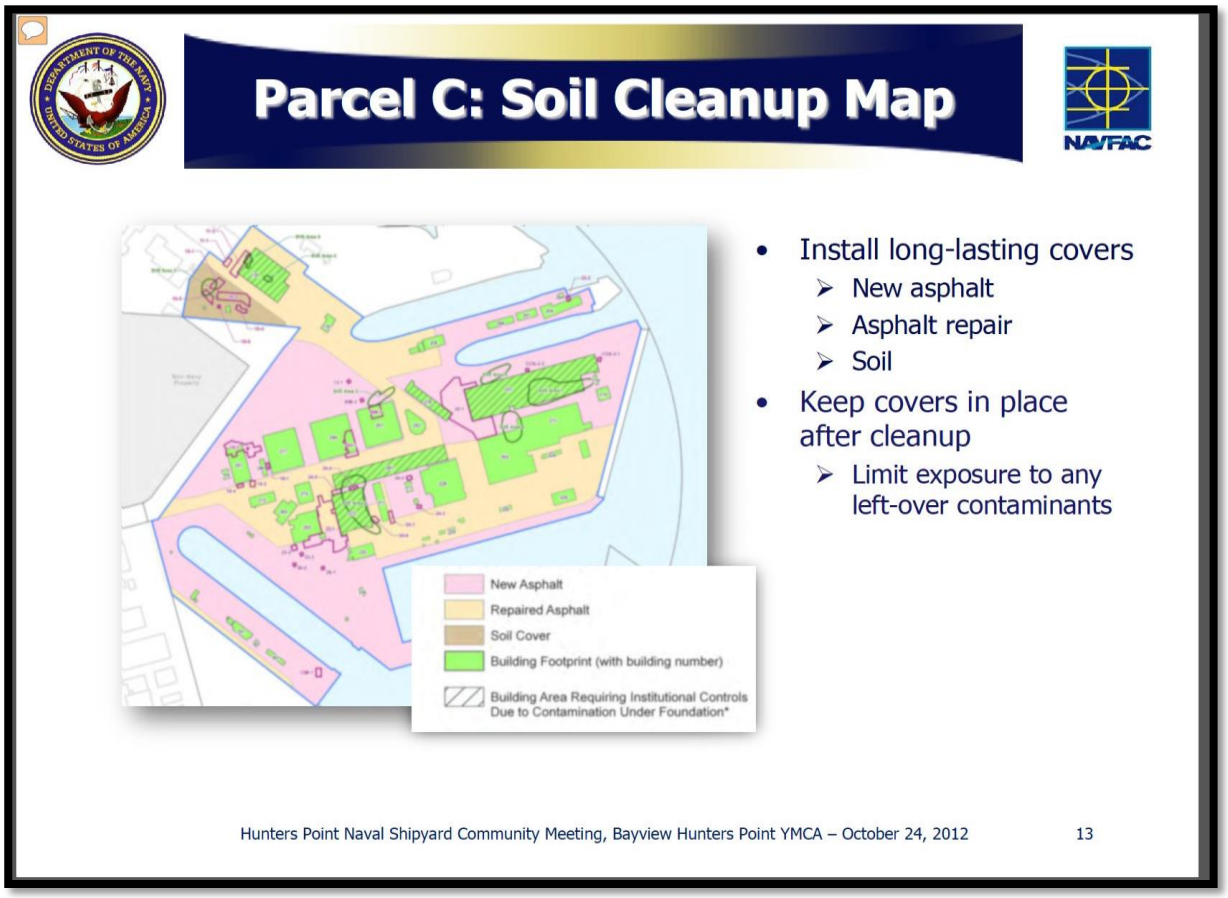
COVERS ARE INEFFECTIVE AT PROTECTING PEOPLE FROM CONTAMINATION

The original promise by the Navy to clean up HPNS contamination to levels that would allow unrestricted residential use has been quietly replaced with plans to leave much of the contamination in place and rely instead on covers. However, numerous mechanisms such as root penetration, burrowing animals, and upward gradients caused by evapotranspiration can bring contamination to the surface. Covers, even if they remain in place, are ineffective. But as we shall show below, the entire plan for HPNS, the largest redevelopment project in San Francisco since the 1906 earthquake, necessitates tearing up the covers to do the construction.[131]

EVEN IF COVERS WERE EFFECTIVE—WHICH THEY AREN'T—THEY MUST BE TORN UP DURING DEVELOPMENT, MAKING THEM USELESS

Regardless of their ineffectiveness, the covers will not even have the chance to fail. As development of the site is conducted, the existing building foundations, asphalt, and soil covers will have to be torn up and the soil beneath them excavated as part of construction of new buildings and infrastructure. **The assumption that covers will remain on site in perpetuity is illusory; in reality, they must be destroyed for construction to take place.**

The Navy asserts, as shown in its slide on Parcel C below,[132] that the covers will be "long-lasting" and will remain "in place after cleanup."



The basis for that assertion is that Institutional Controls will be required that **prevent any land disturbing activity.** The primary IC of relevance, as set forth in the RODs, is a prohibition on:

> **"Land disturbing activity which includes but is not limited to:**
> **(1) excavation of soil**
> **(2) construction of roads, utilities, facilities, structures, and appurtenances of any kind**
> **(3) demolition or removal of 'hardscape' (for example, concrete roadways, parking lots, foundations, and sidewalks)**
> **(4) any activity that involves movement of soil to the surface from below the surface of the land"**[133]

On its face this IC would keep the covers intact and the contamination beneath them isolated (if one ignores the mechanisms for breach of covers discussed earlier in this report). **However, one obviously cannot build the largest development in San Francisco in a century without massive excavation, construction of structures, demolition of hardscape, and movement of soil. The IC is thus pure fiction.**

Indeed, a separate document called the Risk Management Plan was produced by the developer to allow them to bypass these requirements to make development possible.[134] So, on the one hand,

the Navy has tried to get out of its obligation to clean up the contamination at HPNS by relying instead on covers and Institutional Controls that it claims will remain intact in perpetuity to provide protection from the long-lived contaminants. On the other hand, once the Navy hands the land to the City and the developers, the covers will be torn up and there will be massive excavation of the soil beneath them, irrespective of the IC supposedly prohibiting any land disturbing activities.

THE MEANINGLESSNESS OF "INSTITUTIONAL CONTROLS" PROHIBITING LAND DISTURBING ACTIVITIES AT HPNS

Earthmoving at Hunters Point. Source: Francisco DaCosta

The inevitable destruction of the covers at HPNS as part of construction is a central part of what makes them so ineffective as a remedy. The intent is for ICs to be in place as long as contamination remains at the site above levels that would allow for unrestricted release of the land.[135] Given the nature of the contamination (radiological contamination that will last hundreds of thousands of years and many chemicals that will last essentially forever), the ICs will have to remain in perpetuity, a feat that is unheard of and effectively impossible.

Restrictions are recorded in legal documentation which run with the land known as the Covenant to Restrict Use of Property (CRUP) and Quitclaim Deeds. The CRUP is supposed to be enforceable by the California Department of Toxic Substances Control (DTSC) and the US Environmental Protection Agency against the owner of the property should the ICs be violated.[136] However, in a 1998 survey of the International City/Council Management Association, nearly two thirds of respondents stated that it was somewhat or highly likely that an owner could violate an IC without the local government's knowledge.[137] It seems even more likely that such a failure could occur without the knowledge of a state or federal agency.

More particularly, the *institutions* responsible for Institutional Controls, such as EPA and DTSC, have already shown tremendous weakness in their oversight of the cleanup of HPNS. After all, the Tetra Tech data fabrication occurred for years without the regulatory agencies catching it. DTSC has long been widely criticized for lax oversight statewide.[138] No important action was supposed to take place at HPNS without EPA review and approval, and yet the cleanup was botched. For example, despite the requirement in CERCLA that EPA assure that the cleanup standards employed are consistent with its guidance, EPA allowed the Navy to use cleanup standards for buildings and soil that were decades out of date and far more lax than EPA's guidance would require.[139] Even when these problems were identified, EPA took no actions to correct them. If these institutions have failed in their oversight duties during the height of public attention over the cleanup, it is difficult to have confidence that they would rigorously enforce Institutional Controls over long periods in the future when institutional memory will be even fainter.

Furthermore, the ICs themselves are contrary to the will of the people and the Board of Supervisors, as clearly articulated through Prop. P and the resolution adopting it as official City Policy, for HPNS to be cleaned to the highest possible standards allowing for residential use and unrestricted release, i.e., without either ICs or covers. The Navy's proposal is, in fact, just the opposite. Institutional controls are themselves restrictions, limiting behaviours and uses for the land to a narrow scope that will supposedly keep the covers intact.

As will be explained in the coming pages, **the ICs are illusory, existing largely to allow the Navy to avoid a real cleanup, then being waived or ignored once development begins**.

MASSIVE REDEVELOPMENT OF THE SHIPYARD

Given the persistent contamination at Hunters Point, the ineffective legal mechanisms required to enforce ICs, and most importantly, the fact that the key IC prohibiting land disturbing activities is to be overridden, ICs will be ineffective at protecting people. This is particularly true because the plan for the property is a massive redevelopment project, on a scale not seen in San Francisco since early in the last century.

Upon completion of "remediation" by the Navy, with much of the pollution left in place, the land at Hunters Point will be transferred to the San Francisco Office of Community Investment and Infrastructure. OCII, in coordination with FivePoint (a spin-off corporation of Lennar), has set forth a future use plan for The Shipyard that includes homes, retail, open space parks, restaurants, schools, childcare facilities, offices and industrial use, hotels, recreational facilities, and a potential

Recycled Water Treatment Facility.[140] Their vision is to turn the neighborhood into a community that "foster[s] employment, business, and entrepreneurial opportunities."[141]

Source: OCII Approval of Proposed Changes to the Candlestick Point/Hunters Point Shipyard Phase II Project, May 2018

Nearly the entirety of HPNS is supposed to have a cover before the land is transferred to the City.[142] Where the Navy is not installing soil covers or new asphalt, it is leaving behind currently existing buildings and asphalt to act as covers. The need to construct a vast array of new buildings and subsurface utilities and other infrastructure will guarantee that the great majority of the site is affected by land disturbing activities necessary for redevelopment.

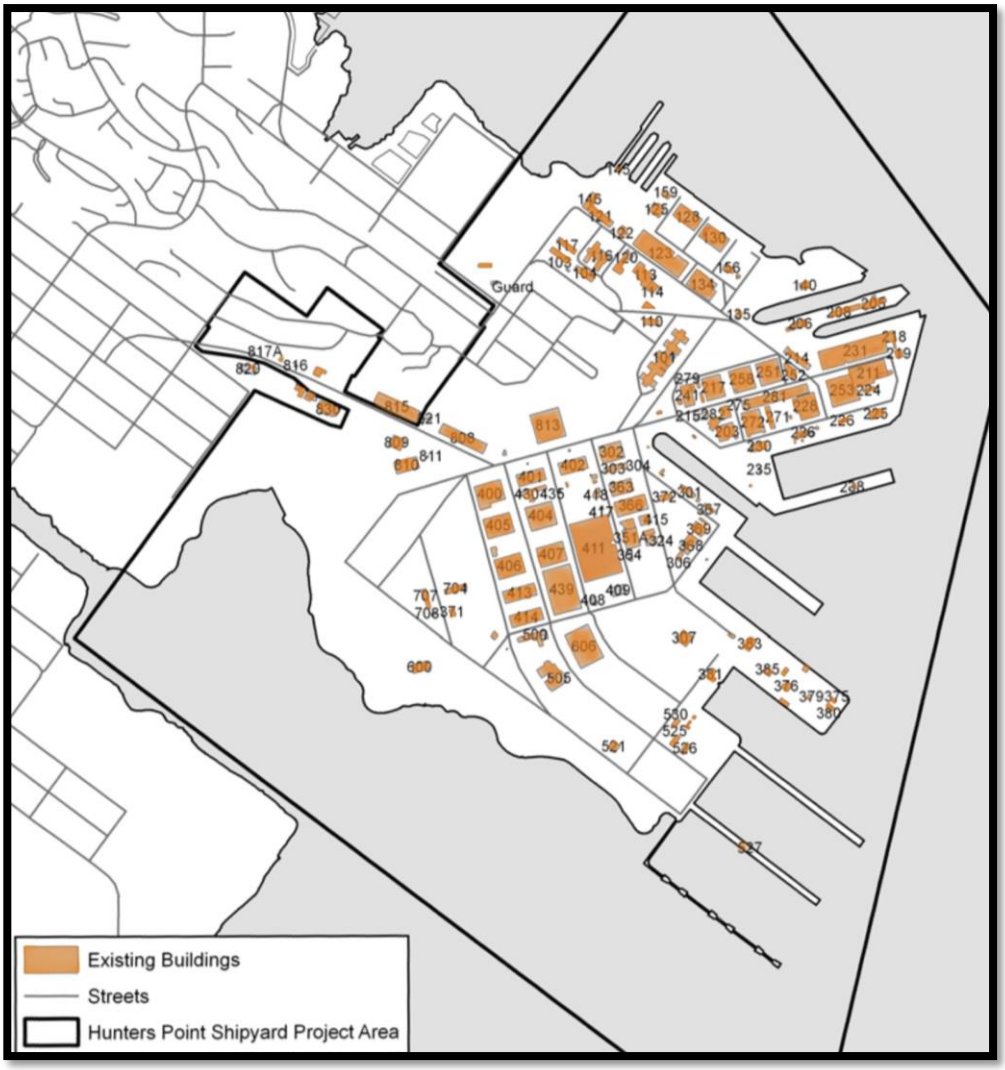
Despite ICs supposedly banning land disturbing activity, development will obviously have to destroy covers and disturb the soil beneath. As indicated earlier, the RODs for the various parcels specifically state that activities such as "construction of roads, utilities, facilities, structures, and appurtenances of any kind" are prohibited. **And yet the purpose of redevelopment is precisely such construction.** ICs further prohibit "alteration, disturbance, or removal of any component of a response or cleanup action," such as a cover; this is another restriction that, if enforced, would directly contradict the goals of development.

This presents a fundamental conceptual problem: **HPNS cannot be developed into the urban commercial and residential center envisioned by OCII without violating the ICs and destroying the covers put in place for the remedy.**

Despite this paradox, development and the extensive destruction of covers it requires are slated to move forward. To do this, the 2019 Risk Management Plan (RMP) sets forth procedures to nullify the ICs.[143] The document was prepared for CP Development Co. LP (CP), a joint venture headed by Lennar[144] chosen by OCII to be its developer company.[145] It outlines certain activities necessary

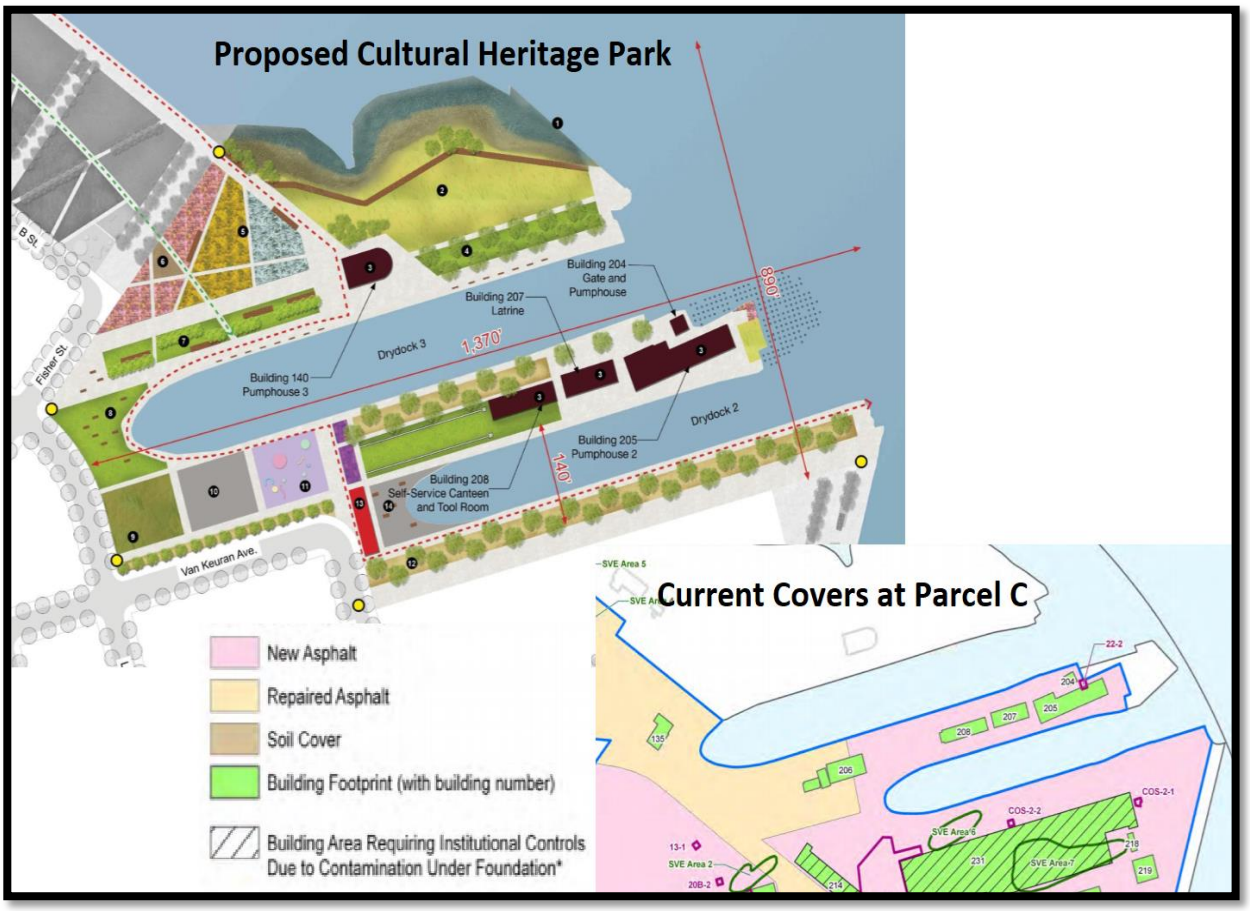
for development that can take place without consulting the FFA signatories, provided the procedures set forth in the RMP are followed.[146] All other development activities are also allowed, but with FFA signatory approval. **Collectively, the RMP overrides the IC barring land disturbing activities, destruction of covers, and excavation of the soil beneath them.** According to the RMP, it is acceptable for developers to ignore the ICs and dig up the covers.[147] It is further acceptable for them to remove the asphalt and building foundations and move huge amounts of contaminated soil around the site, so long as a cover is reinstalled at that location within five years.[148]

Below is a map of HPNS from OCII's Redevelopment Plan which shows buildings still present at HPNS. OCII's plan for Hunters Point would require the destruction of many of these buildings, as well as the removal of covers the Navy has already either installed or left behind.[149] Beneath these buildings is soil that the Federal Facilities Agreement signatories have determined may "contain unexpected levels of COCs [Chemicals of Concern]."[150]



Existing Buildings at Hunters Point; HPNS Redevelopment Plan[151]

The soil beneath these buildings, some of which the FFA signatories admit have potential for contamination, as well as soil under asphalt and soil covers which could also be contaminated,[152] may be moved throughout the site.[153] If this soil is ultimately placed under a soil cover, the dangerous substances could easily be reintroduced into the environment by the mechanisms detailed earlier in this report.[154] Below is an example of a location (Parcel C/Future Cultural Heritage Park) that currently has building and asphalt covers which will be converted into areas of soil with plants growing therein, according to the most recent development plans.[155]



INADEQUATE SCREENING FOR CONTAMINANTS DURING DEVELOPMENT

When certain buildings are removed to make way for new ones, the soil beneath need only be screened for contamination if the soil is visibly "unnaturally" discolored and/or exhibits a "chemical" odor, a crude approach that would miss most of the contaminants known to exist at HPNS.[156] USEPA has disagreed with this approach, as discussed below.

USEPA first commented on the RMP in regard to the proposed plan for handling soil beneath building foundations that had not yet been sampled thoroughly. Its comment stated:

> Please note that when EPA reviews individual Restricted Activity Workplans, these workplans are expected to specify field testing approaches for location-specific

> health and safety protocols referred to in Section [4.1], which apply during removal of building foundations and excavation of soil beneath the foundations. For example, Section [4.1], Location-Specific Health and Safety Protocol, states that field screening instruments will be employed if the soil is unnaturally discolored and/or exhibits a chemical odor. **Visual and olfactory indications, while useful, will not indicate the potential presence of all COCs, notably metals and polychlorinated biphenyls (PCBs)**. Field screening methods and precautions should be implemented based on the COCs that were detected around the building before any RAs [Remedial Actions] occurred. In addition, **in the beginning stages of foundation removal, it would be difficult to see staining and detect chemicals by smell until after enough foundation was removed to expose soil, at which point, contaminated dust may have already been dispersed.** (emphasis added)[157]

Rather than address USEPA's concerns, the response in the RMP was simply "comment noted."[158]

Unsatisfied with this response, USEPA followed up with a comment pointing out the clear dismissal of its concerns and once again asking that the issue be addressed:

> The response does not address the comment. The comment notes that "Visual and olfactory indications, while useful, will not indicate the potential presence of all COCs, notably metals and polychlorinated biphenyls (PCBs);" however, the response only states "Comment noted" and does not reference any revisions to address the concern regarding screening methods for COCs with no visual or olfactory cues. Please revise the response to address the concern regarding the screening methods for COCs with no visual or olfactory cues, such as metals and PCBs.[159]

CP responded to this second EPA comment with more than "comment noted," but made the extraordinary claim that no monitoring for contamination in excavated soil was required because the Navy wouldn't have transferred the land if there were still contamination:

> As explained in the monthly coordination meeting with the FFA Signatories on 11/7/2018, OCII and FivePoint **assume that once a Parcel has transferred, all investigation and remediation necessary to be protective of human health and the environment, including conditions beneath building foundations, has been conducted to the satisfaction of the FFA Signatories**, with the exception of those locations specifically noted in Appendix C of the RMP. Based on this premise, it is not necessary to conduct a full screening of all COCs in soil beneath building foundations where a specific source concern is not noted. (emphasis added).[160]

This is a key fallacy and contradiction underlying the cleanup and development plans. The Navy is asserting it can avoid cleaning up much of the contamination, relying instead on covers and ICs barring land disturbing activities that it presumes will remain intact in perpetuity. The developer assumes, however, that the Navy has in general cleaned up the contamination before transfer so the developer can presume, with certain exceptions, the construction site doesn't need screening unless there is an unexpected condition such as staining or strong odor. This is a recipe for

substantial risk to public health, as intense excavation activities will be occurring for years near the residents in the Hunters Point neighborhood.

EXCAVATION IN POTENTIALLY CONTAMINATED SOIL POSES SIGNIFICANT RISKS

Looking through the Hunters Point neighborhood, Lennar Corp. grading the new development in 2006.[161]
Source: Liz Hafalia/San Francisco Chronicle/Polaris

Since the great majority of HPNS soil was never sampled at all and gamma scans can't detect radioactivity deeper than about a foot, construction activities such as those shown above can expose workers and residents alike to potentially contaminated soil. Similarly, for those areas where the Navy knows there is contaminated soil but has chosen to merely cover it, redevelopment activities which require tearing up the covers and excavating deep into the contaminated soil beneath them can create potential exposures to radioactivity and toxic chemicals. Furthermore, risks will continue long thereafter due to the failure to clean up the contamination in the first place.

The RMP does state that after the covers are destroyed and the soil beneath them excavated as part of construction activities, covers should be reinstalled and the soil either put back beneath new covers, there or elsewhere, or shipped offsite. In the real world of a massive, messy construction site, coupled with the troubled history of the Hunters Point project, it is unrealistic that this would be done with anything approaching the degree of meticulousness suggested.

INSTITUTIONAL CONTROLS WILL NOT BE MAINTAINED

After development is completed, Institutional Controls (such as inspecting and repairing covers and preventing new land disturbing activities) are assumed to function in perpetuity. A key component for the effectiveness of ICs is having an institution capable of and responsible for enforcing them. Given the length of time ICs at HPNS would need to be enforced, the institution would need to reliably be in place for periods far longer than can reasonably be assumed.

There is no such institution in existence, and the institutions currently in place and responsible for upholding the ICs are already failing. An example of this occurred when the SF Police Department leased building 606 at the shipyard. To protect people from exposure to contaminated dust blown up by helicopters taking off and landing, the IC required construction of a large asphalt helipad. The pad that was built ended up being smaller than the one required, resulting in the creation of a dangerous exposure pathway, whereby potentially contaminated dust is lofted into the air. Rather than fix the pad, there reportedly was an attempt to change the text of the restriction to reflect the smaller size of the pad that was actually built.[162]

In an article in Fordham Environmental Law Review, attorney Susan Borinsky raises concerns about the ability of ICs in general to be enforced during development. She explains that "local building officials ordinarily do not consult real property transfer instruments when issuing construction permits and could unintentionally approve actions that would disturb toxic soil."[163] This is concerning at HPNS, where the entire assertion that residents will be safe is based on the presumption that contaminated lands are covered and undisturbed. She goes on to stress that, "while restrictions in deeds may seem like a straightforward means of establishing environmental restrictions....The courts have not favored enforcement of deed restrictions against parties who are not signatories to the original deed."[164] HPNS is currently owned by the Navy, will be owned by the City after transfer, and will be owned by someone else following them. It is unknown how many owners may be a part of the Shipyard legacy as time passes. This raises the concerning possibility that restrictions may be abandoned or forgotten in future years.

COSTS OF MAINTAINING ICS FALL UPON FUTURE OWNERS

When the HPNS parcels are transferred to the City, they will be accompanied by legal documents that explain the restrictions and enforcement of restrictions at the site. According to the Risk Management Plan (RMP) and the UC-1/UC-2 Covenant to Restrict Use of Property (CRUP) the great majority of responsibility for maintaining ICs at HPNS **falls upon the future owner of the site**.

The RMP states that the costs of administration of the CRUP fall on the Owner, and that the Owner does not have a right of recovery against the Navy for any necessary maintenance to the covers after transfer.[165] The only exception to this is the discovery of unexpected conditions, in which case the Owner "may elect to request the Navy to take responsibility for the condition."[166]

The UC-1/UC-2 CRUP states in section 3.05 that "Costs of Administering the Covenant [are] to be Paid by Owner."[167] It further very explicitly states that "**Each Owner is ultimately responsible**

for the IC compliance Obligations and Operation and Maintenance Obligations,"[168] specifying the specific obligations in various paragraphs.[169]

Article 5 of the CRUP addresses enforcement of ICs after the land has been transferred, stating that in the event of a violation, "the Department [DTSC] shall have grounds by means of this Covenant to require **Owner or Occupant** to . . . correct the violation of the Environmental Restrictions," (emphasis added).[170] The language indicates that costs and responsibility will ultimately fall upon the future owners of the land.

CONCLUSIONS AND RECOMMENDATIONS

As we showed in earlier reports in this series, scores of naval vessels contaminated from nuclear weapons tests in the Pacific were brought to HPNS and sandblasted in the open air to remove radioactivity, which had the potential to transfer it across the site. Many other polluting activities took place involving a wide array of radionuclides and toxic chemicals. Nonetheless, despite the potential for contamination throughout HPNS, only a small fraction of the site has been sampled. Similarly, what tests were conducted looked for only a small fraction of the potential radionuclides and toxic chemicals. Furthermore, the cleanup standards employed were outdated even at the time of use and are inconsistent with and far weaker than EPA's Superfund standards.

Even so, with testing only a small fraction of the site and for only a small fraction of potential contaminants, EPA has found evidence that the Navy's contractor fabricated measurements at 90-97% of survey units. The recent retesting plans, supposedly aiming to put to rest public concerns raised by the data falsification, have been likewise deeply flawed (e.g., the California Department of Public Health using scanning devices that were incapable of detecting contaminants at the levels requiring cleanup, and the Navy using background locations that are in the midst of the contaminated Superfund site.)

In this report, we have shown that these are by no means the end of the problems. When cleanup of HPNS began, the Navy initially promised that it would clean up the contamination at Hunters Point Naval Shipyard to standards safe for unrestricted residential use, i.e., without need for barriers such as covers and without restrictions such as Institutional Controls. In November of 2000 San Francisco voters overwhelmingly approved Proposition P, calling for full cleanup to the most protective standards, those for unrestricted residential release, with no barriers or land use restrictions. The San Francisco Board of Supervisors followed suit in 2001, adopting Prop P as Official City Policy and calling on all City Agencies to follow it. Indeed, as recently as the date of this report, the City Department of Public Health posts on its website assertions that the site is in fact being returned to its natural state, i.e., as it was before it was contaminated.

However, the Navy long ago discovered far more contamination than it had anticipated and decided to discard those original promises. Instead, it has opted to leave much of the contamination behind and merely cover it with thin layers of dirt or asphalt. As shown in this report and the companion papers by Drs. Bianchi and Wilshire, there are numerous mechanisms which render covers ineffective.

The Navy insists the covers will be "durable" and "long-lasting" and remain in place after the cleanup is over, relying on "Institutional Controls" which purportedly prohibit any land-disturbing activities. However, to construct the buildings, underground utilities, and other infrastructure of what is planned to be the largest development project in San Francisco in over a century, those covers will have to be dug up and the contaminated soil beneath them excavated, rendering such restrictions meaningless.

The Navy's plan to cover up rather than clean up much of the contamination and rely on fictitious Institutional Controls violates its original promises, the vote of San Francisco residents and official policy of the City, and poses a serious risk, exacerbating what is already a deeply troubled project.

The Hunters Point Naval Shipyard is one of the most contaminated sites in the country, yet efforts to clean it up have been, to put it charitably, a fiasco. The conduct of the party responsible for the contamination, the Navy, and its contractors and regulators greatly aggravated what was already a major environmental challenge. The current plan to cover up rather than clean up much of the contamination would make a bad situation considerably worse.

RECOMMENDATIONS: The plans for remediation of Hunters Point Naval Shipyard should be returned to the original requirement of cleanup, not coverup of the contamination. Furthermore, there needs to be fundamental reform of the entities that have so badly managed and regulated the project to date.

ENDNOTES

[1] United States Department of the Navy, Base Realignment and Closure, "Final Remedial Action Completion Report for Installation Restoration Sites 07 and 18 at Parcel B, Hunters Point Naval Shipyard, San Francisco, California," prepared by Engineering/Remediation Resources Group, Inc., May 2012, p. 3-22, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/3383392155/Fnl_RACR_IR07-18.pdf

[2] View our full series of reports on Hunters Point Shipyard at http://committeetobridgethegap.org/2018/10/18/hunters-point-publications/.

[3] Daniel Hirsch et al., "Hunters Point Naval Shipyard: The Nuclear Arms Race Comes Home," Committee to Bridge the Gap, October 2018, http://www.committeetobridgethegap.org/pdf/HuntersPointReport1.pdf.

[4] Daniel Hirsch et al., "The Great Majority of Hunters Point Sites Were Never Sampled for Radioactive Contamination: And the Testing That Was Performed Was Deeply Flawed," Committee to Bridge the Gap, October 2018, http://committeetobridgethegap.org/wp-content/uploads/2018/10/HuntersPointReport2.pdf.

[5] Daniel Hirsch et al., "Hunters Point Shipyard Used Outdated and Grossly Non-Protective Cleanup Standards," Committee to Bridge the Gap, October 2018, http://committeetobridgethegap.org/wp-content/uploads/2018/10/HuntersPtReport3CleanupStandards.pdf.

[6] John Chesnutt, Superfund Division, U.S. Environmental Protection Agency, to George "Pat" Brooks, U.S. Department of the Navy, December 27, 2017, https://semspub.epa.gov/src/document/09/100006302.

[7] Daniel Hirsch, Taylor Altenbern, and Maria Caine, "Critique of the California Department of Public Health Work Plan for a Partial Gamma Survey of Parcel A-1 Hunters Point Naval Shipyard," Committee to Bridge the Gap, July 31, 2018, http://committeetobridgethegap.org/wp-content/uploads/2018/10/Critique_of_HPNS_ParcelA_GammaScan.pdf;
Committee to Bridge the Gap, "Committee to Bridge the Gap Critique of the Work Plan for Retesting of Parcel G Hunters Point Naval Shipyard," August 15, 2018, http://committeetobridgethegap.org/wp-content/uploads/2018/10/WorkPlanCritique.pdf.

[8] The release status of land refers to what may be done with it after cleanup is completed. Land granted unrestricted release will have no rules regarding how it can be used because it is presumably cleaned to the highest standards.

[9] San Francisco Department of Public Health, "Listen, Share, Connect," accessed July 19, 2019, PDF p. 26, https://www.sfdph.org/dph/files/listenshareconnect/HPS-Presentation-V8.pdf.

[10] Environmental Protection Agency, Federal Register Notice, November 21, 1989, Vol. 54, No. 223, p. 222, https://semspub.epa.gov/work/HQ/189634.pdf.

[11] United States Department of the Navy, "Hunters Point Annex Parcel A Record of Decision," November 16, 1995, p. 2, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/8012501358/Parcel%20A%20ROD_10.16.95.pdf. There is a requirement for a deed notification that motor oil had been found in groundwater at the parcel.

[12] The Navy simply presumed that there couldn't be contamination in Parcel A and so almost no monitoring or cleanup was conducted before releasing it to the City. United States Department of the Navy, Naval Facilities Engineering Command, "Final Finding of Suitability to Transfer for Parcel A, Hunters Point Shipyard, San Francisco, California," January 17, 2001, p. 8, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/8252964615/Final_FOST_Parcel_A.pdf.

[13] United States Department of the Navy, Naval Facilities Engineering Command, "Hunters Point Shipyard Parcel B Final Record of Decision," October 7, 1997, p. 43, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/7556136906/Parcel%20B%20Final%20ROD%5F10%2E7%2E97%2Epdf.

[14] The 1997 Parcel B ROD required cleanup of soil to residential standards down to the groundwater table. There was a deed notification required about contamination in soil below the groundwater table. U.S. Navy, "Parcel B ROD," p. 49. In 1998, the Navy issued an Explanation of Significant Differences (ESD) which changed the remedy to excavating contaminated soil to a maximum depth of ten feet. Because the water table in some locations was as deep as forty feet, this amounted to one of the first acts weakening the cleanup commitments. United States Department of the Navy, "Explanation of Significant Differences, Parcel B, Hunters Point Shipyard Site, San Francisco, California," August 24, 1998, p. 1, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/5472030460/Parcel%20B%20ROD%20ESD%5F10%2E28%2E98%2Epdf.

[15] See later section of this report for a discussion of the inclusion of the consumption of homegrown produce in the Navy's original cleanup standards.

[16] See language of Proposition P, quoted in the subsequent section of this report.

[17] 242,795 people voted for Proposition P, 38,293 voted against it. The Board of Supervisors resolution the following year says the vote in favor was 87%. Data retrieved from https://sfelections.sfgov.org/november-7-2000-consolidated-presidential-general-election-0.

[18] City and County of San Francisco, "Voter Information Pamphlet and Sample Ballot," November 7, 2000, p. P-229, https://sfpl.org/pdf/main/gic/elections/November7_2000.pdf.

[19] "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, 40CFR300.430(e)(9)(iii)(I), https://www.govinfo.gov/content/pkg/CFR-2011-title40-vol28/pdf/CFR-2011-title40-vol28-part300.pdf.

[20] "National Contingency Plan," 40CFR300.430(f)(i)(C).

[21] Hirsch et al., "Hunters Point Sites Were Never Sampled."

[22] The recent limited gamma survey of Parcel A by the California Department of Public Health was incapable of detecting most radionuclides of concern at the levels that would require cleanup, as detailed in our critique of that survey, available at http://committeetobridgethegap.org/wp-content/uploads/2018/10/Critique_of_HPNS_ParcelA_GammaScan.pdf.

[23] A Record of Decision (ROD) documents the selected remedy for a contaminated site.

[24] U.S. Navy, "Parcel B ROD," pp. 42, 65. The full ROD for soil contamination includes no use restrictions or requirements for covers.

[25] United States Department of the Navy, Base Realignment and Closure, "Parcel B Technical Memorandum in Support of a Record of Decision Amendment, Hunters Point Shipyard, San Francisco, California," prepared by ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc., December 12, 2007, pp. 2-5, 2-13 https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/3389905631/final%20Parcel%20B%20TMSRA%20Chapter%202.pdf.

[26] United States Department of the Navy, Naval Facilities Engineering Command, "Final Explanation of Significant Differences, Parcel B, San Francisco, Hunters Point Shipyard Site," May 4, 2000, Attachment A: Original and Revised Parcel B Soil Cleanup Levels, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/4623766839/Parcel%20B%20ROD%20ESD%5F5%2D4%2D2000%2Epdf.

[27] U.S. Navy, "Parcel B Technical Memorandum in Support of ROD Amendment," p. 2-5.

[28] Department of the Navy, Base Realignment and Closure, "Amended Parcel B Record of Decision, Hunters Point Shipyard, San Francisco, California," prepared by ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc., January 14, 2009, p. xiii-xiv, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/6790684342/Final%20B%20Amended%20ROD%201%2D09%20Sections%201%20through15%2Epdf.

[29] U.S. Navy, "Amended Parcel B Record of Decision," p. xiii.

[30] U.S. Navy, "Amended Parcel B Record of Decision," p. 1-5.

[31] U.S. Navy, "Amended Parcel B Record of Decision," p. 1-5.

[32] U.S. Navy, "Amended Parcel B Record of Decision," p. 1-5.

[33] U.S. Navy, "Amended Parcel B Record of Decision," p. 12-7.

[34] United States Department of the Navy, Base Realignment and Closure, "Final Design Basis Report Installation Restoration Sites 7 and 18, Parcel B," prepared by ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc., January 8, 2010, pp. 9-10, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/2240147233/Final_DBR%20texttablesfiguresappendices%20%281of2%29_01.04.10.pdf.

[35] United States Department of the Navy, "Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California," February 18, 2009, p. 8, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/2607404410/Final%20Parcel%20G%20ROD.TextTablesFigures.Attachments1%2C2_02.24.09.pdf.

[36] U.S. Navy, "ROD for Parcel G," pp. 30, 41.

[37] United States Department of the Navy, Base Realignment and Closure, "Explanation of Significant Differences to the Final Record of Decision for Parcel G, Hunters Point Naval Shipyard, San Francisco, California," prepared by Langan Engineering and Environmental Services, Inc., April 18, 2017, pp. 9-11, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/9716323673/731609901.04%20DCS_FINAL%20Parcel%20G%20ESD%20to%20Final%20ROD_04182017.pdf.

[38] U.S. Navy, "ESD to ROD for Parcel G," p. 15.

[39] U.S. Navy, "ESD to ROD for Parcel G," Table 1: PDF p. 32.

[40] U.S. Navy, "ESD to ROD for Parcel G," Appendix B: pp. 1-2.

[41] U.S. Navy, "ROD for Parcel G," pp. 41, 45.

[42] U.S. Navy, "ESD to ROD for Parcel G," pp. 13-14.

[43] United States Department of the Navy, Base Realignment and Closure, "Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California," July 24, 2009, p. 32, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/7471423089/Parcel%20D-1_UC-1%20Final%20ROD_Rev1_text.tables.figures.7.24.2009.pdf. Note that the restriction to industrial standards also is at variance with Prop P and the City Policy, which call for cleanup to unrestricted residential standards across the entire site.

[44] U.S. Navy, "ROD for Parcels UC-1 and D-1," pp. 30, 44-45, 50. The Remedial Action Objective only mentions PAHs and Metals in soil. The selected Soil cleanup alternative calls for

excavation of elevated levels of PAHs and a cover to prevent exposure to metals left behind in the soil.

[45] United States Department of the Navy, Base Realignment and Closure, "Final Design Basis Report Parcel D-1, Hunters Point Shipyard, San Francisco, California," prepared by ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc., February 11, 2011, p. 25, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/6277602970/Final_Parcel%20D-1_DesignBasisRpt_2.11.11.pdf.

[46] U.S. Navy, "ROD for Parcels UC-1 and D-1," p. 50.

[47] United States Department of the Navy, "Final Record of Decision for Parcel UC-2, Hunters Point Shipyard, San Francisco, California," pp. 16, 44-45, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/7860066056/Final_Parcel%20UC-2%20ROD%20121709and%20Attachments%201and2.pdf.

[48] United States Department of the Navy, Base Realignment and Closure, "Final Record of Decision for Parcel C, Hunters Point Shipyard, San Francisco, California," September 30, 2010, p. 55, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/7154371500/Hunters%20Point_Parcel%20C%20Record%20of%20Decision%201of5_09.30.2010.pdf.

[49] United States Department of the Navy, Naval Facilities Engineering Command, "Final Explanation of Significant Differences to the Final Record of Decision for Parcel C," prepared by CH2M HILL Kleinfelder, A Joint Venture, October 2014, p. 1-2, PDF p. 43, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/8935804605/Parcel_C_ESD_Final%2010.29.2014.pdf.

[50] U.S. Navy, "ESD to ROD for Parcel C," p. 4-8.

[51] U.S. Navy, "ESD to ROD for Parcel C," p. 2-4.

[52] U.S. Navy, "ESD to ROD for Parcel C," p. 1-2.

[53] United States Department of the Navy, Base Realignment and Closure, "Final Record of Decision for Parcel E-2, Hunters Point Naval Shipyard, San Francisco, California," November 2012, pp. 2-20, 2-22, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/2095854043/Final_E-2_ROD.pdf.

[54] U.S. Navy, "ROD for Parcel E-2," pp. 2-39 - 2-40, 2-42, 2-44.

[55] U.S. Navy, "ROD for Parcel E-2," p. 2-23.

[56] United States Department of the Navy, Base Realignment and Closure, "Final Record of

Decision for Parcel E, Hunters Point Naval Shipyard, San Francisco, California" December 2013, p. 2-24, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/9190902531/Parcel%2DE%5FFinal%2DROD%2Epdf.

[57] U.S. Navy, "ROD for Parcel E," Figure 10: p. 2-24.

[58] U.S. Navy, "ROD for Parcel E," p. 2-53.

[59] United States Department of the Navy, Base Realignment and Closure, "Record of Decision for Parcel UC-3, Hunters Point Naval Shipyard, San Francisco, California," prepared by CH2M HILL Kleinfelder, A Joint Venture (KCH), January 2014, p. 2-13, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/3999647378/Parcel%20UC-3%20Final%20ROD_1.24.2014.pdf.

[60] U.S. Navy, "ROD for Parcel UC-3," pp. 2-34, 2-38.

[61] U.S. Navy, "ROD for Parcel E-2," Attachment 3: pp. 4-5. There is some language in the Board of Supervisors Resolution about technical feasibility, but the resolution also adopts as formal City policy Prop. P, which has no such language.

[62] The only ROD in which we have even seen even a reference to Prop. P is in the Parcel E-2 ROD, referenced above. There the Navy says, "excavation and off-site disposal of the entire Parcel E-2 Landfill" poses engineering challenges "and *borders* on being technically infeasible" (emphasis added). So, the Navy does not claim that even digging up the entire E-2 landfill is technically infeasible, but merely borders on it. All other parcels would involve lesser actions to achieve unrestricted release.

[63] U.S. Navy, "ROD for Parcel E," Attachment 5: PDF p. 1051;
U.S. Navy, "Parcel B Technical Memorandum in Support of a ROD Amendment," Appendix L: pp. L-32 - L-38; United States Department of the Navy, Base Realignment and Closure, "Navy Response to Agency Comments on the Draft Parcel B Technical Memorandum in Support of a Record of Decision Amendment," December 8, 2006, p. 121, https://www.navfac.navy.mil/niris/SOUTHWEST/HUNTERS_POINT_NS/N00217_001073.PDF.

[64] Department of Public Health, "Listen, Share, Connect," PDF p. 26.

[65] Our graphic was created using an older draft of the presentation made available through a Public Records Act request. Though there are minor differences, such as the color scheme, the text appearing in our graphic is consistent with the final version of the presentation cited here.

[66] Parcels A, D-2, and a small portion of UC-3 are the only areas excluded from the cover remedy.

[67] U.S. Navy, "Amended Parcel B ROD," p. 12-7. Some of the HPNS documents refer to covers of 2 inches of asphalt over 4 inches of aggregate base (crushed rock or crushed recycled asphalt and concrete).

[68] Minor repairs such as filling cracks in the asphalt or foundations will occur in some instances - for example: U.S. Navy, "Amended Parcel B ROD," p. 12-7.

[69] CP Development Company L.P., "Risk Management Plan Hunters Point Naval Shipyard Revision 1," prepared by Geosyntec Consultants, January 2019, p. 4-1, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/7226015985/HPNS%20RMP%20Revision%201%5Ffinal%5FJanuary%2E2019%2Epdf.

[70] U.S. Navy, "ESD to the ROD for Parcel C," p. 1-2; U.S. Navy, "ROD for Parcel E-2," p. 2-23.
[71] Andrew G. Bowerman and Edward F. Redente, "Biointrusion of Protective Barriers at Hazardous Waste Sites," *Journal of Environment Quality* 27, no. 3 (1998): 631, https://doi.org/10.2134/jeq1998.00472425002700030021x.

[72] United States Department of the Navy, Naval Facilities Engineering Command, "Final Remedial Action Work Plan, Final Cover, Wetlands, and Landfill Gas Control and Containment System, Remedial Action Parcel E-2," prepared by Kemron Environmental Services, Inc. and Gilbane Federal, December 2018, pp. 18-20, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/5066914439/Text%20thru%20Apdx%20A%5FFinal%5FRAWP%5FE%2D2%5FFinal%5F20181226%2D2%2Epdf.

[73] Previously known as California Department of Fish and Game.

[74] U.S. Navy, "ROD for Parcel E," Attachment 5: pp. 39-40.

[75] U.S. Navy, "ROD for Parcel E," Attachment 5: pp. 39-40.

[76] United States Department of the Navy, Naval Facilities Engineering Command, "Final Design Basis Report, Parcel E" prepared by Construction Engineering Services, LLC, May 2018, Appendix IB: p. 18, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/6921955943/HPNS_Final_RDP_Parcel%20E%20APPENDIX%20G-I-_May%202018.pdf.

[77] Shawn K. Smallwood, Michael L. Morrison, and Jan Beyea, "Animal Burrowing Attributes Affecting Hazardous Waste Management," *Environmental Management* 22, no. 6 (1998): 837, https://doi.org/10.1007/s002679900151.

[78] Bowerman and Redente, "Biointrusion of Protective Barriers," 631.

[79] Smallwood, Morrison, and Beyea, "Animal Burrowing," 834; Tom Hakonson, "Review of Sandia National Laboratories/New Mexico Evapotranspiration Cap Closure Plans for the Mixed Waste Landfill," Citizen Action, February 15, 2002,

http://www.radfreenm.org/old_web/pages/hakonson_full.htm; Emmanuel Gabet, O. J. Reichman, and Eric W. Seabloom, "The Effects of Bioturbation on Soil Processes and Sediment Transport," *Annual Review of Earth and Planetary Sciences* 31, no. 1 (2003): 250, https://doi.org/10.1146/annurev.earth.31.100901.141314.

[80] Smallwood, Morrison, and Beyea, "Animal Burrowing," 834.

[81] Smallwood, Morrison, and Beyea, "Animal Burrowing," 834. Bioturbation is the disturbance of soil by living organisms, most commonly through acts such as burrowing.

[82] Howard Wilshire, "Bioturbation, Erosion, and Seismic Activity Make Shallow Soil Covers Ineffective at Isolating Contamination," August 2019, p. 5, and the references cited therein.

[83] U.S. Navy, "Amended Parcel B ROD," p. 5-1.

[84] United States Department of the Navy, "Phase 1A Ecological Risk Assessment, Task 5 Summary Report" vol. 3, prepared by PRC Environmental Management, July 15, 1994, pp. 5-3 - 5-4, https://www.navfac.navy.mil/niris/SOUTHWEST/HUNTERS_POINT_NS/N00217_003024.PDF.

[85] United States Department of the Navy, "Phase 1A Ecological Risk Assessment, Task 6 Summary Report," vol. 3, prepared by PRC Environmental Management, July 15, 1994, p. 5, https://www.navfac.navy.mil/niris/SOUTHWEST/HUNTERS_POINT_NS/N00217_003024.PDF.

[86] United States Department of the Navy, Base Realignment and Closure, "Final Third Five-Year Review of Remedial Actions," prepared by TriEco-Tt, a Joint Venture of TriEco LLC and Tetra Tech EM Inc., November 8, 2013, pp. F-7 - F-8, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/7991254508/Final_HPNS_3rd_5YR.pdf.

[87] United States Department of the Navy, Base Realignment and Closure, "Annual Operation and Maintenance Summary Report for Installation Restoration Sites 07 and 18 in Parcel B," prepared by Engineering/Remediation Resources Group, Inc., September 26, 2014, pp. 2-1 - 2-2, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/3948698282/2014AnnualRep_IR7-18.pdf.

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[116] CP Development, Risk Management Plan, pp. A-1 – A-2, 3-3 – 3-4.

[117] U.S. Navy, "ROD for Parcel E," p. 2-56; U.S. Navy and DTSC, "CRUP UC-1 and UC-2," p. 8.

[118] Center for Agroecology and Sustainable Food Systems, University of California at Santa Cruz, "French Intensive Gardening: A Retrospective," accessed July 10, 2019, p. 2, https://casfs.ucsc.edu/documents/for-the-gardener/French_Intensive.pdf.

[119] Some of the ICs, while allowing growing vegetables for human consumption if they are planted in raised beds above the cover, require that fruit trees be grown in containers with a bottom "that prevents the roots from penetrating the native soil." See, e.g., Parcel E ROD p 2-56. This shows that the Navy recognizes that tree roots grow deeper than the cover, but fails to acknowledge that the same is true for many vegetables. It also makes clear that raised beds for vegetables as required in the HPNS ICs do not have bottoms.

[120] Battelle, "Hunters Point Naval Shipyard Estimated Excess Cancer Risks and Dose Equivalent Rates from Resident Exposures to Radionuclide-Containing Soils Report," prepared for the US Navy, August 7, 2019, https://www.bracpmo.navy.mil/content/navfac/brac_pmo/brac_bases/california/former_shipyard_hunters_point/public_notices/public_notice_soil_evaluation0.html

[121] U.S. Navy, "ESD to Parcel B ROD," p. 1; United States Department of the Navy, Naval Facilities Engineering Command, "Final Action Memorandum Time-Critical Removal Action for Steam Lines, Fuel Lines, and Non-VOC Soil Sites at Parcels C and D, Hunters Point Shipyard, San Francisco, California," September 13, 2000, Table 2: p. 5, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/9446060001/Final_ParcelsCandDTCRA_AM_9.13.00.pdf; United States Department of the Navy, Base Realignment and Closure, "Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California," prepared by SulTech, A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc., November 30, 2007, Table 3-1, PDF p. 26, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/2948902726/Final%20Revised%20FS%20for%20Parcel%20D%203.0-References.pdf; United States Department of the Navy, Base Realignment and Closure, "Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California," prepared by SulTech, A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc., November 30, 2007, Appendix B: pp. B-7, B-21, and B-35.

[122] Hirsch et al., "Non-Protective Cleanup Standards."

[123] Hirsch et al., "Non-Protective Cleanup Standards," pp. 2-4.

[124] One way the Navy and its regulators could try to leave behind soil so contaminated that it would be unsafe to grow anything edible in it might be to impose a new IC that would allow homegrown produce in raised beds, but only if the raised beds were to have bottoms that roots supposedly couldn't penetrate. In the real world, of course, no one is going to go around and enforce such a requirement; most vegetables wouldn't grow well if their roots could only go down a few inches; and buried wood rots.

The only indication we have seen that the Navy might possibly be considering trying to change its IC regarding raised beds to require a bottom comes in a 2018 document for Parcel E that claims that the existing ICs for Parcel E contain a prohibition on"growing any edible items (beneath the durable cover) unless grown in raised beds or containers (above the durable cover), with imported clean soil, and with a bottom that prevents the roots from penetrating the durable cover." United States Department of the Navy, Base Realignment and Closure, "Final Land Use

Control Remedial Design Parcel E, Hunters Point Naval Shipyard, San Francisco, California," prepared by Construction Engineering Services, LLC, November 2018, pp. 4-1 – 4-2, https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/1310331046/Final_LUC-RD_rev1.pdf. The sentence is poorly written, creating ambiguity as to whether the Navy is attempting to assert that the requirement of a bottom applies to containers or to raised beds and containers. If the latter, it misrepresents the IC as actually approved in the Parcel E ROD (the bottom requirement only applies to fruit trees, which must be grown in containers, not to vegetables in raised beds).

[125] Battelle, "HPNS Estimated Excess Cancer Risks," p. 9

[126] United States Environmental Protection Agency, "PRG Home," accessed July 16, 2019, https://epa-prgs.ornl.gov/radionuclides/; United States Environmental Protection Agency, "PRG User's Guide," accessed July 16, 2019, PDF p. 70, https://epa-prgs.ornl.gov/radionuclides/PRG_UsersGuide.pdf. (The default for "Resident Produce Ingestion Rate" is "plant-specific," which in turn is cited to the EPA's 2011 Exposure Factors Handbook Table 13-10, "Consumer-Only Intake of Home-Produced Vegetables (g/kg-day)—All Regions Combined," which may be viewed at https://19january2017snapshot.epa.gov/sites/production/files/2015-09/documents/efh-chapter13.pdf. Intake rates for the produce items incorporated into EPA's PRG Calculator may be found in Table 2.4.1-A on PDF p. 5 of the PRG User's Guide.

[127] EPA Preliminary Remediation Goal Calculator for radionuclides, https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search; compare runs with the default garden and with the garden inputs turned off. For chemicals, see U.S. Navy, "Explanation of Significant Differences, Parcel B," Attachment A.

[128] United States Geological Survey, "Earthquake Outlook for the San Francisco Bay Region 2014–2043, Fact Sheet 2016-3020," by Brad T. Aagaard et al. (June 2016): 1, https://doi.org/10.3133/fs20163020.

[129] United States Geological Survey, "Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California: A Digital Database," geology by Keith L. Knudsen et al., digital database by Carl M. Wentworth et al., last modified September 22, 2005, https://pubs.usgs.gov/of/2000/of00-444/of00-444_8b.pdf.

[130] United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, "(Draft) Technical Guidance For RCRA/CERCLA Final Covers," April 2004, p. 2-18, https://nepis.epa.gov/Exe/ZyPDF.cgi/P10074PP.PDF?Dockey=P10074PP.PDF.

[131] Chris Roberts, "San Francisco accepted Hunters Point shipyard land that may still be radioactive," SF Curbed, March 13, 2018, https://sf.curbed.com/2018/3/13/17081188/san-francisco-hunters-point-shipyard-radioactive-toxic-navy.

[132] United States Department of the Navy, "Parcel C: Upcoming Cleanup," Hunters Point Naval Shipyard Community Meeting, October 24, 2012, p. 13, https://www.bracpmo.navy.mil/content/dam/bracpmo/california/former_naval_shipyard_hunters_point/pdfs/restoration_advisory_board/2012CIM/102412_pres.pdf.

[133] U.S. Navy, "Amended Parcel B ROD," p.12-11; U.S. Navy, "ROD for Parcels D-1 and UC-1," p. 49; U.S. Navy, "ROD for Parcel C," p. 60; U.S. Navy, "ROD for Parcel G," p. 45; U.S. Navy, "ROD for Parcel UC-3," p. 2-38; U.S. Navy, "ROD for Parcel E," p. 2-56; U.S. Navy, "ROD for Parcel E-2," p. 2-45; U.S. Navy, "ROD for Parcel UC-2," p. 44; U.S. Navy and DTSC, "CRUP UC-1 and UC-2," p. 9.

[134] CP Development Company L.P., "Risk Management Plan Hunters Point Naval Shipyard Revision 1," prepared by Geosyntec Consultants, January 2019, https://www.envirostor.dtsc.ca.gov/public/view_document?docurl=/public/deliverable_documents/7226015985/HPNS%20RMP%20Revision%201%5Ffinal%5FJanuary%2E2019%2Epdf.

[135] U.S. Navy, "Amended Parcel B ROD," pp. 12-8 - 12-9; U.S. Navy, "ROD for Parcel C," p. 58; U.S. Navy, "ROD for Parcel E," p. 2-54; U.S. Navy, "ROD for Parcel E-2," p. 2-42; U.S. Navy, "ROD for Parcel G," p. 41.

[136] U.S. Navy and DTSC, "CRUP UC-1 and UC-2," pp. 11-12.

[137] Kris Wernstedt and Robert Hersh, "Urban Land Use and Superfund Cleanups," *Journal of Urban Affairs* 20, no. 4 (1998): 471, https://doi.org/10.1111/j.1467-9906.1998.tb00432.x.

[138] Liza Tucker, Consumer Watchdog, "Golden Wasteland: Regulating Toxics, or Toxic Regulation?" February 2013, https://www.consumerwatchdog.org/golden-wasteland-report.

[139] Hirsch et al., "Non-Protective Cleanup Standards," pp. 1-2.

[140] Office of Community Investment and Infrastructure, "Redevelopment Plan," pp. 7 – 14.

[141] Office of Community Investment and Infrastructure, "Redevelopment Plan," p. 4.

[142] U.S. Navy, "Amended Parcel B ROD," p.12-1; U.S. Navy, "ROD for Parcels D-1 and UC-1," p. 45; U.S. Navy, "ROD for Parcel C," pp. 55; U.S. Navy, "ROD for Parcel G," p. 42; U.S. Navy, "ROD for Parcel UC-3," p. 2-34; U.S. Navy, "ROD for Parcel E," pp. 1-3, 2-48; U.S. Navy, "ROD for Parcel E-2," p. 2-39; U.S. Navy, "ROD for Parcel UC-2," p. 40

[143] The plan is a document which currently covers only Parcels B, G, UC-1 and UC-2, but will cover additional parcels as they are transferred from the Navy to OCII. CP Development Co., "Risk Management Plan."

[144] Office of the Secretary of State of the State of California, "Foreign Limited Partnership Application for Registration File # 200824100015," August 28, 2008, https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id=200824100015-777678;

San Francisco Bay Conservation and Development Commission, "Hunters Point Shipyard-Candlestick Point Project, City and County of San Francisco; Pre-Application Review," September 25, 2009, https://bcdc.ca.gov/drb/2009/09-14_hunterPt.pdf.

[145] CP Development Co., "Risk Management Plan," p. 1-2.

[146] CP Development Co., "Risk Management Plan," p. 1-1.

[147] If the area being developed is less than 1 acre in size, developers can remove the covers and move forward with work without seeking additional FFA signatory approval. If the area is greater than one acre in size, the developer need only come up with a work plan and have this approved by the signatories to then destroy the covers. CP Development Co., "Risk Management Plan," pp. 2-1, 1-1, and 1-2.

[148] Soil excavated from areas known by the FFA signatories to have Chemicals of Concern must supposedly be replaced in the same location or disposed of off site. Soil excavated from areas with Land Use Controls is supposed to only be moved to areas with the same controls unless given FFA signatory approval. CP Development Co., "Risk Management Plan," pp. 2-1, 2-2, 3-4, and 4-2.

[149] When describing the physical conditions of HPNS, the plan describes it as being "characterized by conditions of blight" which "include buildings in which it is unsafe or unhealthy for persons to live or work, and the existence of factors that prevent or substantially hinder the economically viable reuse of buildings and areas." As a project objective, OCII intends to "[r]emove conditions of blight in the form of buildings, site improvements, and infrastructure systems that are substandard and serve as impediments to land development." Office of Community Investment and Infrastructure, "Redevelopment Plan," pp. 3 –4.

[150] CP Development Co., "Risk Management Plan," p. 4-1.

[151] Office of Community Investment and Infrastructure, "Redevelopment Plan," Map 3, PDF p. 51. Image modified to highlight existing buildings in orange.

[152] Hirsch et al., "Hunters Point Sites Were Never Sampled."

[153] CP Development Co., "Risk Management Plan," pp. 2-1, 3-4, and 4-4.

[154] Comparing development plans with current cover conditions at HPNS and the guidelines in the RMP, it appears that covers can be changed to soil, asphalt, or building foundations to meet the needs of the Redevelopment Plan. CP Development Co., "Risk Management Plan," pp. 2-1, 4-2.

[155] Image created from two separate images: FivePoint, "Full HPS CAC Presentation on updated HPS2 Parks, Open Space & Habitat Master Plan," November 13, 2017, p. 10, https://sfocii.org/sites/default/files/20171113%20HPS2%20Parks%20%26%20Open%20Space%20Full%20CAC%20Presentation.pdf; and U.S. Navy, "Parcel C: Upcoming Cleanup," p. 13.

[156] CP Development Co., "Risk Management Plan," p. 4-1 - 4-2.

[157] CP Development Co., "Risk Management Plan," Appendix J: p. 26.

[158] CP Development Co., "Risk Management Plan," Appendix J: p. 26.

[159] CP Development Co., "Risk Management Plan," Appendix J: p. 27.

[160] CP Development Co., "Risk Management Plan," Appendix J: p. 26.

[161] Note that Parcel A doesn't include covers, in contrast to what will occur for most of the other parcels.

[162] Erwin Tam, "Analysis of Institutional Controls at California Superfund Sites," UC Berkeley, Environmental Science & Economics, PDF p. 9, https://nature.berkeley.edu/classes/es196/projects/2000final/tam.pdf.

[163] Susan C. Borinsky, "The Use of Institutional Controls in Superfund and Similar State Laws," *Fordham Environmental Law Review* 7, no. 1 (2011): 7, https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1408&context=elr.

[164] Borinsky, "Institutional Controls in Superfund," 8.

[165] CP Development Co., "Risk Management Plan," p. 1-4.

[166] CP Development Co., "Risk Management Plan," Appendix E: p. E-2.

[167] U.S. Navy and DTSC, "CRUP UC-1 and UC-2," p. 6.

[168] U.S. Navy and DTSC, "CRUP UC-1 and UC-2," p. 11.

[169] U.S. Navy and DTSC, "CRUP UC-1 and UC-2," pp. 10-11.

[170] U.S. Navy and DTSC, "CRUP UC-1 and UC-2," pp. 11-12.