# APPENDIX B – HISTORICAL CERCLA VIOLATIONS

This Appendix places the violations of CERCLA, the NCP and the FFA described in the Notice in the context of the history of CERCLA violations the Navy and EPA have committed throughout the cleanup.

## I. THE NAVY HAS VIOLATED CERCLA, THE NCP and the FFA THROUGHOUT the HPNS CLEANUP

### A. The Navy Improperly Excluded Wide Swathes of HPNS from Radiological Testing

The first steps in a CERCLA cleanup are a Preliminary Assessment ("PA") followed by a Remedial Investigation ("RI") and Feasibility Study ("FS"). The Preliminary Assessment is intended to screen out sites that do not pose a threat to public health or the environment, determine if any short-term "removal actions" are necessary, set priorities for a site inspection and gather data to facilitate a fuller site evaluation.

A Remedial Investigation characterizes the nature and vertical and horizontal extent of contamination at a site. The Feasibility Study analyzes remedial alternatives, proposes a preferred alternative, and summarizes the data relied upon in selecting the preferred alternative.[1]

To inform the *HPNS RI/FS*, the Navy reviewed its historical records and published *Hunters Point Shipyard Historical Radiological Assessment* ("*HRA")* in 2004. It claimed to be "a comprehensive history of radiological operations conducted by the U.S. Department of the Navy (Navy) and Navy contractors at the Hunters Point Shipyard."[2] (Parenthesis in original.)

The HRA, on which all subsequent investigation of the radiological risks at HPNS was based, identified several dozen radionuclides of concern ("ROCs") that have half-lives long enough to still be present at HPNS and should have been investigated. But not all were.

Table 4-2, "Radionuclides Used at HPS," lists 108 radionuclides. Table 4-3, "Radionuclides of Concern at HPS," lists 33 radioactive elements.[3] However, in 2006, when the Navy adopted its cleanup standards, it adopted cleanup standards called "release criteria" for only 11 radionuclides.[4]

As a result, remedial goals were adopted for only a third of the radionuclides of concern. The Navy did not adequately justify the elimination of the remaining two-thirds of radionuclides of concern and their risk was never evaluated in the Record of Decision ("ROD") process or subsequent actions, including *Five-Year Reviews*. Failure to establish remedial goals for the majority of radionuclides of concern identified by the HRA improperly underestimated risk to

[1] 40 CFR § 300.420.
[2] *2004 Hunters Point Shipyard Historical Radiological Assessment* ("*Historical Radiological Assessment*"), 1-1.
[3] *Id.* at Tables 4-2 and 4-3.
[4] *Basewide Radiological Removal Action*, *Action Memorandum* (2006), Table 1.

human health and the environment.

Based on this inadequate review and preliminary radiological surveys, the Navy classified each of 882 shipyard sites as either "impacted" or "non-impacted."[5] Sites were "impacted" if the Navy found that "the history of the site indicate[d] that radioactive materials may have been used or stored there,"[6] including "locations where leaks or spills are known to have occurred." Conversely, "non-impacted" sites allegedly had "no reasonable potential for residual radioactive contamination."[7]

If a site was designated "non-impacted," no further radiological sampling or investigation was conducted because the Navy claimed "there [was] no reasonable potential for radioactive material to be present."[8] The Navy only classified 91 of 882 sites at HPNS "impacted."[9] Accordingly, the Navy never sampled or tested the remaining 791 sites. To this day, nearly 90 percent of HPNS sites have never been sampled for radiological contamination.[10]

The Navy relied on the HRA's incorrect analysis to justify its failure to sample most of HPNS. This violated EPA guidances requiring more comprehensive sampling, "to ensure that no area of the site is overlooked."[11] While a lead agency may consider "hot spots" as a factor in where to *concentrate* sampling, it was inappropriate for the Navy to entirely exclude nearly 90 percent of a Superfund site from sampling, as it did at HPNS.[12]

Leaving such a large majority of sites unsampled and untested means it was impossible for the Navy to accurately estimate the nature, extent, and concentration of contaminants, as required by EPA RI/FS guidance.[13]

### B. The Navy Inappropriately Used Parcel B as a Model for Other Parcels

The first Parcel for which the Navy issued a ROD was Parcel B, in October 1997, *Hunters Point Shipyard Parcel B Final Record of Decision* ("*Parcel B ROD*"). In the *Parcel B ROD,* the Navy proposed "to clean up the entire parcel to residential risk-based standards."[14]

Navy operations contaminated Parcel B with a variety of contaminants including heavy metals and other hazardous chemicals from activities such as "machining and metal fabrication" and "fuel storage and distribution.[15]

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[5] *Historical Radiological Assessment*, 2-2.
[6] *Id.*
[7] *Id.*
[8] *Id.,* at 4-3.
[9] *Id.,* at 1-5.
[10] *Id.*
[11] *Data Quality Objectives for Remedial Response Activities*, Appendix C, Sampling Considerations, p. C-6.
[12] *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, 3-17, https://semspub.epa.gov/work/HQ/100001529.pdf.
[13] *Risk Assessment Guidance for Superfund Part A*, 4-2.
[14] *Parcel B Final Record of Decision*, Oct. 7, 1997, at 43.
[15] *Id.* at 10.

The chemicals of concern identified in the *Parcel B ROD* included chromium VI, copper, lead, mercury, nickel, and selenium.[16] The Navy identified its primary contamination methods to be the release of waste acids, oil, paint, plating solutions, and fuels, largely via disposal into building drains, leaks from storage tanks, or unintentional spills.[17] According to the Navy's *Human Health Risk Assessment* ("*HHRA*"), the "ingestion of and dermal contact with contaminated soil" at Parcel B, as well as "ingestion of produce grown [by potential residents] at the site," could lead to serious illness.[18]

The Navy attributed radiological contamination in Parcel B to seven sources:

> (1) potential disposal of decontamination materials from ships used during atomic weapons testing in the South Pacific during the 1950s that were decontaminated at the shipyard, (2) radiological decontamination of personnel, (3) storage of samples from atomic weapons testing, (4) radiological sample counting, (5) storage and disposal of radioluminescent devices, (6) non-destructive testing and gamma radiography, and (7) storage of low-level radioactive waste.[19]

The radionuclides of concern identified in the *Parcel B ROD* were strontium-90 ("Sr-90"), cobalt-60 ("Co-60"), cesium-137 ("Cs-137"), radium-226 ("Ra-226"), and plutonium-239 ("Pu-239").[20]

The Navy's characterization of Parcel B sites as "impacted" or "non-impacted," employed an approach it eventually called the "spill model," and which it eventually applied to all parcels. However, "spill model" is not a term used in CERCLA, the NCP or any EPA CERCLA guidance. Nor does the phrase appear in the HPNS *HRA* or the *Parcel B ROD*.[21]

The Navy's "spill model" assumed contamination resulted from discreet, well-delineated spills rather than there being more widespread general contamination. It also assumed that discrete chemical spills resulted in "high chemical concentrations . . . near the center of the release and concentrations decrease outward."[22] This allowed for less testing than a full site characterization would, as the assumption was that contamination dissipated further from the documented spill; fewer samples were arguably necessary the farther one got from the spill.

As the Navy prepared to remediate Parcel B, however, it was confronted with stark differences between the HRA and the facts on the ground. This resulted in alterations to the *Parcel B ROD* through two *Explanations of Significant Differences* ("*ESDs*")[23] followed by a

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[16] *Fourth Five-Year Review* at 3-10. For a complete list of chemicals of concern, see Table 1, *Fourth Five-Year Review*, at PDF pages 118-121.
[17] The *First 5-Year Review's* Table 1 summarizes soil contamination at Parcel B. *See First FYR* at 57-59.
[18] *1997 Parcel B ROD* at 20.
[19] *Parcel B Amended Record of Decision*, Jan. 14, 2009, 5-6.
[20] *Id*.
[21] *1997 Parcel B ROD*.
[22] *Parcel B Amended ROD*, 1-4.
[23] The first ESD, (*Final Explanation of Significant Differences, Parcel B, Hunters Point Shipyard*," August 24, 1998; "*First Parcel B ESD*"), altered the depth of excavation. Originally, the Navy planned to excavate "to the groundwater table or $10^{-6}$ cancer risk (residential)." The new standard called for excavation "to a cleanup level of $10^{-6}$ cancer risk (residential) or to a maximum depth of 10 feet" below ground surface. (*Id*. at 1.) This was done to

January 14, 2009, *Amended Parcel B Record of Decision* ("*Amended Parcel B ROD*"). The "spill model" was first introduced by the Navy in the *Parcel B Amended ROD*.[24]

The Navy's model for designating "impacted" and "non-impacted" sites proved to be demonstrably wrong in Parcel B. For example, the "spill model" assumed chemical contamination was quite limited there, but testing found hazardous heavy metals were "ubiquitous" throughout the Parcel.[25] In response, the Navy was forced to change the remediation plan for Parcel B and amend the ROD, conceding that "the spill model did not account for all areas where chemical concentrations exceeded cleanup goals . . . [and that] the spill model needed to be supplemented to account for these other areas."[26]

Furthermore, as the *Parcel B Amended ROD* summarized, the "spill model" was the basis of the cleanup from the very start, but proved to be wrong in important ways:

> The discrete release of chemicals, referred to as the "spill model," was the basis for the remedial action selected in the 1997 ROD. . .. The spill model for chemical releases was appropriate for many areas at Parcel B. The Navy successfully delineated and removed all contaminants at concentrations above cleanup goals at 93 of 106 excavations implemented for the remedial action. **The ubiquitous distribution of metals in soil, especially manganese, led to reevaluation of the remedy at the remaining 13 excavations at Parcel B, however.**[27] (Emphasis added.)

Thus, the Navy knew its assumption that the "spill model" was appropriate to Parcel B's chemical contamination was incorrect more than 10 percent of the time. This should have called into question continuing to rely on it. However, the Navy did not apply this lesson to investigation of radiological contamination. It continued to rely on the "spill model" as the basis for radiological site characterizations in Parcel B and all other subsequent parcels.

A primary source of radiological contamination at HPNS came from contaminated ships brought to the shipyard in the 1950's for decontamination after "Operation Crossroads."[28] Enormous amounts of radioactive sand, or "grit," were contaminated in the process.

The Navy purportedly disposed of the radioactive grit by dumping it directly into the Bay or putting it into containers which were then dumped into the ocean farther from shore.[29] However, the *HRA* included testimony of former shipyard employees who said spent sandblast

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protect workers who "could be exposed to residual contaminated soils while believing they are protected as long as they do not dig into the saturated zone." (*Id*. at 3.) The Second ESD, *Final Explanation of Significant Differences, Parcel B, Hunters Point Shipyard*," May 4, 2000 ("*Second Parcel B ESD*"), updated cleanup standards for chemical contamination as a result of EPA's update of its "Preliminary Remediation Goals" ("PRGs") for chemically contaminated soil: "This ESD revises the soil cleanup values presented in Table 8 to incorporate EPA's 1999 PRGs. . . ." (*Second Parcel B ESD* at 1.)

[24] *Parcel B Amended ROD*, 1-4.

[25] *Id.*

[26] *Id.*

[27] *Id*. at § 1.3.1 Soil, 1-4.

[28] *Historical Radiological Assessment* at 6-21.

[29] *Id.* at 6-35. Interviews with former personnel involved in the sandblasting process recalled disposing of sandblast waste in the Shipyard's landfill as well. *Id.* at B-3.

grit was widely dispersed through a combination of sloppy procedures and natural forces, particularly the swirling winds which have long characterized southeastern San Francisco.[30] One employee recalled that it "would have been impossible to catch and containerize all sandblast grit in the drydocks," and that some of the sandblast grit was collected "in open barrels on the piers [which] blew around because of the nature of the winds at the piers."[31] In addition to being widely dispersed by wind, the radioactive grit was regularly washed away with water. Run-off from this process resulted in contamination of the shipyard, particularly its sewage system. There was also evidence that the grit was buried at several shipyard sites.

Another interviewee remembered that "[t]he grit would blow toward the Bay, but, occasionally, the wind would blow it back over the base. Blasting would not stop because the wind changed direction."[32]

The "spill model" was not appropriate to wind-blown radioactive sandblast grit.

EPA pointed out this inconsistency in its critique of the *HRA* and the Navy responded by nominally adding "sediment" as a "potential migration pathway."[33] However, this addition was not meaningfully incorporated into the designation of "impacted" sites – not a single site designation changed from "non-impacted" to "impacted" after sediment was included as a factor.[34]

The Navy claimed that the "identification of sandblast grit is not a reason for designating a site as impacted," even though the entire purpose of sandblasting the "Operation Crossroads" ships was to transfer radioactivity from the ships' hulls to the particles of sand.[35] Responding to comments, the Navy argued that it need not consider airborne sandblast grit since one deposit (a designated testing area around Building 901) was not found to be radiologically contaminated.[36]

But the absence of contamination at one location did not justify a refusal to test for or consider the extent of windswept radioactive sand – especially since other samples of sandblast grit **did** find radiological contamination.[37] Even so, the Navy did not investigate. For example, the *HRA* states, "During remedial investigation at Parcel A, the Navy discovered contaminated sandblast grit under pipes at IR-59. The Navy cleaned up this pocket of sandblast grit; however, **a comprehensive survey for other areas of sandblast grit at Parcel A was not conducted**."[38] (Emphasis added.)

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[30] Candlestick Park, a stadium notorious for its unpredictable, swirling winds was just across Double Rock Cove from the shipyard.
[31] *Historical Radiological Assessment* at B-12.
[32] *Id*. at B-36.
[33] *Id*. at E-8.
[34] *Id*.
[35] *Id.* at Appendix E, p. E-46.
[36] *Id*.
[37] *Finding of Suitability to Transfer for Parcel A* (2004), *Responses to Regulatory Agency, City of San Francisco, and Public Comments on the Finding of Suitability to Transfer for Parcel A, Revision 2, Dated Mar. 26, 2002*, 32, https://www.nrc.gov/docs/ML1829/ML18291A739.pdf.
[38] *Id.*

The Navy also did not address the very real possibility of migration of contamination; migration was not accounted for in the "spill model."

Another example of the Navy's incorrect assumptions related to radioactive smoke from burning contaminated fuel. As the HRA states, "Approximately 6l0,000 gallons of contaminated fuel oil from the [Operation Crossroads] ships were subsequently burned in the shore power/steam plants at HPS."[39] Smoke from burning that radioactive fuel was carried widely by the wind, like the radioactive sandblast grit.

As a result of these *HRA* inaccuracies, the *Parcel B ROD* incorrectly stated, "[n]o air or radiation concerns were identified on Parcel B."[40] It never considered the possibility that Parcel B was contaminated with radioactive sandblast grit and/or smoke from burning radioactive fuel.

The *Parcel B ROD* served as a model for all subsequent parcels' RODs. Thus, the same faulty assumptions and unlearned lessons identified in Parcel B tainted all subsequent parcels and their RODS.

The Navy's inappropriate reliance on the "spill model" meant that the Navy failed to comprehensively characterize the shipyard by quantifying the full vertical and horizontal extent of contamination, as required by EPA's guidances, CERCLA, and the NCP.

### C. The Navy Chose Grossly Under-Protective Remedial Goals

#### 1. The Navy Improperly Chose the Cleanup Goals in the 2006 Basewide Removal Action and Applied Them to All Subsequent RODs Involving Remedial Actions.

The Navy first promulgated a two-page table of remedial goals for radionuclides, called "Release Criteria," in Table 1 to its 2006 *Basewide Removal Action, Action Memorandum* ("*Basewide Removal Action Memo*"), reproduced below.[41]

[39] *Historical Radiological Assessment* at 6-18.
[40] *1997 Parcel B ROD* at 10.
[41] *Basewide Radiological Removal Action, Action Memorandum*, Table 1.

**TABLE 1**

**RELEASE CRITERIA**

| Radionuclide | Surfaces | | | Soil[d] (pCi/g) | | | | Water[b] (pCi/L) |
|---|---|---|---|---|---|---|---|---|
| | Equipment, Waste (dpm/100 cm$^2$)[a] | Structures (dpm/100 cm$^2$)[b] | Residual Dose (mrem/yr)[c] | Outdoor Worker (pCi/g)[e] | Residual Dose (mrem/yr)[c] | Residential (pCi/g)[e] | Residual Dose (mrem/yr)[c] | |
| Americium-241 | 100 | 100 | 18.7 | 5.67 | 0.8661 | 1.36 | 24.84 | 15 |
| Cesium-137 | 5,000 | 5,000 | 1.72 | 0.113 | 0.2142 | 0.113 | 0.2561 | 119 |
| Cobalt-60 | 5,000 | 5,000 | 6.01 | 0.0602 | 0.5164 | 0.0361 | 0.3918 | 100 |
| Europium-152 | 5,000 | 5,000 | 3.21 | 0.13[f] | 0.5018 | 0.13[f] | 0.502 | 60 |
| Europium-154 | 5,000 | 5,000 | 3.49 | 0.23[f] | 0.9593 | 0.23[f] | 0.9599 | 200 |
| Plutonium-239 | 100 | 100 | 18.1 | 14.0 | 1.743 | 2.59 | 1.138 | 15 |
| Radium-226 | 100 | 100 | 0.612 | 1.0[g] | 6.342 | 1.0[g] | 14.59 | 5[i] |
| Strontium-90 | 1,000 | 1,000 | 0.685 | 10.8 | 0.1931 | 0.331 | 1.648 | 8 |
| Thorium-232 | 1,000 | 36.5 | 24.9 | 2.7 | 24.91 | 1.69 | 25 | 15 |
| Tritium | 5,000 | 5,000 | 0.00053 | 4.23 | 0.00179 | 2.28 | 0.05263 | 20,000 |
| Uranium-235+D | 5,000 | 488 | 25 | 0.398 | 0.178 | 0.195 | 0.8453 | 30 |

***Notes:***

[a] These limits are based on AEC *Regulatory Guide 1.86* (1974). Limits for removable surface activity are 20 percent of these values.

[b] These limits are based on 25 mrem/yr, using RESRAD-Build Version 3.3 or *Regulatory Guide 1.86*, whichever is lower.

[c] The resulting dose is based on modeling using RESRAD-Build Version 3.3 or RESRAD Version 6.3, with radon pathways turned off.

[d] EPA PRGs for two future-use scenarios.

[e] The on-site and off-site laboratory will ensure that the MDA meets the listed release criteria by increasing sample size or counting time as necessary. The MDA is defined as the lowest net response level, in counts, that can be seen with a fixed level of certainty, customarily 95 percent. The MDA is calculated per sample by considering background counts, amount of sample used, and counting time.





**TABLE 1**

**RELEASE CRITERIA**

[f] Based on EPA-decay corrected PRGs for commercial reuse and a previous action memorandum (TtEMI, 2000a, 2001).

[g] Limit is 1 pCi/g above background, per agreement with EPA.

[h] Release criteria for water have been derived from *Radionuclides Notice of Data Availability Technical Document*, (EPA, 2000) by comparing the limits from two criteria and using the most conservative limit.

[i] Limit is for total radium concentration.

AEC – Atomic Energy Commission
cm$^2$ – square centimeters
dpm – disintegrations per minute
EPA – U.S. Environmental Protection Agency
MDA – minimum detectable activity
mrem/yr – millirem per year
pCi/g – picocurie per gram
pCi/L – picocurie per liter
PRG – preliminary remediation goal
TtEMI – Tetra Tech EM, Inc.

A "removal action" is a short-term remedy to an immediate threat, to be done "as promptly as possible,"[42] but in any case, to be completed in less than a year at a cost under $2 million.[43] A "removal action" may be subject to less stringent cleanup standards in the short-term and may need to be followed by "remedial actions" to assure long-term protectiveness.

A "remedial action," on the other hand, is designed to protect public health and the environment permanently. This includes but is not limited to "cleanup of released hazardous substances and associated contaminated materials" and the "segregation of reactive wastes."[44]

"Removal actions" are not included in the public participation provisions of CERCLA whereas "remedial actions" are. 42 U.S.C. §9617, "Public Participation," states, in part, "Before adoption of any plan for remedial action to be undertaken by the President," the President "shall" publish a notice of the plan and provide a "reasonable opportunity" for public comment.

As a result of adopting Table 1 as part of a "removal action" rather than a "remedial" one, the Navy excluded the public from participating in the seminal decision adopting these remedial goals. This violated the EPA guidance, A *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, by failing to make information that forms the basis for choosing a cleanup plan available for public comment.

Though the 2006 *Basewide Removal Action Memo*, as its title stated, was a short-term remedy, the Navy subsequently applied the cleanup standards in Table 1 to all subsequent long-term **remedial** actions, including the *Base-wide Radiological Work Plan* in 2007, the RODs for all the other parcels,[45] and *Five Year Reviews*.

**a. Soils**

Radionuclides of concern in soil were the only remedial goals in Table 1 that claimed to use EPA methods. However, it is unclear to what extent the Navy actually used them. Table 1 footnote "d" states that its soil release criteria were drawn from "EPA PRGs for two future use scenarios."[46] However, the Navy failed to specify the inputs and assumptions for these scenarios. Nor did it publicly disclose its PRG calculations. It also did not refer to default PRGs for radionuclides, which EPA published in 2004.[47] In some cases, like europium-152 and europium-154, the EPA 2004 default PRGs were orders of magnitude more stringent than what the Navy adopted.[48]

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[42] 40 CFR § 300.410.
[43] 42 U.S.C. § 9604(c). There are limited exceptions to which these limits may not apply.
[44] 42 U.S.C.A. § 9601(24).
[45] *Parcel C Record of Decision*, p. 41; *Parcel D-1 Record of Decision, p.* 33; *Parcel E Record of Decision*, Table 8, p. 2-33; *Parcel G Record of Decision*, p. 31.
[46] *Basewide Radiological Removal Action, Action Memorandum*, Table 1, fn. (d).
[47] The EPA periodically publishes PRGs for individual radionuclides using the default inputs in the PRG Calculator. *See Default PRG Download Area*, https://epa-prgs.ornl.gov/radionuclides/download.html.
[48] As to europium-152, EPA's default was .0416 pCi/g, while the Navy's release criteria was .13 pCi/g; the EPA default for europium-154 was .0499 pCi/g versus the Navy's .23 pCi/g. Footnote "f" indicates that the europium goals were based on "commercial reuse" instead of residential reuse, without justification. *Basewide Radiological Removal Action, Action Memorandum*, Table 1, fn. (f).

According to footnote "g," EPA agreed that the release criteria for radium would be "1 pCi/g above background," while the 2004 EPA default was .193 pCi/g. However, the Navy failed to disclose the basis for this agreement or justify it in any way. Furthermore, as discussed further below, the Navy took background measurements in locations on the shipyard that were likely radioactively impacted, skewing background level, and violating EPA guidance for calculating background radiation, *Role of Background in the CERCLA Cleanup Program*, ("*Background Guidance*"), OWSER 9285.6-07P (May 1, 2002).

**b. Buildings**

The Navy violated EPA guidances, including *Risk Assessment Guidance for Superfund, Parts A and B* ("*RAGS*") and *Radiation Risk Assessment at CERCLA Sites:Q and A* ("*Radiation Risk Assessment Q and A*") by using incorrect methods and toxicity data for setting remedial goals for contaminated buildings.

According to Table 1, the Navy used two sources for the building release criteria, neither of which were EPA-approved. Footnote "a" cites the Atomic Energy Commission's ("AEC") *Regulatory Guide 1.86.* Footnotes "b" and "c" cite "RESRAD-Build Version 3.3," a computer model developed by Argonne National Laboratory and sponsored by the Department of Energy to evaluate radiation doses from residual radioactivity in buildings.[49]

However, EPA's 1999 guidance document, *Radiation Risk Assessment Q&A*, explicitly criticized the Department of Energy (DOE) risk assessments because they calculated residual contamination's maximum allowed ***dose***; they do not calculate lifetime cancer ***risk,*** as required by CERCLA. The EPA guidance states: "dose recommendations (e.g., guidance such as DOE orders and NRC Regulatory Guides) **should generally not be used** as to-be-considered materials."[50] (Parenthesis in original, emphasis added.)

Although *RAGS Part A* states that the PRGs should be calculated with "the most recent information available,"[51] *Regulatory Guide 1.86* was published in **1974** and was more than three decades old when the Navy adopted the building remediation goals.

Being decades out of date was but one of the problems with using the AEC's *Regulatory Guide*. Its cleanup criteria were developed for terminating licenses at nuclear power plants and to help plant operators "[s]how that reasonable effort has been made to reduce residual contamination to **as low as practicable levels**."[52] (Emphasis added.)

Yet the Navy never explained, let alone justified, why cleanup levels from closed nuclear power plants were relevant to HPNS, a former military base and Superfund site.[53] Furthermore,

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[49] https://resrad.evs.anl.gov/.
[50] *Radiation Risk Assessment at CERCLA Sites: Q&A* (1999), p. 2.
[51] *Risk Assessment Guidance for Superfund Part A*, 7-15; *see Risk Assessment Guidance for Superfund Part B*, 14, which states that "the hierarchy for obtaining toxicity values for risk-based PRGs is essentially the same as that used in the baseline risk assessment [of RAGS Part A.]"
[52] Atomic Energy Commission, *Regulatory Guide 1.86 Termination of Operating Licenses for Nuclear Reactors* (1974), 1.86-4.
[53] *Basewide Radiological Removal Action, Action Memorandum*, Table 1.

"as low as practicable" is not the standard for CERCLA cleanups. "As low as practicable" is not synonymous with "protective of human health." Nor does the AEC standard contemplate the elevated level of protection CERCLA requires when, as here, the future use of the cleaned-up shipyard will be long-term residential use.

EPA guidance has consistently set the primary standard of "protectiveness" to mean remedies that ensure excess lifetime cancer risk remains below one in a million (in scientific notation, $1x10^{-6}$), or in site-specific circumstances, one in ten thousand ($1x10^{-4}$).[54] However, the release criteria in *Regulatory Guide 1.86* did not calculate lifetime excess cancer risk.[55] Using cleanup goals that were dose-based rather than risk-based violated the NCP's protectiveness requirement and EPA guidance.[56]

The Navy's use of RESRAD-Build was also based on an out-of-date risk threshold. Footnote "b" states that the limits for buildings are based on a maximum dose of 25 millirems of radiation per year ("25 mrem/year").[57] However, well before the Navy adopted Table 1 in 2006, EPA guidance explicitly stated that 25 mrem/year was not sufficiently protective under CERCLA. EPA's 1997 guidance, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, specifically found that 25 mrem/year "generally will not provide a protective basis" for establishing PRGs under CERCLA.[58] EPA found that the 25 mrem/year dose limit translated to a lifetime cancer risk of five in ten thousand, far less protective than acceptable CERCLA risk.[59] EPA considered doses above 15 mrem/year to not be protective.[60]

Accordingly, the Navy should not have used either *Regulatory Guide 1.86 or* RESRAD-Build using a 25 mrem/year dose, both of which were significantly outdated.

And, for reasons only EPA can explain but never has, EPA improperly violated its own guidance and agreed to the Navy's adoption of Table 1 release criteria in the 2006 *Basewide Removal Action Memo*, and all subsequent parcels' *RODs*, contrary to CERCLA, the NCP and the FFA.

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[54] *Role of Baseline Risk Assessment in Superfund Remedy Selection Decisions*, 4-5, https://www.epa.gov/sites/default/files/2015-11/documents/baseline.pdf.
[55] Atomic Energy Commission, *Regulatory Guide 1.86 Termination of Operating Licenses for Nuclear Reactors* (1974), Table 1.
[56] *Risk Assessment Guidance for Superfund Part B*, 1, 34.
[57] *Basewide Radiological Removal Action, Action Memorandum*, Table 1, fn. (b).
[58] *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* (1997), *Analysis of What Radiation Dose Limit Is Protective of Human Health at CERCLA Sites*, 1, https://semspub.epa.gov/work/HQ/176331.pdf.
[59] *Id.* at 2.
[60] *Id.* EPA has since lowered the protective dose even further, to 12 mrem/year. *Radiation Risk Assessment at CERCLA Sites: Q&A,* (May 2014), Q. 35.

### D. Background Measurements Were Inappropriately Taken from Potentially Contaminated Areas

The Navy inappropriately took samples intended to determine background[61] levels of radiation at the shipyard from shipyard sites that may have been radiologically contaminated. This violated EPA's "*Background Guidance*," which cautions that background samples must not be taken from sites that are at or near contaminated sites.

Background levels are supposed to be taken from "non-impacted" sites. The guidance, *Multi-Agency Radiation Survey and Site Investigation Manual* ("*MARSSIM*"), defines a non-impacted area as "an area where there is **no reasonable possibility** (extremely low probability) of residual contamination."[62] (Parenthesis in original, emphasis added.)

However, the Navy selected locations amid the contaminated Superfund site to take background samples, areas that have a significant likelihood of being contaminated from windblown radioactive sandblast grit, migrating contamination, and radioactive smoke, but were inappropriately labeled as "non-impacted."

The use of areas that could be contaminated to measure background raises the possibility that those samples would not be representative of true background, inflating them, and compromising the integrity of the cleanup.

The misuse of shipyard sites to determine background has been true both historically and recently. The Navy's *Parcel G Removal Site Evaluation Work Plan* (2019) was designed to retest Tetra Tech's fraudulent work. However, some background locations were chosen in the midst of the polluted shipyard.[63] One building location used for background sampling was actually in an **impacted building**, until commenters pointed that out; the Navy moved the location to a building about a block away, but still on the shipyard.[64]

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[61] Background radiation is "the amount of naturally-occurring radioactive elements in soil, water and air." (https://www.epa.gov/radiation/what-background-radiation-background-radiation-risk-me-and-my-family.) In other words, it is the radiation that would have been present at Hunters Point Shipyard had radiological activity, such as sandblasting contaminated ships, never occurred there.

[62] *Multi-Agency Radiation Survey and Site Investigation Manual* ("*MARSSIM*"), p. GL-14.

[63] For example, one site used for background sampling was close to the Parcel E-2 landfill and the site designated IR-04, the Former Scrap Yard. According to the *Final Status Survey Report* for IR-04, "the HRA specifies that known areas with elevated levels of cesium-137 (137Cs) and 226Ra exist within the footprint of the IR-04 Former Scrap Yard Site." Yet a site in this vicinity was chosen for background sampling.

[64] Building 401 was originally planned to be the site of a background sample, despite that the Navy itself described the building as "impacted." (*Work Plan*, Figure 1-2.) After comments pointed out this error, the Navy moved the sample location to Building 404. (*Work Plan, Responses to Comments*, p. 9.)

### E. Parcel B's Institutional Controls Are Inappropriate

The *Amended Parcel B ROD* dramatically changed the remedy in Parcel B in 2009. The original *Parcel B ROD* contained "institutional controls ("ICs") [65] restricting the use of groundwater, which the Navy stated was unlikely to ever be of beneficial use.[66] The *Amended Parcel B ROD* included far more extensive ICs. The remedy was changed to "install durable covers[67] over the entire parcel to prevent contact with any [chemicals of concern] that are not excavated," rather than to excavate and remove all contamination.[68]

What the Navy labels "durable" covers were merely a layer of asphalt, concrete, or soil; the majority were "existing covers," already present on the parcel. Indeed, the Navy defined "existing covers" to include "existing building footprints, roads, and parking lots," which were constructed long before the Navy contemplated remedial action at the site.[69] The *Amended Parcel B ROD called* for constructing **new** covers only over areas it had already excavated, "select areas where concentrations of chemicals of concern (COC) exceed[ed] remediation goals."[70] (Parenthesis in original.)

These new covers would follow "[s]tandard construction practices for roads, sidewalks, and buildings" or be constructed of "a minimum 4 inches of asphalt or a minimum 2 feet of clean imported soil."[71] The Navy estimated that the Parcel B covers would consist of "approximately 16 acres . . . covered with soil, 3 acres . . . covered by the shoreline revetment, and 40 acres [covered by] existing asphalt and concrete surfaces (including buildings)."[72] (Parenthesis in original.)

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[65] "ICs are legal and administrative mechanisms used to implement land use restrictions that are used to limit the exposure of future landowner(s) or user(s) of the property to hazardous substances present on the property, and to ensure the integrity of the remedial action." *Parcel G Record of Decision, at* p. 43.

[66] *1997 Parcel B ROD* at 2. It also included restrictions on "any owner and/or tenant of Parcel B who excavates soils containing levels of contaminants in excess of the cleanup goals," prohibiting them "from placing the excavated soils onto the ground surface and restricted from mixing the excavated soils with soils present in the surface to groundwater zone."

[67] "The amended selected remedy includes the installation of durable soil covers to prevent contact with any COCs [chemicals of concern] that are not excavated. Covers will be required at all redevelopment blocks to prevent human exposure to ubiquitous metals in soil that may pose an unacceptable risk. Existing covers, such as buildings and asphalt parking lots, are considered adequate for this alternative. New covers are considered for construction only in areas where there are no existing covers or existing covers have been destroyed in the process of redevelopment. . .. Existing asphalt and concrete surfaces and buildings will be considered existing covers and may include existing building footprints, roads, and parking lots. These existing covers may require rehabilitation, such as sealing or repairing cracks." *Parcel B Amended ROD,* at p. 12-7.

[68] *Parcel B Amended ROD,* at p. xiii-xiv.

[69] *Id.,* at p. 9-5.

[70] *Id.,* at p. xiii.

[71] *Id.,* at p. 9-5.

[72] *Id.* The Navy discussed construction of Parcel B covers in its Fourth Five Year Review. However, it contradicted itself in reporting when the Parcel B covers were constructed, stating that it completed "radiological removal actions" at the parcel between May 2006 and September 2010, but that "hot spot removal was performed between August 2010 and May 2011." *See Fourth 5-Year Review,* at PDF pp. 33 and 124.

In addition to "durable covers," ICs call for preventing ingestion of potentially radioactive food by prohibiting gardening except in raised boxes to prevent roots from accessing potentially contaminated soil below.

The problems with the "durable cover" and gardening ICs are addressed in more detail in Section IV(D)(4) of the Notice.

**F. The Parcel G Cleanup**

The Navy issued its *Final Record of Decision for Parcel G, Hunters Point Shipyard* ("*Parcel G ROD*") on February 18, 2009.

Some of the impacted sites identified by the *Parcel G ROD* were buildings formerly used by the Naval Radiological Defense Laboratory ("NRDL") for research and administrative functions.[73]

The radionuclides of concern identified by the *Parcel G ROD* were strontium-90 ("Sr-90"), cesium-137 ("C-137"), cobalt-60 ("Co-60"), plutonium-239 ("Pu-239"), radium-226 ("Ra-226"), thorium-232 ("Th-232"), hydrogen-3 ("H-3"), and uranium-235 ("U-235").[74]

Metals of concern included arsenic, lead, manganese, chromium VI, and nickel.[75] Other contaminants included polycyclic aromatic hydrocarbons ("PAHs") in soil and volatile organic compound ("VOC") vapors.[76]

The Navy's original remedy for chemical contamination consisted of, among other things, "excavation and off-site disposal, durable covers, and institutional controls (IC) to address soil contamination." Its radiological remedy called for "removing" contamination; the *Parcel G ROD* described the radiological remedy to be "surveying, decontaminating, and **removing radiologically impacted structures and soil**."[77] (Parenthesis in original, emphasis added.)

The *Parcel G ROD* also called for removing radiological soil contamination to meet its remedial action objectives ("RAOs"):

> The remedy for radiologically impacted sites meets the RAOs by identifying and decontaminating any impacted structures. Additionally, remaining contaminated materials, **storm drains and sewers, and soils would be excavated and disposed of off site**, thereby removing the source of contamination.[78] (Emphasis added.)

However, as the Tetra Tech fraud highlighted, the radiologically contaminated soil excavated in Parcel G was not necessarily disposed of offsite. Instead, it was supposedly

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[73] *See Parcel G Record of Decision,* at p. 8-98 *et. seq*.
[74] *Id.*
[75] *Id.,* at p. 2. The Navy attributes the elevated concentrations of metals other than lead, such as arsenic and manganese, to the bedrock fill quarried to build the shipyard in the 1940s. See p. 15.
[76] *Id.,* at p. 2.
[77] *Id.*
[78] *Id*., at p. 41.

screened by TtEC to segregate and dispose of soil exceeding a remedial goal. But TtEC's fraud resulted in tainted soil rather than clean soil being backfilled into the trenches from which they came. Accordingly, the *Parcel G ROD*'s remedy, removal of all contaminated soil, was not carried out.

As for chemical contamination of Parcel G, the Navy announced plans to rely on a mix of durable covers and ICs rather than complete removal shortly after it adopted the same combination of durable covers and ICs in the 2009 *Amended Parcel B ROD*. However, the two parcels began with different planned *future* uses. Parcel B was always intended for residential development, while Parcel G was originally to be a mix of industrial uses and open space, with one small area designated as mixed use.[79] The Navy's shift in Parcel G's planned future use to residential was done without conducting additional remedial action to meet the more stringent health and safety standards required for residential uses.[80]

Instead of using EPA soil PRGs to justify residential uses, the Navy relied on a *Feasibility Assessment for Evaluating Areas with Residential Land Use Restrictions, Parcel G, Hunters Point Naval Shipyard*, (2016), ("*Parcel G Feasibility Study*"). This study was not commissioned by the Navy, but instead was prepared for San Francisco's redevelopment agency, the Office of Community Investment and Infrastructure ("OCII"). Its purpose was to modify areas subject to residential land use restrictions so they could be residential areas, "to facilitate implementation of the updated Redevelopment Plan adopted by the OCII (SFRA, 2010)."[81] The *Feasibility Study* proposed:

> reducing the area currently restricted against residential use in areas where COCs [chemicals of concern] in soil do not exceed the identified residential Action Levels. According to this proposal, the residential land use restriction established in the Final Record of Decision (ROD) would no longer apply. Areas with COCs above residential Action Levels remain restricted against residential use.[82]

Based on the *Feasibility Study*, the Navy issued an *Explanation of Significant Differences* ("ESD") on April 18, 2017, changing the designated future use for most of Parcel G to residential.[83]

The *ESD* described the cancer risk associated with the change:

> For the majority of COCs at Parcel G, residential soil Action Levels are chemical concentrations that generally correspond to a five-in-one million [$5 \times 10^{-6}$] cancer risk or a non-carcinogenic hazard quotient of five. Following the Navy's accepted risk assessment practices these cancer risks and hazard quotients do not consider the protection provided by several measures already agreed to, such as the durable cover. The cancer risk level that corresponds to residential soil Action Levels ($5 \times 10^{-6}$) is below the

[79] *Id*., at p. 8.
[80] *Parcel G Explanation of Significant Differences* ("*Parcel G ESD*"), at p. 15.
[81] *Id.*
[82] *Parcel G Feasibility Study*, *Executive Summary*, p. 2.
[83] *Parcel G ESD* at p. 9-11.

upper bound of the cancer risk management range of $10^{-4}$ as defined by the National Contingency Plan (NCP).[84]

However, neither the *Feasibility Study* nor the *ESD* provided sufficient site-specific, scientific justification for exceeding the risk threshold of 1 x $10^{-6}$ to allow for a risk level of 5 x $10^{-6}$.

Furthermore, the justification for exceeding the 1 x $10^{-6}$ cancer risk relied entirely on institutional controls. Except for areas with COCs in soil above Action Levels, which would remain subject to residential land use restrictions, the *ESD* claims that newly designated residential areas, "no longer need a restriction against residential use" provided that durable covers and ICs are in place.[85]

The problems with institutional controls – that it is unreasonable to assume that durable covers and deed restrictions requiring gardening in raised boxes will protect future residents in perpetuity without a meaningful inspection and maintenance program – are more fully explained in Section IV(D)(4) of the Notice and are incorporated herein by reference.

In addition to violating CERCLA, the NCP and the FFA by exceeding CERCLA cancer risk and improperly using durable covers and ICs to justify it, the Navy also violated CERCLA, its regulations and the FFA by changing Parcel G's end use to residential by means of an *ESD* based on the *Parcel G Feasibility Study* rather than by amending the ROD, as a transformation as significant as converting land use restrictions to allow for residential uses required.

Finally, the saga of Tetra Tech's fraud and its impact on the cleanup has been playing out in the radiological retesting of Parcel G and is discussed in more detail in Section III of the Notice.

[84] *Id., Executive Summary*, p. 13.
[85] *Parcel G Feasibility Study,* at p. 2.