GOLDEN GATE UNIVERSITY | School of Law

Environmental Law and Justice Clinic

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Via e-mail and U.S. mail

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Re: Comments from Greenaction for Health and Environmental Justice Regarding Navy's Draft Addendum to the Five-Year Review (Evaluation of Radiological Remedial Goals for Buildings, Hunters Point Naval Shipyard)

Dear Mr. Robinson:

On October 10, 2019, the Department of the Navy issued a Draft Addendum to the Five-Year Review ("Draft Addendum for Buildings"), enclosing an Evaluation of Radiological Remedial Goals for Buildings at the Hunters Point Naval Shipyard ("HPNS"), and provided a 30-day period for both the public and regulatory agencies to review and comment on the document. This letter, submitted on behalf of Greenaction for Health and Environmental Justice ("Greenaction"), contains comments regarding the Navy's Draft Addendum for Buildings. In its Fourth Five-Year Review, the Navy stated that it would issue a Draft Addendum to evaluate the long-term protectiveness of the Remediation Goals for buildings, and would prepare responses to regulatory agency comments and a responsiveness summary to comments from the public. NAVFAC's Final Fourth Five-Year Review at 7-3 (July 2019) (hereafter "Fourth FYR"). We request the Navy to provide a written response to these comments when it finalizes the Draft Addendum for Buildings.

I. BACKGROUND

A. Five-Year Review

Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") requires the Navy, as the lead agency for HPNS, to prepare a review of the remedial action at HPNS "no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented." 42 U.S.C. § 9621(c). Pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), the lead agency must conduct a five-year review "[i]f a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at

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the site above levels that allow for unlimited use and unrestricted exposure." 40 C.F.R. § 300.430(f)(4)(ii).

The five-year review process is critical to ensure the protectiveness of the remedies selected in a record of decision ("ROD").[1] "The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is or will be protective of human health and the environment." Comprehensive Five-Year Review Guidance at 1-1, OSWER No. 9355.7-038-P, EPA 540-R-01-007 (June 2001) (hereafter "Comprehensive FYR Guidance"). For federal facilities such as HPNS subject to 42 U.S.C. § 9620, five-year reviews are conducted by the Federal agency or department that has jurisdiction over the site, "but EPA retains final authority over whether the five-year reviews adequately address the protectiveness of remedies." Comprehensive FYR Guidance at 2-5.

B. Acceptable Exposure Levels for Remedial Actions

As the D.C. Circuit explained: "[w]hen EPA develops objectives for a remedial action at a site, it selects a remediation goal that 'establish[es] acceptable exposure levels that are protective of human health." State of Ohio v. U.S. E.P.A., 997 F.2d 1520, 1533 (D.C. Cir. 1993) (citing NCP at 40 C.F.R. § 300.430(e)(2)(i)). For known or suspected carcinogens, the NCP provides that "acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response." 40 C.F.R. § 300.430(e)(2)(i)(A)(2).[2]

Furthermore, "[t]he *10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives* when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure." Id. (emphasis added).[3] By using 10^{-6} as the "point of departure" in the selection of remedial goals, "EPA intends that there be a preference for setting remediation goals at the more protective end of the range, other things being equal." 55 Fed. Reg. at 8,718. EPA explained the resulting process for selecting cleanup levels as follows:

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[1] EPA will not reopen remedy selection decisions contained in a ROD unless a "new or modified requirement calls into question the protectiveness of the selected remedy." 55 Fed. Reg. 8,666, 8,757 (March 8, 1990). In the preamble to the final NCP, EPA explained its rationale for this policy: "freezing ARARs at the time of the ROD signing will not sacrifice protection of human health and the environment, because the remedy will be reviewed for protectiveness every five years, considering new or modified requirements at that point, or more frequently, if there is reason to believe that the remedy is no longer protective of health and environment." Id. at 8,758.

[2] "A 10^{-4} risk subjects the surrounding population to an increased cancer risk of 1 in 10,000. A 10^{-6} risk subjects the surrounding population to an increased cancer risk of 1 in 1,000,000." State of Ohio, 997 F.2d at 1533.

[3] The term "ARAR" refers to an "Applicable or Relevant and Appropriate Requirement" selected for a remedial action under 42 U.S.C. § 9621(d).

> *The use of 10^{-6} expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range*, but this does not reflect a presumption that the final remedial action should attain such a risk level. Factors related to exposure, uncertainty and technical limitations may justify modification of initial cleanup levels that are based on the 10^{-6} risk level. The ultimate decision on what level of protection will be appropriate depends on the selected remedy, which is based on the criteria described in [40 C.F.R.] § 300.430(e)(9)(iii).

55 Fed. Reg. at 8,718 (emphasis added).

C. Application of CERCLA's Requirements and EPA's Guidelines to Federal Facilities

Pursuant to 42 U.S.C. § 9620(a)(1), each department or agency of the United States is subject to CERCLA in the same manner and to the same extent as any nongovernmental entity. Accordingly, EPA's guidelines are applicable to federal facilities such as HPNS. Id. § 9620(a)(2). Moreover, the Navy may not adopt any guidelines that are inconsistent with EPA's guidelines. Id. Consistent with this statutory mandate, the Navy and EPA agreed in the 1992 Federal Facility Agreement ("FFA") for HPNS "to perform the tasks, obligations and responsibilities described in this Section [Work to Be Performed] in accordance with CERCLA and CERCLA guidance and policy." FFA at 8, § 6.1.

D. The Navy's Fourth Five-Year Review and Draft Addendum for Buildings

A five-year review is required in this case because ongoing and completed remedial actions have left contaminants in place at HPNS above concentrations that would allow for unlimited use and unrestricted exposure. Fourth FYR at 1-2. In January 2018, the Navy determined that a significant portion of the radiological survey and remediation work completed to date at HPNS was not reliable because one of the Navy's radiological remediation contractors manipulated and/or falsified data. Fourth FYR at 6-7, 7-3. In its comments on the 2018 Draft Fourth FYR, EPA emphasized the need for the Navy, as part of the protectiveness determinations required in the fourth five-year review, to conduct an updated review of the remedial goals in the ROD for each parcel to determine whether the remedy, upon completion, will be protective of human health. Letter from Lily Lee (EPA's RPM) to Derek Robinson (Navy's BRAC Environmental Coordinator) at 2, ¶4 (May 25, 2019). Due to its contractor's fraud, the Navy is currently implementing corrective actions, including retesting of parcels, to ensure that the radiological remedies specified in the RODs are implemented as intended. Fourth FYR at 6-7. In addition, the Navy stated its plan in the Fourth FYR to evaluate the radiological Remediation Goals identified in the RODs, using current guidance, to ensure the long-term protectiveness of its radiological remedies. Id. at 6-12. Finally, as part of this evaluation, the Navy intended to "identify any relevant changes in toxicity or other contaminant characteristics that may result in post ROD changes." Id.

Because a significant portion of the radiological survey and remediation work completed to date is unreliable, the Navy did not complete a long-term protectiveness evaluation of the

radiological Remediation Goals in the Fourth FYR. Id. at 7-3. Instead, the Navy proposed to issue a Draft Addendum for soil and this Draft Addendum for Buildings to evaluate the long-term protectiveness of the Remediation Goals for soil and buildings. Id.[4] In contrast to its proposed Draft Addendum for soil, however, the Navy did not mention in the Fourth FYR what calculator it intended to use for its evaluation of the Remediation Goals for buildings. Id.

The Draft Addendum for Buildings encloses a Battelle report dated October 7, 2019, which is entitled "Draft Hunters Point Naval Shipyard - Estimated Excess Cancer Risks and Dose Equivalent Rates from Exposures to Radiological Contamination on Building Surfaces Report" (hereafter "Battelle Report"). As the Battelle Report explains, the Navy decided to use "the model RESRAD-BUILD to estimate radiation doses and risks from exposure to surface radiological contamination." Battelle Report at 2, § 1 (Introduction).[5]

Table 1 of the Battelle Report lists current building surface Remediation Goals for 11 Radionuclides of Concern. Id. The Battelle Report claims that the Remediation Goals "presented in Table 1 were intended to be the *most conservative available* . . . and are applied to site- and radionuclide-specific background." Id. (emphasis added). Notably, the Remediation Goals are based on building surface remediation goals from the Navy's 2006 HPNS Action Memorandum. Id., Table 1. According to the Battelle Report, the Remediation Goals for 9 radionuclides "are based on the surface activity limits in Regulatory Guide 1.86 (AEC 1974) and a removable fraction of 0.2 (20 percent)." Id. at 6, § 3.6 (Source Parameters).[6] The Remediation Goals for Thorium-232 and Uranium "are based on the source activity that resulted in 25 mrem/yr [millirem per year] using RESRAD-BUILD Version 3.3 and a removable fraction of 0.5 (50 percent)." Id. For purposes of this Report, Battelle then *decreased* the removable fraction for all radionuclides from the default of 0.5 to 0.2 "to be consistent with the Navy source model assumptions and with radiological survey methodology." Id. Nevertheless, Battelle asserts that the value of 0.2 is "a conservative removable fraction." Id.

Battelle also discusses the application of a dissipation rate to its model to estimate radiation doses risks from exposure to surface radiological contamination. In the Report, Battelle explains that the removable fraction is eroded over time due to receptor contact and routine cleaning, stating: "Since there is no renewal of the source (shipyard operations have

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[4] A lead agency should complete a five-year review addendum for a remedy when the protectiveness determination was deferred in a prior five-year review in order to collect additional information. See Five-Year Reviews, Frequently Asked Questions (FAQs) and Answers at 2, OSWER 9355.7-21 (hereafter "Five-Year Reviews FAQs").

[5] Because the Battelle Report is not numbered, our comments in this letter contain references to the unnumbered page and the section number of the Report.

[6] The Report explains that "removable fraction" is that "fraction of the source activity that can be removed from the surface from normal cleaning and wear." Battelle Report at 6, § 3.6 (Source Parameters).

ceased using radiological materials), the erosion linearly reduces the source activity over the source lifetime." Id.[7]

The Battelle Report states that the RESRAD-BUILD risks for individual radionuclides or radionuclide decay chains are protective for residential exposure to HPNS building surfaces that are uniformly contaminated at the remedial goal levels. Id. at 9, § 3.7 and Table 3. Battelle concludes that "the current estimated risks remain within the 10^{-4} to 10^{-6} range . . . indicating that the remedial goals in the 2006 Action Memorandum are protective for future indoor workers and residents." Id. at 9, § 4 (Summary).

II. DISCUSSION OF COMMENTS

A. Summary of Greenaction's Comments

Our comments cover two primary aspects of the Navy's Draft Addendum for Buildings and the Fourth FYR, each concerning the protectiveness of the remedy at HPNS: (1) inconsistencies with the NCP arising from the Navy's failure to comply with EPA's guidance; and (2) the Navy's own calculations, which show excess cancer risks that exceed the upper bound lifetime cancer risks established under the NCP.

The Navy's Draft Addendum for Buildings does not comply with CERCLA's requirements and EPA's guidance. As explained in Section A.1. below, instead of using EPA's current Building Preliminary Remediation Goals for Radionuclides ("BPRG") calculator to evaluate the Navy's Remediation Goals in accordance with EPA's guidance, the Navy relied on the RESRAD-BUILD calculator. Furthermore, the Navy failed to include any justification in the administrative record to support the use of RESRAD-BUILD, and ignored EPA's admonition to include model runs using both the recommended BPRG model and the alternative model. Because there is no justification for deviating from EPA's guidance, the Navy's Draft Addendum for Buildings is inconsistent with CERCLA's mandate. See 42 U.S.C. § 9620(a)(2).

Furthermore, the Navy's approach in the Draft Addendum for Buildings does not follow through on the Navy's commitment in the Fourth FYR to evaluate the radiological Remediation Goals identified in the RODs, using current guidance, to ensure the long-term protectiveness of its radiological remedies. Fourth FYR at 6-12. Rather than examine whether "the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection [are] still valid" (Comprehensive FYR Guidance at 4-1), the Navy simply adopted, without any review, evaluation or discussion, the Remediation Goals for buildings from the Navy's 2006 Action Memorandum. See Section A.2. below. The Navy

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[7] The Navy proposed in the draft FYR to use a dissipation rate of 0.38 based on a study of a Binghamton state office building. In its comments on the draft FYR, EPA rejected the Navy's proposal, explaining that the BPRG calculator is set to a "zero" dissipation rate, which assumes that a contaminant reservoir is present at the site. Letter from Lily Lee to Derek Robinson at 5 (Sept. 21, 2018). EPA stated that if the Navy applied a non-zero dissipation factor to the model, it must be calculated using data from HPNS. Id. The Navy has not provided any data to support the use of a dissipation rate.

failed to consider adoption of EPA's current BPRG, which contains preliminary remediation goals for buildings that are substantially more protective than the Navy's Remediation Goals. In addition, the Navy did not use the NCP's risk range to develop cleanup levels for radionuclides of concern in its 2006 Action Memorandum. In fact, the Remediation Goals in the Navy's 2006 Action Memorandum were based on: (1) "acceptable surface contamination levels" provided in the Atomic Energy Commission's Regulatory Guide 1.86 from 1974; and (2) an exposure level of 25 mrem/yr. Battelle Report at 6, § 3.6 (Source Parameters). Significantly, EPA has determined that dose recommendations from other federal agencies should generally not be used to establish cleanup levels. See Radiation Risk Assessment at CERCLA Sites: Q & A at 28, Q36, EPA 540-R-012-13 (May 2014) (hereafter "Radiation Risk Assessment Q&A"). In addition, EPA has concluded that an effective dose equivalent greater than 12 mrem/yr is generally not considered sufficiently protective for developing cleanup levels under CERCLA at remedial sites. Id. at 28, Q35. Therefore, the Navy not only used the wrong model, but it also failed to take into account relevant toxicity data from the BPRG calculator in evaluating its Remediation Goals in the Draft Addendum for Buildings.

The Navy's own calculations – even those based on the outdated, unprotective Remediation Goals in the 2006 Action Memorandum – demonstrate that the Navy's Remediation Goals pose an unacceptable risk to human health. In the risk calculations included in the Draft Addendum for Buildings, the Navy failed to consider that radionuclide risks are not estimated based on an individual radionuclide or radionuclide decay chains, but are instead the sum of the risks from all radionuclides. If the Battelle Report had added the risks from all of the radionuclides of concern, the combined exposure would subject future residents at HPNS to an increased cancer risk of 1.45 in 1,000, which exceeds the upper bound lifetime cancer risk to an individual of 1×10^{-4} established under the NCP to protect human health. See Section A.3. below.

This risk exceedance is especially troubling because of the characteristics of the Bayview Hunters Point community surrounding HPNS. At HPNS, the most protective end of the NCP's risk range is particularly appropriate, given that the State of California has identified Bayview Hunters Point as a disadvantaged community "disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation." See https://calepa.ca.gov/wp-content/uploads/sites/6/2017/04/SB-535-Designation-Final.pdf; Cal. Office of Envtl. Health Hazard Assessment, Disadvantaged Communities map (https://oehha.ca.gov/calenviroscreen/sb535).

In this case, the Navy's Remediation Goals are not protective of human health. EPA's current residential preliminary remediation goals for buildings are substantially more stringent than the Navy's building Remediation Goals. See Section A.4. below. Because the calculated risk associated with the Navy's Remediation Goals for buildings is outside of EPA's risk range under CERCLA, the Navy should adopt EPA's more protective preliminary remediation goals for buildings, and should amend the RODs for parcels at HPNS to adopt remedies that can meet the revised, more protective Remediation Goals. See Section B below.

1. The Navy's Draft Addendum for Buildings is Inconsistent with CERCLA and EPA's Guidelines – and Thus Not Health Protective -- and Should Be Revised.

Pursuant to 42 U.S.C. § 9620(a)(2), EPA's guidelines, rules, regulations, and criteria apply to remedial actions at federal facilities such as HPNS. Moreover, the Navy cannot adopt or use any guidelines or criteria at HPNS that are inconsistent with EPA's guidelines. Id.

In order to assist in the evaluation and cleanup of radioactively contaminated sites, EPA developed a comprehensive guidance for conducting radiation risk assessments. See Radiation Risk Assessment Q&A at 2. In its guidance, EPA recommended the use of Preliminary Remediation Goal ("PRG") calculators to develop risk-based preliminary remediation goals for radionuclides to ensure consistency with CERCLA, the NCP, and EPA's Superfund guidance for remedial sites. Id. at 17, Q16. EPA's list of recommended PRG calculators includes the BPRG calculator. Id. at 2. EPA's recommended preliminary remediation goals for radionuclides in buildings "are risk-based concentrations, derived from standardized equations combining exposure information assumptions with EPA toxicity data" used for Superfund programs. U.S. EPA, BPRG Frequently Asked Questions at Q1 (https://epa-bprg.ornl.gov/faq.html). EPA designed these preliminary remediation goals to achieve protective cleanup levels for humans (including sensitive groups) over a lifetime. Id. In its guidance, EPA emphasizes that if there is a reason for using a different model, the user must develop justification for doing so on a site-specific basis: "The justification should include specific supporting data and information in the administrative record. The justification normally would include the model runs using both the recommended EPA PRG model and the alternative model." Radiation Risk Assessment Q&A at 17, Q16.

In its comments regarding the Navy's 2018 Draft FYR, EPA noted that its guidance called for evaluation of the significance of changes in toxicity values and other contaminant characteristics when conducting a five-year review. Letter from Lily Lee to Derek Robinson at 3 (Sept. 21, 2018). In particular, EPA recommended that the Navy include updated risk evaluations in the Five-Year Review for existing Remediation Goals using the current version of EPA's PRG calculators to ensure that the existing Remediation Goals remain protective. Id. at 3-4; see also Letter from Angeles Herrera (EPA's Superfund Division Assistant Director) to Lawrence Lawnsdale (Navy's Environmental Director) re Parcel G Removal Site Evaluation Work Plan at General Comments ¶9 (Aug. 14, 2018) (based on EPA's national practices, EPA expects the Navy's Five-Year Review at HPNS "to use the most current version of the EPA Preliminary Remediation Goal (PRG) Calculator and Building PRG Calculator to assess the ROD radiological RGs [Remediation Goals].")

However, in the Draft Addendum for Buildings, the Navy does not use the BPRG calculator as recommended by EPA in its Radiation Risk Assessment Q&A guidance and its September 21, 2018 and August 14, 2018 comment letters. Instead, the Navy used the RESRAD-BUILD model to estimate risk and dose from building surface radiation exposure, and to evaluate the long-term protectiveness of the building surface radiological remedial goals. Draft Addendum for Buildings at 2. Furthermore, contrary to EPA's guidance, the Navy neither provides any data in its Draft Addendum for Buildings to support the use of RESRAD-BUILD, nor does it include a model run using BPRG. Because the Navy's unsupported use of RESRAD-BUILD is inconsistent with EPA's guidance, the Navy should revise the Draft Addendum for Buildings to use both the current version of the BPRG calculator and RESRAD-BUILD.

2. The Navy's Remediation Goals for Building Surfaces Are Inconsistent with the NCP and EPA's Guidelines – and Thus Not Health Protective -- and Should Be Revised.

According to EPA's guidance, the lead agency should examine whether "the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection [are] still valid." Comprehensive FYR Guidance at 4-1. For an assumption based on a cleanup level, the lead agency should ask the following two questions: "What is the basis for each cleanup level identified in the ROD (e.g., risk-based or promulgated standards as ARARs)? Have there been changes to the basis of the cleanup levels?" Id. at 4-5. As EPA explained, "the toxicity data evaluation done in the risk assessment should be reviewed to ensure that any assumptions made at the time of the original risk assessment continue to be protective." Five-Year Reviews FAQs at 9.

The Navy failed to examine its Remediation Goals for buildings. Instead, the Navy adopted, without any discussion, the Remediation Goals for building surfaces from its 2006 Action Memorandum. As explained below, the Navy's approach is flatly inconsistent with EPA's guidance and EPA's comment letters. Contrary to EPA's guidance, the Navy's Remediation Goals were derived from dose-based exposure levels that are not sufficiently protective for developing cleanup levels under CERCLA at remedial sites.

First, EPA guidance provides that dose recommendations from other federal agencies should generally not be used to assess risk of establish cleanup levels. Radiation Risk Assessment Q&A at 28, Q36. As EPA emphasizes, the cleanup levels for carcinogens for CERCLA remedy selection purposes should be consistent with the NCP and CERCLA guidance: "EPA has made the policy decision to use the NCP's risk range in developing cleanup levels for radionuclides at CERCLA remedial sites rather than using dose-based guidance." Id. at 29, Q36.

Second, in comment letters to the Navy, EPA expressly noted that some of the release criteria in the RODs were originally based on limits in the AEC's Regulatory Guide 1.86, which has been withdrawn. Letter from John Chestnutt (EPA's Federal Facilities Section Manager) to George Brooks (Navy) at 6, ¶11; 18, ¶31 (March 26, 2018). Accordingly, EPA requested the Navy to update all references to Regulatory Guide 1.86 and recommended that the Navy review the protectiveness of these criteria using the current version of EPA's risk model, the BPRG calculator. Id. Because it conflicts directly with EPA's guidance, the Navy cannot rely on "acceptable surface contamination levels" from the AEC's 1974 Regulatory Guide, i.e., a dose-based guidance from another federal agency, to establish building surface remediation goals for nine radionuclides. Draft Addendum for Buildings at 2, Table 1; Battelle Report at 6, § 3.6 (Source Parameters). The Navy should revise the Draft Addendum for Buildings to apply the current version of EPA's BPRG calculator to select protective Remediation Goals for these nine radionuclides of concern.

Furthermore, EPA stresses in its guidance that the recommendation for a protectiveness criteria evaluation for an ARAR should be changed from 15 mrem/yr to 12 mrem/yr to reflect the current federal government position on the risk posed by radiation. Radiation Risk Assessment Q&A at 28, Q35. EPA specifically states that ARARs "greater than 12 mrem/yr effective dose

equivalent (EDE) are generally not considered sufficiently protective for developing cleanup levels under CERCLA at remedial sites." Id. However, the Navy's Remediation Goals for Thorium-232 and Uranium-235 are based on source activity that resulted in ***25 mrem/yr*** using RESRAD-BUILD. Battelle Report at 6, § 3.6 (Source Parameters). An exposure of 25 mrem/yr is more than twice as high as the 12 mrem/yr effective dose equivalent that EPA regards as sufficiently protective for developing cleanup levels under CERCLA at remedial sites. Radiation Risk Assessment Q&A at 28, Q35. Consequently, the Navy should revise the Draft Addendum for Buildings to select protective Remediation Goals for Thorium-232 and Uranium-235 based on EPA's BPRG.

3. The Navy's Remediation Goals for Buildings Are Not Protective of Human Health.

According to the Battelle Report, the total risks, using RESRAD-BUILD, were calculated as follows:

TABLE 1 - NAVY's ESTIMATED EXCESS CANCER RISKS

Radionuclide	**Total Risk - Resident RESRAD-BUILD**[8]
Americium-241	1.3E-06
Cesium-137	2.4E-05
Cobalt-60	4.1E-05
Europium-152	3.6E-05
Europium-154	3.1E-05
Plutonium-239	1.6E-06
Radium-226	3.0E-06
Strontium-90	2.5E-07
Thorium-232	3.4E-06
Tritium (H-3)	1.2E-09
Uranium-235	3.3E-06
All Radionuclides	1.45E-04

The Battelle Report concludes that the resultant risks under RESRAD-BUILD "for *individual radionuclides or radionuclide decay chains* are protective for . . . residential exposures to building surfaces that are uniformly contaminated at the remedial goal levels." Battelle Report at 9 (emphasis added). However, radionuclide risks are not estimated based on an individual radionuclide or radionuclide decay chain. As EPA has explained: "The total incremental lifetime cancer risk attributed to radiation exposure is estimated as *the sum of the risks from all radionuclides* in all exposure pathways." See Radiation Risk Assessment Q & A at 25, Q28 (emphasis added). In fact, "excess cancer risks from both radionuclides and chemical carcinogens should be summed to provide an estimate of the combined risk presented by all carcinogenic contaminants." Id. at 25, Q29.

[8] Battelle Report at 9, Table 3.

As EPA stated in its comments regarding the Navy's Draft Fourth FYR, "EPA's guidance for radiological cleanup states that generally 1×10^{-4} excess cancer risk is an upper bound for risk management decisions." Letter from Lily Lee to Derek Robinson at 4, ¶11 (May 25, 2019). In addition, EPA advised the Navy not to set a Remedial Goal too close to the upper bound of 1×10^{-4}. Letter from Lily Lee to Derek Robinson at 4 (Sept. 21, 2018). As EPA pointed out, this would increase the potential for the combined risk of multiple contaminants to exceed the NCP risk range. Id. In addition, EPA noted that its "estimates of risk at a given radionuclide concentration have increased over time. It would be prudent to allow room to accommodate these likely future increases." Id.

The Navy did not revise its Remediation Goals in response to EPA's comment letters. Instead, the Navy used the same values that it had adopted in 2006. Using these outdated Remediation Goals as inputs for RESRAD-BUILD, according to the Navy's own calculations, the sum of excess cancer risk from all radionuclides of concern is 1.45×10^{-4}. See Table 1 above ("All Radionuclides"); Battelle Report at 9, Table 3. These excess cancer risks exceed the upper bound lifetime cancer risk to an individual of 1×10^{-4} established under the NCP to protect human health. 40 C.F.R. § 300.430(e)(2)(i)(A)(2).

Notably, the Navy, in the Battelle Report, deliberately chose to reduce the "removable fraction" of the source activity for hard surfaces from 0.5 to 0.2 when running the RESRAD-BUILD calculator. Battelle Report at 6, § 3.6 (Source Parameters). In proposing this approach, Battelle argues that the removable fraction of 20 percent is "consistent with the Navy source model assumptions and with radiological survey methodology." Id. In its comments on the Navy's draft FYR, however, EPA expressly rejected this approach. Letter from Lily Lee to Derek Robinson at 5 (Sept. 21, 2018). EPA explained that the "removable fraction" is the fraction transferred from a building surface to a person's skin, and noted that BPRG's default input for hard surfaces is 0.5. Id. Based on EPA's extensive research, EPA stated that it was not willing to deviate from the default input of 0.5 for hard surfaces. Id.; see also BPRG User's Guide at 5 (Recommended Default Exposure Parameters) (https://epa-bprg.ornl.gov/users_guide.html). In spite of EPA's express opposition, however, the Navy chose to reduce the removable fraction to 0.2.

By reducing the removable fraction input in the RESRAD-BUILD model, the Navy deliberately understated the total cancer risk. Furthermore, by failing to provide any supportable basis in the administrative record for this change, the Navy again deviated from EPA's guidance, which provides: "Any alternative values or assumptions used in remedy evaluation or selection on a CERCLA site should be presented with supporting rationale in Administrative Records." See BPRG User's Guide at 5 (Recommended Default Exposure Parameters). Nevertheless, even with this unwarranted manipulation of a data input, the Navy's own calculations show that excess cancer risks from all radionuclides exceed the NCP's upper bound lifetime cancer risk.

4. EPA's Current Residential Preliminary Remediation Goals for Buildings Are Substantially More Stringent than the Navy's Remediation Goals for Buildings.

The Navy first adopted Remediation Goals for building surfaces in a 2006 Action Memorandum for this site. The Navy has not updated these Remediation Goals since 2006, but has repeatedly adopted the same values in each ROD for the HPNS parcels.

According to the BPRG calculator's Frequently Asked Questions, "the recommended BPRG database is typically updated when new toxicity values are presented by the EPA. This is generally done monthly; however, there may be times when more than one month passes without the release of updated toxicity values." U.S. EPA, BPRG Frequently Asked Questions at Q7 (https://epa-bprg.ornl.gov/faq.html#FAQ7).

In 2006, the Navy did not use toxicity values from the BPRG current at that time to establish its Remedial Goals for building surfaces. Instead, the Navy relied on the AEC's 1974 Regulatory Guide 1.86 and an outdated version of RESRAD-BUILD. Battelle Report at 6, § 3.6 (Source Parameters). The Navy has not explained why it originally chose in 2006 to rely on outdated and unprotective standards in selecting the Remediation Goals for building surfaces, rather than adopting EPA's then current preliminary remediation goals from the BPRG. Nor has it explained why it has retained the same outdated and unprotective Remediation Goals in each ROD at HPNS.

As shown below, EPA's preliminary remediation goals for buildings are derived from two data sets: (1) external exposure from contamination inside buildings (Table 2 below); and (2) exposure to removable contamination in buildings (Table 3 below). Strikingly, EPA's current residential preliminary remediation goals for radionuclide contaminants in buildings applicable in 2019, calculated at a 10^{-6} risk level, are up to three orders of magnitude more stringent (i.e., thousands of times more protective) than the Navy's Remediation Goals. For example, EPA's preliminary remediation goal for external exposure from contamination inside buildings for Cesium-137 is 446 times more protective than the Navy's Remediation Goal. See Table 2 below; D. Hirsch, et al., Hunter's Point Shipyard Cleanup Used Outdated and Grossly Non-Protective Cleanup Standards at 14 (http://committeetobridgethegap.org/publications/) (hereafter "Hirsch, Non-Protective Cleanup Standards").[9] Similarly, EPA's preliminary remediation goal for exposure to removable contamination inside buildings for Radium-226 is 3,288 times more protective than the Navy's Remediation Goal. See Table 3 below; Hirsch, Non-Protective Cleanup Standards at 19.

[9] Mr. Hirsch's calculations used the default input values for the BPRG calculator; the units for EPA's preliminary remediation goals were then converted from pci/cm^2 to dpm/100 cm^2 to compare them with the Navy's Remediation Goals. See "Hirsch, Non-Protective Cleanup Standards (Conversion Tables at back of document).

TABLE 2 - COMPARISON OF REMEDIATION GOALS (External Exposure from Contamination Inside Buildings)

Radionuclide	**Navy's Remediation Goals for Buildings (dpm/100 cm^2)**[10]	**EPA's 2019 Preliminary Remediation Goals for Buildings (dpm/100 cm^2)**[11]
Americium-241	100	5.88
Cesium-137	5,000	11.21
Cobalt-60	5,000.	1.27
Europium-152	5,000	1.74
Europium-154	5,000	2.14
Plutonium-239	100	7.17
Radium-226	100	2.69
Strontium-90	1,000	
Thorium-232	36.5	1.33
Uranium-235	488	7.17

TABLE 3 - COMPARISON OF REMEDIATION GOALS (Exposure to Removable Contamination Inside Buildings)

Radionuclide	**Navy's Remediation Goals for Buildings (dpm/100 cm^2)**[12]	**EPA's 2019 Preliminary Remediation Goals for Buildings (dpm/100 cm^2)**[13]
Americium-241	20	0.02
Cesium-137	1,000	0.78
Cobalt-60	1,000.	0.74
Europium-152	1,000	0.54
Europium-154	1,000	1.17
Plutonium-239	20	0.02
Radium-226	20	0.01
Strontium-90	200	0.26
Thorium-232	7.3	0.01
Uranium-235	97.6	0.02

[10] Battelle Report at 2, Table 1.
[11] Hirsch, Non-Protective Cleanup Standards at 14.
[12] Battelle Report at 2, Table 1, and 6, §3.6 Source Parameters) (assuming a removable fraction of 0.2).
[13] Hirsch, Non-Protective Cleanup Standards at 19.

B. In the Five-Year Review, the Navy Should Propose the Adoption of EPA's More Protective Preliminary Remediation Goals for Buildings and a Follow-up Action to Amend the RODs to Meet the More Protective Remediation Goals.

The Battelle Report states that the Remediation Goals for building surfaces "were intended to be the most conservative available." Battelle Report at 2. On the contrary, these Remediation Goals are far from the "most conservative available." In fact, the Navy's Draft Addendum for Buildings shows that the Navy's Remediation Goals are not protective of human health because the combined risks from the radionuclides of concern exceed the upper bound lifetime cancer risk to an individual of 1×10^{-4} established under the NCP. Id. at 9, Table 3; see Table 1 above. Significantly, the Navy's calculations exceeded the upper bound lifetime cancer risk even though the Navy understated the cancer risk by reducing the "removable fraction" of the source activity for hard surfaces from 0.5 to 0.2 when running the RESRAD-BUILD calculator. Furthermore, if the Navy had properly followed EPA's guidance as required by 42 U.S.C. § 9620(a)(2), the Navy would have used EPA's current preliminary remediation goals for buildings and the BPRG calculator in the Navy's Draft Addendum for Buildings, as EPA repeatedly urged in its comment letters to the Navy. If the Navy had complied with EPA's guidance, the Navy's use of EPA's current preliminary remediation goals for buildings and the BPRG calculator would have shown that the total risk from the radionuclides of concern for external exposure to radiation inside buildings to be 9.75×10^{-3}, and the total risk from the radionuclides of concern for exposure to removable contamination inside buildings to be 1.59×10^{-2}. Hirsch, Non-Protective Cleanup Standards at 15, Table (Total Risk); 20, Table (Total Risk). These total risks far exceed the NCP's acceptable risk range.

When the proposed remedy is no longer protective, EPA guidance provides the following path forward for the Navy:

> For example, based on revised risk information for a specific chemical, a new standard (e.g., more stringent MCL for a chemical) may result in a situation where the cleanup level to be achieved by the original remedy would pose a 10^{-3} cancer risk. In that circumstance, the five-year review could recommend that a new cleanup level based on the new standard be adopted and, if necessary, that the remedy be modified.

Comprehensive FYR Guidance at 4-6, 4-7. EPA's guidance also sets out a flowchart to evaluate changes in standards. Id. at G-4, Exhibit G-1. If the new currently calculated risk associated with an old standard is not within EPA's risk range, the "old standard is considered not protective" and the "newly revised (protective) standard should be adopted." Id. Moreover, the lead agency should determine whether the remedy in the ROD can meet the new standards and recommend follow-up actions. Id.; see also State of Ohio, 997 F.2d at 1535 (EPA asserting that a five-year review may result in a new remedial action "when the review reveals that the remedy is *no longer* protective") (emphasis in original).

Adoption of EPA's current preliminary remediation goals for buildings is particularly appropriate at HPNS for several reasons. First, the Navy has determined that a significant

portion of the radiological survey and remediation work completed to date was not reliable because of its contractor's manipulation and/or falsification of data. Fourth FYR at 7-3. As a result, extensive survey and remediation work will need to be redone at HPNS. Id. This Fourth Five-Year Review requires the Navy and EPA to conduct a long-term protectiveness evaluation of the RODs' radiological Remediation Goals. Id.; see 42 U.S.C. § 9621(c); 40 C.F.R. § 300.430(f)(4)(ii). The Navy now has the opportunity to push the "reset button" on the remediation of HPNS in order to regain the public's trust in this process. Second, as earlier noted, if the Navy had followed EPA's guidance and used EPA's current preliminary remediation goals for buildings and the BPRG calculator, the total risk from the radionuclides of concern would pose an excess cancer risk that greatly exceeds the NCP's uppermost risk range. For all of the reasons discussed in these comments, the Navy's Fourth FYR should propose: (1) the adoption of EPA's more protective residential preliminary remediation goals for buildings (see Tables 2 and 3 above); and (2) after consideration of the nine evaluation criteria established by 40 C.F.R. § 300.430(e)(9)(iii), the amendment of RODs for HPNS parcels to select remedies that can meet the more protective Remediation Goals.

III. CONCLUSION

In the Draft Addendum for Buildings, the Navy fails to follow EPA's guidance, and instead used an unapproved model, RESRAD-BUILD, with inputs based on unprotective Remediation Goals derived from withdrawn guidance from other federal agencies. Despite manipulating inputs to understate the cancer risks, the Navy's own calculations demonstrate that the Navy's Remediation Goals are not protective of human health. Because the calculated risk associated with the Navy's Remediation Goals for building surfaces is outside of EPA's risk range under CERCLA, the Navy must adopt EPA's more protective residential preliminary remediation goals for buildings, and must amend its RODs for parcels at HPNS to adopt remedies that can meet the more protective Remediation Goals.

Thank you for your consideration of these comments. If you have any questions, you can reach me at (415) 442-6675 or by email at rmullaney@ggu.edu.

Sincerely,

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