Contamination Issues at Hunters Point Shipyard

Presented by

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President, Committee to Bridge the Gap
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October 18, 2018

What We Will Be Addressing

Tetra Tech Scandal

Untold Radiological History at HPS

Failure of Regulatory Agencies

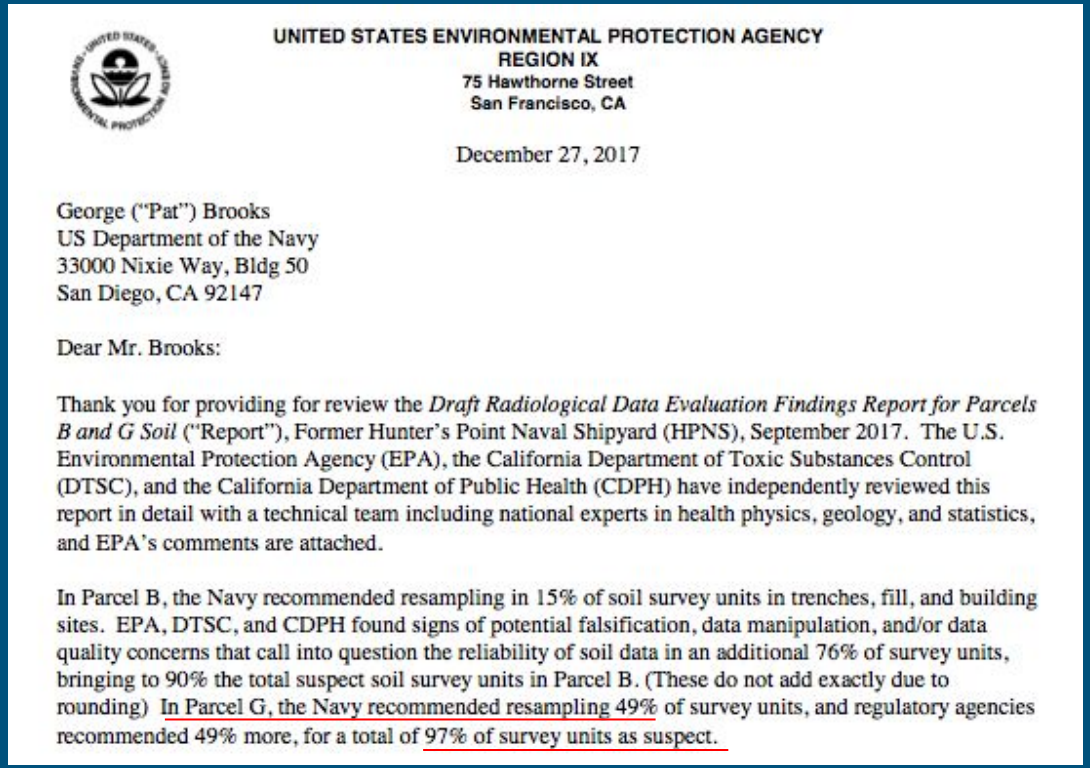
Inadequacies of Parcel A Survey

Systemic Flaws of HPS Cleanup:

- Most of Site Not Tested
- Most Radionuclides Not Tested
- Most Tests Couldn’t Detect Radionuclides at Cleanup Levels
- Cleanup Standards Outdated & Non-protective

Tetra Tech Falsifications

97% of measurements were found to be suspect



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA

December 27, 2017

George ("Pat") Brooks
US Department of the Navy
33000 Nixie Way, Bldg 50
San Diego, CA 92147

Dear Mr. Brooks:

Thank you for providing for review the *Draft Radiological Data Evaluation Findings Report for Parcels B and G Soil* ("Report"), Former Hunter's Point Naval Shipyard (HPNS), September 2017. The U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the California Department of Public Health (CDPH) have independently reviewed this report in detail with a technical team including national experts in health physics, geology, and statistics, and EPA's comments are attached.

In Parcel B, the Navy recommended resampling in 15% of soil survey units in trenches, fill, and building sites. EPA, DTSC, and CDPH found signs of potential falsification, data manipulation, and/or data quality concerns that call into question the reliability of soil data in an additional 76% of survey units, bringing to 90% the total suspect soil survey units in Parcel B. (These do not add exactly due to rounding) In Parcel G, the Navy recommended resampling 49% of survey units, and regulatory agencies recommended 49% more, for a total of 97% of survey units as suspect.

EPA Found Only 3% of Samples to Be Free of Falsification

Summary of EPA, DTSC, CDPH review of Parcel G Radiological Data Evaluation

	Trench	Fill	Building Sites	Total	% of total
Total Survey Units in Parcel G	63	107	32	202	100%
Navy recommended resampling	20	53	25	98	49%
EPA, CDPH, DTSC recommend resampling	39	54	5	98	49%
Total recommended resampling	59	107	30	196	97%
No signs of falsification found in data	4	0	2	6	3%
% of total recommended resampling	94%	100%	94%	97%	

EPA, CDPH, and DTSC review of Parcel B Rad Data Evaluation

	Trench	Fill	Building Sites	Total	% of total
Total Survey Units in Parcel B	70	110	17	197	100%
Navy recommended resampling	2	18	9	29	15%
Navy recommended reanalyzing archived samples	2	1	0	3	2%
EPA, CDPH, DTSC recommend resampling	55	87	7	149	76%
Total recommended resampling	57	105	16	178	90%
No signs of falsification found in data	13	5	1	19	10%
Regulators not yet reviewed	0	0	0	0	0%
% of total recommended resampling	81%	95%	94%	90%	

	Total	% of total	D-2	UC-1	UC-2	UC-3
Total Survey Units in Parcels UC-1,2,3 & D-2	80	100%	5	26	20	29
Navy recommended resampling	55	69%	4	14	13	24
Navy recommended reanalyzing archived samples	0	0%	0	0	0	0
DTSC recommended resampling	23	29%	1	12	6	4
Total recommended resampling	78	98%	5	26	19	28
No signs of falsification found in data	2	3%	0	0	1	1
% of total recommended resampling	98%		100%	100%	95%	97%

Tetra Tech Scandal Indicative of Broken Agency Oversight

Regulatory Agencies

- Department of Toxic Substances Control **(DTSC)**
- Environmental Protection Agency **(EPA)**
- California Department of Public Health **(CDPH)**
- San Francisco Department of Public Health (**SFDPH**)
- San Francisco Bay Regional Quality **Water Board**

These regulatory agencies do not have clean hands: they supervised and signed off on the flawed work for years.

Tetra Tech Scandal is just the Tip of the Iceberg

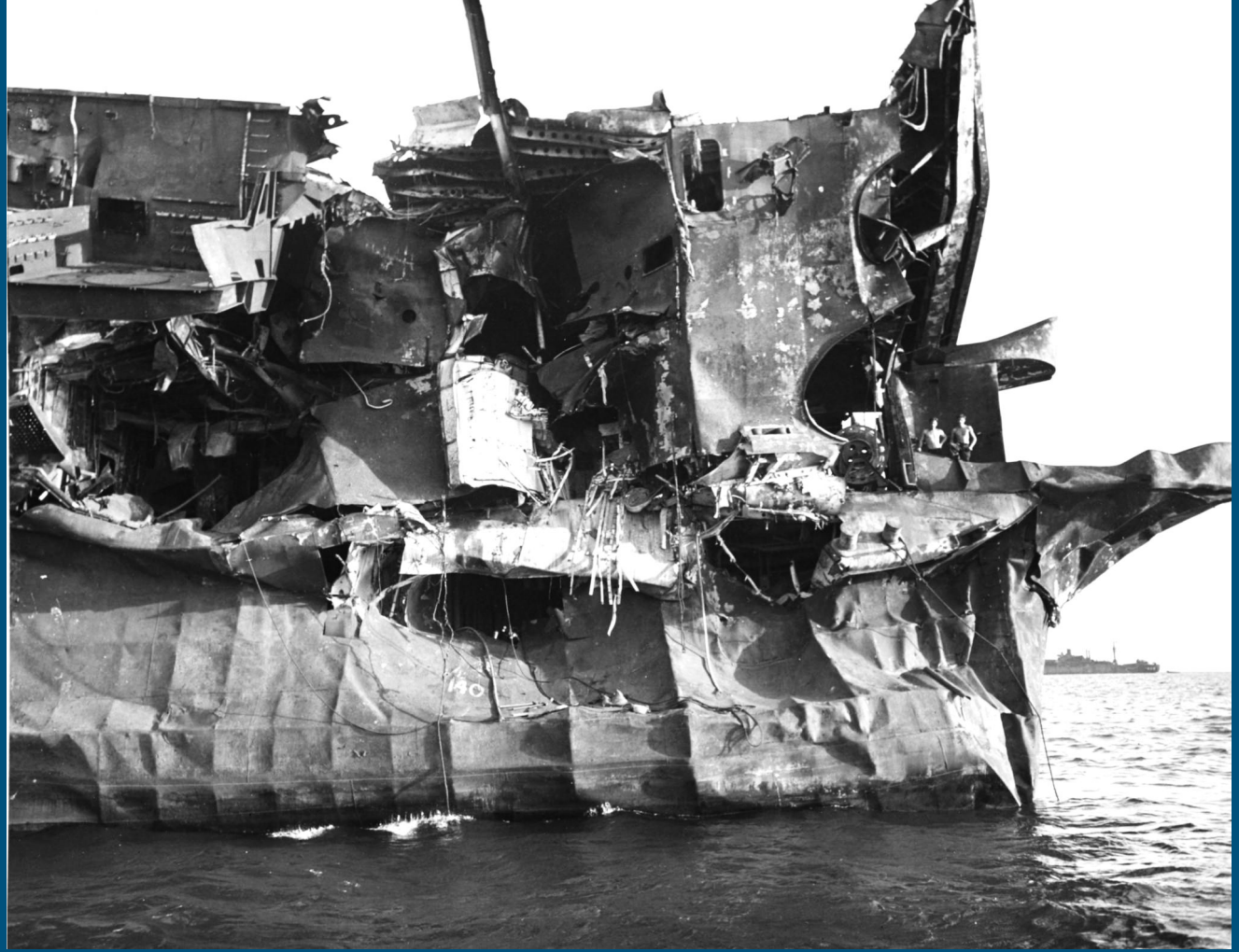
The Navy has ignored
the likelihood of widespread contamination
throughout HPS

Why HPS is *so* Contaminated: Radiological History

Ships anchored offshore of the Bikini Atoll Islands, with the Shot Baker blast in the background, US Army Signal Corps, July 25, 1946

Aerial view of Shot Baker, OPERATION CROSSROADS, July 25, 1946, ships in foreground; US Army Photographic Signal Corps

The tests went awry, badly contaminated hundreds of ships



Radioactively contaminated USS Independence after A-bomb blast damage. Note two sailors at far right. (NARA)

USS Independence wreckage after the Able Shot blast, still smoking (NARA)

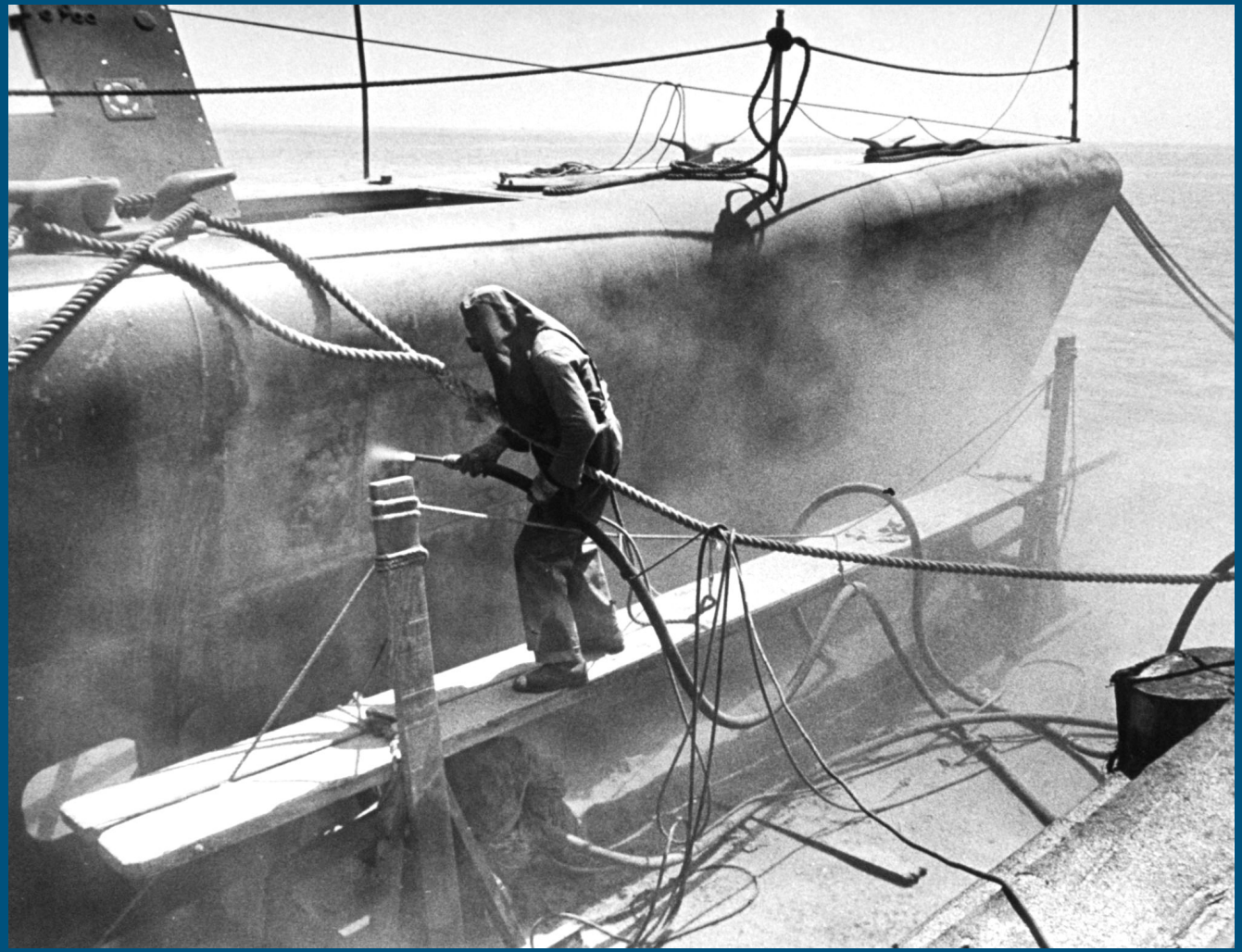
Group of sailors wash down the highly contaminated deck of the captured German battleship USS Prinz Eugene (IX 300). The ship was so radioactive that it was later sunk. (NARA, Still Pictures Unit, Record Group 80-G, box 2228)

Crude efforts at decontaminating the radioactive fleet at sea proved futile

Navy decided to take 79 irradiated ships to Hunters Point for decontamination

Aerial View of Hunters Point Naval Shipyard, 1940s, NARA

Drydock 4 at Hunters Point, 1950s (Todd Lappin)



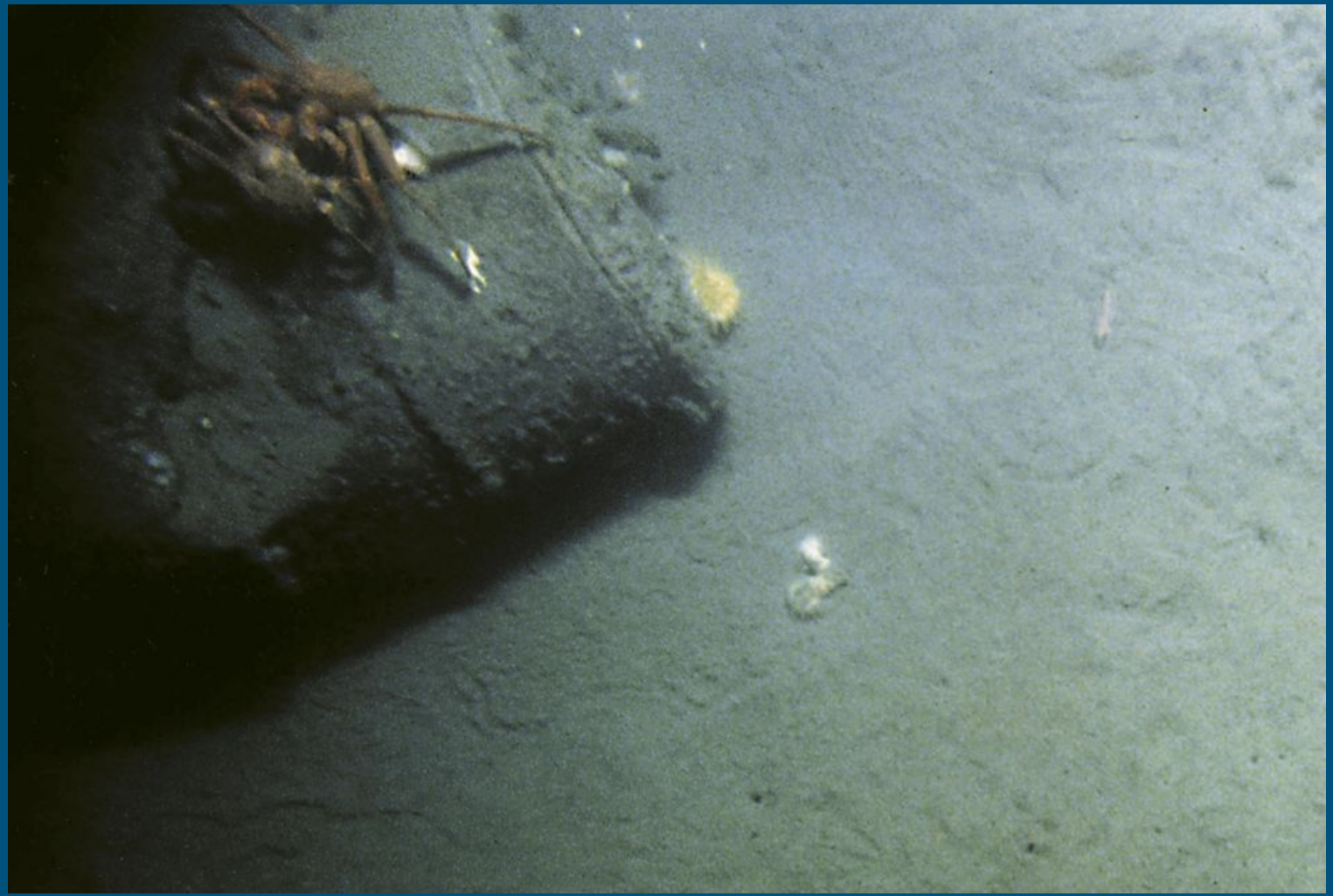
A worker sandblasts a radioactively contaminated vessel in one of the drydocks at HPS. (Fritz Goro/Life Magazine Collection/Getty Images)

Radioactive ships were sandblasted and steam-cleaned in the open air, with the potential to spread the contamination throughout Hunters Point

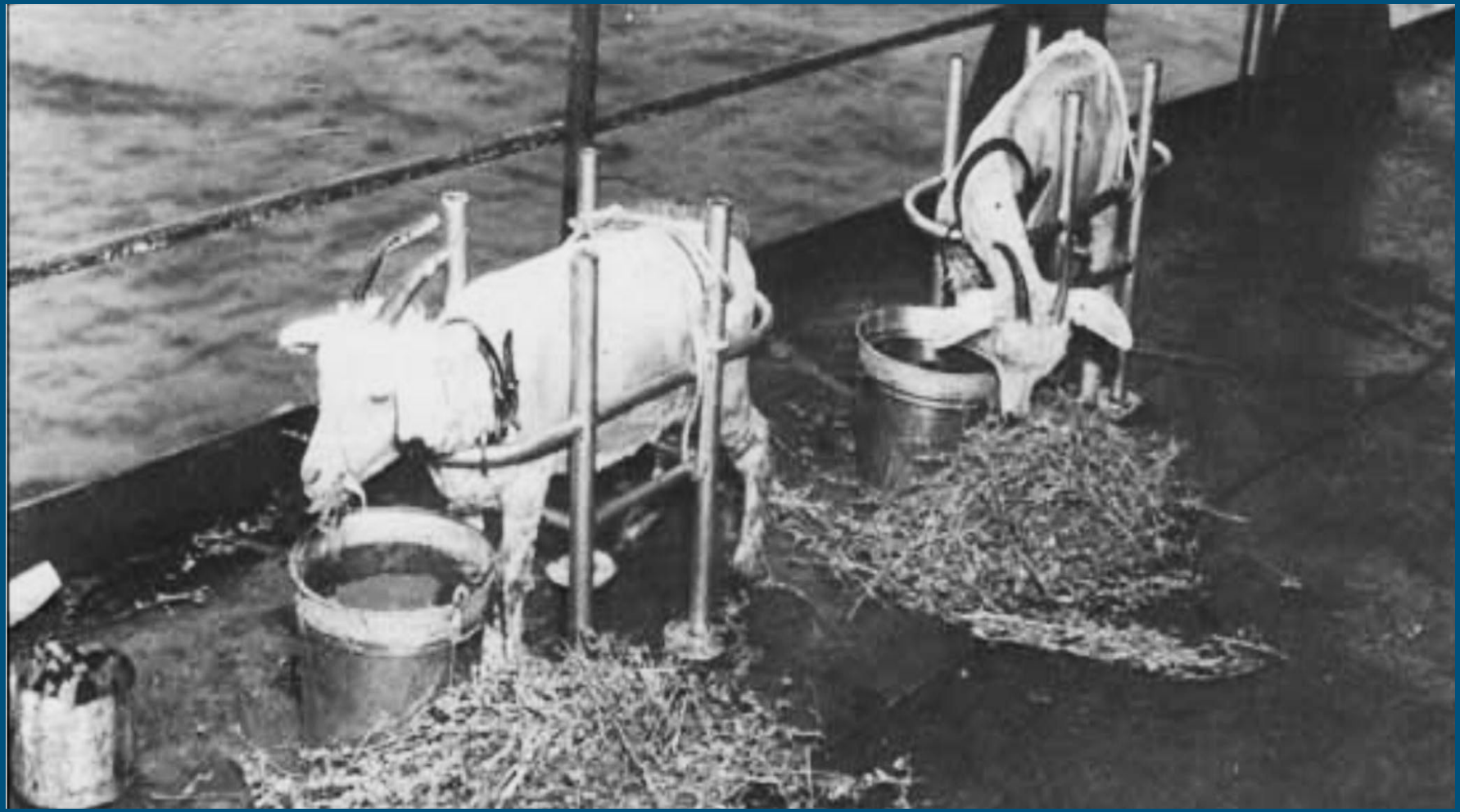
A sign in front of the Ex-USS Independence anchored at HPS, reading "Personnel for Radioactive Ships Only" (NARA)

Ex-USS Independence loaded with barrels of radioactive waste on its way to be sunk at the Farallon Islands (San Francisco Maritime National Historical Park)

Tens of thousands of barrels of radioactive waste, both from HPS and other nuclear sites in the region, were stored at HPS for eventual dumping at the Farallon Islands. This included an entire contaminated aircraft carrier loaded with radioactive waste.



A crab on a sunken barrel containing radioactive waste, Farallon Islands (USGS)



Goats confined to USS Niagara before the Baker Shot. They were left on board, in the detonation zone, for a number of days following the blast, the effects of which were later observed and documented. (NARA)

Navy workers crossing the boundary line. Credit: Fritz Goro / Life Magazine Collection / Getty Images

Sailors–and their clothing–contaminated by nuclear work at HPS were washed at the site, with the contaminated rinse water going down the drains and leaking into the soil through breaks in the lines.

The Entire Site Has Significant Potential for Contamination

Many activities occurred over the decades which likely led to widespread dispersal of contamination:

- ➔ Sandblasting and steam-cleaning of radioactive ships
- ➔ Burning of contaminated fuel oil in HPS boilers
- ➔ Use of wide array of radionuclides for nuclear research at NRDL
- ➔ Extensive earth moving for cleanup and construction activities
- ➔ Helicopters landing at Police Building

BUT Only ~*10%* of Sites Received Any Sampling

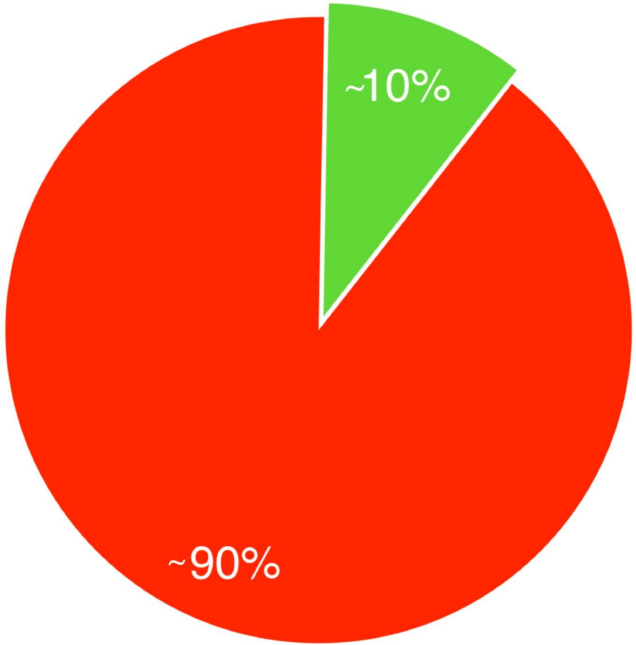
A Navy document (2004 HRA) determined *90% of all HPS sites* to be “non-radiologically impacted” and exempt from sampling

This determination was made through a paper exercise:

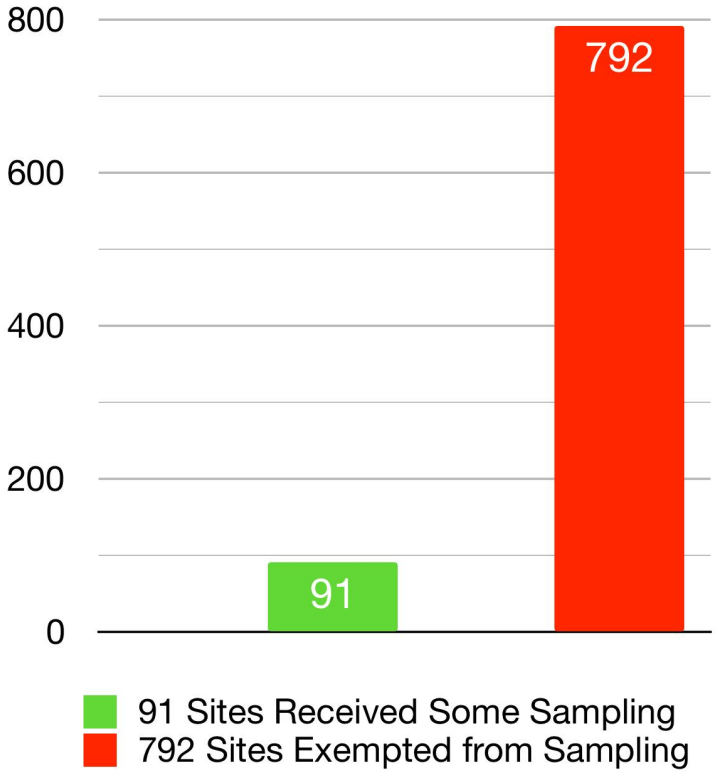
- historical records
- interviews
- **NO SAMPLES**

Parcel A was declared “non-impacted”

~90% of HPS Sites Were Never Sampled



792 of 883 HPS Sites Were Exempted from Sampling



from HRA Volume 2 Figure 4.1, “Overall Impacted Sites”

from US Navy, Draft Radiological Data Evaluation Findings Report for Parcels B and G Soil September 2017, Figure 1-2

Proof of Widespread Contamination —"*Spill Model*" Later Disproved

Spill model assumes contamination only present where spills are known to have happened

It is a justification for only deeming 10% of sites impacted and in need of sampling

This model was later proved wrong with the discovery of "ubiquitous" contamination & radioactivity where not expected

The Testing That *Did* Occur Was Deeply Flawed

- Excluding almost all Radionuclides of Concern
- Using extremely outdated cleanup goals
- Inflating background measurements

Great Majority of Radionuclides Excluded from Testing

TABLE 4-2
RADIONUCLIDES USED AT HPS

Radionuclide	Half-Life	Radiation
Ac-227 (Actinium)	21.8 Years	Alpha, beta⁻, and gamma
Ag-110 (Silver)	24.6 Seconds	Beta⁻ and gamma
Am-241 (Americium)	432.7 Years	Alpha and gamma
Am-243	7,370 Years	Alpha gamma
As-73 (Arsenic)	80.3 Days	Beta⁻ and gamma
As-76	26.3 Hours	Beta⁻ and gamma
Au-195 (Gold)	186 Days	Gamma
Au-198	2.7 Days	Beta⁻ and gamma
Ba-133 (Barium)	10.5 Years	Beta⁻ and gamma
Ba-140	12.8 Days	Beta⁻ and gamma
Be-7 (Beryllium)	52.28 Days	Beta⁻ and gamma
Bi-207 (Bismuth)	32 Years	Beta⁻ and gamma
Bi-210	5.01 Days	Beta⁻ and gamma
Br-82 (Bromine)	1.47 Days	Beta⁻ and gamma
C-14 (Carbon)	5715 Years	Beta⁻
Ca-45 (Calcium)	162.7 Days	Beta⁻ and gamma
Cd-109 (Cadmium)	462 Days	Gamma
Cd-115	2.23 Days	Beta⁻ and gamma
Ce-141 (Cerium)	32.5 Days	Beta⁻ and gamma
Ce-144	284.6 Days	Beta⁻ and gamma
Cf-252 (Californium)	2.65 Years	Alpha, beta⁻, and gamma
Cl-36 (Chlorine)	3.01×10^5 Years	Beta⁻
Cm-242 (Curium)	162.8 Days	Alpha and gamma
Cm-244	18.1 Years	Alpha and gamma
Co-57 (Cobalt)	271 Days	Gamma
Co-58	70.9 Days	Beta⁻ and gamma
Co-60*	5.27 Years	Beta⁻ and gamma
Cr-51 (Chromium)	27.7 Days	Gamma
Cs-134 (Cesium)	2.07 Years	Beta⁻ and gamma
Cs-137*	30.1 Years	Beta⁻ and gamma
Eu-152 (Europium)	13.5 Years	Beta⁻ and gamma
Eu-154	8.6 Years	Beta⁻ and gamma
Eu-155	4.8 Years	Beta⁻ and gamma
Eu-156	15.2 Days	Beta⁻ and gamma
Fe-55 (Iron)	2.73 Years	Gamma
Fe-59	45.5 Days	Beta⁻ and gamma
Gd-152 (Gadolinium)	1.1×10^{14} Years	Alpha
Ge-68 (Germanium)	270.8 Days	Beta⁻ and gamma
H-3 (Tritium)	12.3 Years	Beta⁻
Hg-203 (Mercury)	46.6 Days	Beta⁻ and gamma

TABLE 4-2
RADIONUCLIDES USED AT HPS

Radionuclide	Half-Life	Radiation
I-125 (Iodine)	59.4 Days	Beta⁻ and gamma
I-129	1.57×10^7 Years	Beta⁻ and gamma
I-131	8 Days	Beta⁻ and gamma
In-115 (Indium)	4.4×10^{14} Years	Beta⁻
Ir-192* (Iridium)	73.8 Days	Beta⁻ and gamma
K-40 (Potassium)	1.27×10^9 Years	Beta⁻ and gamma
K-42	12.36 Hours	Beta⁻ and gamma
Kr-85 (Krypton)	10.76 Years	Beta⁻ and gamma
La-140 (Lanthanum)	1.68 Days	Beta⁻ and gamma
Lu-177 (Lutetium)	6.71 Days	Beta⁻ and gamma
Mn-54 (Manganese)	312.1 Days	Beta⁻ and gamma
Mo-99 (Molybdenum)	2.75 Days	Beta⁻ and gamma
Na-22 (Sodium)	2.6 Years	Beta⁺ and gamma
Na-24	14.95 Hours	Beta⁻ and gamma
Nb-94 (Niobium)	2×10^4 Years	Beta⁻ and gamma
Nd-147 (Neodymium)	10.98 Days	Beta⁻ and gamma
Ni-63 (Nickel)	100 Years	Beta⁻
Np-237 (Neptunium)	2.14×10^6 Years	Alpha and gamma
P-32 (Phosphorus)	14.28 Days	Beta⁻
Pa-234 (Protactinium)	6.7 Hours	Beta⁻ and gamma
Pb-210 (Lead)	22.6 Years	Beta⁻ and gamma
Pd-109 (Palladium)	13.5 Hour	Beta⁻ and gamma
Pm-147 (Promethium)	2.62 Years	Beta⁻ and gamma
Po-210 (Polonium)	138.4 Days	Alpha and gamma
Pr-143 (Praseodymium)	13.57 Days	Beta⁻ and gamma
Pr-144	17.28 Minutes	Beta⁻ and gamma
Pu-237 (Plutonium)	45.2 Days	Alpha and gamma
Pu-238	87.7 Years	Alpha and gamma
Pu-239*	2.41×10^4 Years	Alpha and gamma
Ra-226* (Radium)	1,599 Years	Alpha and gamma
Rn-222 (Radon)	3.82 Days	Alpha and gamma
Rb-86 (Rubidium)	18.65 Days	Beta⁻ and gamma
Ru-103 (Ruthenium)	39.27 Days	Beta⁻ and gamma
Ru-106	1.02 Years	Beta⁻
S-35 (Sulfur)	87.2 Days	Beta⁻
Sb-125 (Antimony)	2.76 Years	Beta⁻ and gamma
Sc-46 (Scandium)	83.8 Days	Beta⁻ and gamma
Se-75 (Selenium)	119.8 Days	Gamma
Sm-145 (Samarium)	340 Days	Gamma
Sm-153	1.93 Days	Beta⁻ and gamma

TABLE 4-2
RADIONUCLIDES USED AT HPS

Radionuclide	Half-Life	Radiation
Sn-113 (Tin)	115.1 Days	Beta⁻ and gamma
Sr-85 (Strontium)	64.84 Days	Gamma
Sr-89	50.52 Days	Beta⁻ and gamma
Sr-90*	28.78 Years	Beta⁻
Ta-182 (Tantalum)	114.4 Days	Beta⁻ and gamma
Tb-161 (Terbium)	6.91 Days	Beta⁻ and gamma
Tc-97 (Technetium)	2.6×10^6 Years	Beta⁻ and gamma
Tc-99	2.1×10^5 Years	Beta⁻ and gamma
Te-127 (Tellurium)	9.4 Hours	Beta⁻ and gamma
Te-133	12.4 Minutes	Beta⁻ and gamma
Te-133m	55.4 Minutes	Beta⁻ and gamma
Th-228* (Thorium)	1.91 Years	Alpha and gamma
Th-232	1.4×10^{10} Years	Alpha
Ti-44 (Titanium)	67 Years	Gamma
Tl-204 (Thallium)	3.78 Years	Beta⁻
Tm-170 (Thulium)	128.6 Days	Beta⁻ and gamma
Tm-171	1.92 Years	Beta⁻ and gamma
U-233 (Uranium)	1.59×10^5 Years	Alpha and gamma
U-235	7.04×10^8 Years	Alpha and gamma
U-236	2.34×10^7 Years	Alpha and gamma
U-238	4.478×10^9 Years	Alpha and gamma
W-185 (Tungsten)	74.8 Days	Beta⁻ and gamma
Xe-133 (Xenon)	5.24 Days	Beta⁻ and gamma
Y-88 (Yttrium)	106.7 Days	Beta⁺ and gamma
Y-90	2.67 Days	Beta⁻ and gamma
Y-91	58.5 Days	Beta⁻ and gamma
Zn-65 (Zinc)	243.8 Days	Beta⁺ and gamma
Zr-95 (Zirconium)	64 Days	Beta⁻ and gamma

Over 100 radionuclides used

from US Navy, 2004 Historical Radiological Assessment Volume 2, Table 4-2

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TABLE 4-3
RADIONUCLIDES OF CONCERN AT HPS

Radionuclide	Half Life	Radiations
Ac-227 (Actinium)	21.8 Years	Alpha, beta, and gamma
Am-241 (Americium)	432.7 Years	Alpha, beta, and gamma
Am-243	7,370 Years	Alpha and gamma
Ba-133 (Barium)	10.5 Years	Beta and gamma
Bi-207 (Bismuth)	32 Years	Beta and gamma
C-14 (Carbon)	5715 Years	Beta
Cl-36 (Chlorine)	3.01×10^5 Years	Beta
Cm-244 (Curium)	18.1 Years	Alpha and gamma
Co-60 (Cobalt)	5.27 Years	Beta and gamma
Cs-137 (Cesium)	30.1 Years	Beta and gamma
Eu-152 (Europium)	13.5 Years	Beta and gamma
Eu-154	8.6 Years	Beta and gamma
Gd-152 (Gadolinium)	1.1×10^{14} Years	Alpha
H-3 (Tritium)	12.3 Years	Beta
In-115 (Indium)	4.4×10^{14} Years	Beta
K-40 (Potassium)	1.27×10^9 Years	Beta and gamma
Nb-94 (Niobium)	2×10^4 Years	Beta and gamma
Ni-63 (Nickel)	100 Years	Beta
Np-237 (Neptunium)	2.14×10^6 Years	Alpha and gamma
Pb-210 (Lead)	22.6 Years	Beta and gamma
Pu-238 (Plutonium)	87.7 Years	Alpha and gamma
PU-239	2.41×10^4 Years	Alpha, beta, and gamma
Ra-226 (Radium)	1,599 Years	Alpha and gamma
Sr-90 (Strontium)	28.78 Years	Beta
Tc-97 (Technetium)	2.6×10^6 Years	Beta and gamma
Tc-99	2.1×10^5 Years	Beta and gamma
Th-232 (Thorium)	1.4×10^{10} Years	Alpha
Ti-44 (Titanium)	67 Years	Gamma
Tl-204 (Thallium)	3.78 Years	Beta
U-233 (Uranium)	1.59×10^5 Years	Alpha and gamma
U-235	7.04×10^8 Years	Alpha and gamma
U-236	2.34×10^7 Years	Alpha and gamma
U-238	4.478×10^9 Years	Alpha and gamma

Table 3-5. Soil Remediation Goals

Radionuclide	Residential Soil Remediation Goal[a] (pCi/g)
^{137}Cs	0.113
^{239}Pu	2.59
^{226}Ra	1.0
^{90}Sr	0.331

[a]All RGs will be applied as concentrations above background.

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Table 3-4. Soil Radionuclides of Concern

Soil Area	Radionuclide of Concern
Former Sanitary Sewer and Storm Drain Lines and Building 351A Crawl Space	^{137}Cs, ^{226}Ra, ^{90}Sr
Former Buildings 317/364/365 Site	^{137}Cs, ^{226}Ra, ^{90}Sr, ^{239}Pu

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Cleanup Goals Are Extremely Outdated

Radionuclide	2018 EPA Default PRG for soil (pCi/g)	Navy Remediation Goals for Soil (pCi/g)	How many times higher are the Navy's Remediation goals?
Cesium-137	0.0303	0.133	**4** times higher
Plutonium-239	0.00615	2.59	**421** times higher
Radium-226	0.00182	1*	**549** times higher
Strontium-90	0.00361	0.331	**92** times higher
Thorium-232	0.00174	1.69	**971** times higher
Uranium-235	0.00623	0.195	**31** times higher

Soil comparisons

Cleanup Goals Are Extremely Outdated

Radionuclide	EPA Building Preliminary Remediation Goal (dpm/100 cm^2)	Navy's Hunters Point Release Criterion for Buildings and Structures (dpm/100 cm^2)	How many times higher are the Navy's Remediation goals?
Cesium-137	11.21	5000	**446** times higher
Cobalt-60	1.27	5000	**3,925** times higher
Europium-152	1.74	5000	**2,876** times higher
Europium-154	2.14	5000	**2,341** times higher
Uranium-235	7.17	488	**68** times higher

External Building Comparisons

Cleanup Goals Are Extremely Outdated

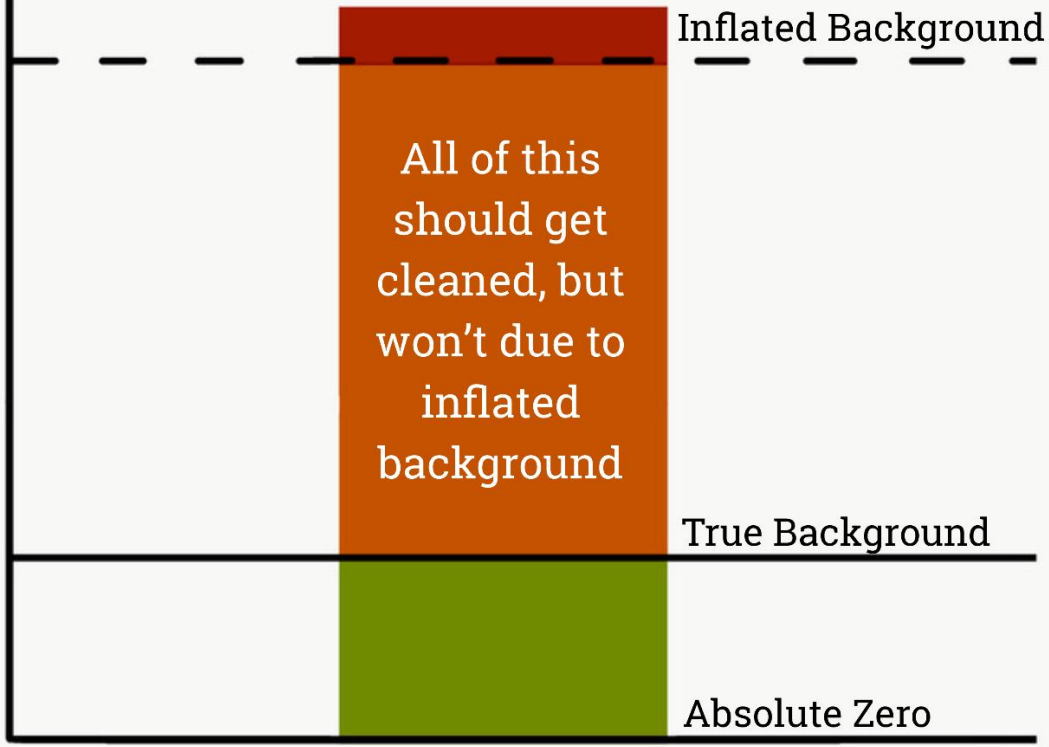
Radionuclide	EPA Building Preliminary Remediation Goal (dpm/100 cm^2)	Navy's Hunters Point Release Criterion for Buildings and Structures (dpm/100 cm^2)	How many times higher are the Navy's Remediation goals?
Cesium-137	0.744	1000	**1,345** times higher
Cobalt-60	0.779	1000	**1,283** times higher
Europium-152	0.539	1000	**1,854** times higher
Europium-154	1.170	1000	**855** times higher
Uranium-235	0.024	97.6	**4,148** times higher

Removable Dust Building comparisons

Testing Couldn't Even Detect those Few Radionuclides Remaining on Their List

- The gamma surveys couldn't detect alpha- or beta-emitting radionuclides at all
- They couldn't detect any gamma radionuclide at the cleanup level, with one possible exception
- Soil samples tested for only a small fraction of the radionuclides of concern (~4 out of dozens)
- Only a small fraction of soil samples were tested for strontium-90 or plutonium-239; most were only tested for radium and cesium

Inflating Background



At HPS,
Measurements are taken near contaminated areas & used as “background”

“Background + 3 sigma”

FIGURE 1-1

BUILDING 401 AND REFERENCE AREA LOCATIONS

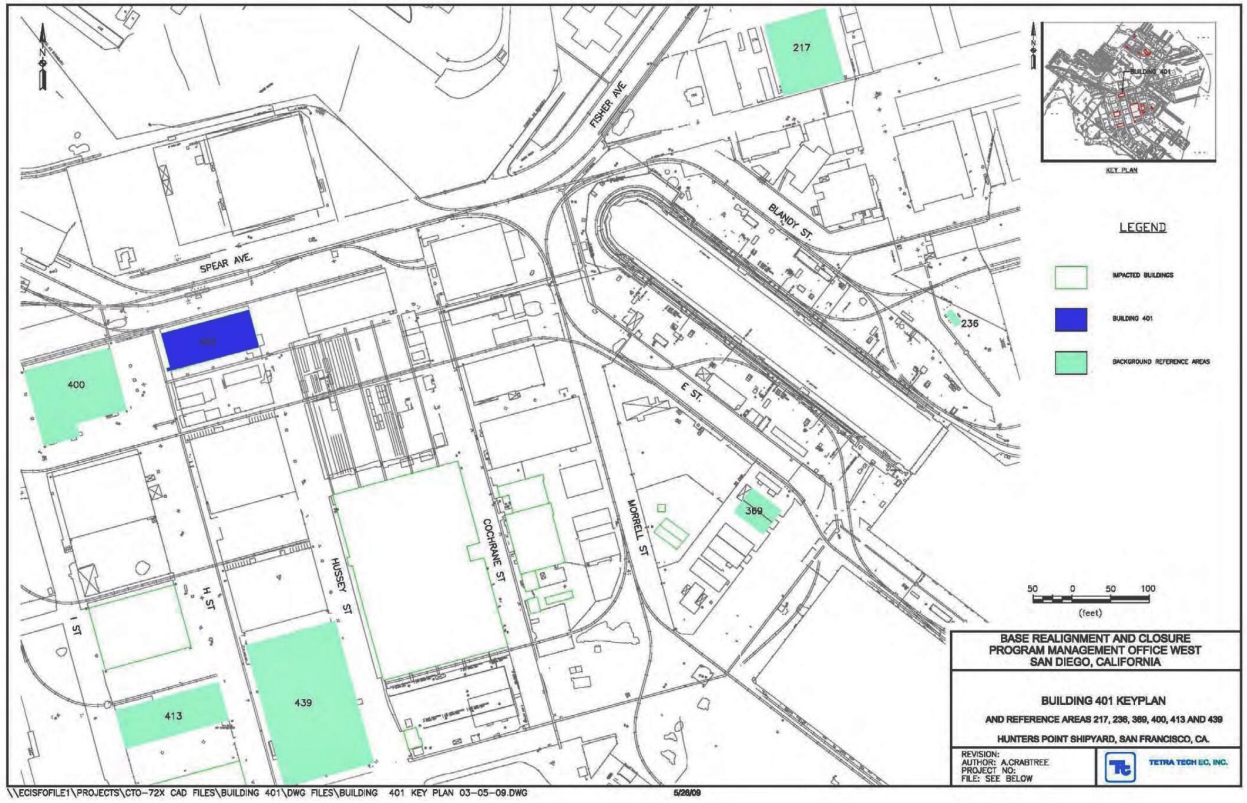
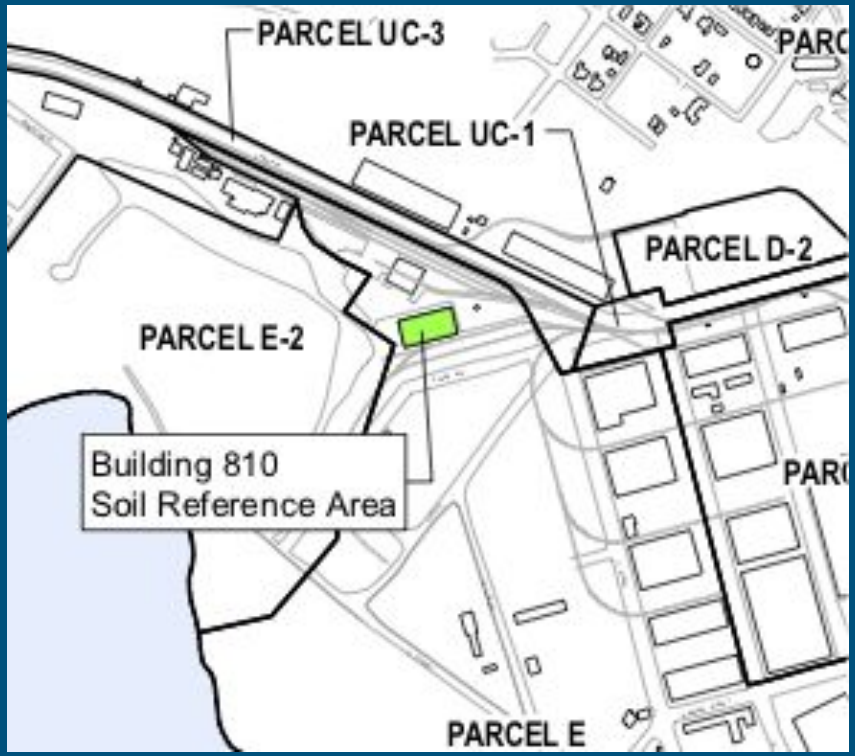


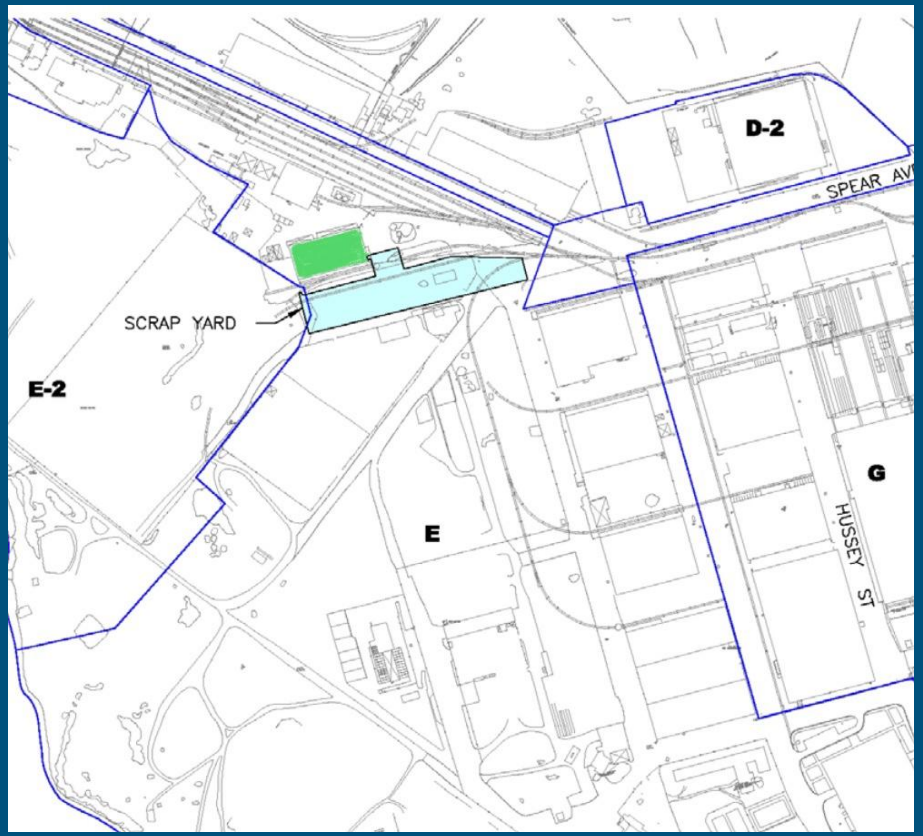
Figure 1-1, Tetra Tech, Final Status Survey Results, Bldg 401, Hunters Pt., Sept. 21, 2009

Background in Green

Contaminated building in Blue

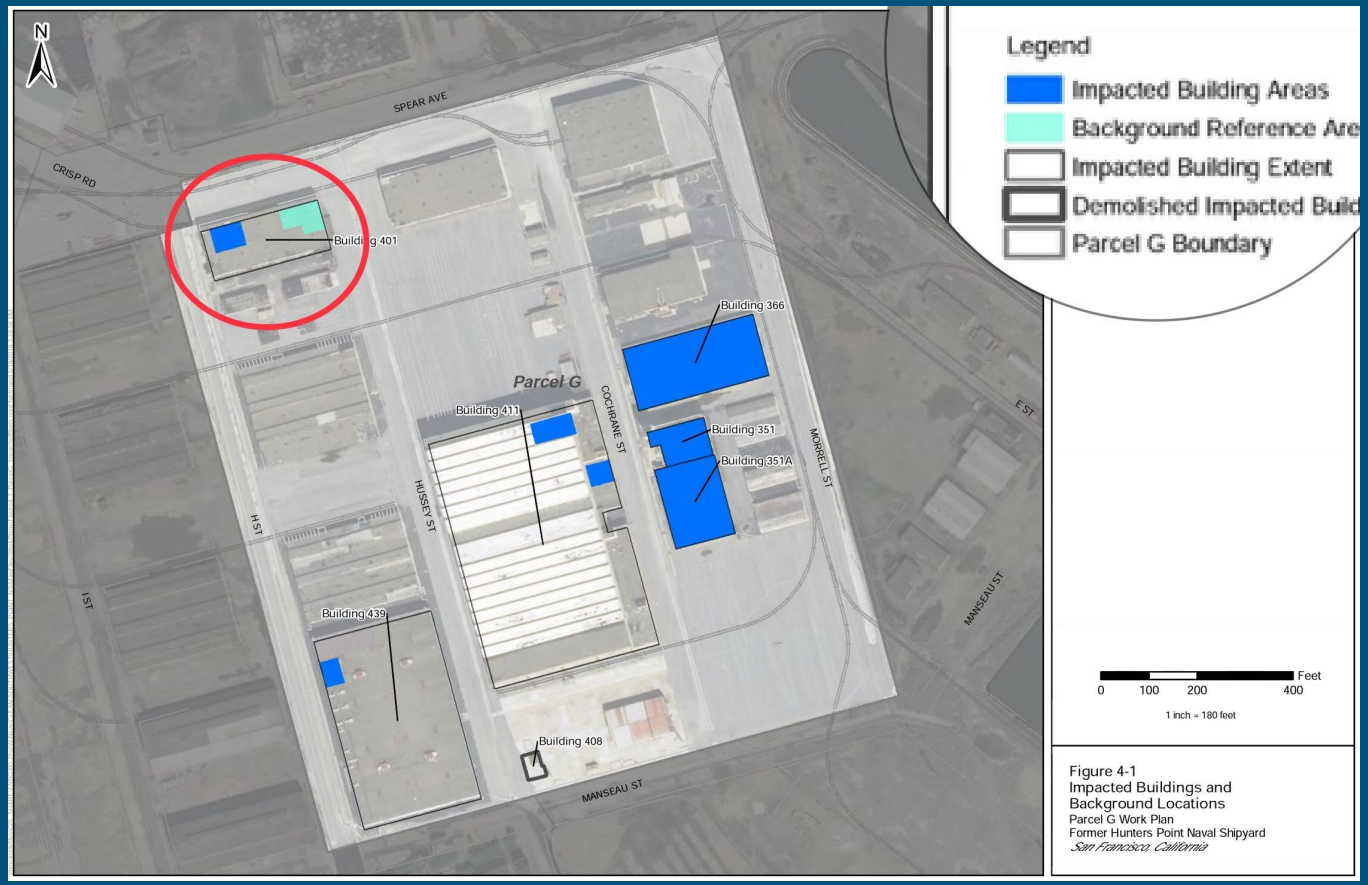


FINAL REMEDIAL ACTION WORK PLAN ADDENDUM, Remedial Action in Parcel D-1, HUNTERS POINT NAVAL SHIPYARD, prepared for the Navy by Aptim Federal Services, July 2018



FINAL STATUS SURVEY RESULTS, IR-04 Former Scrap Yard Site and Former Building 807 Site, HUNTERS POINT NAVAL SHIPYARD, prepared for the Navy by Tetra Tech EC, INC.

Misuse of Background Continues Beyond TtEC

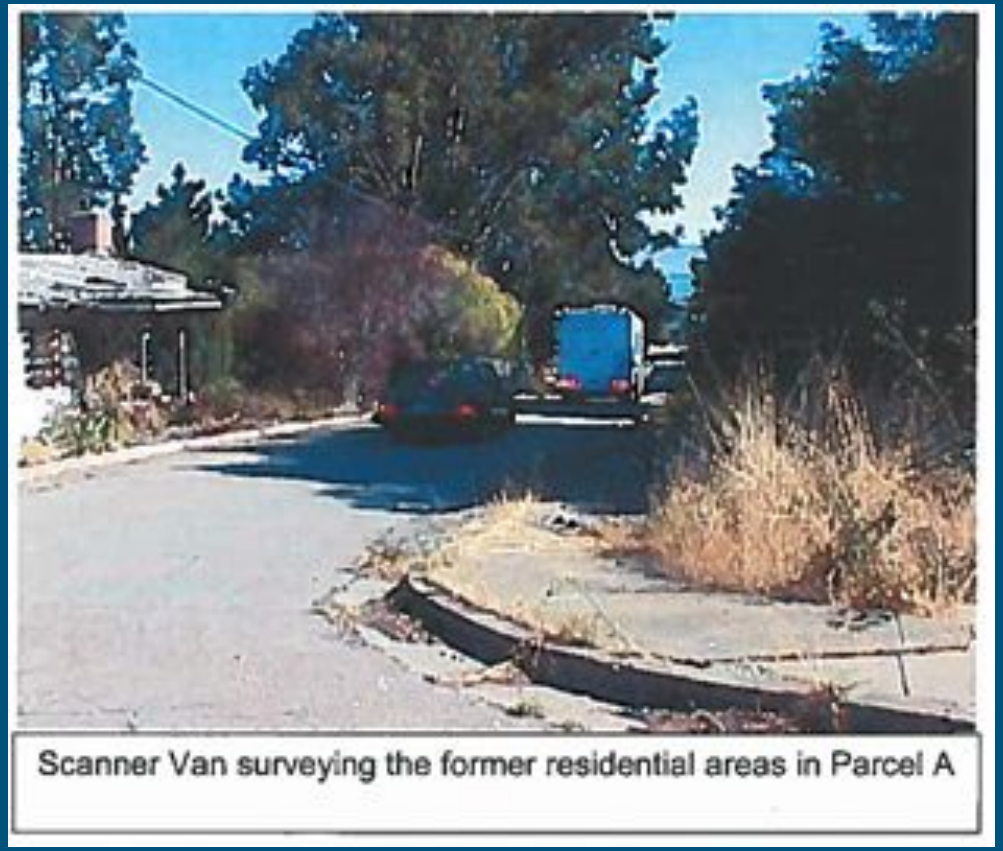


In the Parcel G retesting plan, background is taken inside a contaminated building

Parcel A

Found ‘suitable to transfer’ in 2004 without almost any soil sampling for radionuclides

Now, CDPH limited “gamma scan” is just as inadequate



Scanner Van surveying the former residential areas in Parcel A

EPA Scanner Van, September 2002

Map of 2002 EPA Gamma Scan

- Covered only navigable roads
- Scanned for only gamma radionuclides
- Essentially blind to contaminants at cleanup levels

Declared Parcel A warranted no further investigation

EPA Radiological Scanner Survey Van Hunters Point Naval Shipyard California, September 9-12 2002, p. 10

CDPH Recent Parcel A Limited Gamma Scan Unable to Detect Contamination

Same inadequacies as initial testing

Still no soil samples, only scanning, which can't see:

- Alpha
- Beta
- Gamma at the levels requiring cleanup

Only covered a portion of Parcel A

Yet – Contamination Was Still Found

- ~800 mrem/year at soil surface
  - **Exposure = 400 chest x-rays/year**
- ~30,000 mrem/yr at source

This disproves claim that Parcel A was unimpacted

If contamination was found despite so many limitations, soil sampling might find much more.

Forthcoming Reports

Cleanup standards

Cover-up, not cleanup (Caps, Covers, and Institutional Controls)

Failure of Oversight Agencies