Radiological Risk at Hunters Point

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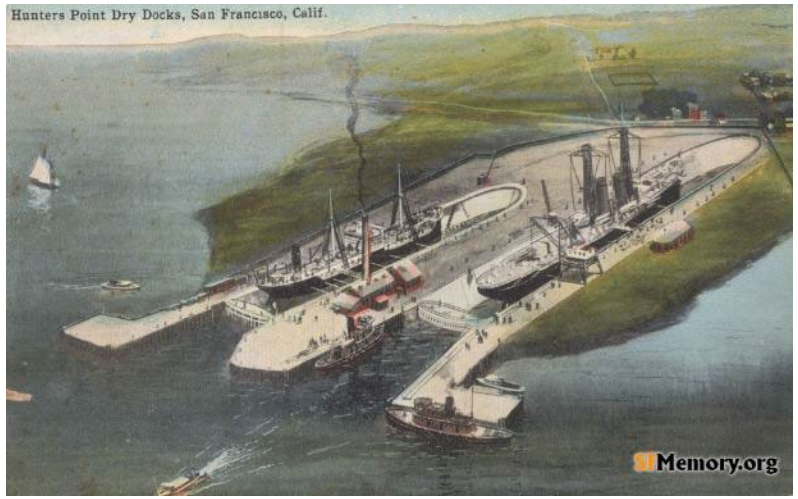
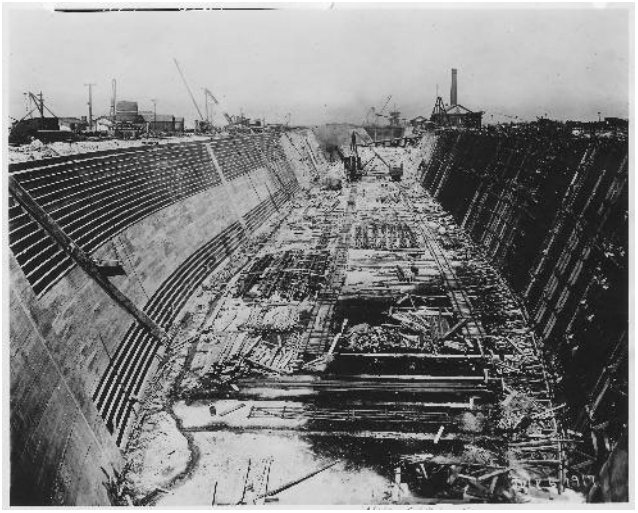
Oregon State University Distinguished Professor of Nuclear Science & Engineering

President, National Council on Radiation Protection and Measurements

Early History of HPNS

Postcard image of drydocks in apx. 1910

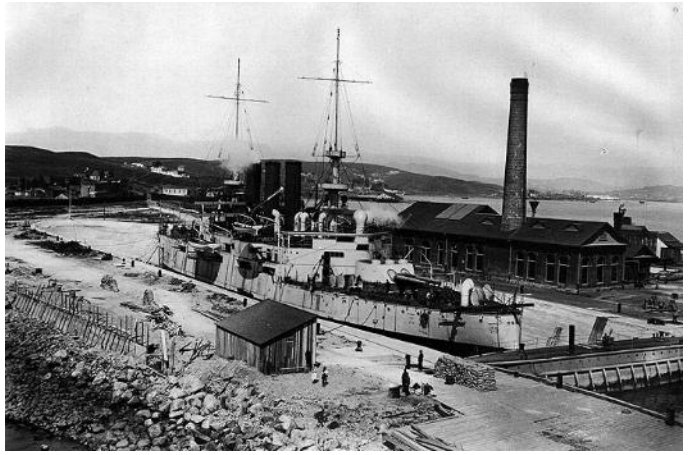




Dry dock construction, ~ 1868
https://en.wikipedia.org/wiki/Hunters_Point_Naval_Shipyard

Destroyer getting serviced in graving dock at Hunter's Point, 1904. *Photo: Private collection*

https://www.foundsf.org/Hunter%27s_Point_Naval_Shipyard



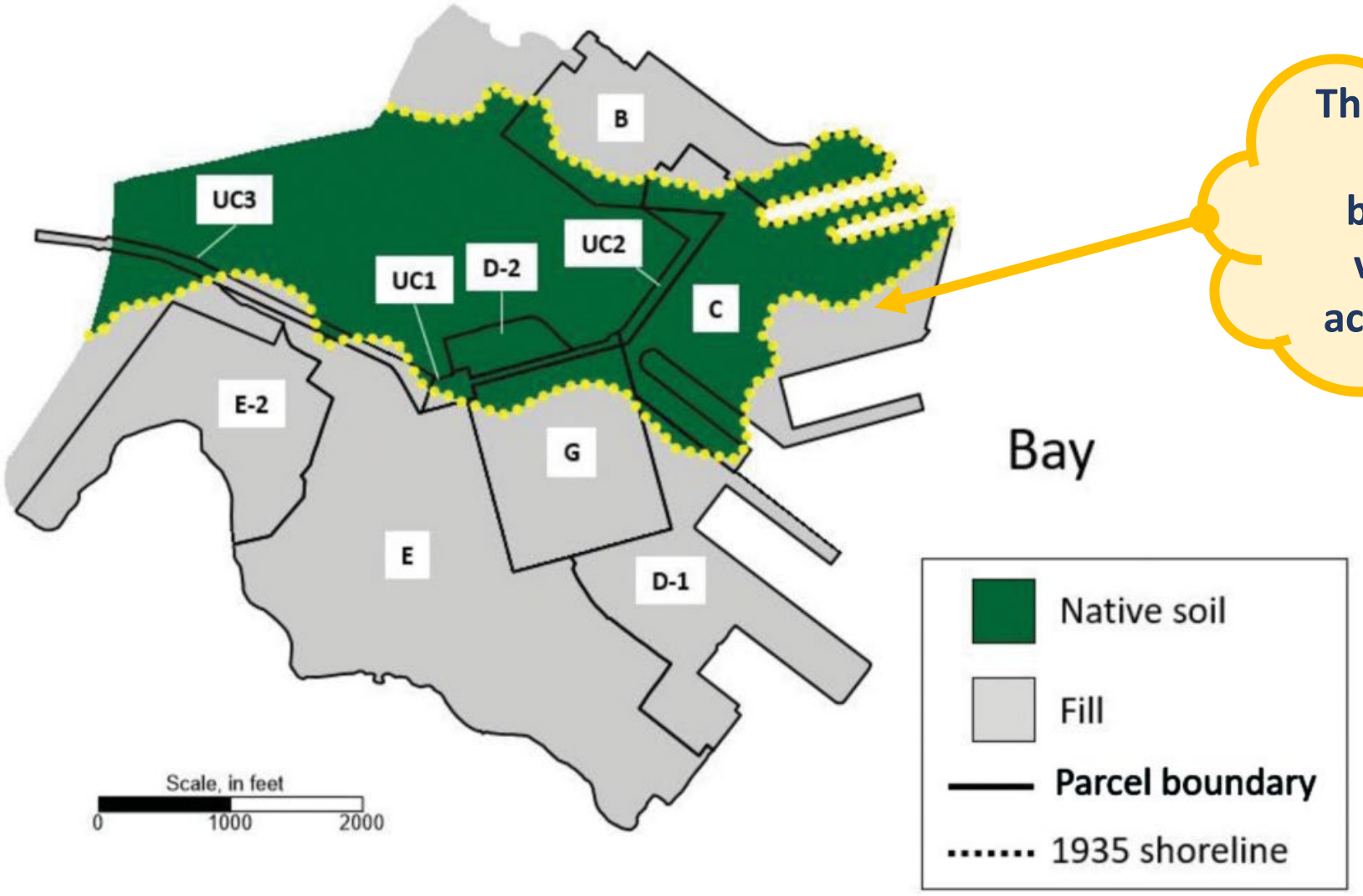
Decommissioned – The History of Hunters Point Shipyard,
Stacey Carter, Bldg 101
Last showing, Aug 2, 2025,
stacey@staceycarter.net

HPNS Mid Century

https://en.wikipedia.org/wiki/Hunters_Point_Naval_Shipyard

Paustenbach, D. J., & Gibbons, R. D. (2022). Radiological risk assessment of the Hunters Point Naval Shipyard (HPNS). Critical Reviews in Toxicology, 52(7), 499-545

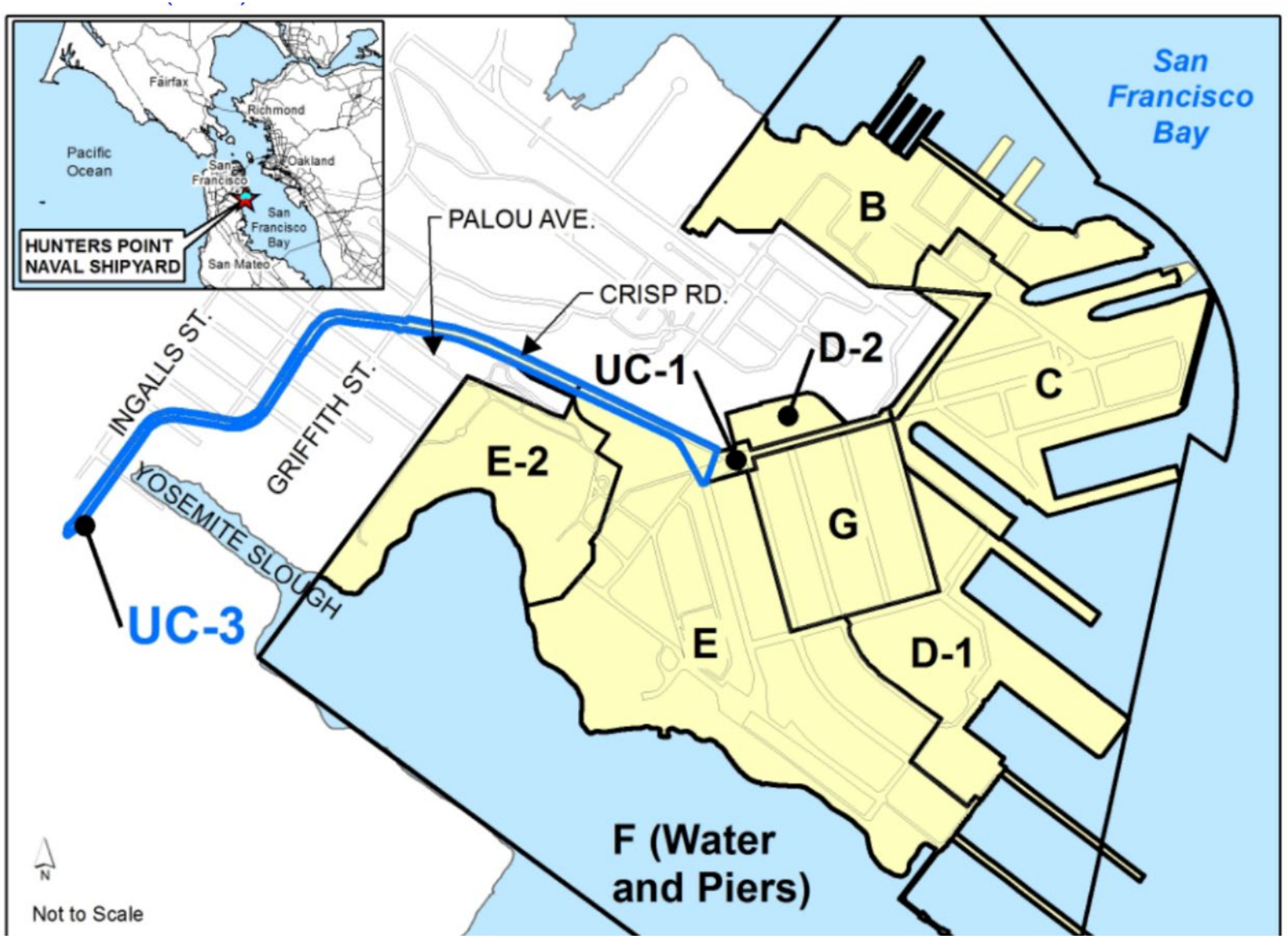
Build out of HPNS since 1935



This means the natural background varies ***a lot*** across the site

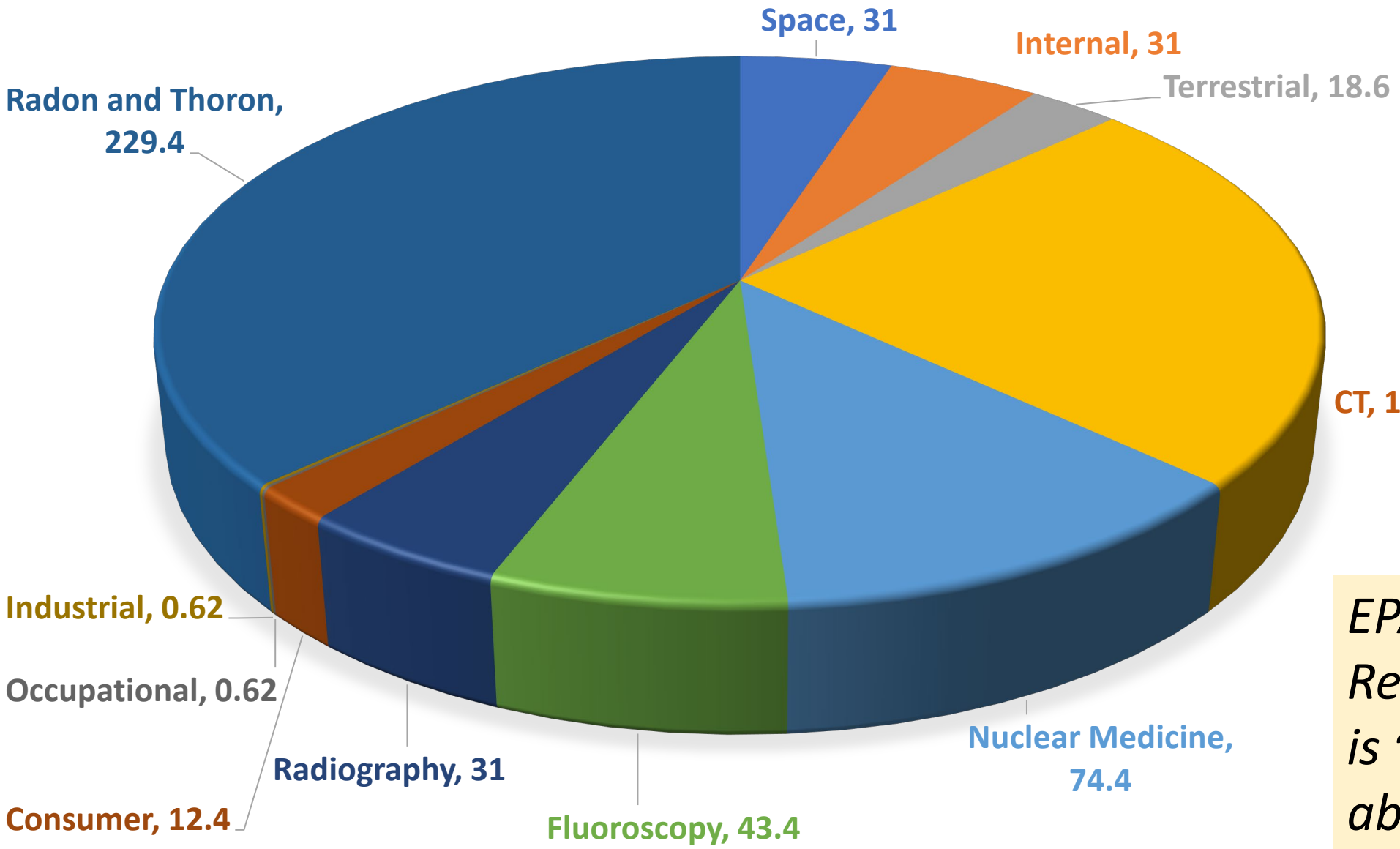
Paustenbach, D. J., & Gibbons, R. D. (2022). Radiological risk assessment of the Hunters Point Naval Shipyard (HPNS). Critical Reviews in Toxicology, 52(7), 499-545.

- **Parcel A** was used for residential and administrative purposes
- **Parcel B** was used for shipping, ship repair, training, barracks, and offices.
- **Parcel C** us the oldest part of the Shipyard and used for industrial purposes since the late 1800s including shipping, ship repair, office, and commercial activities
- **Parcel D & G** were part of the industrial support areas at the Shipyard, including shipping, ship repair, office, and commercial activities
- **Parcel E** served as an industrial support area where chlorinated solvents were released and spent waste oil was stored
- **Parcel F** is offshore of the Shipyard and includes approximately 446 acres of underwater property



From https://semspub.epa.gov/work/09/1149277.pdf and https://www.sf.gov/hpns-cleanup-status

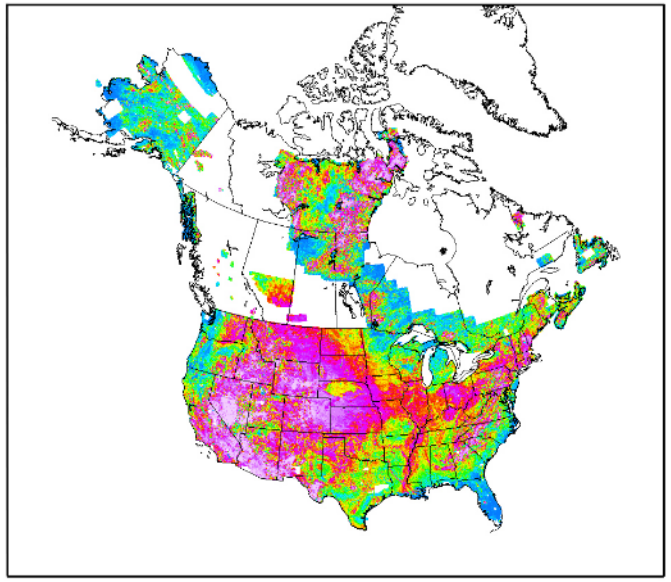
U.S. AVERAGE YEARLY BACKGROUND DOSE, MREM



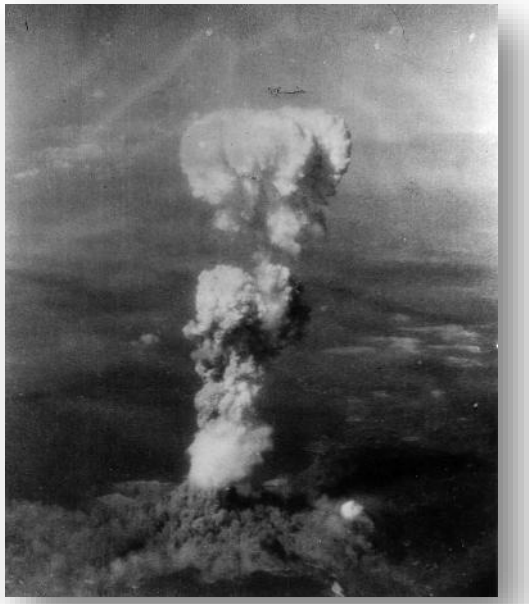
USA Average:
620 mrem total
- 310 Medical
- 310 Natural

EPA HPNS Remediation Goal is ~ 12 mrem above background

Annual *natural* background radiation dose varies across the USA



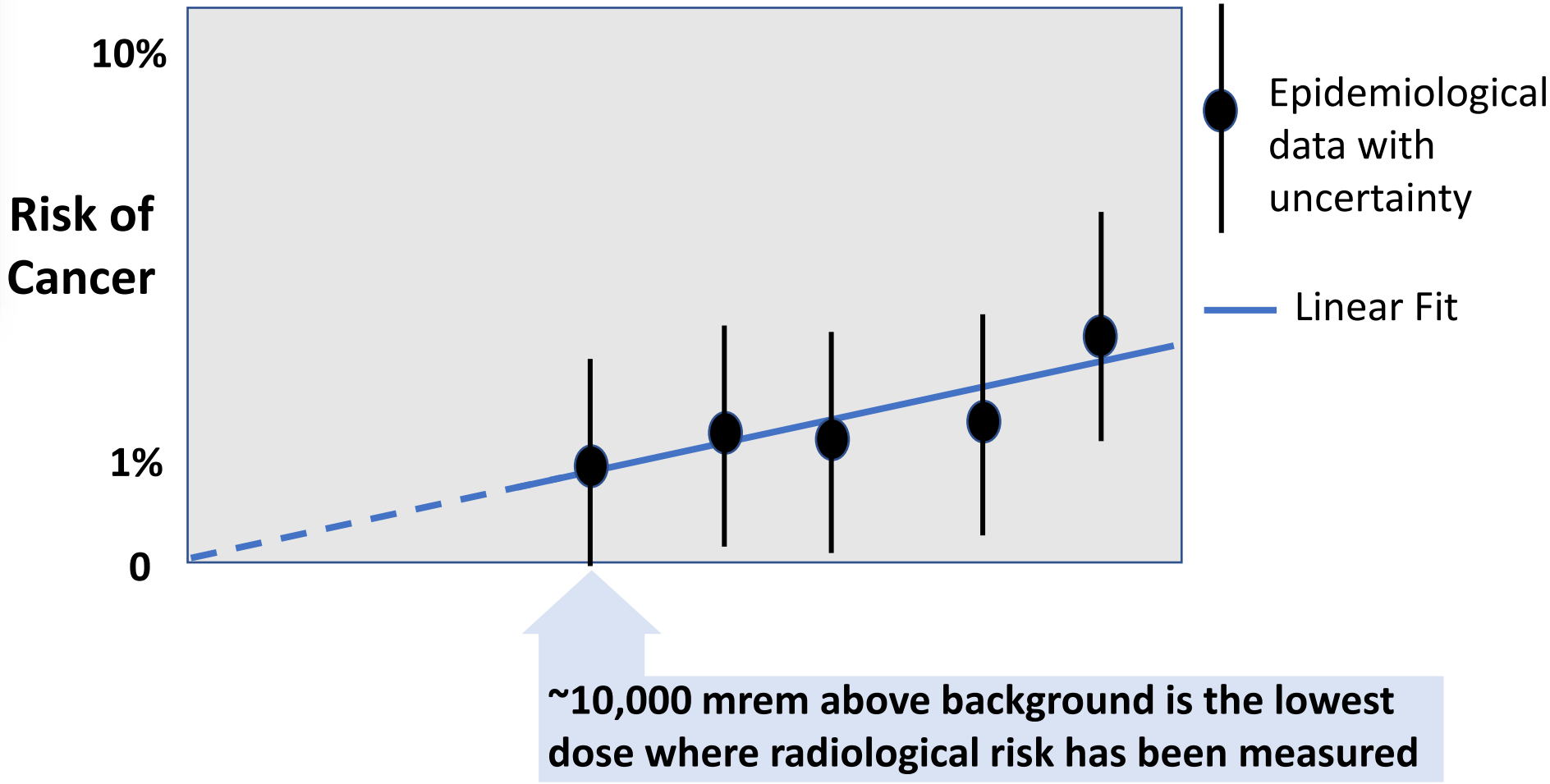
Measured Data: Radiation Dose and Risk



Hulton Archive / Getty Images

Japanese Atomic Bomb Survivors (Life Span Study) ~ 120,000 survivors and controls

HTTPS://www.rerf.or.jp/en/



U.S. Million Person Study Population

Robert Oppenheimer, General Lesl Groves, Enrico Fermi, Hans Bethe, Theodore Hall

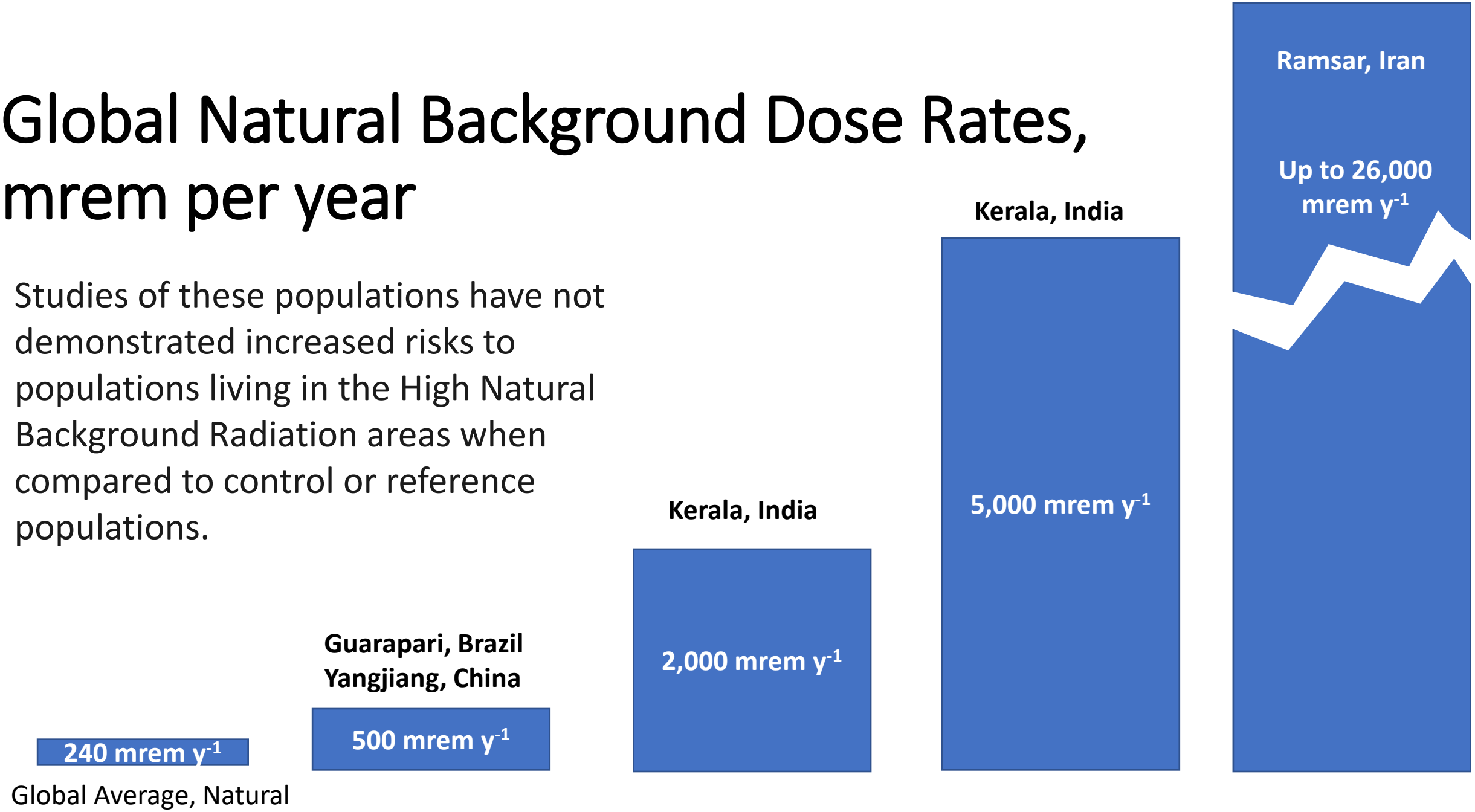
Cohort/Group	Collaborating Agency	Population
DOE Workers	DOE	260,000
Atomic Veterans	DoD/US Navy	114,000
Nuclear Power Plant Workers	USNRC	135,000
Industrial Radiographers	USNRC	123,000
Medical Radiation Workers	NASA	109,000
Nuclear Submariners	US Navy/NASA	126,000
Shipyard Workers	US Navy	96,000
Radium Dial Painters	DOE	3,300

~350-400K total DoD/Veterans

Boice et al. *The Million Person Study, Whence it Came and Why*. IJRB April 2022

Global Natural Background Dose Rates, mrem per year

Studies of these populations have not demonstrated increased risks to populations living in the High Natural Background Radiation areas when compared to control or reference populations.

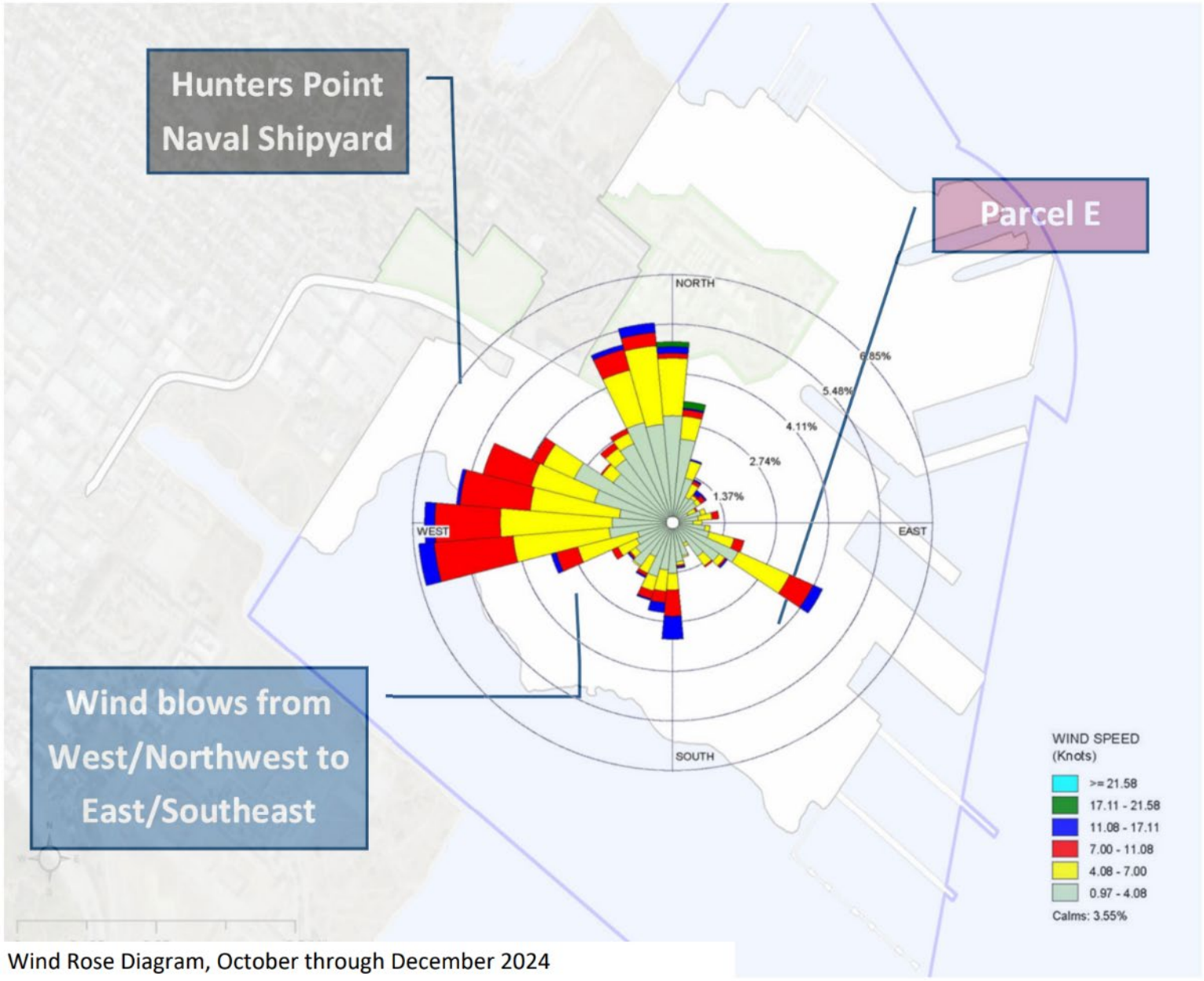


What does this mean for HPNS?

- For radiation workers in the USA
  - Annual occupational limit: 5,000 mrem (USNRC, US DOE, USDoD, OSHA, States)
  - Radiation cleanup industries (e.g., DOE decommissioning at weapons sites such as Hanford and Los Alamos) workers receive average annual doses < 1% of the limit, most workers had no measurable dose
  - Commercial Nuclear Power Plants (US NRC), the average worker dose is ~ 3% of the limit
- Recent results for workers at Parcel G
  - Radiological air monitoring: only background levels
  - Radiological contamination surveys: only background levels
  - Personnel external doses – well below 1 % occupational levels
- Very safe industry
- For the public
  - EPA requires HPNS cleanup to annual limit 12 mrem
  - Navy cleanup ~4-5 mrem per year
  - Doses will be within background for onsite tenants and offsite residents

FYI: Wind Patterns

- Dust monitoring protocols in place
- Wind blows mainly into the bay
- Most recent (Parcel G) dust at background



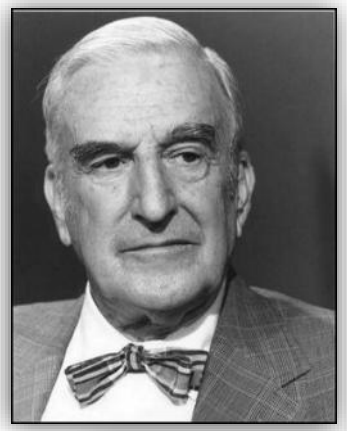
Wind Rose Diagram, October through December 2024

https://media.defense.gov/2025/Jun/04/2003732723/-1/-1/0/PARCEL_E_AIRMON_FACT_SHT_OCT_DEC_2024.PDF

Conclusion

- Radiological dose to workers, tenants, and residents around HPNS expected to be very low, or even not detectable
- Radiological risk will be no different than background

National Council on Radiation Protection and Measurements



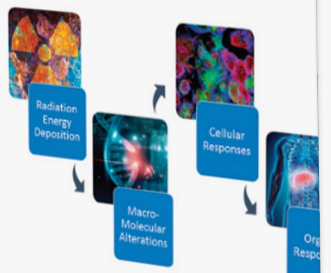




- Founded by Lauriston Taylor (co-founder of ICRP)
- Active in radiation protection & measurements since 1929
  - Represented all radiological organizations in US
  - U.S. *analog* to International X-Ray and Radium Protection Committee (which became the ICRP)
- Originally informal association of scientists
  - Expanded in 1940s & 1950s in response to need
- Reorganized & chartered by US Congress in 1964
- NCRP recommendations form the basis of federal, state, and local regulations, ***including guidance to physicians***
  - Members are choses solely for their scientific expertise

NCRP REPORT No. 186

APPROACHES FOR INTEGRATING INFORMATION FROM RADIATION BIOLOGY AND EPIDEMIOLOGY TO ENHANCE LOW-DOSE HEALTH RISK ASSESSMENT



National Council on Radiation Protection an

NCRP COMMENTARY No. 33

RECOMMENDATIONS FOR STRATIFICATION OF EQUIPMENT USE AND RADIATION SAFETY TRAINING FOR FLUOROSCOPY

National Council on Radiation Protection and Measurements

NCRP COMMENTARY No. 13

AN INTRODUCTION TO EFFICACY IN DIAGNOSTIC RADIOLOGY AND NUCLEA MEDICINE (JUSTIFICATION OF MEDICAL RADIATION EXPOSURE)

National Council on Radiation Protection and Me

NCRP COMMENTARY No. 24

HEALTH EFFECTS OF LOW DOSES OF RADIATION: PERSPECTIVES ON INTEGRATING RADIATION BIOLOGY AND EPIDEMIOLOGY

National Council on Radiation Protection and Measurements

NCRP REPORT No. 180

MANAGEMENT OF EXPOSURE TO IONIZING RADIATION: RADIATION PROTECTION GUIDANCE FOR THE UNITED STATES (2018)

National Council on Radiation Protection and Measurements