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Navy and Marine Corps Public Health Center

Appendix B Overview of the Risk Screening Evaluation Approach

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Comparison of Environmental Sampling Results to Risk-Based Screening Concentrations

To determine whether or not the sampling results for indoor air, soil, and drinking water are potentially of concern to human health, the sampling results were compared to United States Environmental Protection Agency (USEPA) risk-based screening levels (SLs) adjusted to reflect site-specific exposure scenarios. In addition, drinking water results were compared to USEPA Maximum Contaminant Levels (MCLs) which are regulatory standards. For further context, indoor air results were compared to Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels (PELs) which are also regulatory standards.

Comparison of Environmental Sampling Results to USEPA Screening Levels

SLs incorporate many conservative assumptions about exposure to be protective of human health, such as being based on a 25-year residential exposure. SLs are calculated based on carcinogenic (i.e., cancer) risks and noncarcinogenic (i.e., noncancer) health effects. Cancer risk is an estimate of how exposure to a chemical may increase the normal or expected rate of developing cancer in a population of people. The USEPA generally evaluates cancer risk as follows:

- **Acceptable Risk** – A cancer risk of $1E-06$ (i.e., one person out of 1,000,000 will develop cancer) or less is considered safe (i.e., acceptable).

Note: The USEPA generally also considers the range between one in 10,000 ($1E-04$) and one in 1,000,000 ($1E-06$) people as a safe (i.e., acceptable) range, and actions to reduce the risk may or may not be required based on various site-specific factors. The USEPA typically considers additional actions to reduce cancer risks that are close to or greater than one in 10,000 ($1E-04$) people.

- **Unacceptable Risk** – USEPA considers an increase of “more than” one additional case of cancer (or greater) in 10,000 ($1E-04$) people to be of concern (i.e., unacceptable).

Noncancer health effects are expressed by a number known as the hazard quotient (HQ). The HQ compares the amount of a chemical that people may have been exposed to over a specified time period with the amount that is considered to have no effect (i.e., safe). If people are exposed to an amount greater than that considered safe for a particular chemical, then the ratio will be greater than one. Because people can be exposed to more than one chemical at a time, the HQs for different chemicals are added together to give an overall hazard index (HI), unless data are available to indicate that they should not be added together (e.g., they do not affect the same target organ). USEPA policy considers chemical concentrations resulting in an HI above one to be of concern for developing potential noncancer health effects. Professional judgment must be used to evaluate the potential noncancer health effects related to the concentration of these chemicals to determine if risk management actions are required.



[Comparison of Environmental Sampling Results to USEPA NAAQS](#)

National Ambient Air Quality Standards (NAAQS) are established by USEPA under the Clean Air Act for outdoor air for pollutants considered harmful to public health and the environment. These are designed to protect human health with an adequate margin of safety including sensitive populations (e.g., children, the elderly, and individuals suffering from respiratory diseases).

[Comparison of Environmental Sampling Results to USEPA MCLs](#)

MCLs are established by the USEPA to set maximum permissible levels of a contaminant in public water supplies under the Safe Drinking Water Act. For private water supplies, MCLs are useful for determining potability (fit for human consumption). MCLs are protective of public health during a lifetime (70 years) for an individual who drinks two liters of water per day.

[Comparison of Environmental Sampling Results to OSHA PELs](#)

The PEL is a legal limit in the United States for exposure of an employee to a chemical substance or physical agent such as loud noise. A PEL is a time-weighted average (TWA), although some are short term exposure limits (STEL) or ceiling limits. A TWA is the average exposure over a specified period of time, usually a nominal 8 hours. This means that, for limited periods, a worker may be exposed to concentration excursions higher than the PEL, so long as the TWA is not exceeded and any applicable excursion limit is not exceeded.

[Comparison of Radon Sampling Results to USEPA Action Level](#)

The standard or action level for radon is 4 pCi/L. At or above this level, USEPA recommends you take corrective action to reduce your exposure to radon gas. The United States Navy has adopted this standard in Navy-occupied buildings.

[Standards Used for Ionizing Radiation Measurements in AV-32, AV-29, AV-31 and AV-34](#)

To evaluate exposures to ionizing radiation (other than radon), we compared the results of our testing using sensitive radiation detectors and posted dosimetry, to dose limits set by international and national radiation protection organizations (e.g., International Commission on Radiological Protection and National Council on Radiation Protection and Measurements) to control and limit potential harmful radiation effects. These dose limits are intended to protect the public, radiation workers and the environment from the potential effects of chronic low-level exposure (i.e., less than 10 rem [100 mSv]).