Missile Community Cancer Study Town Hall

Thank you for joining us today.
The Town Hall will begin at 2 p.m. Central.

Email questions to:

afgsc.paworkflow@us.af.mil

We will monitor this email throughout the Town Hall.

Missile Community Cancer Study (MCCS) Update

Gen Thomas Bussiere
AFGSC/CC
June 2025

Missile Community Cancer Study Objectives

Assess the as-is environmental state at the three active Missile Wings.

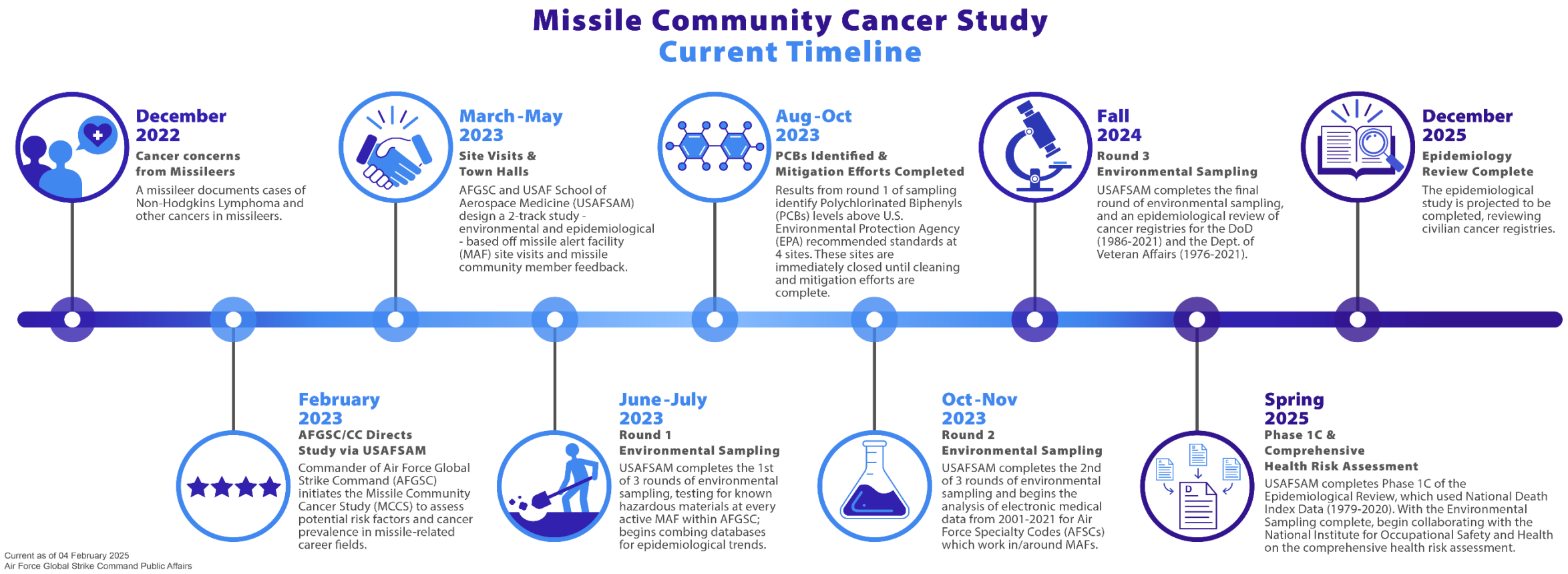
Identify the risk of exposure to our Airman and develop institutional processes to document and communicate potential risks for Airman and their families.

Understand the scope of potential exposures, 1976 through current day, and document exposures for DoD, separated and retired members, families, and VA partners.

Environmental Sampling **DOEHRS/ILER** **Epidemiology Review**

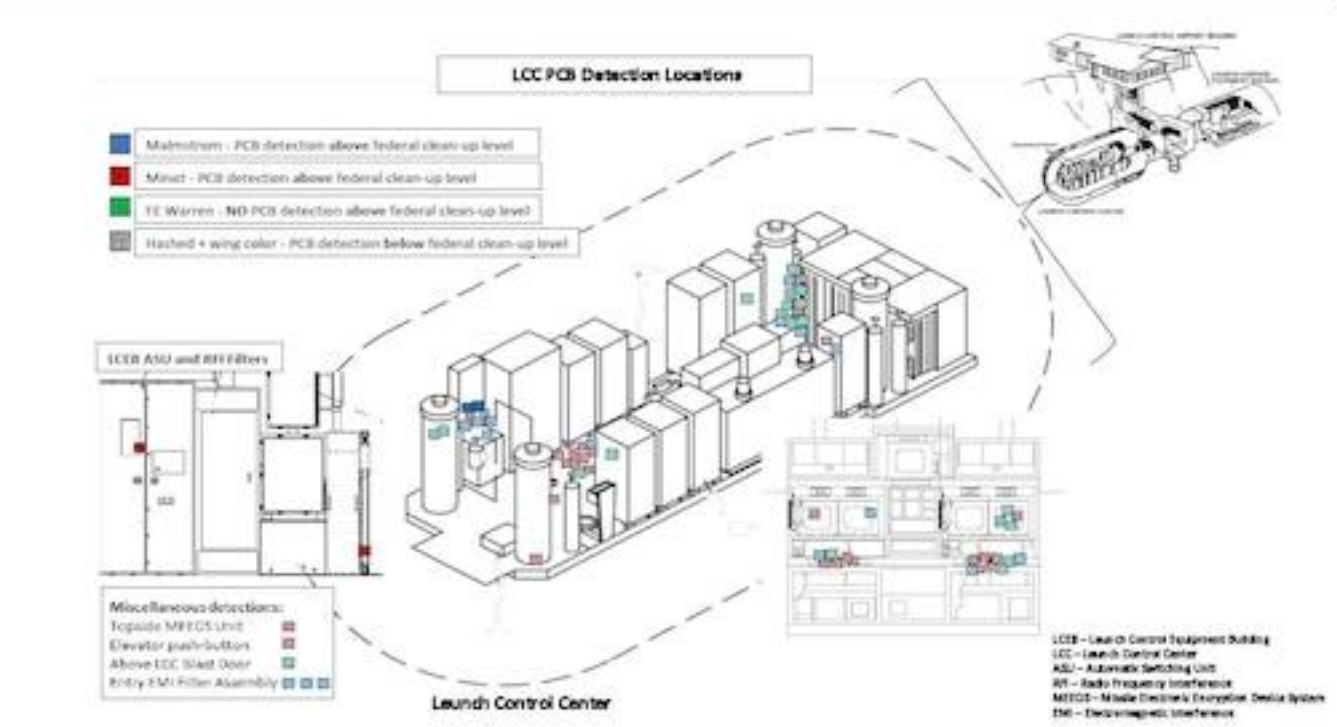
MCCS Timeline/Recap

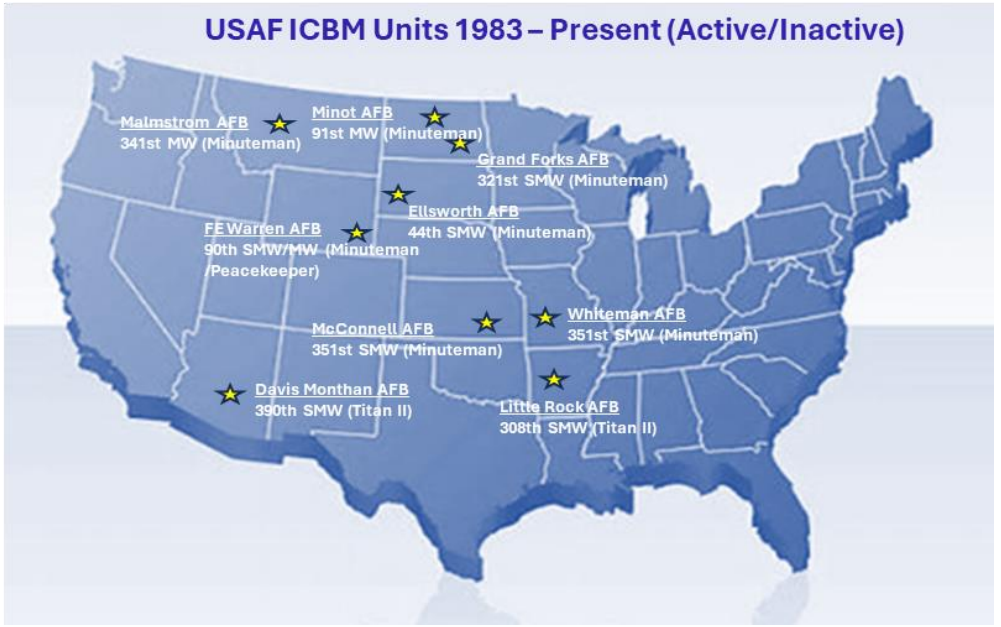
December 2022 - Space Force Guardian and Former Missileer started an important dialogue: *Do Missileers have an increased cancer risk?*



Ongoing Efforts

- **PCB response protocols standardization complete**
  - Maintenance Technical Orders (TOs)
  - Civil Engineer Manuals
  - Signage





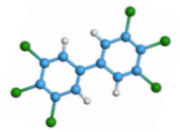
- **Missile Alert Facility** (MAF) improve environmental system inspection processes
- Deep Cleaning contract in progress
- PCB Cleaning contract awarded
- **Launch Facility** (LF) PCB sampling integrated into inspection processes

Environmental Sampling Results

- 20th Air Force Missile Wings: all 45 Missile Alert Facilities (MAFs) tested in each of 3 seasonal rounds - over 8400 samples
  - Vandenberg SFB missile facilities
  - Hill AFB Strategic Missile Integration Complex (SMIC)
- **All Rounds: all air, water, & soil samples <u>below</u> acceptable regulatory levels for any chemicals or hazards**
- **Radon levels well <u>below</u> intervention threshold for all 5 bases**

Nitrate & Nitrites	• Seasonal testing to track water quality fluctuations • Compared to community water systems
Radon	• Odorless, radioactive gas from natural stone deposits • 90-day sampling process
Organo-phosphates	• Pesticide sampling conducted seasonally to assess fluctuation based on local farmers spray schedule
Volatile Organic Cmpds (VOCs)	• Often in cleaning supplies & pesticides • Can accumulate indoors with low ventilation
Polychlorinated Biphenlys (PCBs)	• Common in lubricating oils & electrical equipment • Found in electrical components in MAFs
Carbon Monoxide	• Colorless, odorless gas produced from fuel combustion • Can accumulate indoors

- **PCBs on surfaces, <u>only</u> hazard discovered above EPA recommended threshold**
- Long-lasting chemicals widely used in electrical, heat transfer, and hydraulic equipment
  - Labeled as a potential carcinogen, US banned production in 1979
  - AF Civil Engineer - Elimination of Liquid PCBs Prioritization Guidance, 1996
  - 3 MAFs (4 surface samples out of 1205 total at 5 bases) over EPA recommended threshold for mitigation
    - PCBs mitigated to prevent exposure

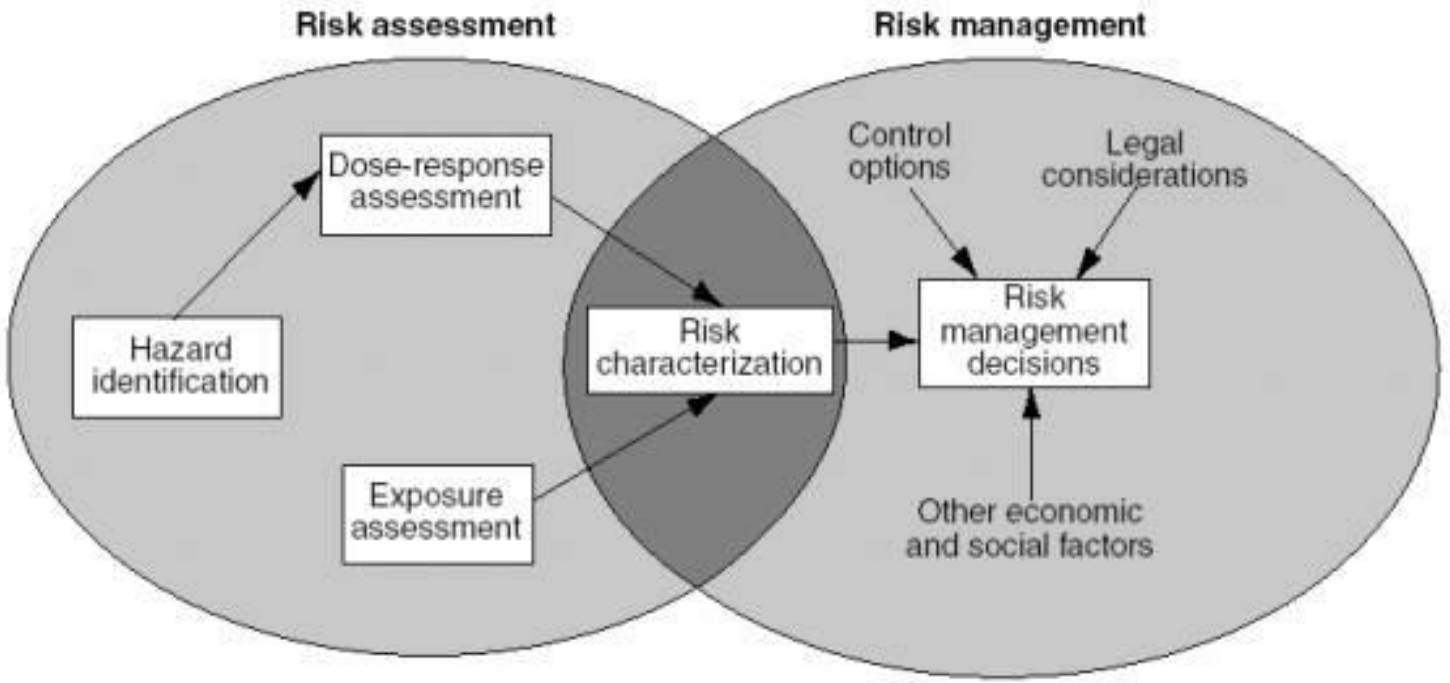


Health Risk Assessment (HRA)

- **US Environmental Protection Agency's HRA Process**
  - Hazard Identification
  - Dose-Response Assessment
  - Exposure Assessment
  - Risk Characterization

- **3 Exposure Routes**
  - Air (chemical & Radon) → Inhalation
  - Water → Ingestion
  - Surface containments → Absorption

- **2 Types of HRA**
  - Cancer
  - Non-Cancer (targeted organ risk)



Source: EPA Office of Research and Development.

HRA Methodology

Methodology Overview

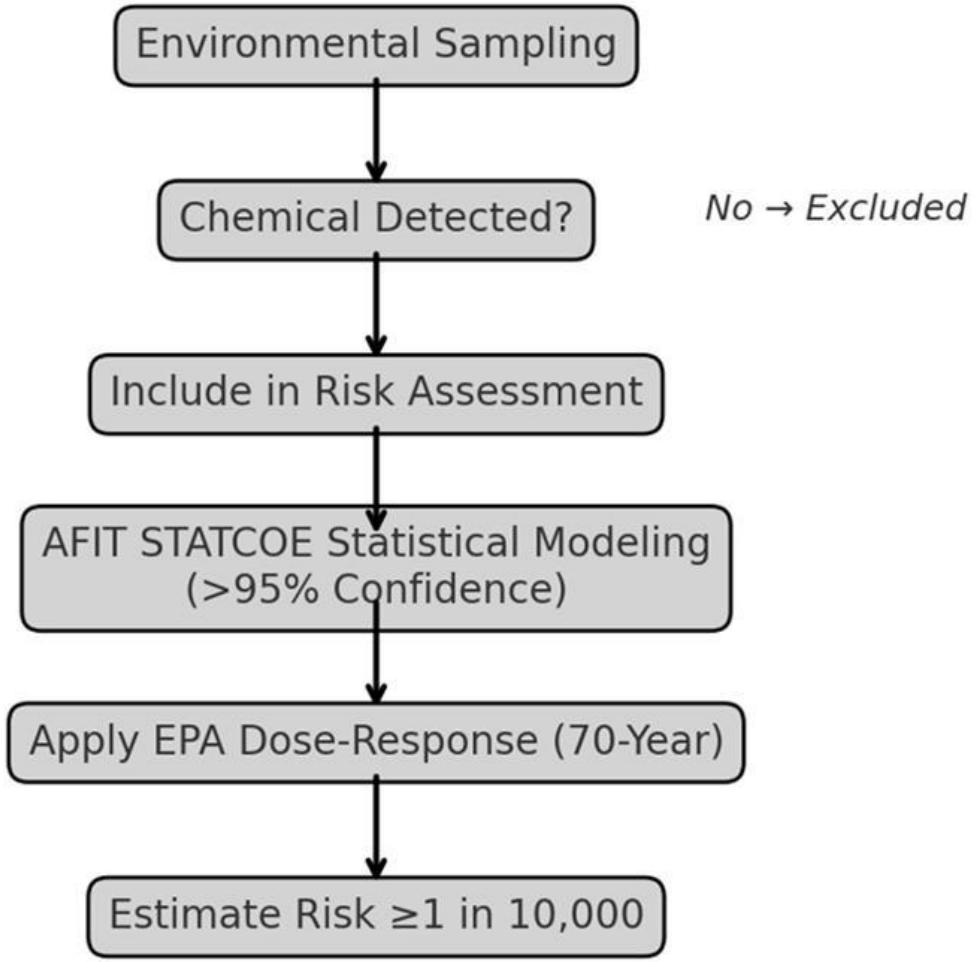
- Developed in consultation with NIOSH experts
- Inclusion: Any detected chemical assessed
- Exclusion: Non-detected substances

Statistical Approach

- >95% confidence estimation by AFIT STATCOE

Dose-Response & Risk Modeling

- Carcinogen data from EPA (70-year exposure)
- Conservative assumptions for safety
  - MAF exposure duration is much shorter



HRA Carcinogen References

- Agency for Toxic Substances and Disease Registry (ATSDR)
  - International Agency for Research on Cancer (IARC)
  - US Environmental Protection Agency (EPA)
  - Health and Human Services' National Toxicology Program (NTP)
  - National Institute for Occupational Safety and Health (NIOSH)
- American Conference of Governmental Industrial Hygienists (ACGIH)

- American Cancer Society: US lifetime cancer risk
  - Males 39.9% (3,990 per 10,000)
  - Females 39.0% (3,900 per 10,000)

HRA Cancer Risk

The potential cancer risks based on the 3 rounds of sampling are presented as a range.

- **The lower bound estimate is based on 8-years of exposure**
- **The conservative, upper bound estimate is based on 70-years of exposure**

The additional estimated lifetime risks to develop cancer for members working in the Missile Alert Facilities are:

- **Malmstrom: <1-23 potential cancer cases in 10,000 persons; (0.23%)**
  - **Probability for males – 39.9% to 40.13%; probability for females 39.0% to 39.23%**
- **F.E. Warren: <1-11 potential cancer cases in 10,000 persons; (0.11%)**
  - **Probability for males – 39.9% to 40.01%; probability for females 39.0% to 39.11%**
- **Minot: <1-7 potential cancer cases in 10,000 persons; (0.07%)**
  - **Probability for males – 39.9% to 39.97%; probability for females 39.0% to 39.07%**

This risk assessment is not specific to any type of cancer

Cancer Risk– Malmstrom AFB

CHEMICAL NAME	CAS NUMBER	MATRIX	ROUTE OF EXPOSURE	INHALATION CANCER RISK	INGESTION CANCER RISK	DERMAL CANCER RISK	CUMULATIVE CANCER RISK BY EXPOSURE PATHWAY	TOTAL ESTIMATED CANCER RISK	EXCEEDS ONE EXCESS CANCER RISK IN TEN THOUSAND [0.0001]?*	CANCER RISK**
Benzene	71-43-2	Air	Inhalation	0.00179	---	---	0.00223	0.00234	Yes	Potential Cancer Risk Equals 23 in 10,000 MAF Occupants
Styrene	100-42-5			7.98E-06	---	---				
1,2-Dichloroethane	107-06-2			3.38E-04	---	---				
Radon-222	14859-67-7			1E-4	---	---				
Di(2-ethylhexyl)phthalate	117-81-7	Drinking Water	Ingestion	---	4.81E-07	---	1.79E-05			
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6			---	1.75E-05	---				
Aroclor 1260	11096-82-5	Surface	Absorption	---	---	4.6E-05	9.26E-05			
Aroclor 1254	11097-69-1			---	---	4.6E-05				

* Source: National Institute of Occupational Safety and Health, *Current Intelligence Bulletin 68: NIOSH Chemical Carcinogen Policy* (2017)

** Number is attributed to Total Cancer Risk, which may include Non-Hodgkins Lymphoma (NHL)

Non-Cancer Health Screening Value

Health screening value (HSV) (screening for long term exposure)

- **Derived from prioritized sources:**
  - **Federal screening levels (EPA, ATSDR, DOE, etc)**
  - **State screening levels**
  - **Military exposure guidelines**
  - **International screening levels**
  - **Air Force health limits**
- **Consider risks from simultaneous exposures to multiple hazardous substances through all routes of exposure.**
- **Chemicals often impact multiple organs**
  - **Benzene impacts blood, bone marrow, central nervous system, GI tract**

Non-Cancer Risk

Statistical Base Exposure are the 95% confidence estimations from 3 sampling rounds

- The **lower bound** levels are based on Federally regulated limits (OSHA)
- The conservative **upper bound** levels are based on health screening value
- Both regulatory and HSV hazard quotients were added across 3 routes and 13 target organs

$$\textbf{\textit{Hazard Quotient}}\ (\textbf{\textit{HQ}}) = \frac{\textbf{\textit{Statistical Base Exposure}}}{\textbf{\textit{Federal Limits or HSV}}}$$

- HQ < 1 indicates action not warranted
- HQ > 1 indicates action may be warranted

Upper and Lower Bounds by Number of Target Organs		
Installation	Federal (Lower Bound)	HSV (Upper Bound)
Malmstrom	1	11
F.E. Warren	0	11
Minot	0	1

Upper Bound – Malmstrom AFB

BY TARGET ORGAN														
Chemical Name	**CAS Number**	**BL**	**BM**	**CNS**	**CVS**	**EY**	**GIT**	**IS**	**Ki**	**Li**	**RP**	**RS**	**SK**	**UT**
Benzene	71-43-2	0.702	0.702	0.702	---	0.702	0.702	0.702	---	---	0.702	---	0.702	---
Styrene	100-42-5	0.005	---	0.005	0.005	0.005	---	---	---	0.005	---	---	0.005	---
1,2-Dichloroethane	107-06-2	---	---	0.636	0.636	0.636	0.636	0.636	0.636	0.636	---	0.636	---	0.636
Toluene	108-88-3	---	---	0.007	0.007	0.007	---	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Trans-1,2-Dichloroethylene	156-60-5	---	---	0.265	---	0.265	---	0.265	0.265	0.265	0.265	---	0.265	---
Radon-222	14859-67-7	---	---	---	---	---	---	---	---	---	0.050	---	---	---
p+m-Xylene	179601-23-1	0.058	---	0.058	---	---	0.058	---	0.058	0.058	0.058	---	0.058	---
Di(2-ethylhexyl)phthalate	117-81-7	---	---	0.183	---	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	---
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	---	---	---	---	0.143	---	---	0.143	0.143	---	0.143	0.143	---
Total Nitrate/Nitrite	14797-55-8	0.460	---	---	0.460	---	---	---	---	---	---	0.460	---	---
Aroclor-1260	11096-82-5	---	---	---	---	---	---	---	---	---	---	---	0.925	---
Aroclor-1254	11097-69-1	---	---	---	---	---	---	---	---	---	---	---	0.925	---
Cumulative Risk By Target Organ		**1.225**	0.702	**1.852**	**1.108**	**1.942**	**1.580**	**1.794**	**1.293**	**1.298**	**1.266**	**1.429**	**3.214**	0.643

Target Organs: BL – Blood, BM – Bone Marrow, CNS – Central Nervous System, CVS – Cardiovascular System, EY – Eyes, GIT – Gastrointestinal Tract, IS – Immune System, Ki – Kidneys, Li – Liver, RP – Respiratory System, RS – Reproductive System, SK-Skin, UT – Urinary Tract

Lower Bound – Malmstrom AFB

BY TARGET ORGAN															
Chemical Name	**CAS Number**	**Federal Health Limit [µg/m³]**	**BL**	**BM**	**CNS**	**CVS**	**EY**	**GIT**	**IS**	**Ki**	**Li**	**RP**	**RS**	**SK**	**UT**
Benzene	71-43-2	3,190	0.072	0.072	0.072	---	0.072	0.072	0.072	---	---	0.072	---	0.072	---
Styrene	100-42-5	426,180	0.000	---	0.000	0.000	0.000	---	---	---	0.000	---	---	0.000	---
1,2-Dichloroethane	107-06-2	200,000	---	---	0.000	0.000	0.000	0.000	0.000	0.000	0.000	---	0.000	---	0.000
Toluene	108-88-3	753,370	---	---	0.000	0.000	0.000	---	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trans-1,2-Dichloroethylene	156-60-5	793,000	---	---	0.000	---	0.000	---	0.000	0.000	0.000	0.000	---	0.000	---
p+m-Xylene	179601-23-1	435,000	0.000	---	0.000	---	---	0.000	---	0.000	0.000	0.000	---	0.000	---
Chemical Name	**CAS Number**	**Federal Health Limit [WLM/yr]**	**BL**	**BM**	**CNS**	**CVS**	**EY**	**GIT**	**IS**	**Ki**	**Li**	**RP**	**RS**	**SK**	**UT**
Radon-222	14859-67-7	4	---	---	---	---	---	---	---	---	---	0.050	---	---	---
Chemical Name	**CAS Number**	**Federal Health Limit [µg/L]**	**BL**	**BM**	**CNS**	**CVS**	**EY**	**GIT**	**IS**	**Ki**	**Li**	**RP**	**RS**	**SK**	**UT**
Di(2-ethylhexyl)phthalate	117-81-7	6	---	---	0.183	---	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	---
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	3E-06	---	---	---	---	0.143	---	---	0.143	0.143	---	0.143	0.143	---
Total Nitrate/Nitrite	14797-55-8	10,000	0.460	---	---	0.460	---	---	---	---	---	---	0.460	---	---
Chemical Name	**CAS Number**	**Federal Health Limit [µg/100 cm²]**	**BL**	**BM**	**CNS**	**CVS**	**EY**	**GIT**	**IS**	**Ki**	**Li**	**RP**	**RS**	**SK**	**UT**
Aroclor-1260	11096-82-5	10	---	---	---	---	---	---	---	---	---	---	---	0.925	---
Aroclor-1254	11097-69-1	10	---	---	---	---	---	---	---	---	---	---	---	0.925	---
Cumulative Risk By Target Organ			0.532	0.072	0.255	0.460	0.398	0.255	0.255	0.326	0.326	0.305	0.786	**2.248**	0.000

Health Risk Assessment Summary

- This Health Risk Assessment (HRA) combined three interim reports to characterize cancer and non-cancer risk as a range between shift work to a lifetime exposure.
- Provides a single snapshot of the current environment; does not describe past environments

- Results warrant active monitoring of MAF personnel as an occupational shop
  - Bioenvironmental will conduct annual sampling and update the HRA based on sampling results
  - Public Health will guide shop supervisors in hazard communication for workplace exposures
  - Public Health in concert with supervisors will maintain accurate unit rosters
  - Occupational and Environmental Health Exposure Data added to every member's medical record

- HRA and annual sampling results available in Defense Occupational and Environmental Health Readiness System (DOEHRS)
  - DOEHRS data feeds to Individual Longitudinal Exposure Record (ILER)

Way Forward

- **DOEHRS/ILER**
- **Burning Classified Materials**
- **Complete Epidemiology Review**
  - Phase 2 – continuing to receive data from civilian cancer registries through the Virtual Pooled Registry; projected completion Dec 2025
- **Stakeholder Engagement**
  - Continuing to pass along study updates to Veterans Affairs (VA)
  - VA Coordination - Military Environmental Exposure Sub-Council
  - Congressional updates
  - For more information on expanded VA coverage

The PACT Act And Your VA Benefits | Veterans Affairs

- **Website for public information/questions:** [Missile Community Cancer Study (af.mil)]