



Identification of Historical Potential Contaminants of Concern (COCs) at the Karshi-Khanabad (K2) Air Base in Uzbekistan

K2 Community Forum
June 29, 2023

Karen Scruton, MS
Aaron Young, PhD
**OCHHA Exposure
Investigations Section**

Good morning – my name is Karen Scruton and I am the section chief for the exposure investigations section at ATSDR. I will be providing you with information on the Identification of Historical Potential Contaminants of Concern (COS) at the K2 Air Base in Uzbekistan report.

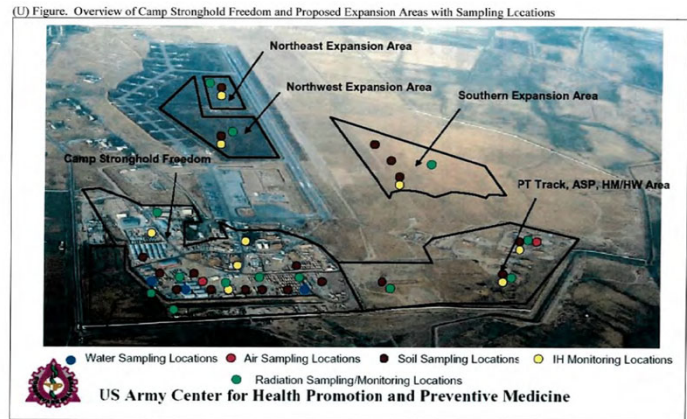
Background

- Karshi-Khanabad (K2) Air Base in Uzbekistan, also called Camp Stronghold Freedom, was a Soviet-era Air Base used for support missions in Afghanistan
- The US military operated the base from 2001 to 2005 with 15,034 Service members deployed during that time
- Pursuant to Section 2010 of the Johnny Isakson and David P. Roe, M.D. Veterans Health Care and Benefits Improvement Act of 2020, Public Law 116-315, the Veteran's Administration (VA) entered into an agreement with ATSDR to
 - prepare a report on the exposures at K2
 - assess potential health effects associated with contaminants found at K2.

Read the information on the slide

Data Evaluation

- Sampling results were extracted from historical documents from 2001 to 2004.
- The data were included in documents produced by the Army Center for Health Promotion and Preventative Medicine – Europe (CHPPM).
- ATSDR reviewed data for
 - organic and inorganic compounds
 - asbestos (air and water),
 - radiation (air, water, and soil),
 - pesticides (surface wipes),
 - inorganic arsenic (surface wipes), and
 - sound.



For the Data Evaluation –environmental samples were taken on the K2 base in the areas noted on the map.

- Read the first two bullets
- For the third green bullet:

ATSDR reviewed all the data in the reports and the COCs identified from our screening process were organic and inorganic compounds. I will discuss the screening process and the COCs identified from the screening process later in the presentation. I also wanted to provide information on other contaminants we reviewed but did not identify as COC.

- Read the rest of the bullets

Data Evaluation Results

All data were screened using ATSDR Screening Levels

- Organic and inorganic chemicals were identified as contaminants of concern (see slides 6-12)
- All asbestos samples were below occupational standards
- Radiation data were within the range of background levels in the area
- Pesticides were below detection limit in surface wipes
- Inorganic arsenic
 - no screening level in surface wipes
 - evaluated in water and soil
- Sound was of concern based on flight operations

All data were screened using ATSDR Screening Levels - Organic and inorganic compounds were identified as contaminants of concern. Organic compounds included volatile and semi-volatile organic compounds (VOCs and SVOCs) and inorganic compounds included naturally-occurring metals or elements. The term organic just means that the compounds contain carbon.

The additional chemicals that were evaluated as outlined on the previous slide were not identified as COCs for the reasons below.

- Read the rest of the bullets

ATSDR Screening Process

- Historical documents identified Contaminants of Concern (COCs) based on comparison to Military Environmental Guidelines (MEGs)
 - MEGs are used by the military to identify COCs for military personnel and were used to screen the K2 data in the 2001 to 2004 reports
 - ATSDR used current Screening Levels (SLs) based on protecting residential adults and, therefore, are usually lower than the MEGs
 - Maximum concentrations identified in each medium from the historical documents were compared to ATSDR's health-based SLs
- Contaminants with maximum concentrations above the SL were identified as Contaminants of Concern (COCs)
- Additional COCs were identified using the ATSDR SLs compared to the MEGs

I'd like to go over the ATSDR screening process and how it differs from the screening process used by the military

- Read the information on the slide

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Arsenic	None expected	Liver, kidney, lung, bladder, skin (All Human)		X	X	
Benzene	Blood disorders (anemia, bleeding) (Human) Changes to levels of blood antibodies and white blood cells (Human) Changes in nervous system responses (Mouse)	Leukemia (Human)	X			X
Benzo(a)pyrene	None expected	Respiratory (Human), skin and gastrointestinal (Rat/Mouse)	X		X	

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

I'm going to walk you through six tables that provide the COCs identified from the screening process and health effects associated with each COC

- Again, the screening process identified COCs that are organic and inorganic chemicals.
- The potential health effects listed on these tables are health effects that have been found to be associated with exposure to each chemical. Scientists use information collected from both human and animal studies to identify potential health effects for a chemical. The table notes what kind of study was used to identify the health effects – human or animal study – meaning rats and mice.
- A chemical can have non-cancer or cancer effects or both – these are both listed on the table with the screening levels for cancer effects usually lower than those for noncancer so it's not unusual for a screening level for cancer, but not non-cancer, to be exceeded by the maximum concentration of a chemical.
- *I want to emphasize as we go through these tables that even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Again, the intention of the COC identification was to help the VA inform their K2 surveillance program.*
- Finally, the table indicates with an X which medium the chemical was found in above screening levels with medium means air, water, soil or gas that is generated from soil.
- For arsenic, which is an inorganic metal, the maximum level found in water and soil was above the screening level for cancer, but not for non-cancer.
- For benzene, which is a VOC, the maximum level in air and soil gas was higher than the screening levels for both noncancer and cancer effects.
- Benzo(a)pyrene is a SVOC and was found to exceed the cancer screening level in air and soil

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Bromodichloro-methane	None expected	Liver, kidney, small intestine (All Rat/Mouse)		X		
Cadmium	Increased protein excretion from the kidneys (Human) Decrease in bone density (Rat) Altered pup behavior (Rat)	None known		X		
Chloroform	None expected	Kidney, Liver (All Rat)		X		
Chromium (assumed hexavalent)	Changes in number of blood cells, anemia (Rat) Changes in liver and small intestine tissues (Rat) Changes in lymph nodes (Mouse)	Lung and Stomach (Human), small intestine (Mouse), mouth (Rat)		X		

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

- On this slide, the maximum level of bromodichloromethane and chloroform, both VOCs, exceeded the cancer screening level in water
- The maximum level of cadmium and chromium, both inorganic metals, also exceeded non-cancer screening levels in water. The cancer screening level was also exceeded for chromium.
- There are several forms of chromium. To be health protective, we listed effects associated with the form that has more health effects

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Copper	Abdominal pain, vomiting, nausea (Human) Reduced antibodies (Human) Increased salivation (Human)	None known		X		
Cumene (isopropyl benzene)	Increased kidney and adrenal gland weight (Rat)	None known				X
Di(2- ethylhexyl) phthalate	Decreased estrogen during pregnancy and accelerated maturing of eggs (Mouse) Increased liver weight and changes in enzymes (Rat) Increased immune response in animals (Mouse) Impaired learning, memory and reduced motor skills (Mouse)	Liver, pancreatic, testicular (All Rat)			X	

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

- The maximum level of copper, a metal, was found to be greater than the noncancer screening level in water
- For cumene, a VOC, the maximum level was found to be above the noncancer screening level in soil gas
- For di(2-ethylhexyl)phthalate, a SVOC, the maximum level was found to be above both the noncancer and cancer screening levels in soil

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Ethylbenzene	Hearing loss (Rat) Kidney damage (Rat) Changes in liver enzymes (Rat)	None known				X
Kerosene	Reduced motor skills (Rat) Effects on liver function (Rat)	None known	X			
Lead	Reduced fetal growth and lower birth weights, permanent adverse effects on the developing brain and lower IQ (Human) High blood pressure (Human) Decreased kidney function (Human)	None known		X		
Methylene chloride	Not above SL	Liver, lung, breast (All Rat)	X		X	

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

- Ethylbenzene and kerosene are both VOCs and their maximum levels were found to exceed the noncancer screening levels in soil gas or air
- Methylene chloride is also a VOC and the maximum level was found to exceed the cancer screening level in air and soil
- Lead is a metal and is well known to cause health effects, especially in children. The maximum level was found above the noncancer screening level in water.

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Naphthalene	Altered central nervous system function (Rat) Effects on cells lining the respiratory system (Rat and Mouse)	Respiratory (Rat/Mouse)	X			
Particulate Matter (less than 10 microns (PM10))	Worsening asthma, bronchitis, decreased lung function (Human) Increased risk of heart attack (Human)	None known	X			
Total Phosphorus	Lethargy and loss of appetite (Human) Decreased number offspring and an increased incidence of stillborn births (Rat) Increased tremors during pregnancy (Rat) Reduction of number of liver cells (Rat)	None known		X		

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

- Naphthalene is a SVOC and the maximum level was found to exceed both the noncancer and cancer screening levels in air
- Particulate matter, which is just that – particulates in air with the 10 indicating the size of the particles. The maximum level in air was above the noncancer screening level.
- The maximum level of total phosphorus, an inorganic element, was found to exceed the noncancer screening level in water

Health Effects Associated with COCs by Medium

Potential Health Effects			Medium Sampled			
COC	Non-Cancer Effects	Cancer Type	Air	Water	Soil	Soil Gas
Tetrachloroethylene	None expected	Bladder, non-Hodgkin's lymphoma, leukemia, respiratory, cervical, breast (All Human), liver (Mouse), kidney (Rat)	X			
Trimethylbenzenes 1,2,3-TMB; 1,2,4-TMB; and 1,3,5-TMB	Decreased detection of pain (Rat) Cellular changes and decreased clotting time in blood (Rat) Inflammation of lung tissue (Rat)	None known	X			X
Xylenes, total	Increase in anxiety and forgetfulness (Human) Irritation of the nose and sore throat (Human) Increased nausea and poor appetite (Human)	None known				X

Potential health effects for each contaminant were identified using the following: ATSDR's Toxicological Profiles, ATSDR's Public Health Assessment Site Tool (PHAST), and EPA's Integrated Risk Information System (IRIS). *Even if someone has been exposed to these chemicals, it does not mean that they will develop these health effects. Whether or not someone will develop health effects depends on many factors including how much they were exposed to and for how long.* The health effects are identified to help the VA inform its K2 surveillance program.

- Tetrachloroethylene, the trimethylbenzenes and xylenes are all VOCs. The maximum for tetrachloroethylene was above the cancer screening level in air.
- The maximum levels of trimethylbenzenes and xylenes were above the noncancer screening levels in soil gas and/or air

Additional COCs Resulting from ATSDR Screening

Contaminant	Media			
	Air	Water	Soil	Soil Gas
Volatile Organic Compounds (VOCs)				
Benzene	X	--	--	--
Bromodichloromethane	--	X	--	--
Cumene (isopropylbenzene)	--	--	--	X
Methylene Chloride	X	--	--	--
1,2,3-trimethylbenzene	X	--	--	X
1,3,5-trimethylbenzene	X	--	--	X
Chloroform	--	X	--	--
Semi-volatile Organic Compounds (SVOCs)				
Benzo(a)pyrene	X	--	X	--
Di(ethylhexyl)phthalate	--	--	X	--
Naphthalene (o)	X	--	--	--
Inorganics				
Arsenic	--	X	X	--
Cadmium	--	X	--	--
Copper	--	X	--	--
Total Phosphorus	--	X	--	--
Chromium (assume CrVI)	--	X	X	--

Propylbenzene and xylene were identified as COCs in the CHPPM document but not for the ATSDR screening

- This table provides a listing of the additional COCs that resulted from the ATSDR screening— meaning they were not found as COCs from the MEG screening. They are highlighted in yellow.
- Again, we did expect to see more chemicals identified as chemical of concern in our analysis because our screening levels are lower than MEGS. This table indicates the additional chemicals, VOCs, SVOCS and inorganics, that we identified from our screening that were not identified in the screening done using the military levels, or MEGs.
- Two contaminants were identified from the MEGs and not from our screening – the screening levels do evolve as more information is gathered and the maximum levels didn't exceed our current screening levels.

Uranium and Radiation Assessment

- Depleted Uranium (DU) was identified in soil in 2001 at the former Missile Storage Site (Site 1), which is outside the military protection berm area.
 - Access to Site 1 was declared “off-limits” from use in 2001.
- Radiation was measured in soil, air, and wipes within the military protection berm in 2001.
 - All results were either non-detect or considered to be below background levels.

Read the information on the slide

Limitations and Conclusions

- ATSDR recognizes that data at K2 are limited to specific areas of the base and times of testing and may not fully represent levels of exposure to contaminants by Service members at K2.
- ATSDR identified additional COCs in this report as compared to the K2 documents because the SLs used by ATSDR were generally lower than the MEGs
- The health effects associated with the COCs identified by the ATSDR screening were used by the VA for consideration in the K2 Surveillance Program (K2SP)

Read the information on the slide

Thank you for attending!

For more information, contact NCEH/ATSDR
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.atsdr.cdc.gov www.cdc.gov
Follow us on Twitter @CDCEnvironment

The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention / the Agency for Toxic Substances and Disease Registry and should not be construed to represent any agency determination or policy.



Read the information on the slide