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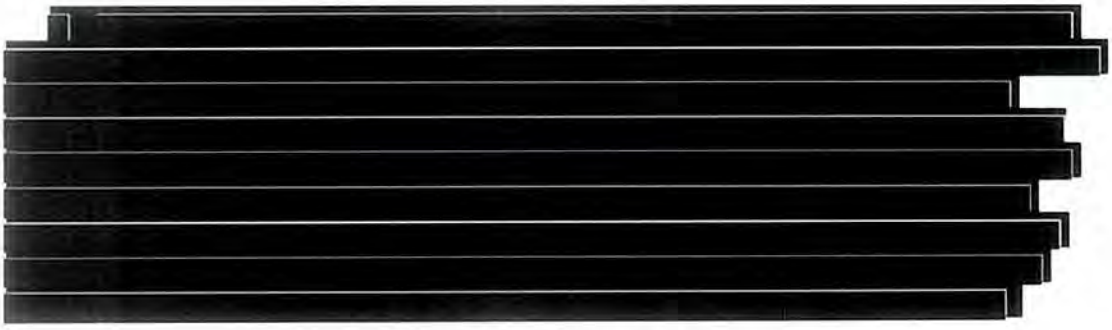
(U) Preliminary Industrial Hazards Assessment, Uzbekistan, Operation Enduring Freedom.

1. (U) REFERENCES. See Appendix A for a list of references used.

2. (U) ~~(S)~~ PURPOSE. To provide a preliminary industrial hazards assessment of Karshi- Khanabad Airfield, Uzbekistan, in support of intelligence preparation of the battlefield measures and on-going environmental health surveillance for Operation Enduring Freedom. It summarizes the potential hazards at the airfield due to the nearby industries. It does not address current environmental conditions. That document will be a separate assessment under different cover.

3. (U) ~~(C)~~ BACKGROUND. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Deployment Environmental Surveillance Program, has coordinated with the Armed Forces Medical Intelligence Center (AFMIC) to determine the potential occupational and environmental health hazards of operational significance at the Karshi-Khanabad Airfield, Uzbekistan. In general, occupational and environmental health hazards will present increasing health risks to deployed forces and may result in short-term or long-term adverse health effects as the result of exposures to Toxic Industrial Chemicals (TICs).

4. (U) ~~(S//NF)~~ PROCEDURES.



[redacted]

b. (U) ~~(S)~~ Information provided on the associated TIC's was derived from comparing facilities [redacted] to similar U.S. industrial sectors. The U.S. facilities are associated with specific chemicals through the U.S. Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) and Accidental Release Information Program (ARIP) databases. The EPA's TRI and ARIP databases contain information on releases of toxic chemicals by specific industrial sectors in the U.S. Foreign industrial facilities may differ significantly from U.S.-based industries with respect to processes, products, waste emissions, and accidental releases; thus, the chemicals associated with foreign facilities may include highly toxic and explosive chemicals not addressed in this analysis.

c. (U) ~~(S)~~ Based on this screening process, the primary chemical hazards at this facility are believed to include some volatile organic chemicals; benzene and benzene derivatives; MEK; Glycol Ethers and MTBE; low molecular weight saturated and unsaturated hydrocarbons (< C_8); and two other volatile organics - dichloromethane, and 1,1,1 trichloroethane. (See table 2) These chemicals represent the most toxic chemicals likely to pose acute health risks to deployed U.S. personnel from industrial chemical exposure. Pertinent toxicological information, to include a lethal dose (LD_{50}) less than 50 milligrams/ kilogram; a lethal concentration (LC_{50}), less than 20 milligrams/liter or a National Fire Protection Association Code of 4 (the highest level), were used to assist in ranking the chemicals and the hazards potentially associated with these facilities (Reference 1).

[redacted]

5. (U) ~~(S//NF)~~ Karshi- Khanabad Airfield

a. (U) ~~(S//NF)~~ The Karshi- Khanabad Complex lies in open, flat terrain, approximately 11 miles east of the Karshi City Center, Figure 1. Specific weather and physical descriptions are available at REDACTED

b. (U) ~~(S//NF)~~ Currently, a tent city is being constructed at the west end of the airfield. At this time, the location is designed to be semi-permanent facility that may hold up to 2000 personnel.

c. (U) ~~(S)~~ Chemicals potentially associated with this location (that may represent acute hazards) are identified in the first column of Table 2 This list is based on an initial screen using acute toxicity data and US based TRI release data.

6. (U) ~~(S)~~ Operational Risk Assessment Level. The risk level for this site is based on the toxicity (severity of effect) of the chemicals present, and the probability of friendly force exposure.

a. (U) ~~(S)~~ Severity. Table 2 was developed based on the effects that may be present after exposure to the chemicals that may be associated with this location. The effects considered are based on both high and low exposure. The high exposure scenario would result from personnel being in very close geographical and temporal proximity to a location and an event that would result in a large release of that chemical. The low exposure scenario would result from personnel in close proximity to a moderated release (e.g. a small but significant leak) or recent residual contamination. In many cases, there may not be sufficient quantity of the chemical present to present a hazard. For purposes of this assessment, the effects resulting from high exposure are considered of critical severity (may effect mission capability), and low exposure will be considered of negligible severity (little or no adverse effect on the mission).

Table 2. (U) ~~(S)~~ Chemical List And Hazard Severity At Karshi-Khanabad Airfield. .

Industrial Chemical	**High Exposure (Critical severity)**	**Conditions for Concentrations Resulting in High Exposure**	**Low Exposure (Negligible severity)**	**Conditions for Concentrations Resulting in Low Exposure**
Acetone	Irritation eyes, skin, respiratory system; dizziness, weakness, headache, confusion, convulsions; liver, kidney injury; pulmonary edema, asphyxia.	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, skin, respiratory system; dizziness, weakness, headache, confusion, convulsions; liver, kidney injury	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Ammonia	Difficulty breathing, bronchospasms, pulmonary edema, skin and respiratory tract burns	Large bulk storage, release event that results in significant volatilization/ aeresolization of concentrated product. Air stagnation, limited mixing layer and low wind speeds.	Irritation of eye, nose and throat	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.

Industrial Chemical	High Exposure (Critical severity)	Conditions for Concentrations Resulting in High Exposure	Low Exposure (Negligible severity)	Conditions for Concentrations Resulting in Low Exposure
Benzene	Headache, nausea, staggered gait; fatigue, loss of appetite, lassitude (weakness, exhaustion); dermatitis; bone marrow depressant/depression	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, skin, nose, respiratory system; giddiness;	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Glycol ethers	Nausea, vomiting and diarrhea, kidney damage CNS depression.	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation, corneal injury redness and pain, Skin irritation, GI irritation.	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Cyclohexane	muscle weakness; dermatitis; giddiness; chemical pneumonia (aspiration liquid). *(for n-hexane)*	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, nose; lightheadedness; nausea, headache; peripheral neuropathy: numbness extremities	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Dichloromethane	(sleepiness, unnatural drowsiness), lightheadedness; numbness, limbs tingle, nausea.	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, skin; fatigue, weakness, somnolence	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Ethylbenzene	Narcosis, coma.	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, skin, mucous membrane; headache; dermatitis;	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Ethylene	Toxicologically, ethylene is a simple asphixiant. High exposure symptoms may include irritation, dizziness or asphyxiation.			
Methanol	Dizziness and vertigo, nausea, vomiting, optic nerve damage	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation of eyes and skin	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Methyl ethyl ketone	Headache, dizziness and vomiting	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation of eye skin and nose, headache, dizziness and vomiting	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.

Industrial Chemical	High Exposure (Critical severity)	Conditions for Concentrations Resulting in High Exposure	Low Exposure (Negligible severity)	Conditions for Concentrations Resulting in Low Exposure
Methyl tert-butyl ether	Dizziness, disorientation, headache, nausea vomiting, unconsciousness and death	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Skin and eye irritation, Irritation to the respiratory tract	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
N-hexane	Peripheral neuropathy: numbness extremities, muscle weakness; dermatitis; giddiness; chemical pneumonia (aspiration liquid).	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, nose; lightheadedness; nausea, headache	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Propylene	Toxicologically, propylene is a simple asphixiant. High exposure symptoms may include irritation, dizziness or asphyxiation.			
1,1,1-trichloroethane	Cardiac sensitization, blood pressure depression and death. LOW single dose ingested toxicity	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Skin, respiratory and eye irritation and corneal damage, dermatitis.	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
1,2,4-trimethylbenzene	Bronchitis; hypochromic anemia, head, drowsiness, fatigue, dizziness, nausea, inco; vomit, conf; chemical pneumonia	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, skin, nose, throat, respiratory system.	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Toluene	Confusion, euphoria, dizziness, headache; dilated pupils, excessive tearing; nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Irritation eyes, nose; fatigue, weakness,	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.
Xylene (mixed isomers)	Confusion; respiratory depression and coma at high doses; Above 200 ppm, xylene causes conjunctivitis, nasal irritation, and sore throats; it is a potent respiratory irritant at high concentrations; dermatitis with prolonged cutaneous exposure	Large bulk storage, atmospheric conditions that do not result in mixing of local air.	Lightheadedness, nausea, headache, and ataxia	Large bulk storage, or other environmental reservoir such as heavily contaminated soil. atmospheric conditions that do not result in mixing of local air.

b. (U) ~~(S)~~ Probability. The probability of acute exposure is dependent on three conditions being met. There must be sufficient quantity present, a sufficient quantity must be released, and friendly forces must be present. Table 3 describes the probability associated with each type of event identified above.

(U) Table 3. Hazard Probability

	Probability Of High Concentration Event	**Probability Of Low Concentration Event**
Sufficient quantity of material present or could be produced.	Likely. (Many of these facilities are active petroleum production facilities)	Likely. (Many of these facilities are active petroleum production facilities)
That an event occurs where a sufficient quantity of chemical is released	Unlikely. This facility is sufficiently removed from the airfield as to preclude a high concentration event.	Seldom. Assuming sporadic release and contact by friendly personnel.
The release may be contacted by friendly forces	Likely. (Friendly forces are bivouacked there)	Likely. (Friendly forces are bivouacked there)
Overall Hazard Probably	Unlikely. Based on distance of facilities from location.	Seldom.

c. (U) ~~(S)~~ Human health risk from exposure to chemicals located at or released from this site are a function both of exposure to these chemicals and the toxicity of these chemicals. Operational risk levels are associated with probability of these exposures and the degree to which personnel/units are exposed. This assessment currently only includes hazards identified using short-term exposure assumptions. It does not address the environmental conditions due to past dumping practices at the airfield.

d. (U) Table 4. Operational Risk Level.

	High Concentration Event	**Low Concentration Event**
Probability	Unlikely	Seldom
Severity	Critical	Negligible
Risk Level	Low	Low
Uncertainty	High	High

7. (U) ~~(S//NF)~~ CONCLUSIONS. Based on this assessment, the industrial chemicals associated with the industries that can affect the airfield pose a low operational risk at this time. The uncertainty associated with these risk levels is fairly high. The assessment is limited by lack of specific information regarding the specific processes used, the identity and amount of chemicals used at this location. Absent this information, the uncertainty associated with this risk level will remain high. Significant deviations from the assumptions identified above may invalidate the assessment.

8. (U) RECOMMENDATIONS. The following recommendations should be incorporated (with applicable revisions) into appropriate combat health support (Annex Q) operation plans, pertinent to occupational and environmental health surveillance for Operation Enduring Freedom.

a. (U) Ensure personnel are informed of potential hazards and trained and equipped with appropriate personal protective equipment (PPE) required to occupy the site during a release due to combat damage. Traditional MOPP is not necessarily sufficient to protect friendly forces in the case of a large-scale release of these industrial chemicals. Table XX contains a summary of the filtration performance of nuclear, biological, and chemical filters containing ASZM-T Carbon (Reference 8).

b. (U) ~~(S)~~ Security of the locations identified in Table 1 must be maintained.

c. (U) Ensure Occupational and Environmental Health (OEH) Surveillance is incorporated into combat health support (CHS) planning (Reference 9). At a minimum this should include ambient monitoring for the following: volatile and semivolatile organic chemicals; particulate matter less than 10 microns; inorganic acids and bases in both air and soil at all potential base camp and/or release point sites within 10 Km.

d. (U) In addition, the current operational risk level can be confirmed with more information. This information should include locations of friendly personnel and specific information on location and amount of materials present or produced.

9. (U) Do not separate this analysis and explanatory information from the following appendices.

10. (U) The points of contact for this assessment are Mr. [redacted], and Mr. [redacted]. Our STU-III number is [redacted]

(U) Table. Filtration Performance of NBC Filters Containing ASZM-T Carbon.

Effective	Marginal	Poor
allyl isothiocyanate	acetone cyanohydrin	1,2-dimethyl hydrazine
Arsine	allyl alcohol	acrolein
boron trichloride	allyl chlorocarbonate	acrylonitrile
boron trifluoride	arsenic trichloride	allyl amine
Chlorine	boron tribromide	ammonia
chlorosulfonic acid	bromine chloride	bromine
cyanogen	bromine pentafluoride	carbon disulfide
Diborane	bromine trifluoride	carbon monoxide
dimethyl sulfate	chlorine pentafluoride	carbonyl fluoride
diphenylmethane-	chlorine trifluoride	carbonyl sulfide
ethyl chlorothioformate	chloroacetaldehyde	ethylene imine
ethylphosphonothiodichloride	chloroacetone	ethylene oxide
Fluorine	chloroacetonitrile	formaldehyde
hexachlorocyclopentadiene	chloroacetyl chloride	hydrogen iodide
hydrogen bromide	crotonaldehyde	hydrogen selenide
hydrogen chloride	diketene	isopropyl isocyanate
hydrogen cyanide	ethyl chloroformate	methyl bromide
hydrogen fluoride	ethylene dibromide	methyl chloroformate
hydrogen sulfide	ethylphosphonous dichloride	methyl chlorosilane
methanesulfonyl chloride	iron pentacarbonyl	methyl isocyanate
parathion	isobutyl chloroformate	methyl mercaptan
perchloromethyl mercaptan	iso-propyl chloroformate	nitric acidfuming
Phosgene	methyl hydrazine	nitric oxide
phosphorus trichloride	n-butyl chloroformate	nitrogen dioxide
selenium hexafluoride	n-butyl isocyanate	phosphorous pentafluoride
sulfur dioxide	n-propyl chloroformate	silicon tetrafluoride
sulfuric acid	phosphine	stibine-
tert-octyl mercaptan-	phosphorus oxychloride	sulfuryl chloride
tetraethyl lead	sec-butyl chloroformate	sulfuryl fluoride
tetraethyl pyrophosphate	sulfur trioxide	tellurium hexafluoride
titanium tetrachloride	tert-butyl isocyanate	trifluoroacetyl chloride
toluene 2,4-diisocyanate	tetramethyl lead	
toluene 2,6-diisocyanate	trichloroacetyl chloride	
tungsten hexafluoride		
Reference: ECBC, ECBD-TR-093, Toxic Industrial Chemicals Assessment of NBC Filter Performance, September 2000		

APPENDIX A
REFERENCES

1. (U) REDACTED [redacted]

3. (U) NATO/PFP, Allied Command Europe (ACE) Directive Number 80-64, Subject: ACE Policy for Defensive Measures Against Toxic Industrial Chemical Hazards During Military Operations, 20 December 1996.

4. (U) Technical Guidance Document 230, Chemical Exposure Guidelines for Deployed Military Personnel, U.S. Army Center for Health Promotion and Preventive Medicine, August, 2001.

5. (U) Field Manual (FM) 100-14, Risk Management, Department of the Army, 23 April 1998.

6. (U) REDACTED [redacted]

7. (U) REDACTED [redacted]

8. (U) USASBCCOM, ECBC, ECBD-TR-093, Toxic Industrial Chemicals Assessment of NBC Filter Performance, September 2000.

9. (U) Joint Chiefs of Staff, Updated Procedures for Deployment Health Surveillance and Readiness, Draft October 2001.

(U) ~~(S//NF)~~ Figure 1. REDACTED ~~Location of toxicological Hazards Near Karshi-Khandar Airfield.~~

(U) ~~(S//NF)~~ REDACTED ~~Figure 2. Avoidance Zones Effecting Karshi-Khandar Airfield.~~