(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

Final Report
Environmental Site Survey and Operational Health Risk Assessment
Stronghold Freedom
Karshi-Khanabad Airfield, Uzbekistan
31 May – 14 June 2002

1. (U) ~~(S//REL)~~ **References.** A list of references is provided in Appendix A.

2. (U) ~~(C//REL)~~ **Purpose.** To assess and characterize potential health risks from environmental contaminants at Stronghold Freedom, Karshi-Khanabad (K2) Airfield, Uzbekistan; make recommendations to mitigate identified health risks; and evaluate the effectiveness of existing countermeasures to minimize health risks. This assessment expands upon an occupational and environmental health (OEH) assessment that was conducted by the U.S. Army Center for Health Promotion and Preventive Medicine - Europe (CHPPM-EUR) from 27 October - 27 November 2001 (reference 1).

3. (U) ~~(S)~~ **Authority.**

a. (U) DoD Directive 6490.2, dated 30 August 1997.

b. (U) DoD Instruction 6490.3, dated 7 August 1997.

c. (U) Joint Chiefs of Staff Memorandum MCM-0006-02, 1 February 2002, subject: Updated Procedures for Deployment Health Surveillance and Readiness.

d. (U) Headquarters Department of the Army Policy Letter, Force Health Protection (FHP): Occupational and Environmental Health (OEH) Threats, 27 June 2001.

e. (U) ~~(S)~~ Message, 150756Z May 02, COMCFLCC, SURG-MD, subject: Request for USACHPPM Services.

f. (U) Message, 271355Z May 02, USCINCCENT, CCJ3, subject: Request for USACHPPM Services.

4. (U) ~~(S//REL)~~ **Scope.**

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

a. (U) ~~(S//REL)~~ Previous Efforts. Reference 1 details an extensive OEH survey performed at Stronghold Freedom in the October-November 2001 timeframe. This survey was performed in response to environmental health threats from jet kerosene contaminated soils uncovered during construction of the Stronghold Freedom tent city area.

b. (U) ~~(S//REL)~~ Scope of Work/Specified Tasks. Commander, Combined Forces Land Component Command (COMCFLCC) requested USACHPPM to perform the following tasks at Stronghold Freedom: assess radiation levels at Site 1 and inside the perimeter berm; be prepared to conduct ambient air monitoring for volatile organic compounds (VOCs); PM10, radiation and suspended asbestos fibers (paragraph 3.e.). USCENTCOM endorsed this request for action and authorized direct coordination between CFLCC Surgeon, Combined Joint Task Force – Afghanistan (CJTF-AFG), and USACHPPM. On 1 June 2002, responsibility for the execution of these surveys passed from the CFLCC to Combined Joint Task Force (CJTF) 180.

c. (U) DoD Requirements. The Department of Defense, Joint Staff, Department of Army, and USCENTCOM policies require that deployed forces identify the risks from OEH hazards as part of the overall Force Health Protection efforts. The CHPPM has developed tactics, techniques and procedures to assess these risks using Operational Risk Management (ORM) practices. These practices were used to conduct this assessment.

d. (U) CHPPM-EUR Team Members. A multidisciplinary team from CHPPM-EUR conducted the assessment. This team included:

(1) COL [redacted], Commander, USACHPPM-EUR and environmental toxicologist.

(2) LTC [redacted], P.E., environmental engineer, Survey Team Leader.

(3) MAJ [redacted], D.V.M., M.P.H., risk communication specialist, epidemiologist, and veterinarian.

(4) Mr. [redacted], health physicist.

(5) Mr. [redacted], industrial hygienist.

(6) CPT [redacted], nuclear medical science officer.

(7) CPT [redacted], E.I.T., environmental engineer.

(8) SGT [redacted], health physics technician

(9) CPL [redacted], preventive medicine specialist.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(10) SPC [redacted], preventive medicine specialist.

(11) SPC [redacted], preventive medicine specialist.

5. (U) ~~(S//REL)~~ Background.

a. (U) ~~(C//REL)~~ Previous Assessment Findings / Countermeasures. Reference 1 contains a detailed report of previous findings, conclusions, and recommendations to mitigate potential health risks at Stronghold Freedom. These are summarized in Appendix H.

b. (U) ~~(S//REL)~~ Areas of Interest/ Current Activities – Stronghold Freedom. To maintain consistency with terminology and locations of sampling points/ installation areas between references 1 and 2 and the current Stronghold Freedom Land Use Master Plan (Figure 1) (reference 15), the following areas of interest are described and cross-referenced as follows:

(1) (U) ~~(S//REL)~~ Former Air to Air Missile/ Air to Surface Missile (AAM/ ASM) Storage Facility. This was referred to as Site 1 in reference 1 [redacted] This facility is located outside the force protection berm (NW corner of the site) and is effectively posted and fenced as an off-limits area by the installation commander. For the purposes of this report, this site will be referred to as Site 1. This area is not described on the master plan. However, the Stronghold Freedom command group published a safety overview map distributed to all personnel identifying this area as an off-limits area for low-level radiation (Figure 2).

(2) (U) Tent City. This is the living area shown in Figure 1 (reference 15). This will be referred to as the Tent City area for this report.

(3) (U) Subsistence/ Storage Area (SSA). This area is located in the northeastern quadrant, was referred to as Site 3 in reference 1, and was the location of the exposed fuel contaminated soils that prompted the CHPPM-EUR deployment in October 2001. At the time of this survey, this area contained a light industrial area used for storage and maintenance and a bulk fuel point constructed and operated by US Forces. This will be referred to as the SSA area for this report.

(4) (U) ~~(S//REL)~~ Operations Area. This area is defined by the boundaries shown in Figure 1 and contains the bulk of the logistics task force and other unit operational areas. The use of this area is primarily for operations, although some personnel also use the area for living. There was no cross-reference for this area in reference 1. Sampling performed in this area previously was identified near the relevant structures or installation landmarks (eg, building/ hardened aircraft shelter). This will be referred to as the Operations Area in this report to maintain consistency with the master plan.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(5) (U) Hardened Aircraft Shelters (HAS)/ Chemical Agent Residual Survey by U.S. Army Technical Escort Unit (TEU). During the same timeframe as this survey, the 507th Logistics Task Force (LTF) requested that TEU perform monitoring and sampling for chemical warfare agents and residuals for HAS and occupied buildings located in the Stronghold Freedom Operations Area, abandoned Uzbek bunkers located south of the runway adjacent to the Uzbek Ammunition Supply Point (ASP), and bunkers within the confines of the present US ASP (also located south of the runway).

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(a) (U) ~~(S)~~ Field results of this survey on 8 June 2002 indicated presumptive positive results for G-Nerve agent in HAS 17 and mustard agent/ blood agent in HAS 14 in the Operations Area. Based on these results, the 507th LTF evacuated Stronghold Freedom personnel from these HAS as a precautionary measure, pending laboratory confirmation. Simultaneously, the TF 261 Medical (installation medical authority) performed a retrospective medical records review and screening of Stronghold Freedom personnel to determine possible clinical exposure effects related to the TEU field results. The CJTF 180 Surgeon subsequently requested HQ, USACHPPM conduct epidemiological analysis and archiving of all questionnaires to determine possible trends as a reach-back capability (reference 23).

(b) (U) ~~(S)~~ The TEU subsequently published a report on 12 June 2002 detailing the results of their field investigation (reference 24). During the course of the TEU investigation, the following samples were collected and submitted to the US Army Soldier and Biological Command (SBCCOM) laboratory for confirmatory analysis: 10 pairs of solid sorbent sample tubes; 7 functioned Drager sample tubes; 16 swipe samples; 28 soil samples; 3 concrete samples; 4 wood samples; 2 water samples and 7 functioned M256 kits. These samples arrived at the SBCCOM laboratory on 16 June 2002. The initial report published by SBCCOM (reference 25) indicated that no Chemical Warfare Material (CW) was detected in the samples submitted by TEU. Non-CW material from these samples indicated the presence of hydrocarbons and semi-volatile organic compounds (SVOCs).

(c) (U) After the release of the SBCCOM test results, both 507th LTF, their successor unit (164th LTF), and CJTF 180 requested the CHPPM-EUR survey team perform additional OEH sampling of HAS 14 and 17 to quantify and qualify possible environmental health hazards, and associated countermeasures, prior to any decision regarding future use of these facilities. The findings of this sampling were summarized in a subsequent report (reference 26).

6. (U) Methodology and Procedures.

a. (U) Radiological Surveys. Radiological survey / sampling locations are shown in Figures B-1 through B-5.

(1) (U) Purpose and Scope. The primary purpose of radiological sampling at Stronghold Freedom was to verify the findings of the previous assessment in October-November 2001; perform additional monitoring for uranium to further define potential health risks; and evaluate the effectiveness of countermeasures implemented by the installation to mitigate radiological health risks. Additionally, the survey team sought to further define the presence and nature of small pieces of depleted uranium in discrete clumps in the former AAM/ ASM site (Site 1). Additional reasons for sampling were to determine if any significant exposure to ionizing and non-ionizing radiation existed in other locations, conduct risk assessment, and if necessary, make recommendations to reduce exposure.

(2) (U) Procedures.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(a) (U) Dosimetry. Six team members wore thermoluminescent dosimetry (TLDs) while deployed at Camp Stronghold Freedom in order to measure representative ionizing radiation dose information for deployed soldiers. Dosimetry was submitted for beta/gamma radiation dose analysis to US Army Ionizing Radiation Dosimetry Branch, Redstone Arsenal. In addition, Mr. [redacted] wore a direct-read dosimeter Eberline Digidose® (DD-300) alarming pocket dosimeter, SN: 2588, Calibration Date: 18 April 2002, throughout the deployment at Stronghold Freedom in order to obtain representative gamma dose-rate information.

(b) (U) Gamma dose-rate survey. A Cesium-137 check source (Serial Numbers (SN): 2811 and 2819) was used prior to and following the gamma-dose rate survey to verify each instrument/probe was within established calibration standards. The mean of ten, one-minute background counts, was used for each instrument to determine the background level and ensure the instrument was functioning properly. All ten background counts were verified to be within two standard deviations of the mean value. The naturally-occurring "background" level of radiation was established at an area with the least probability of contamination. Any location exceeding three times the background level (action level) was marked for further investigation. The entire camp was surveyed with Eberline E-600® instruments (SN: 849 and 855; Calibration Due Date 13 January 2003 and 13 April 2003, respectfully) using the SPA-9 probe (SN: 295 and 297, Calibration Due Date: 13 January 2003 and 13 April 2003, respectfully) to measure gamma dose-rate levels. The focus of the survey was the living and working areas of deployed soldiers and the main traffic routes.

(c) (U) Soil Sampling. Selection of soil sampling locations was based on the findings of the gamma dose-rate survey. A soil sample was collected at any area designated for further investigation during the gamma dose-rate survey. If no elevated readings were detected, random locations were selected throughout the airbase. The concentration of the sampling took place in and around areas of highest occupation by deployed soldiers. Collection consisted of a single. surface (approximately 5" depth) sample with a hand shovel or "corer" tool. The sample was placed in a widemouth polyethylene jar, labeled, and stored in a cool tent until shipment. All tools were decontaminated between sample collection to prevent cross-contamination.

(d) (U) Ambient Air Sampling. Blank filter media was provided to HQ, USACHPPM as a control sample for isotopic uranium analysis. The detectable concentration on the blank filter media was subtracted from the final results. Air samples were collected on paper media with a portable high-volume air sampler (model JAP/ T® blower). Staplex TFA 41® filters were used for small volume (~ 10 m^3) samples, and Staplex TFA "S"® pleated filters were used for larger volume (~ 60 m^3) samples. The flow rate for the TFA 41 filters was approximately 0.8 m^3/minute; and the flow rate for the TFA "S" filters was approximately 2 m^3/minute. Samples were collected, placed in Ziplock® bags, labeled, then stored until shipment.

(e) (U) Water Sampling. Four liters of the bottled, drinking water (Nestle Pure Life water) used for consumption at Stronghold Freedom and the ROWPU water (used for bathing/ hygiene) were submitted for radiological isotopic analysis. This collection/analysis was performed to ensure levels of radiological isotopes in the drinking water are within the drinking water standards for deployed soldiers.

(f) (U) Radon sampling. Radon concentrations were measured by collecting approximately 10-30 m^3 of ambient air on a Living Level Monitor® (LLM) paper filter and counting on the LLM system. The filters were stored for a minimum of 48 hours, then counted again to determine if the radioactivity measured on the filter was due to environmental levels of radon and not other contaminants.

(g) (U) Radiofrequency (RF) power density survey. RF power densities were measured at several locations in the Operations Area using a Narda Electromagnetic Frequency Meter®, MMCN: D5448, Model Number: 8718, SN: 1334 kit, and isotropic probe models: 8762 (0.3-1000 MHz) and 8723 (0.3 - 40 GHz); Calibration Date: 7 February 2002. Measurements were focused in living/working areas and main roads near communication equipment.

(h) (U) Alpha radiation survey. Two different instruments were used for detecting alpha radiation: Technical Escort Unit's PDR-77 w/ alpha probe and CHPPM-EUR's Eberline E-600® w/ alpha probe. Correct operation of both instruments was verified by measuring the activity of an alpha check source.

(i) (U) Surface Contamination Sampling. Particulates were collected over an area of 100 cm^2 on a radiological smear in order to determine the presence/absence of gross alpha/beta contamination. Samples were collected in areas with the highest probability of potential contamination, such as those with undisturbed dust deposition.

b. (U) Ambient Air Sampling.

(1) (U) Purpose and Scope. The purpose of the ambient air sampling was to further refine the health threat associated with the inhalation of volatile organic compounds (VOCs) and respirable particulate matter. VOCs present in ambient air may be the result of volatilized organic compounds present in jet kerosene soils exposed as a result of digging or other organic contaminants resulting from US internal combustion sources or fuel storage/ filling operations. Respirable particulate matter consists of small particles, such as dust and soot, that can be inhaled and deposited into the lungs. The most common measure of respirable particulate matter is PM_{10} - the concentration of particles with a mean diameter less than ten micrometers (μm). In addition to determining the ambient concentration of PM_{10}, respirable particulate matter was analyzed for the concentration of heavy metals. The VOC sampling sought to further evaluate the health risks associated with the air exposure pathway, and validate countermeasures implemented following the previous study. Additional samples were collected in locations not previously sampled to provide a more comprehensive exposure and countermeasure evaluation.

These areas included: the northeast portion of tent city, the SSA, the operations area, the installation headquarters, and the southwest portion of tent city. PM_{10} sampling sought to further evaluate the health risk from particulate concentrations relative to the levels detected in November 2001 and the efficacy of countermeasures implemented (e.g., redirection of traffic flow, dust mitigation). Ambient air sampling results are compared to established ambient air quality criteria in order to determine potential health risks, and evaluate the effectiveness of OEH countermeasures implemented. The ambient air quality criteria utilized included Air-Military Exposure Guidelines (MEGs) stated in USACHPPM Technical Guide (TG) 230, and the National Ambient Air Quality Standards (NAAQS) established by 40 CFR 50. Air sampling locations are depicted in Figures B-6 through B-8.

(2) (U) Procedures. Air sampling for organic compounds was performed using SKC Airchek Model 52® personal air sampling pumps and US Environmental Protection Agency (EPA) Modified Method TO1 sampling media (Supelco 20370-U® Tenax tube media). Sampling flow rates were approximately 0.40 milliliters per minute (mL/min), in accordance with guidelines established for the sample media. Sample pumps used the low-flow controller and were calibrated immediately before and after each sampling event using a Dry-Cal DC-1® flow calibrator. Pre- and post- calibration flow rates varied no more than approximately 5%. The average of the pre- and post- calibration flow rates was used to determine the total sampling volume. Sample volumes were generally bracketed between 18 and 20 liters (total volume) to prevent breakthrough of VOCs through the tube media. The Tenax® tube media will be analyzed for VOCs using USEPA Method TO 1. Inorganic air sampling for PM_{10} was performed using Airmetrics MiniVol® air samplers. Two air samplers were deployed in the Stronghold Freedom tent city, along the predominant wind direction. These samplers were operated, maintained, and calibrated in accordance with USACHPPM TG 251 (reference 13).

c. (U) Drinking Water Sampling.

(1) (U) Purpose and Scope. The purpose of drinking water sampling was to determine the physical, chemical, and radiological quality of the water produced at Stronghold Freedom. The drinking water produced at Stronghold Freedom is treated by a military-owned, contractor-operated reverse osmosis water purification unit (ROWPU) and is not being used as a primary source of drinking water by US personnel. US personnel have been consuming bottled water obtained from multiple sources approved by the US Army Veterinary Command (VETCOM) and airlifted into Uzbekistan. The bottled water has been tested through both VETCOM and CHPPM-EUR, and meets the maximum contaminant levels (MCLs) established by the DOD Overseas Environmental Baseline Guidance Document (OEBGD) (reference 16). The water produced by the ROWPU is primarily used for cooking, washing, personal hygiene, and industrial uses. The water source for the ROWPU is a water distribution pipe that reportedly originates from a host nation source 110 kilometers away in the town of Samarkand, Uzbekistan (reference 1). The source water was found to be fairly high quality during the November 2001 assessment (reference 1). The drinking water sampling results were compared to Water-MEGs given by USACHPPM TG 230 (reference 6), the OEBGD MCLs, and the aesthetics-based

standards established by the National Secondary Drinking Water Regulation (NSDWR). The Water-MEGs are based on US personnel deployed in an arid climate over a 1-year time period with a water consumption rate of 15 L/day. The Water-MEGs are designed to indicate "thresholds" for minimal to no adverse health effects.

(2) (U) Procedures. Water sampling was performed using the CHPPM-EUR deployment water test kit, also known as an "OEBGD kit." The OEBGD kit is designed to sample for the parameters regulated by the OEBGD. A treated water sample was collected using an OEBGD kit, preserved, kept cool, and transported via air to the CHPPM-EUR laboratory for analysis. Analytes will include over 100 inorganic/physical parameters, VOCs, heavy metals, polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), and radiological parameters.

d. (U) Soil Sampling.

(1) (U) Purpose and Scope. The purpose of soil sampling is to determine the potential health risks to US personnel from exposure to soil contamination. Surface soil samples are taken to determine the presence and concentration of contaminants at or near (within six to 12 inches) the ground surface level. Sub-surface samples are taken to determine the presence and concentration of contaminants that are present at depths of greater than 12 inches below ground surface.

(2) (U) Procedures.

(a) (U) Sub-Surface Sampling. Sub-surface samples were collected using direct push technology. Samples were collected in approximately one-meter intervals by advancing a steel barrel sampler and stainless steel cutting shoe using a Bosch pneumatic hammer system. The barrel sampler contains a 1.2 m long, 5 cm outside diameter MacroCore® clear plastic soil sampling tube made of polyethylene terephthalate, glycol modified (PETG) plastic that is resistant to the adsorption of contaminants. After the sampler was pushed to the desired depth, it was retracted and the plastic liner opened. The plastic liner and cutting shoe on the leading edge of the barrel sampler were the only parts of the sampling system that contacted the soil. This method of sampling continued to the desired sampling depth or until the sampler encountered refusal. Samples were placed into 300 mL clear glass sampling jars with Teflon-lined screw-top caps. Portions of the collected soil were screened on-site for volatile organic vapors with a MultiRAE Plus Multiple Gas Detector®, Model: PGM50-5P, Serial No.095-507368, MMCN:D6123. On-site screening allowed for adjustment of the sampling plan to accurately identify contaminated soils. Subsurface soil samples were analyzed for heavy metals, VOCs, TPH, and PAHs. After each sample, the plastic liner was replaced with a new one and the cutting shoe was decontaminated. Decontamination of the cutting shoe consisted of removing gross accumulations of soil with a wire brush, washing the cutting shoe with a mixture of laboratory soap (Alconox®) and ROWPU-treated water (equivalent of deionized water), rinsing it with ROWPU-treated water, and air drying.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(b) (U) Surface Soil Sampling. Surface soil samples were collected within grids established over the areas to be sampled. Surface soil samples were also collected in areas that have not been previously characterized. These areas include the southwest portion of tent city, and the area between the Camp Stronghold Freedom HQ and the hospital. Composite soil samples were collected using a stainless steel scoop. Approximately six scoops were collected from across the grid and homogenized in a stainless steel bowl prior to placement in 300 ml clear glass jars with Teflon-lined screw-top caps. All samples were stored and shipped in a cooler with ice packs until analyzed. Surface soil samples will be analyzed for heavy metals, PAHs, PCBs, and pesticides.

e. (U) Industrial Hygiene - Asbestos Sampling (bulk). Figures B-9 through B-11 show locations of Industrial Hygiene samples.

(1) (U) Purpose and Scope. The purpose of bulk asbestos sampling is to determine the location of asbestos containing building materials and to establish the condition of such material. Sampling locations were chosen after a walkthrough inspection of all occupied permanent structures. Bulk samples were taken to determine the presence, type, and concentration of asbestos fibers in building materials on Stronghold Freedom. All laboratory results are compared against the Occupational Health and Safety Administration and the Overseas Environmental Baseline Guidance Document (OSHA/OEBGD) standard for asbestos containing material (ACM) which currently states that asbestos is present if the concentration found in suspect materials is equal to or greater than 1%.

(2) (U) Procedures. Bulk samples are obtained through physical removal of suspect material. The sample is then placed in a clean resealable container, labeled with date, sample identification number and area of collection then sent to the laboratory for analysis. (Refer to Appendix C-22 for number of samples taken and results)

f. (U) Industrial Hygiene - Asbestos Sampling (air).

(1) (U) Purpose and Scope. Personal ambient air sampling for asbestos fibers is conducted to determine if asbestos fibers from the building materials are present in the air at a concentration that poses a health threat to personnel. Area sampling gives a broader representation of asbestos fiber release in the area, and establishes whether the concentration of asbestos fiber is at a level that constitutes a potential health threat. Area sampling also helps to evaluate the effectiveness of asbestos material cleanup and countermeasures implemented by this command since the previous health risk assessment. All laboratory results are compared against the Occupational Health and Safety Administration and the Overseas Environmental Baseline Guidance document (OSHA/OEBGD) standard for airborne asbestos fiber concentration currently set at 0.1 fiber per cubic centimeter of air (0.1 f/cc).

(2) (U) Procedures. All personal air sampling was conducted using an SKC AirChek 52® personal sampling pump with an open face, 25mm static-conductive filter with 0.8μm mixed

cellulose ester (MCE) media attached. The flow rate was set for 2.5 liters per minute. All area air sampling was conducted using an SKC HV-30® high volume sampling pump with an open face, 25mm static-conductive filter with 0.8µm MCE media attached; the flow rate was set at 12 liters per minute and sample times varied between 4 and 8 hours. (Refer to Appendix C-23 for number of samples taken and results)

g. (U) Industrial Hygiene – Lead Based Paint Sampling.

(1) (U) Purpose and Scope. The purpose of Lead Based Paint (LBP) sampling is to determine the potential health risks to personnel from exposure to lead dust, created by either natural or deliberate erosion of paint coatings on the interior surfaces of occupied fixed facilities. Bulk LBP sampling and analysis determines the presence and concentration of lead in the paint coatings.

(2) (U) Procedures. Bulk sample collection for LBP analysis is performed using a scraping tool to remove all layers of paint down to the bare wall; the scrapings are put in a clean, resealable container and sent to the laboratory for analysis. Bulk LBP sampling locations were chosen after an inspection of all occupied buildings, locations were chosen due to obvious erosion/degradation of painted surfaces, the age of the building and whether painted surfaces were in an area used as a living area, or food preparation/serving. The laboratory analysis is used to make a direct comparison to the established guidelines of the office of Housing and Urban Development and US Environmental Protection Agency and the Overseas Environmental Baseline Guidance document (HUD/EPA/OEBGD) which currently states that lead based paint is present if the concentration of lead is greater than 1milligram per square centimeter ($1mg/c^2$) of paint or 0.5%. (Refer to Appendix C, Table 24 for number of samples taken and results)

h. (U) Industrial Hygiene - Noise Monitoring.

(1) (U) Purpose and Scope. Noise monitoring is conducted to define areas of high intensity noise, establish exposure patterns to personnel at Stronghold Freedom, and make recommendations to attenuate/remediate hazardous or nuisance noise levels and prevent hearing loss. OSHA guidance and the Army Hearing Conservation Program states that hearing protection is required if the 8 hour time weighted average exceeds 85 decibels with "A" weighting (dBA).

(2) (U) Procedures. Direct readings were obtained with both the type one and type two sound level meter, using both the "A" and "C" weighting. Overnight noise level readings were obtained using the Quest® Q-300 data-logging noise dosimeter. All sound level measuring equipment was field calibrated before use with the Quest® QC-10 listed below. Sound level measurement was conducted using the following equipment:

(a) (U) Larsen Davis® Type One sound level meter (type one SLM) Model:800B, Serial No:0151, MMCN:D8123.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(b) (U) Quest® Type two sound level meter (type two SLM), Model:2800, Serial No:HSA100005, MMCN:D6125.

(c) (U) Quest® data-logging noise dosimeters, Model Q-300, Serial No.QC7100066, MMCN:D6582, Serial No.QC7100064, MMCN:D6588, Serial No.QC9090063, MMCN:D7495, and Serial No.QC9090064, MMCN:D7496.

(d) (U) Quest® sound level calibrator, Model:QC-10, Serial No:QIA090117, MMCN:D6898.

(3) (U) Direct Reading Sound Level Measurement Locations.

(a) (U) Prime Power generation plant.

(b) (U) ROWPU Location.

(c) (U) SSA logistics yard.

(d) (U) Stronghold Freedom DFAC.

(e) (U) Row 110-120 Tent City (air conditioning units running)

(f) (U) Row 140-150 Tent City (on porch with air conditioning units running)

(4) (U) 8 hour Sound Level Dosimetry locations.

(a) (U) Tent #107 (Outside overnight)

(b) (U) Tent #205 (Outside overnight)

(c) (U) Tent #384 (Outside overnight)

(d) (U) SF Compound Checkpoint (inside overnight)

(e) (U) Tent #462 (Inside overnight)

(f) (U) Tent #469 (Inside overnight)

(g) (U) Tent #492 (Outside overnight)

i. (U) ~~(S//REL)~~ Geo-Coding of Sample Locations. In accordance with requirements contained paragraphs 3.a. through 3.c. and reference 13, all samples collected during this survey

were geo-coded by collecting latitude and longitude (using the WGS 84 datum) or Military Grid Reference System (MGRS) coordinates and recording the date and time collected. Location data were collected using a Magellan® Global Positioning System (GPS) Satellite Navigator. Collection of GPS sample locations enables HQ, USACHPPM to fulfill their responsibility as the DoD repository of deployment environmental surveillance data and to help associate potential environmental exposures with unit stationing/ movement information at a given location and time. Figure 3 shows an aerial photograph of Stronghold Freedom with all sample locations depicted by sample type. Similarly, Appendix E contains a listing of all sample numbers and types with their respective location.

j. (U) Risk Communication. The CHPPM-EUR advance team traveled to Stronghold Freedom (Karshi Khanabad Airbase), Bagram Air Base and Kandahar Airfield to inform the on-site Commander of the environmental team's visit, establish contacts with public affairs assets to provide information on the purpose and scope of the deployment environmental surveillance monitoring to be conducted, and secure logistical support needed for the survey team.

(1) (U) Newspaper Articles. A primary concern for risk communication was to ensure the population of Stronghold Freedom was made aware of the reason for the CHPPM-EUR team's visit. Dissemination of this information was done by several different methods. The first method was an article on the results of the previous environmental assessment (reference 1), and details concerning this assessment were published in the Stronghold Freedom June Newsletter. This article is included in Appendix I.

(2) (U) Town Hall Meetings. A second method to disseminate information was through installation wide, town hall meetings. An initial town hall was scheduled to disseminate the findings from the previous assessment and introduce the survey team. An additional town hall was scheduled to convey the preliminary findings from the direct read instrumentation and the status of sampling efforts. This town hall was held on 14 June 2002. A final town hall was scheduled to disseminate the final results of this survey. This was held on 13 July 2002.

(3) (U) Written Health Risk Communications. Additional methods to disseminate information included the use of an environmental threats brochure. A tri-fold brochure specific to Stronghold Freedom outlining the known environmental hazards was prepared as a risk communication tool for distribution to all in-coming personnel. This brochure is included in Appendix I. Copies were made available to personnel attending the town halls on both 4 June and 14 June 2002. This tri-fold brochure is also available on the CHPPM-EUR website for downloading.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

k. (U) Laboratory.

(1) (U) All samples were initially submitted to the Department of Laboratory Sciences (DLS), CHPPM-EUR for analysis, except for the radiological samples, which went to the Radiological Inorganic Chemistry lab at HQ, USACHPPM. The Deutscher Akkreditierungs Rat (DAR, German Accreditation Council) recognizes the accreditation by the Deutsches Akkreditierungssystem Prüfwesen GmbH (DAP) for all 15 European countries, by the DLS, USACHPPM-EUR. The DAP has determined that the DLS is competent under the terms of Deutsche Institut für Normung (DIN) EN 45001 to carry out physical, physical-chemical, and chemical analysis of water, soils, sediments, and other environmental media. The present accreditation is valid until 3 July 2001. The DLS's, DAR registration number is DAP-P-03.000-00-95-02. The DLS has also established the equivalency of U.S. Environmental Protection Agency (EPA) and German methods.

(2) (U) The American Association for Laboratory Accreditation (A2LA) has also accredited the DLS, USACHPPM-EUR according to the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" and additional requirements in the field of environmental media.

7. (U) ~~(C//REL)~~ Findings.

a. (U) Radiological. Figures D-1 through D-4 depict radiological surveying and sampling activities conducted during this assessment.

(1) (U) Effectiveness of Countermeasures Implemented at Site 1.

(a) (U) The area identified during the previous survey (see Figure 2 and Appendix H for details) to contain uranium was properly marked with multi-lingual signage to indicate the presence of a radiation area (depicted in Figure D-2) and a fence was constructed around the area to restrict access. No further activities were present within the area, indicating access to the area was minimized.

(b) (U) Erosion and flooding caused changes to the landscape since the time of the previous survey. The size of the berm has decreased and a pool of standing water is now present within Site 1. This was due to the flooding which occurred in the December to February timeframe. No uranium was present in areas other than those identified during the previous survey, which indicates the flooding did not cause further dissemination of the contamination beyond Site 1.

(c) (U) The radioactive material discovered in Site 1 was originally referred to as "processed uranium" in the previous survey report (details in Appendix H and reference 1). In the time since the previous report was written, further technical analysis has identified the material as depleted uranium (DU) of non-U.S. origin (depicted in Figure D-1). The change in

terminology is only a more exact description of the material, as depleted uranium is one of several kinds of processed uranium. Depleted uranium is the least radioactive form of processed uranium.

(2) (U) Dosimetry.

(a) (U) Six team members wore TLDs while deployed to Stronghold Freedom from 04 June 2002 to 15 June 2002. The six TLDs and two control TLDs were analyzed by US Army Ionizing Radiation Dosimetry Branch, Redstone Arsenal and results are available in Table C-27. TLD results indicate all exposure readings were below detection limits; therefore, the representative ionizing radiation dose levels were equal to or less than background. Mr. [redacted] direct read dosimeter accrued 3.21 milliRoentgens (mR) for the period 4-16 June. This averages to 0.011 mR/hr, which is representative of typical environmental background levels. These background levels are safe for any duration and pose no health threat to deployed forces.

(3) (U) Gamma dose-rates. All surveyed areas displayed typical environmental background-level gamma dose-rates of 8-15 microRoentgens per hour (μR/hr). No radiation levels above background were detected and no evidence of contamination was observed in any area other than Site 1, which was identified in the previous survey (reference 1). There is no health threat from gamma radiation at Stronghold Freedom. Figure D-4 provides a photograph of gamma dose-rate survey activities conducted during this assessment.

(4) (U) Soil Sampling. One soil sample was collected at Site 1, an area found to contain radioactive material during a previous survey (reference 1), at a location with direct readings greater than four times background. No other areas with elevated dose rates were found; therefore, samples were collected at random locations throughout Camp Stronghold Freedom. Meter readings for all of the other soil samples (nine other soil samples collected at various sites in and around Stronghold Freedom, indicated on Figure 3 and on the Figures B-3 through B-5) were equal to or less than background. The only sample with uranium content exceeding the EPA action level for remediation was collected from the pile of debris in Site 1, previously found to contain non-US depleted uranium. All other soil samples contained typical environmental levels of natural uranium. There is no health threat from uranium in the soil to Stronghold Freedom personnel. Results for each sample are available in Appendix C, Table C-1.

(5) (U) Ambient Air Sampling. Sixteen air samples were collected throughout Camp Stronghold Freedom and sent to HQ, USACHPPM for analysis. The sixteen samples were sent to HQ, USACHPPM for total isotopic uranium analysis and the results for each sample are available in Table C-1. Results indicate no uranium contamination is present in the air throughout the camp. The naturally-occurring levels of uranium detected on the filters are consistent with environmental levels present in dust. These naturally-occurring levels of uranium present no health threat to deployed forces. Results for each sample are available in Appendix C, Table 1. Figure D-5 provides a photograph of ambient air sampling activities conducted during this assessment.

(6) (U) Water Sampling. Drinking water (4 liters, bottled) and ROWPU water samples (4 liters) were sent to HQ, USACHPPM on day of collection. Drinking water results indicate very low levels of uranium (approximately 1 ug/l) present in the water, typical of many bottled waters. Uranium content is well below the EPA suggested guideline of 20 ug/l for drinking water and is safe for consumption. Results are located in Appendix C, Table C-1.

(7) (U) Radon concentrations.

(a) Six real-time measurements of radon concentration were performed. The samples were counted on-site for radon, with very low results (2-4 Bequerel per cubic meter (Bq/m^3)) Equilibrium Equivalent Concentration (EEC), a unit of radon concentration that allows for convenient dose calculation) typical of outdoor concentrations. Samples were reevaluated 48 hours later to ensure no residual contamination remained; all samples were equal to background, indicating no long-lived isotopes were collected on the radon air filters. Thus, the health threat from exposure to radon gas and other airborne radioactive materials is negligible. Results for each measurement are in Appendix C, Table C-1.

(b) Fifteen radon traps were placed throughout the camp for long-term monitoring. Traps should be collected on/about 9 Sept 2002 and returned to CHPPM-EUR for processing. 227th Med Detachment has been shown the locations of the traps and instructed how and when to collect the traps and to return them to CHPPM-EUR.

(8) (U) Radio Frequency (RF) power densities. No areas of elevated RF energy were observed in locations accessible to the general public; some elevated readings were observed directly in front of transmitters (as expected), but are within acceptable exposure guidelines. Some transmitters are located near living areas, but are elevated above the tents or are oriented so the signal beam does not pass through the tents. All transmitters are marked with appropriate warning signs as required. Figure D-3 provides a photograph of non-ionizing site survey activities conducted during this assessment.

(9) (U) Suspected Alpha Contamination Survey. On 5 June 2002, personnel from the 764th Ordnance Company (Explosive Ordnance Detachment) stationed at Stronghold Freedom performed an alpha radiation survey in the areas near their tent (382) using a PDR-77 RADIAC meter with alpha probe. Their readings indicated high levels of alpha contamination. The instrument check source reading was accurate, but a loose connection between the probe and the instrument caused spurious and inaccurate readings. CHPPM-EUR personnel were requested by the installation commander to confirm the results of the EOD survey performed on 5 Jun 2002. Two different instruments were used (Technical Escort Unit's PDR-77 w/ alpha probe and CHPPM-EUR's Eberline® E-600 w/ alpha probe), and both operated correctly, as determined by checking a known alpha source. CHPPM-EUR and EOD personnel jointly repeated a survey of the locations that EOD had initially labeled as contaminated (reference 19) and could not duplicate the high readings taken on 5 Jun 02. Further investigation indicated the EOD PDR-77

instrument used on 5 Jun 02 was faulty. Actual alpha readings were in the range of 0-16 counts per minute (CPM), which is background. A record of this re-survey was transmitted to the Stronghold Freedom installation commander and the CJTF 180 Surgeon on 10 June 2002 (reference 20); this memorandum is provided in Appendix F. Additionally, both CHPPM-EUR and 764th EOD personally briefed the installation commander regarding the results on 10 Jun 02.

(10) (U) Surface Contamination Sampling. Fifteen swipe samples were taken throughout Stronghold Freedom and sent to HQ, USACHPPM for removable contamination analysis. Results indicate no uranium contamination is present in the dust at Stronghold Freedom. The naturally occurring level of uranium detected on the swipe is consistent with typical environmental background levels and is safe. Results for each sample are available in Appendix C, Table C-1.

b. (U) Ambient Air Sampling. The results of the ambient air sampling are provided in Appendix C, Tables C-14 through C-21. Locations of the ambient air sampling locations are shown in Appendix B, Figures B-6 through B-8.

(1) (U) Respirable Particulate Matter. PM_{10} was detected in ambient air sampled at Stronghold Freedom. The levels of PM_{10} detected were consistently above the 1-year Air-MEG of 70 $\mu g/m^3$ established by USACHPPM TG 230. In addition to evaluating PM_{10}, separate analyses were performed for heavy metals on the particulate filters collected. Similarly, surface soil samples were tested for a number of inorganic and organic contaminants in order to help further evaluate this exposure pathway. Visual observations made during the time of this assessment confirmed that this pathway could be a viable exposure pathway for personnel stationed at Stronghold Freedom. The combination of a very dry environment, wind, unpaved roads, with constant construction and vehicle activity seems to suspend available surface soils (and particulates from diesel exhaust) in the air almost constantly. These results are provided in Appendix C, Tables C-15 and C16 and indicate that suspended particulate matter via the air pathway poses a potential health threat to Stronghold Freedom occupants.

(a) (U) Acceptable levels of PM_{10} concentrations for military deployments up to 1-year are provided in USACHPPM Technical Guide (TG) 230 (Reference 5). The guideline for PM_{10} is 70 $\mu g/m^3$ average daily concentration for a one-year period. The guideline is based on military populations, which in general do not contain the sensitive populations (e.g. elderly and children) that US National Ambient Air Quality Standards (NAAQS) are designed to protect. The current US NAAQS standard for PM_{10}, established by the US Environmental Protection Agency, is set at an annual daily average of 50 $\mu g/m^3$ and a 24-hour value of 150 $\mu g/m^3$. The 24-hour value should not be exceeded for any one 24-hour sample and the annual daily average value should not be exceeded when the 24-hour daily samples are averaged over a one-year period. The NAAQS are set at levels that should safeguard the general population from increased illness associated with respiratory conditions. PM_{10} is the current indicator of interest, as particulates in this size range are inhaled deeply into the respiratory tract.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(b) (U) Although monitoring was accomplished for only a short period of time (six consecutive days at two locations; 6-12 June 2002), there were 10 observations that exceeded the USACHPPM Technical Guide annual guideline of 70 μg/ m^3, with most observations over 100 μg/ m^3. Five observations exceeded the US 24 hour NAAQS of 150 μg/m^3. Fortunately, surface soil samples collected to date do not indicate heavy metal, PAH, PCB, pesticide, or herbicide contaminants that would prompt additional health concerns. Additionally, this was confirmed by performing heavy metal analysis on the particulate filters; no heavy metals were detected at more than trace concentrations on any of the filters. Typically, particulate levels for a given location will vary widely with weather conditions, seasons of the year, industrial activity and vehicular traffic, among other factors. For this reason, annual averages are calculated. When sampling is done for shorter periods of time to calculate averages, they are greatly affected by individual high values, particularly when the number of samples is small. Therefore, it is important to conduct routine sampling to determine actually annual average concentrations. Routine ambient air monitoring for PM_{10} should be continued by preventive medicine personnel at Stronghold Freedom. Additionally, the command should continue to implement aggressive dust suppression measures such as: minimizing vehicle traffic, gravelling/ paving dirt areas and roads; and wetting down dusty areas/ unpaved roads to control dust.

(2) (U) VOCs. VOCs were detected at low levels in some of the 16 ambient air samples collected at Stronghold Freedom. The levels of VOCs detected in all samples were below applicable Air-MEGs established by USACHPPM TG 230. During this survey, the highest levels detected for VOCs occurred in the SSA. VOCs detected included 1,2,4-trimethylbenzene; 1,3,5 trimethylbenzene; isopropyltoluene; decane; ethylbenzene, and xylene. These compounds were measured in the low μg/m^3 range and are fuel-related hydrocarbons detected while monitoring adjacent to an open construction excavation where visible, POL contaminated soil had been exposed during a sampling event on 12 June. Pictures of this excavation are provided in Appendix D, Figures D-18 and D-19. This subsurface excavation within the SSA exposed stained soils that were previously approximately one meter below ground surface level. These soils emitted a strong petroleum odor and were the main identifiable source of VOC exposure during the survey. Overall, the VOC monitoring results verified the efficacy of the recommended control measure to minimize exposure to jet fuel contaminated soils during the previous assessment: prohibit digging in tent city and the SSA area and, if digging is necessary, backfill excavations at the earliest opportunity. The existing clay cap in the tent city area is doing an effective job of eliminating/ mitigating VOC exposures from subsurface contaminated soils, resulting in a negligible health threat to Stronghold Freedom personnel.

c. (U) Drinking Water Sampling. The results of the drinking water sampling are given in Appendix C, Tables C-8 through C-13.

(1) (U) Several parameters were detected in the treated water produced by the ROWPU on-site at Stronghold Freedom. The parameters detected include, but are not limited to, nitrate, total dissolved solids (TDS), turbidity, calcium, magnesium, zinc, toluene, and chloroform. The

parameters detected are below the water MEGs established in TG 230, the MCLs established by the OEBGD and the NPDWR, and the standards established by the NSDWR.

(2) (U) A confirmation sample for VOCs taken on 2 July 2002 did not detect toluene, chloroform, or any other VOCs in the raw water purchased from the host nation.

(3) (U) The ROWPU treated water had a pH of 6.1. This is typical of ROWPU water. The NSDWR recommends that drinking water pH should be between 6.5 and 8.5. Low pH may promote increased corrosion of metal water distribution pipes and fixtures and degrade water quality. However, levels of heavy metals measured during this assessment met all applicable standards. Additionally, the ROWPU water at Stronghold Freedom is used only for personal hygiene and light industrial purposes (bathing, washing, cleaning).

d. (U) Soil Sampling. The results of the soil sampling are provided in Appendix C, Tables C-2 through C-7. Heavy metals, PAHs, PCBs, and pesticides were detected at low levels in surface soils samples collected at Stronghold Freedom. Detected heavy metal and pesticide concentrations were generally consistent with previous survey results and appear to approximate background soil concentrations. The lone exception to this were discrete samples collected in an open area (formerly used as an living area) located between the hospital and the installation headquarters building. This is shown in Figure B-6. Samples 2159-1ES and 2159-3ES detected several metals (zinc, copper) in excess of background levels in subsurface discreet and surface composite soils. Additionally, PAH and PCB detections were present in trace quantities in several of the samples collected in this area (Tables C-4 and C-5). An open excavation on the east side of this area for utilities indicated that portions of this area were probably used for indiscriminate disposal of incombustible materials (glass, metal parts) in the past. All parameters detected were at concentrations lower than the Soil-MEGs established by the USACHPPM TG 230, and do not pose a health risk to US personnel. During the time of this survey, no personnel were living at this location and the entire site had been capped with clean backfill soil for future construction.

e. (U) Asbestos Containing Materials. No friable asbestos containing building materials were identified during this evaluation of Stronghold Freedom. All asbestos tile debris found during the previous assessment has been removed and no evidence of gross asbestos contamination exists at this site. Currently, there are four occupied buildings that have asbestos tile roofs they are as follows; One Stop In-processing center, 416th AEG vehicle maintenance facility, CI/Force Protection/Judge Advocate General (CI/FP/JAG) office building and the Headquarters building for the Military Police (MPHQ). Two outside gazebos also have asbestos tile roofs; one is located between the One Stop In-processing Office and the FP office (In-processing gazebo) and the other gazebo is located just outside the CI/FP/JAG office (CI/FP/JAG gazebo) (Figure D-5). The tile roofs of the One Stop In-processing center, In-processing gazebo, CI/FP/JAG office and the MPHQ buildings are in good to excellent condition. The tile roof of the 416th AEG vehicle maintenance facility is approximately 80% damaged. Personal and area air sampling was performed at the 416th AEG Vehicle Maintenance

Facility (Figure D-7). The CI/FP/JAG gazebo roof is also in disrepair (Figure D-6). The health hazard to personnel from exposure to the asbestos containing roofing tiles is negligible. All personal and area air sampling results for airborne asbestos fiber concentrations taken at Stronghold Freedom were negative for airborne asbestos fibers. (Please refer to Appendix E for sample locations, Appendix C, Table C-22 for number of samples and results and Appendix D for photos).

f. (U) Lead Based Paint (LBP). One sample collected at the One Stop In-processing center was positive for lead based paint at a concentration of 11% lead. The OEBGD standard, which is identical to the USEPA standard, currently states that LBP is present if the concentration of lead is greater than 1milligram per square centimeter of paint or 0.5%. All other LBP samples collected and analyzed from Stronghold Freedom did not meet the 0.5% threshold and were not considered as LBP.

g. (U) Noise Sources. Point source noise hazards were identified and evaluated for hazardous and nuisance level noise. Noise levels throughout the camp are between 60 and 83 dBA during the day (this is comparable to noise levels measured within an industrial area/large city with busy street traffic). Noise levels averaged between 50 and 74dBA during 8 hour overnight dosimetry recording (this noise level exceeds most developed nations guidelines for noise levels during quiet hours). Refer to Appendix C, Table C-25 for all noise measurements.

(1) (U) The primary continuous source of noise is the Prime Power generation station. All sound level measurements at this location were taken at a distance of 10 meters (m) or greater from the power generation units. The noise levels closer than 10m to the units exceed the action level of 85dBA. The Prime Power facility is not posted and access is not restricted; noise levels in this area can be hazardous and permanently damaging in a very short period of time. Two points along the road, where openings exist in the conex wall for vehicle access, were chosen for measurement. A single point at rear of HAS 18 was chosen since there is a fixed fighting position located nearby. An employee entry and exit point to the Prime Power control station between HAS 18 and HAS 19 was the fourth measurement point. The noise levels inside the conex wall and at the top of the interior berm exceed the action level of 85dBA. Readings were consistently measured at levels that require hearing protection at all times when personnel are inside the perimeter of the Prime Power facility. The noise levels outside the conex wall and interior berm are below the action level for hearing protection requirements.

(2) (U) The Environmental Control/Air Conditioning units (ECU) were also identified as a primary continuous noise source. Noise levels range between 68 and 73dBA in between the tent rows with air conditioning units running. These levels are below the action level for hearing protection.

(3) (U) The SSA refrigeration trailer area is a continuous noise source. Sound level measurements were taken to determine whether personnel working in this area are being exposed to hazardous noise levels generated by the large number of refrigeration trailers in the area. The

noise levels measured are between 78 and 83dBA at the front section (nearest the cooling unit). The majority of work performed in this area is conducted from the rear opening of the trailer and the sound pressure levels are effectively attenuated by the trailer construction. The plan to consolidate all refrigeration trailers to this location will likely increase the measurable sound to a level that will constitute a hazard to personnel assigned to work in this area. Currently, no health hazard to the general population of Stronghold Freedom exists from this location.

(4) (U) The DFAC refrigeration area is a continuous point source for noise; noise levels in the area directly in front of the refrigeration trailers do not approach the action level for hearing protection. The levels are between 74 and 79dBA.

(5) (U) Direct readings of the noise level generated by the ROWPU water treatment and storage operations were taken at 4 separate points in a circle around the unit. Direct readings were also taken in the row of tents nearest the ROWPU to determine whether the unit was a continuous noise hazard to the personnel living in the area. The ROWPU water supply area was evaluated as a continuous point source for noise; the area in the immediate vicinity of the ROWPU is designated a noise hazard area. Noise levels measured at a distance of 10 meters from the ROWPU ranged between 78 and 82dBA.

(6) (U) The current flight operations conducted by US, allied and host nations were identified during this site assessment as an intermittent noise hazard. Direct readings of noise levels during flyovers were consistently measured at 128-138dBA; the duration of this noise level averaged 20 seconds. Direct readings of run-up and engine testing noise levels in the Tent City area were measured at levels between 120-135dBA; the duration of this noise level averaged 2 minutes, but could last as long as 10 minutes. Two overnight dosimetry recordings measured peaks over the OSHA/Army standard for impulse noise of 140dBA, one peak of 147.6dBA and one peak of 141.7dBA. All other overnight dosimetry recordings measured peaks between 122.3-138.8dBA. All overnight dosimetry peaks were measured during US, allied and host nation flight operations. These noise levels should be considered hazardous, can be quite disruptive to shift workers resting, and may contribute to hearing loss in personnel not adequately protected. All direct reading and dosimetry measurements were conducted in the tent city area.

h. (U) Health Risk Communication.

(1) (U) Initial Efforts. At Stronghold Freedom, briefings on the results of the previous CHPPM-EUR assessment (reference 1) were given to the Installation Command group, the Air Force senior staff and the Command Sergeants Major/ Senior NCO's meeting.

(2) (U) Pre-survey Town Hall Meeting. A Town Hall meeting was held on 4 June to introduce the team and cover the results of the previous CHPPM-EUR assessment (reference 1). The town hall attendance was mandatory for all personnel on Stronghold Freedom as directed by the Installation Commander. The installation commander (COL Love) provided some background information regarding installation efforts and a short summary of the team's

mission. CHPPM EUR survey team personnel explained the mandate for the team's visit, the previous survey's findings and specific countermeasures taken by the Command to prevent exposure to environmental hazards. The specific topics discussed included: information concerning the DU/ radiological threat in Site 1 and it being placed "off-limits", the jet fuel contaminated soil, and the presence of asbestos tiles on older structures on the compound. A basic overview of the CHPPM EUR survey team's sampling activities was also presented. There were several questions from the audience on Hantavirus survey results, how to gain access to the previous CHPPM-EUR report (reference 1), and requests for specific location indoor air sampling. Questions from the audience were fielded as well as one-on-one discussion with individual team members. All available copies of the Environmental Threats Tri-fold were distributed.

(3) (U) Personal Health Risk Communication. Continuous risk communication was performed at every opportunity through personal contact with soldiers, airman, marines and civilians at Stronghold Freedom. Soldiers in the perimeter guard positions were visited by survey team members (especially during sampling on/ outside the perimeter berm) and personally informed of the surveys being conducted and the team's findings.

(4) (U) ~~(C//REL)~~ Host Nation Meetings. Two meetings (11-12 June 2002) with the senior Nuclear, Biological, Chemical (NBC) officer of the Uzbek Army (COL Rabchinko) and several Uzbek Army Medical Officers were held at their request to explain methodology and readings obtained for radiation monitoring at Site 1. The initial meeting was requested by the Uzbek Army as a result of the presumptive CW detection by the TEU (see paragraph 5.b.(5)). The Uzbek officers conceded that Site 1 had been used as a "dumping ground for discarded equipment and debris". COL Rabchinko stated that the DU found in this area could be attributed to many different things. He emphasized that the radiation levels obtained from the CHPPM-EUR team's equipment were nominal and certainly not a threat to health. The CHPPM-EUR team concurred.

(5) (U) Field Final Survey Brief. A presentation on the current status of this assessment to include areas surveyed, samples taken, and results of direct read instrumentation was provided to the Installation Commander on 14 June 2002. The change in terminology from processed uranium to DU was explained and a sample fact sheet on DU was given to the Installation Commander (COL Love). He requested that a fact sheet tailored to the situation at Stronghold Freedom be available for the attendees at the town hall meeting.

(6) (U) Field Final Town Hall Meeting. A presentation on the status of the survey after field sampling had been completed was performed at a town hall meeting on 14 June 2002 to inform the Stronghold Freedom personnel. This town hall risk communication session was presented jointly with the Commander, LTF 507 (COL Albert Love), the Technical Escort Unit (TEU) Commander, (CPT Regan Edens), and the Task Force Medical (TF MED) 261 Commander, (LTC John Schwegmann, MD). The session was given in three distinct sections. These sections detailed this environmental survey preliminary/ direct read results (CHPPM-

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

EUR), the chemical agent detection field results (TEU), and the preliminary findings from the medical screening and future surveillance plans (in response to the presumptive positive chemical agent results) conducted by TF MED 261. This town hall meeting was videotaped. The environmental hazards tri-fold was made available to all attendees as well as the fact sheet on Depleted Uranium tailored to Stronghold Freedom (Appendix I). Questions from the audience were answered on topics such as: uranium atom concentration, confidence limits of the chemical detection equipment, and availability of the environmental threats tri-fold on the Internet.

(7) (U) Incoming Commander's Brief. A briefing on the environmental health threats and current occupational and environmental surveillance efforts was also provided to the incoming Stronghold Freedom Commander, LTC(P) Jon Miller, on 29 June 02. He was informed of the results from the previous assessment (reference 1), the current status of this assessment and the time frame for completion of the final report. A request was made for a final outbrief and town hall meeting prior to the departure of the CHPPM-EUR team. This would accommodate the large turnover of personnel during June/ July 2002 at Stronghold Freedom.

(8) (U) Newsletter Articles. The article written for the Stronghold Freedom June newsletter was updated with preliminary results and included in the July newsletter. A copy of this article is provided in Appendix I. A close-out article was written for inclusion in subsequent newsletter (Appendix I).

(9) (U) Final Commander's Outbrief. A final outbrief on the results from this assessment was provided to LTC McEnaney on 13 July 2002.

(10) (U) Final Town Hall Meeting. A comprehensive town hall meeting, communicating health risks derived from the final results of this assessment, was conducted on 13 July 2002.

(11) (U) Several tools have been constructed to assist the leadership in dissemination of information on the identified environmental threats and recommended countermeasures. It is imperative that the leadership understand these hazards and communicate the actual risks aggressively throughout the chain of command. These tools include: videotape of town hall meetings, depleted uranium fact sheets, environmental threats tri-fold and newspaper articles in the installation newsletter.

8. (U) ~~(C//REL)~~ Health Risk Assessment.

a. (U) ~~(C//REL)~~ Procedures. The sampling data discussed in the body of this report were used to characterize the potential operation occupational and environmental health risks for personnel deployed at Stronghold freedom. Exposure to compounds in soil, air, and drinking water were characterized. The risk assessment was performed according to doctrine described in US Army FM 100-14 and US Army Center for Health Promotion and Preventive Medicine Technical Guide 248. The Radiological Threat Analysis is based on all sample results available

both from the environmental site survey in Nov 2001 and this follow-on environmental site survey.

b. (U) Hazard Identification. An OEH chemical hazard is any chemical or chemical mixture that can cause injury, illness, disease, adverse health conditions, or death for personnel (a health threat). Such conditions may also affect the health status of the field unit or command, in terms of mission effectiveness (a medical threat). OEH hazards are identified through environmental surveillance and sampling.

c. (U) Exposure Profile. An exposure profile is a description of predicted patterns of exposure field personnel will experience while deployed. Exposure patterns describe the frequency and duration of potential personnel exposures to OEH hazards. These patterns also contribute to determining the nature and magnitude of health effects that may be experienced upon exposure to unsafe levels of chemicals. The primary purpose of the exposure profile is to identify one or more exposure periods and exposure media for personnel in the field unit.

(1) (U) ~~(C//REL)~~ Activity Patterns. Stronghold Freedom personnel may consist of units that live in and patrol the area for up to 24 hours a day. The specific deployment duration is not known at this time so a 1-year exposure will be assumed for this evaluation. The type of activities personnel may undertake can affect exposure. Information is not known on specific activity patterns for personnel at Stronghold Freedom so general assumptions were used based on general knowledge of typical activities from past military operations.

(2) (U) ~~(C//REL)~~ Exposure Patterns. Based on the sampling data available, it is impossible to provide a complete assessment of potential exposure over time. However, it is assumed for this assessment that the samples collected represent the overall condition of the Stronghold environment for the deployment duration.

(3) (U) ~~(C//REL)~~ Exposure Periods. This report assesses the potential for health threats based on daily exposures to compounds detected in soil, drinking water, and ambient air during the May - June 2002 sampling event. It was assumed that soldiers would be present at the Stronghold 24 hours per day for the duration of their deployment. This should be a conservative assumption that will add a margin of safety to the evaluation.

d. (U) Preliminary Threat Analysis. The potential soil, water, and air chemical hazards can be classified into health threat categories based on a comparison of conservative estimates of the exposure point concentrations to available standard military guidelines. Table 1 presents the maximum detected concentrations for each compound that exceeded its respective guideline for each environmental media. The exposure guideline is also provided as a point of comparison. The complete list of detected compounds can be found in Annex B. As a preliminary evaluation, all compounds detected were compared to appropriate Military Exposure Guidelines (MEGs) as listed in TG 230 (reference 6). If a MEG was not available, USEPA Region 9 Preliminary Remediation Goals (PRGs) were used. Any additional sources consulted are listed individually. The 1-year MEGs are meant to be protective for continuous exposures to soldiers up to a 1-year

duration. The EPA Region 9 PRGs are protective of a lifetime of exposure. These general population values are also meant to be protective of small children and the elderly and are generally more protective than the MEGs.

Table 1. (U) ~~(C//REL)~~ Data Analysis Summary

Compound	Media	Maximum Detection	Guideline	Source
Tetrachloroethylene	Air	0.0061 mg/m^3	0.0033 mg/m^3	Region 9 PRG
PM_{10}	Air	0.702 mg/m^3	0.07 mg/m^3	TG 230

e. (U) ~~(C//REL)~~ Drinking Water. In addition to the chemical analyses, general water quality indicators were measured including pH, total dissolved solids, and turbidity. Each of these was within the acceptable range as listed in TB MED 577. The complete list and their corresponding values are presented in Table B-4, Annex B. Since the compounds listed above exceed their respective guidelines, the air in the vicinity of Stronghold Freedom may pose a potential medical threat and will be evaluated further.

f. (U) ~~(C//REL)~~ Radiation Survey.

(1) (U) ~~(C//REL)~~ Stronghold Freedom Confine. Potential internal and external radiation hazards in air, water, and soil can be classified into threat categories based on a comparison of sampled concentrations and external radiation measurements to available radiation dose standards for appropriate Radiation Exposure States (RES). External radiation doses are characterized based on direct reading instrument measurements. There are no identified ionizing radiological hazards associated with any areas within the Stronghold Freedom perimeter. External radiation measurements were at background levels. Internal radiation dose estimates are predicated on the results of environmental media analysis. Air sampling results for gamma emitting radionuclides and for uranium were below the results for release criteria for unrestricted areas according to the Nuclear Regulatory Commission (reference 15) and do not pose an internal or external radiation exposure threat. Analysis of the ROWPU potable water for nonconsumptive uses indicated the water met the World Health Organization (WHO) screening criteria for radionuclides in drinking water (References 16 and 17). Bottled water is used for drinking, and the sample results for the bottled water meet the EPA drinking water standard for uranium in drinking water. The potable water does not pose an internal or external radiation exposure threat.

(2) (U) ~~(C//REL)~~ Site 1. The only area with detected external radiation measurements above background were in the Site 1 area soil surveys, which is a restricted access area, outside the Stronghold Freedom perimeter. The external radiation measurements at Site 1 do not indicate an acute external health hazard. Air sampling results for gamma emitting radionuclides and uranium were below the release criteria for unrestricted areas according to the Nuclear Regulatory Commission. Airborne radionuclides do not pose an internal or external radiation

acute exposure threat. The only soil samples with higher than typical background levels of radionuclides were from Site 1 area and from subsurface soil collections. Appendix C, Table C-1 provides a complete list of all sample results from the follow-on environmental site survey.

g. (U) ~~(C//REL)~~ Hazard Probability. The hazard probability ranking chart in TG 230 was used to assign a hazard probability to each environmental media.

(1) (U) ~~(C//REL)~~ Air. The levels of compounds detected in the air samples varied with sample location. Most samples did not indicate the presence of any compounds above the method detection limit. However, a few isolated samples contained elevated levels of tetrachloroethylene as well as particulate matter <10μ (PM_{10}). Due to the highly variable nature of air concentrations, it is estimated that between 50% and 75% of personnel at Stronghold Freedom will be exposed to elevated levels of compounds in air. Therefore, the hazard probability was classified as Likely.

(2) (U) ~~(C//REL)~~ Radiation Survey. The Hazard Probability Ranking Chart in TG 248 was used to assign a hazard probability for radiological hazards in soil and air at Stronghold Freedom and Site 1.

(a) (U) ~~(C//REL)~~ Stronghold Freedom Confine. For the purpose of this assessment, it was assumed that troops occupying Stronghold Freedom would live and patrol the area 24 hours per day for up to 1 year. Therefore, the potential for daily contact with radiation exists for up to 100% of the field unit. However, less than 10% of personnel will experience exposures above background, therefore, the resulting hazard probability ranking for exposure to radiation above background is classified as UNLIKELY.

(b) (U) ~~(C//REL)~~ Site 1. For the purpose of this assessment, it was assumed that fewer than 20% of troops occupying Stronghold Freedom would be in the Site 1 area and then only during daylight hours for only a few hours per day for up to 1 year. The air sampling results for this area indicate no internal inhalation hazard. No water is consumed from this area. Even though the external radiation measurements were higher than background, the external radiation was not a significant radiation hazard at Site 1. Therefore, the resulting hazard probability ranking for exposure to radiation above background is classified as UNLIKELY

g. (U) Hazard Severity. The hazard severities associated with exposure to the detected levels of compounds in all media were classified using the Chemical Hazard Severity Ranking Chart for Military Deployments provided in TG 230. The assigned hazard severities for each compound are detailed in Table 2 below. The health threat classification was reevaluated and resulting threat levels are included in Appendix G. Potential health outcomes for each compound are also included in Appendix G.

(1) (U) ~~(C//REL)~~ Ambient Air.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(a) (U) ~~(C//REL)~~ Tetrachloroethylene. Air concentrations can vary significantly over time and by location. Maximum concentrations were used for comparison purposes to provide a conservative estimate of risk in the absence of additional surveillance. Concentrations of tetrachloroethylene slightly exceeded the Region 9 PRG, which was the only available guideline in this instance. Exposure to high levels of tetrachloroethylene can produce symptoms such as dizziness, eye and skin irritation, respiratory irritation and suffocation. It is estimated that less than 10% of personnel may experience health effects. The resulting hazard severity for tetrachloroethylene is NEGLIGIBLE.

(b) (U) ~~(C//REL)~~ PM_{10}. Measured PM_{10} concentrations also exceeded the long-term guideline in 10 of the 11 samples which produced valid results. Potential affects of PM_{10} exposure include irritation of the eyes, skin, throat, and respiratory system. These effects are considered temporary irritation and it is estimated that greater than 10% of personnel may experience effects. Therefore, the hazard severity for PM_{10} exposure is considered MARGINAL.

Table 2. (U) ~~(C//REL)~~ Hazard Severity Ranking for Ambient Air Compounds

Compound	Concentration	Guideline	Severity Rank
Tetrachloroethylene	0.0061 mg/m^3	0.0033 mg/m^3	Negligible
PM_{10}	0.702 mg/m^3	0.070 mg/m^3	Marginal

(2) (U) ~~(C//REL)~~ Radiation. The hazard severity levels associated with exposures to the radiation were classified using The Hazard Severity Ranking Chart in TG 248. For the radiation exposure levels encountered at Stronghold Freedom, no medical effects or deterministic effects are expected from radiation exposure. Far less than 10% of the exposed persons would be expected to exhibit chronic/permanent injury or disease ascribable to the estimated above background radiation received during this mission. The hazard severity for estimated radiation doses received during this mission is NEGLIGIBLE.

h. (U) ~~(C//REL)~~ Risk Characterization. In order to evaluate the overall operational risk, the hazard probability and severity are compared to the Risk Assessment Matrix provided in TG 248. An evaluation is done for each compound in order to develop an estimate of overall operational risk. In addition, the confidence in the estimate is also provided. Table 3 provides a summary of the risk estimates for compounds exceeding guidelines at Stronghold Freedom. A more extensive summary table is presented in Appendix G.

Table 3. (U) ~~(C//REL)~~ Operational Risk Levels

Air				
Compound	Hazard Probability	Hazard Severity	Operational Risk	Confidence
Tetrachloroethylene	Likely	Negligible	Low	Low
PM_{10}	Likely	Marginal	Moderate	Low

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

(U) The confidence in the air assessment was considered low due to the highly variable nature of air concentrations and the limited temporal scope of the available sampling data.

i. (U) ~~(C//REL)~~ Radiation. In order to evaluate the overall operational risk posed by OEH radiation hazards at Stronghold Freedom, the hazard probability and severity for radiation doses were used with the Risk Assessment Matrix provided in TG 248. The confidence in the estimate is also provided. For the estimated radiation doses received during deployment at Stronghold Freedom, the ORM risk estimate is LOW. A LOW confidence level was assigned for the radiation exposures discussed in this report. This low confidence level is due to the highly variable nature of air concentrations, the lack of detailed information regarding true soldier exposures, the limited temporal scope of the available sampling data, and the limited availability of data on health effects due to the low-level radiation exposure. Table 3 summarizes the radiation ORM estimates for Stronghold Freedom.

Table 3. (U) ~~(C//REL)~~ Radiation Operational Risk Management Estimates

Location	Hazard Probability	Hazard Severity	Operational Risk	Confidence
Stronghold Freedom Confine	Unlikely	Negligible	Low	Low
Site 1	Unlikely	Negligible	Low	Low

j. (U) Develop Controls.

(1) (U) ~~(C//REL)~~ Ambient Air. Most of the air samples collected did not indicate measurable levels of compounds. However some samples detected elevated levels of tetrachloroethylene. Since the operational risk for tetrachloroethylene is LOW, it is not necessary to take action to reduce the air concentrations. However, some simple mitigation action could be undertaken if a source of the compound can be identified. This could consist of removing or isolating the source with soil cover. If this is not feasible, personnel could also simply avoid the area. Elevated PM_{10} concentrations were also seen during most days of sampling. In order to reduce the operational risk associated with PM_{10}, personnel could utilize dust masks or avoid extensive outdoor activities during periods when dust levels in the air are noticeably elevated. Active dust control measures could also reduce the concentrations to more acceptable levels. Implementation of these measures would reduce the operational risk to LOW.

(2) (U) ~~(C//REL)~~ Radiation. Risks due to exposure to soil at Site 1 (AAM/ASM) can be reduced by minimizing contact with potentially contaminated soils. Since most of the elevated levels of chemicals in soil were found in subsurface soils, excavation should be limited. If excavation is necessary sampling should be conducted and personal protective equipment used. Troops should avoid prolonged contact with areas where subsurface soils have been exposed or brought to the surface during berm construction or other excavation activities. In addition,

proper basic sanitation measures should be taken to include frequent hand washing and laundering of uniforms as available. If these controls were observed, the overall operational risk level would be maintained as LOW.

k. (U) ~~(C//REL)~~ Chemical ORM Uncertainties. Overall, this OEH evaluation is meant to be conservative and should be adequately protective of soldiers' health under the conditions evaluated. However, a degree of uncertainty is inherently associated with this type of assessment. The true exposure frequencies of Stronghold Freedom personnel were not known so it was assumed that soldiers would be exposed to the detected hazards continuously for an entire year. However, the samples collected to date are only representative of environmental conditions over a brief time period. It is impossible to account for natural variation in the levels throughout the course of a year. This is particularly true for ambient air quality which can change rapidly and may be highly variable from one day to the next. In addition, the potential cumulative effects of exposure to similar compounds in different media, or different compounds with similar mechanisms of action, cannot be quantified. There were some compounds detected that did not have toxicological data and guidelines available for comparison. These compounds were not evaluated in this assessment. This is a significant source of uncertainty in the evaluation. Future iterations of this evaluation will allow for a more accurate evaluation of potential hazard.

l. (U) ~~(C//REL)~~ Radiation. Overall, this radiation OEH evaluation is meant to be conservative and should be adequately protective of soldiers' health under the conditions evaluated. However, a degree of uncertainty is inherently associated with this type of assessment. The true exposure patterns for Stronghold Freedom personnel were not known for most exposure pathways so it was assumed that soldiers would be exposed to the detected hazards continuously for an entire year. However, the samples collected to date are only representative of environmental conditions over a brief time period. It is impossible to account for natural variation in the levels throughout the course of a year. This is particularly true for ambient air quality, which can change rapidly and may be highly variable from one day to the next. This is a significant source of uncertainty in the evaluation. Future iterations of this evaluation may allow for a more accurate evaluation of potential hazard.

9. (U) ~~(C//REL)~~ Conclusions.

a. (U) ~~(C//REL)~~ Of the two compounds detected in air that exceeded guidelines, tetrachloroethylene appears to pose a LOW operational risk while PM_{10} levels pose a MODERATE operational risk. As a result, tetrachloroethylene is classified as a health threat while PM_{10} is considered a potential medical threat. Areas with noticeable vapors should be avoided if possible and protective measures should be taken if outdoor activity is necessary during periods when high particulate levels are noticeable in air. In addition, active dust control measures should continue in order to help reduce airborne particulate levels. If these measures are taken, the overall operational occupational and environmental health risk for the Stronghold would be LOW.

b. (U) ~~(C//REL)~~ Radiological Survey. Very small amounts of non-US origin DU are present in Site 1; the radiation hazard from this material is low. No DU or any other elevated levels of radiation were found within the camp. No radiological precautions are necessary for personnel at Stronghold Freedom unless entry into Site 1 is required. Basic precautions (e.g., wash hands and tools) will minimize personnel exposure and avoid spread of contamination from the Site 1. The health threat from radiological contamination at Stronghold Freedom is negligible.

c. (U) Ambient Air Quality. Inhalation of vapors from subsurface fuel contaminated soils could potentially cause adverse health effects in personnel at Stronghold Freedom. The clay soils have been shown to greatly mitigate ambient air exposures from subsurface fuel contaminated soils to either very low or non-detectable levels. For this reason, a "no digging" directive must continue to be implemented and enforced for these areas to minimize/ prevent exposures via the air pathway. Additionally, ambient air sampling confirmed that inhalation of respirable particulates could be a viable exposure pathway for personnel stationed at Stronghold Freedom. There were ten samples that exceeded the TG 230 annual guideline of 70 $\mu g/m^3$ of PM_{10}, with two exceeding this standard by a factor of four (e.g., over 280 $\mu g/m^3$). Surface soil samples did not indicate heavy metal, PAH, PCB, pesticide, or herbicide contaminants that would prompt additional health concerns with respirable particulates at this time. Particulate filters did not detect the presence of a significant concentration of heavy metals. Monitoring for organic and inorganic air contaminants should continue at Stronghold Freedom in order to provide additional exposure data (IAW requirements of references 8 and 9) and evaluate the efficacy of countermeasures. Equipment, environmental media, and sample analysis to perform this monitoring can be provided by USACHPPM. Preventive medicine personnel assigned to Stronghold Freedom will be best suited to perform this mission.

d. (U) Drinking Water Quality. The water produced by the on-site ROWPU does not pose a health risk to US personnel. The ROWPU treated water is safe to use for both potable (assuming adequate disinfection and bacteriological monitoring) and non-potable purposes, including showering, hand washing, teeth brushing, and industrial uses.

e. (U) Soil.

(1) (U) Surface Conditions. The soil contains trace levels of various contaminants at and below the surface. These contaminants do not pose a health threat at the levels detected in this study.

(2) (U) Subsurface Conditions. Elevated levels of VOCs were detected at distinct locations below the surface. The elevated levels of VOCs and TPH appear to be related to fuel transmission and storage activities that predate US Forces on the Stronghold. These contaminants do not pose a health threat at the levels detected in this study based on limited exposure pathways.

f. (U) Asbestos. No health hazard exists at this time to personnel assigned to Stronghold Freedom from airborne asbestos fibers. No immediate or long term health effects can currently be attributed to an airborne asbestos exposure received at Stronghold Freedom. No evidence of gross asbestos fiber contamination exists at this site. Previous efforts to clean up asbestos tile debris noted during the initial survey have been effective. All occupied buildings containing asbestos fiber building materials have been identified in this report.

g. (U) Lead Based Paint. One LBP sample taken in the vault/living quarters of the finance officer at the One Stop In-processing facility is positive for lead content. Due to the location of the sampled area (office environment, no food preparation and handling), this poses a negligible health effect to Stronghold Freedom personnel.

h. (U) Noise Sources. The US, allied and host nation flight operations pose both a nuisance and a periodic health threat to personnel assigned to Stronghold Freedom. The combined noise sources at this site generate noise levels that are equivalent to a large city or an industrial facility. Noise levels are not appreciably lower during the overnight hours.

i. (U) Operational Risk Management Estimate. Of the two compounds detected in air that exceeded guidelines, tetrachloroethylene appears to pose a LOW operational risk while PM_{10} levels pose a MODERATE operational risk. As a result, tetrachloroethylene is classified as a health threat while PM_{10} is considered a potential medical threat.

10. (U) Recommendations.

a. (U) The following controls should be implemented in order to minimize the operational occupational and environmental health risk from air: Areas of identifiable contamination should be avoided if possible. Potential sources of elevated air concentrations should be mitigated by covering with soil or other appropriate measures if desired. Dust masks should be worn during periods of high wind or other conditions that could produce elevated levels of PM_{10}. Active dust control measures should continue.

b. (U) Continue to monitor all media in order to detect changes from the current baseline conditions, document exposures, and determine the effectiveness of the risk control practices.

c. (U) The operational OEH risk assessment should be updated as additional sampling data become available.

d. (U) Radiological Survey. No radiological precautions are required for the general population stationed at Stronghold Freedom. Keep Site 1 as a posted "Off Limits" area. Personnel should not enter the Site 1 area unless required by mission. Ensure that all personnel who enter this area wash hands and tools upon leaving the site. Respiratory protection is not necessary for personnel entering this site as long as dust exposure is controlled.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

e. (U) Ambient Air Quality. Minimize airborne particulate concentrations, particularly ust, dirt, and vehicle or equipment emissions. These methods can include, but are not limited to, paving or placing rock along uncovered road and trails, aggressively watering down or capping uncovered areas, and instituting policies in order to minimize disturbances of soil (e.g. digging) and traffic along dirt roads.

f. (U) Drinking Water Quality. Inform personnel that their drinking water is safe for potable and non-potable purposes. This will ensure personnel are drinking adequate amounts of drinking water in order to prevent heat injuries.

g. (U) Soil.

(1) (U) Minimize digging, particularly in areas known to contain fuel contaminated soil. Continue to prohibit digging without a permit in risk communication efforts, along with recommendations for personal protective equipment when manual digging must be done.

(2) (U) When digging must be done, back fill the resulting hole or trench at the earliest opportunity. If digging is to be done manually, then the following personal protective equipment is recommended:

(a) (U) Half- or full-face respirator with organic vapor cartridge and HEPA filter. The M40 mask meets this requirement. If the M40 mask is used, it is recommended that the cartridge/filter be changed when the digging work is complete so that the mask will be fully functional in case of chemical agent attack.

(b) (U) Tyvek suit with Saranac coating

(c) (U) Nitrile gloves (or similar impermeable gloves)

(d) (U) Rubberized overboots

h. (U) Asbestos. Manage undamaged roofing tiles in place. Perform any removal of damaged tiles from the 416th AEG vehicle maintenance facility and the CI/FP/JAG gazebo using a licensed asbestos removal contractor. Install non-asbestos roofing material as a replacement material. Seal the asbestos roofing tiles by spray painting the underside of the One Stop In-processing gazebo roof to minimize any potential asbestos fiber exposure risk to personnel.

i. (U) Lead Based Paint. Clean all interior surfaces containing LBP with a HEPA vacuum cleaner, use soap and water to remove dust and peeling paint, collect all debris and cleaning waste in plastic trash bags and dispose of material in accordance with local regulations. Repaint surfaces with interior grade latex paint to cover/encapsulate lead based paint.

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

j. (U) Noise Sources. Ban all low level flyovers of the Tent City area. Post all noise hazard areas, restrict access to areas that are known noise hazards to personnel assigned to the work site. Relocate refrigeration trailers parked at the entrance to the DFAC to an area behind the food storage and preparation area (along the interior perimeter road). Post the SSA refrigeration truck area as a noise hazard area, restrict access, and limit time spent in the area. Post the Prime Power facility as a noise hazard area and restrict access as noise levels in this area can be hazardous and permanently damaging in a very short period of time. Attenuate noise levels generated by the Prime Power facility by erecting an 8-10 foot tall Hesco barrier wall along the internal perimeter of the conex wall, the backside of HAS 18, and the area between HAS 19 and the interior berm.

k. (U) Future Environmental Monitoring. Continue to conduct periodic respirable particulate ambient air monitoring and VOC monitoring using organic preventive medicine personnel. Coordinate with CHPPM-EUR for equipment, media, and analytical support. Collect passive radon monitors deployed throughout Stronghold Freedom and return them to CHPPM-EUR prior to September 2002.

l. (U) Risk Communication.

(1) (U) Continue aggressive health risk communication efforts on the environmental threats identified on Stronghold Freedom to ensure personnel are aware of actual threats and appropriate countermeasures. Regular risk communication efforts will compensate for personnel turnover and provide deployed personnel with facts regarding their health, environmental health threats, and efforts undertaken to mitigate these health threats.

(2) (U) Future Risk Communication. Continue to communicate health risks to all in-coming personnel at Stronghold Freedom and provide periodic updates through the chain of command and in public forums (i.e., the post newsletter).

12. (U) Point of Contact. The POC for this action is the undersigned and can be reached by telephone at [redacted]; e-mail: [redacted] or by US mail: Commander, USACHPPM-EUR, CMR 402, APO AE 09180.

//Original Signed//
[redacted]
COL, MS
Commanding

Appendices:
A. (U) ~~(S//REL)~~ References
B. [redacted] (redacted)
C. (U) ~~(C//REL)~~ Tables of Results
D. (U) Site Photographs
E. (U) ~~(S//REL)~~ Sampling Coordinates

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May-14 June 2002

F. (U) ~~(S//REL)~~ Communications to Local Command
G. (U) ~~(C//REL)~~ Operational Risk Management Estimate Summary Tables
H. (U) Summary of Previous Findings and Recommended Countermeasures
I. (U) Health Risk Communications

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002

(U) ~~(S//REL)~~ APPENDIX A

REFERENCES

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002

APPENDIX A

REFERENCES

1. (U) Memorandum, USACHPPM-Europe, MCHB-AE, 15 February 2002, subject: Final Report, Environmental Site Characterization and Operational Health Risk Assessment, Site 1, 27 October – 27 November 2001 (Original Document Classified).

[redacted]-(redacted)

3. (U) USACHPM-Europe and USACHPPM-Main Directorate of Laboratory Services, Analytical Methods, 2001.

4. (U) Department of the Army (DA), Risk Management. FM 100-14, 23 April 1998.

5. (U) USACHPPM Technical Guide (TG) 248, Guide for Deployed Preventive Personnel on Health Risk Management. August 2001.

6. (U) USACHPPM TG 230, Chemical Exposure Guidelines for Deployed Military Personnel, January 2002.

7. (U) USEPA Preliminary Remediation Goals. November 2001.

8. (U) DoD Directive 6490.2, Joint Medical Surveillance, 30 August 1997.

9. (U) DoD Instruction 6490.3, Implementation and Application of Joint Medical Surveillance for Deployments, 7 August 1997.

10. (U) Joint Staff Memorandum, MCM-251-98, dated 4 December 1998.

11. (U) Headquarters Department of the Army Policy Letter, Force Health Protection (FHP): Occupational and Environmental Health Threats, 27 June 2001.

12. [redacted] (redacted)

13. (U) U.S. Army Center for Health Promotion and Preventive Medicine, USACHPPM Technical Guide 251 – A Soldier's Guide to Environmental and Occupational Field Sampling for Military Deployment (Draft), August 2001

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002

14. (U) ~~(S//REL)~~ Interim Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 Oct - 27 November 2001

15. [redacted] (redacted)

16. (U) Overseas Environmental Baseline Guidance Document, date.

17. (U) USACHPPM Technical Guide (TG) 236A, Basic Radiological Dose Estimation – A Field Guide, August 2001.

18. (U) Information Memorandum, 12 June 2002, HQUSACHPPM, subject: Uranium Found at Karshi Khanabad Airbase (Original Document Classified).

19. (U) Memorandum for Record, 764th Ordnance Company, AFOD-DG, 5 June 2002, subject: Radiation Readings.

20. (U) Memorandum, USACHPPM-Europe, MCHB-AE, 10 June 2002, subject: False Positive Alpha Contamination at K2.

21. (U) Federal Guidance Report #11, Limiting Values of Radionuclide Intake and Air Concentration, EPA, 1988.

22. (U) Health and Environmental Consequences of Depleted Uranium Use in the U. S. Army: Technical Report, U. S. Army Environmental Policy Institute, June 1995.

23. [redacted] (redacted)

24. [redacted] (redacted)

25. (U) Memorandum, USA SBCCOM, AMSSB-CS, 22 June 02, subject: Samples Received from K2.

26. (U) ~~(S//REL)~~ Memorandum, USACHPPM-Europe, MCAB-AE, 20 July 2002, Subject: Environmental Assessment, Hardened Aircraft Shelters, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 6 June – 20 July 2002.

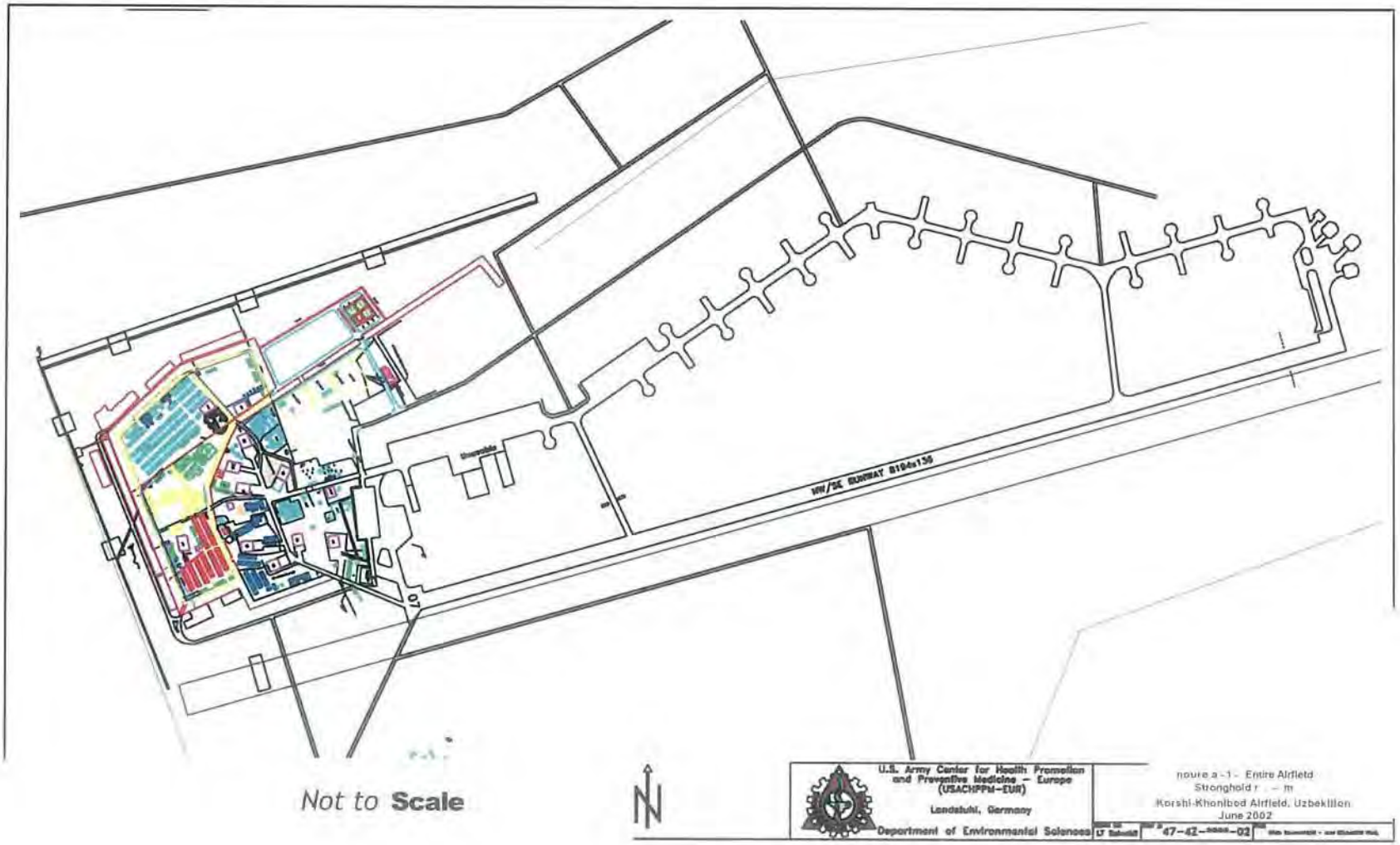
DECLASSIFIED ~~(S//REL)~~ APPENDIX B

SITE MAPS

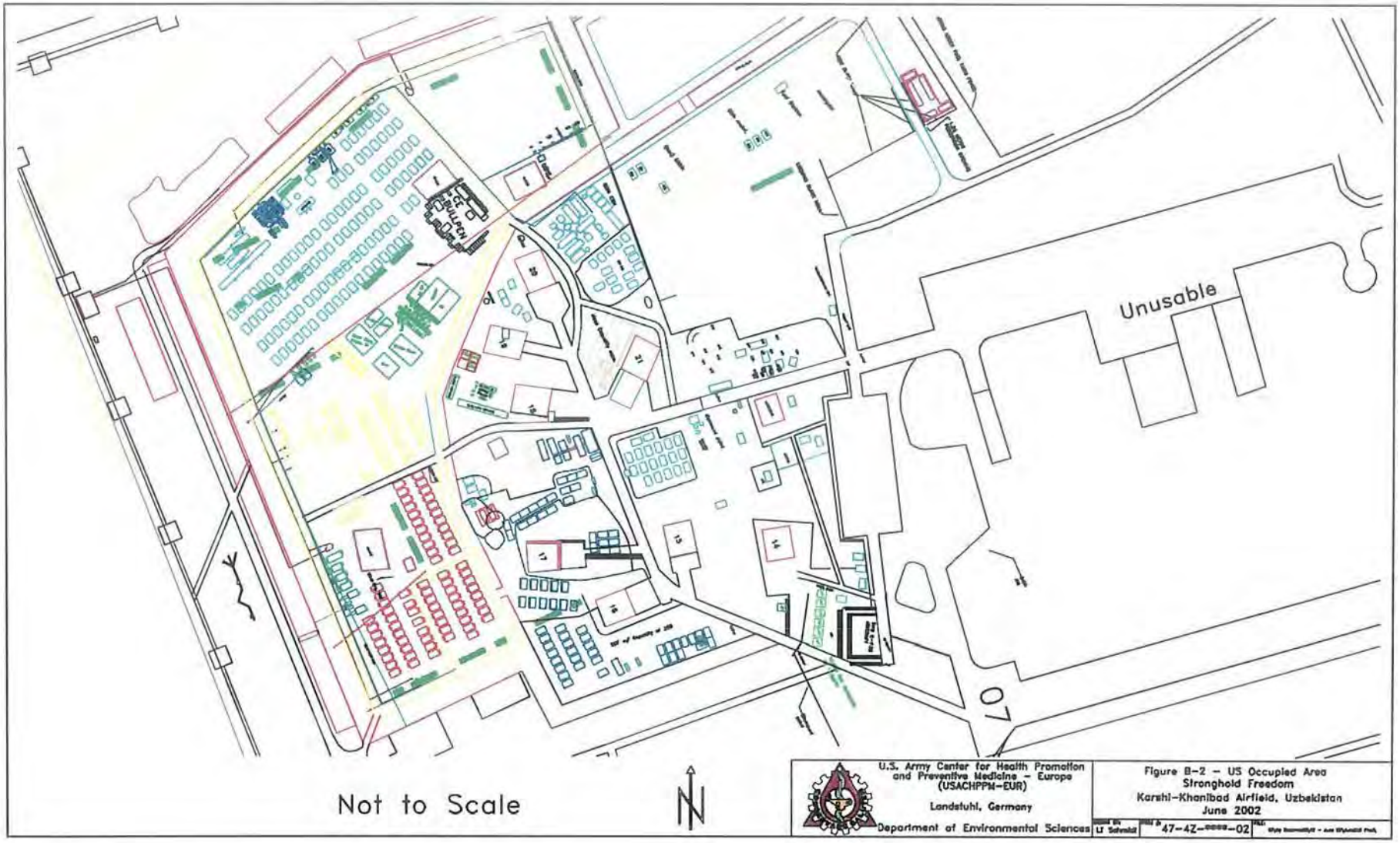
(U) ~~(C//REL)~~ APPENDIX C

ANALYTICAL RESULTS

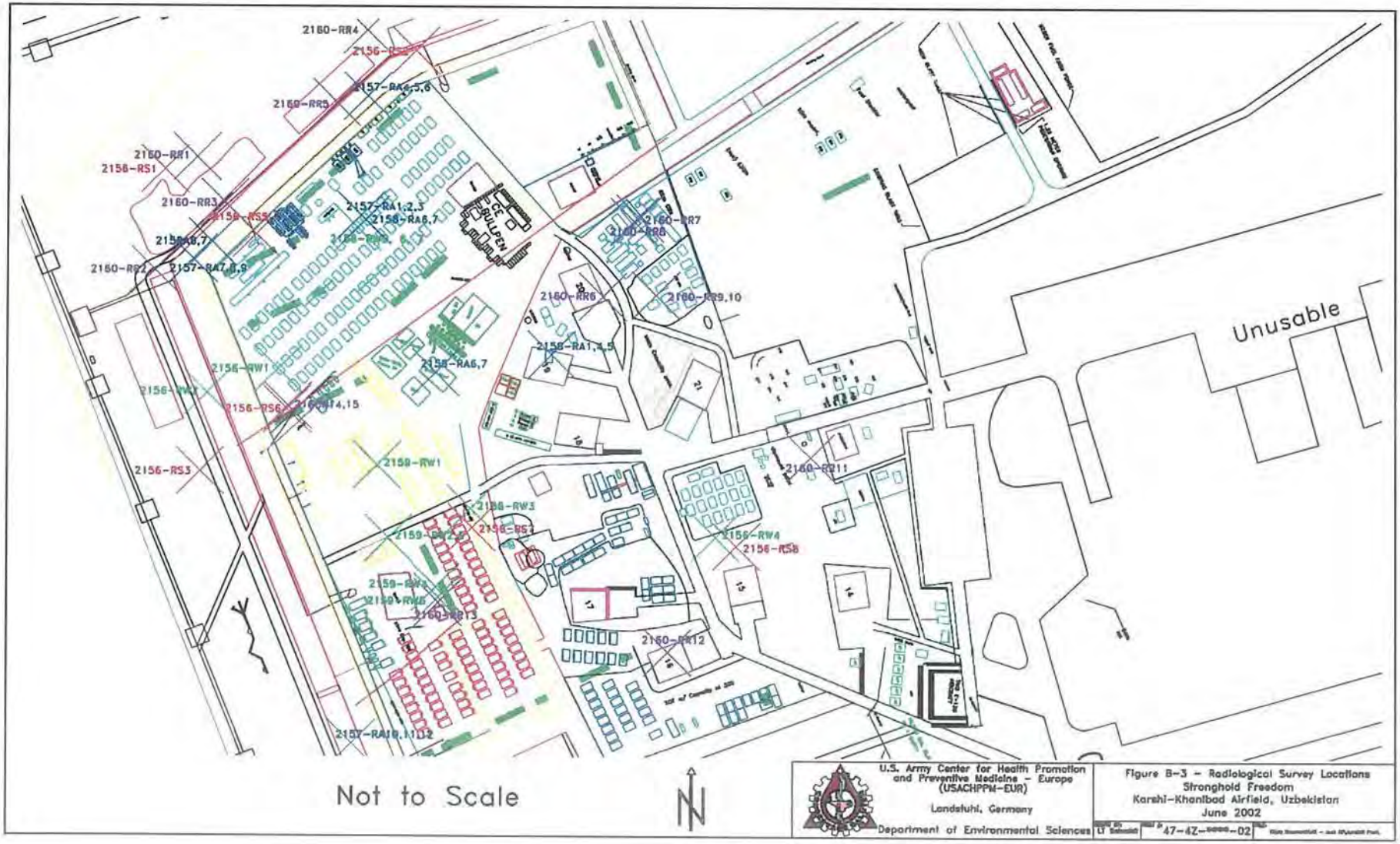
(U) (~~S//REL~~) Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



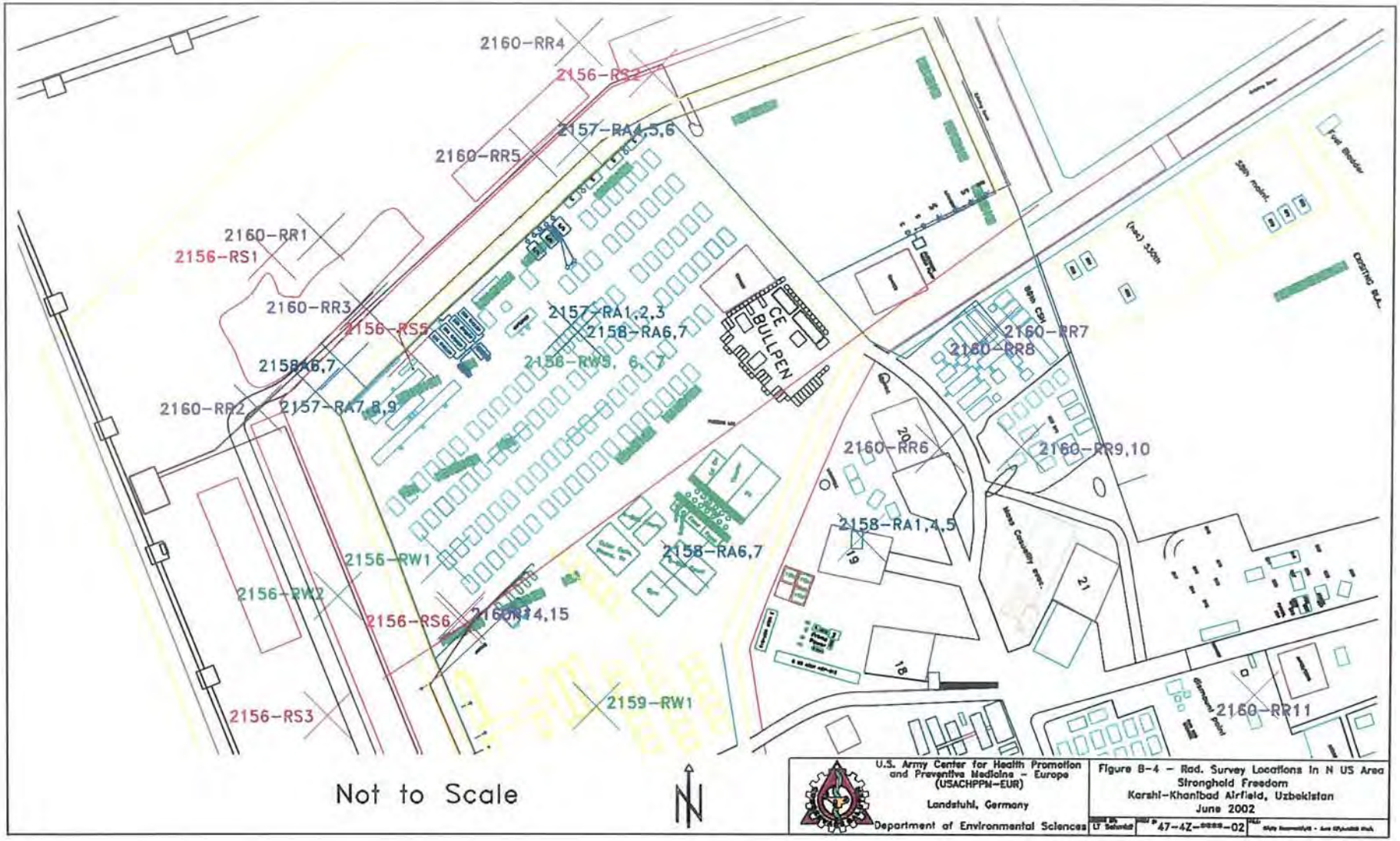
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



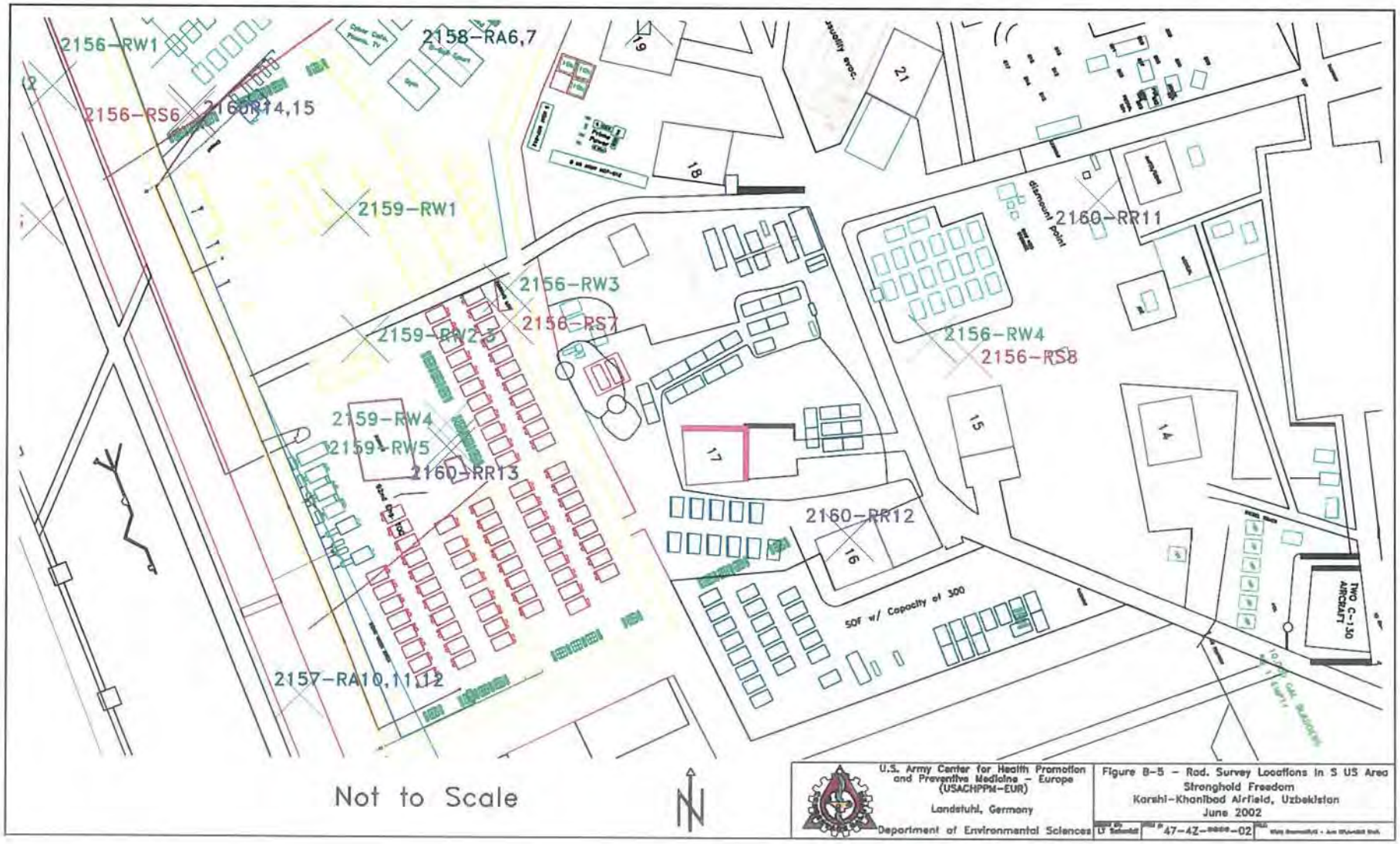
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



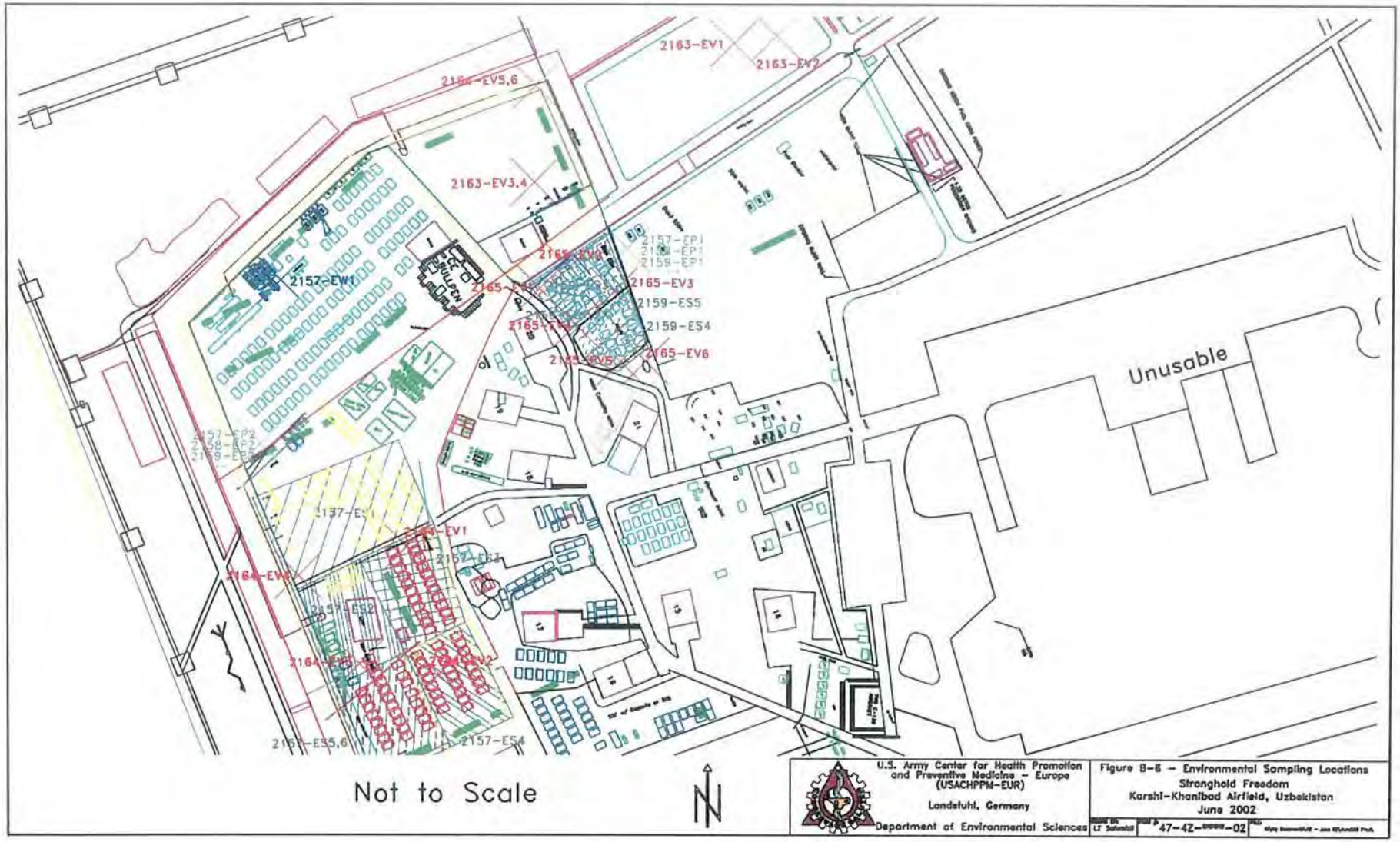
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



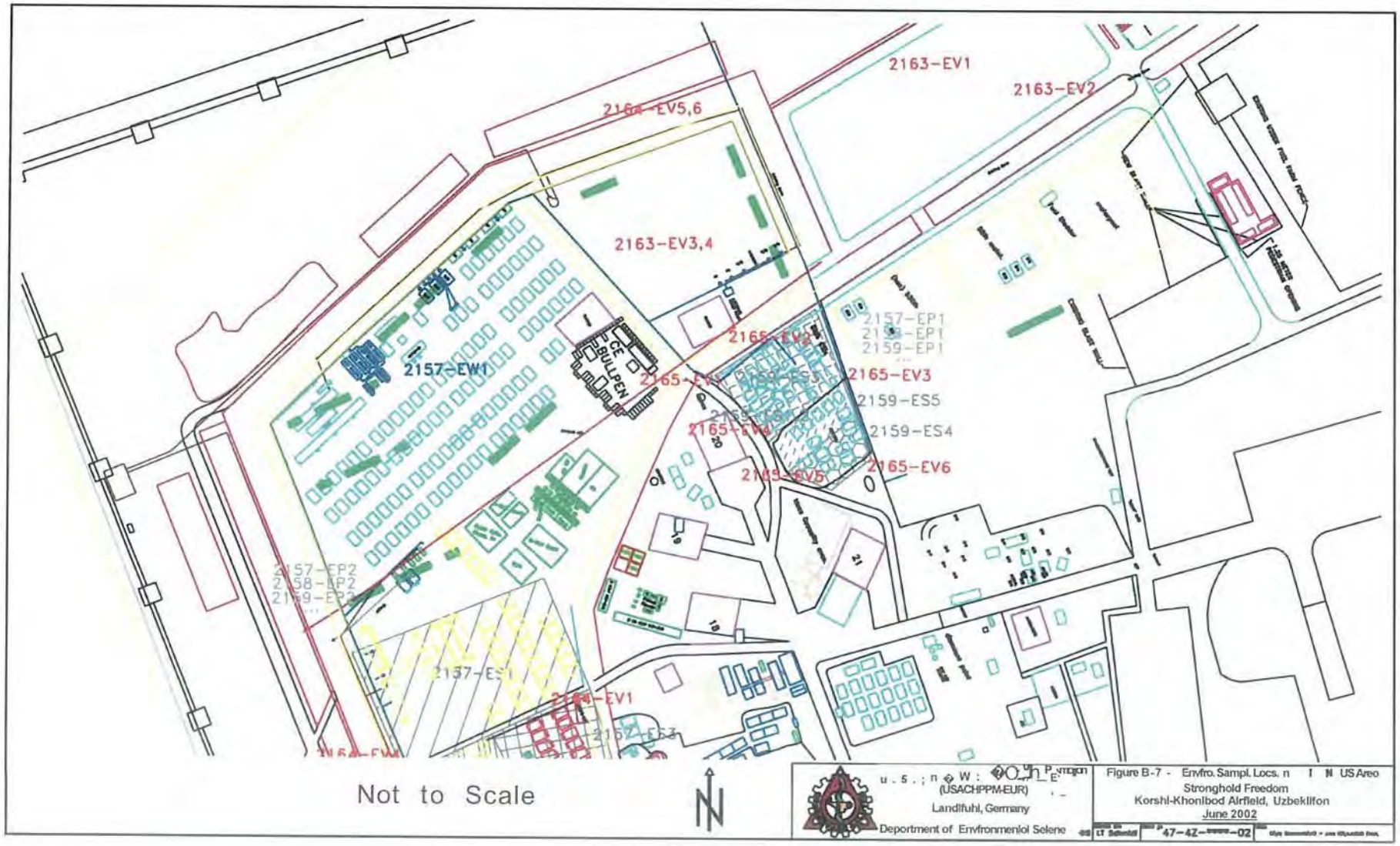
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



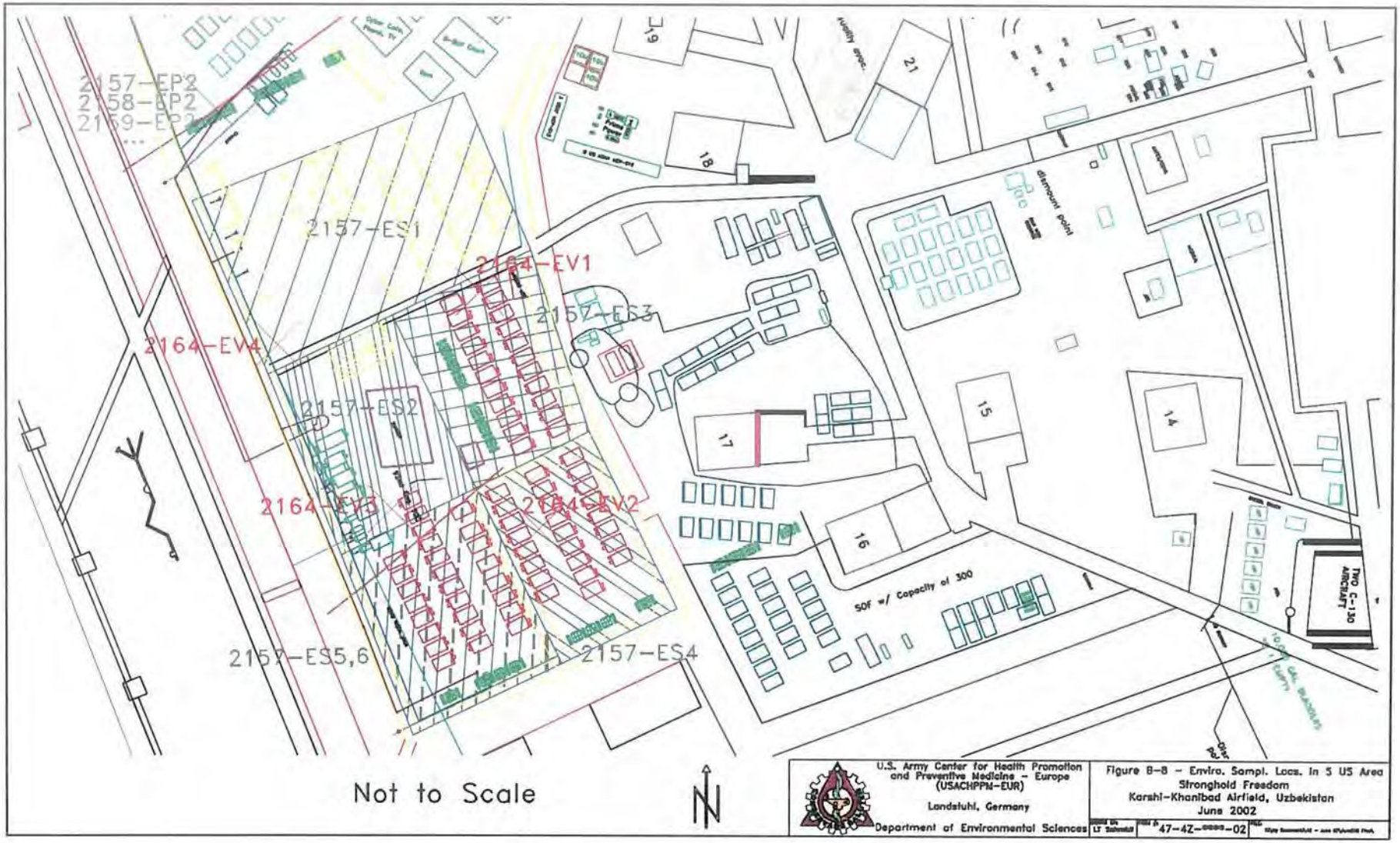
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



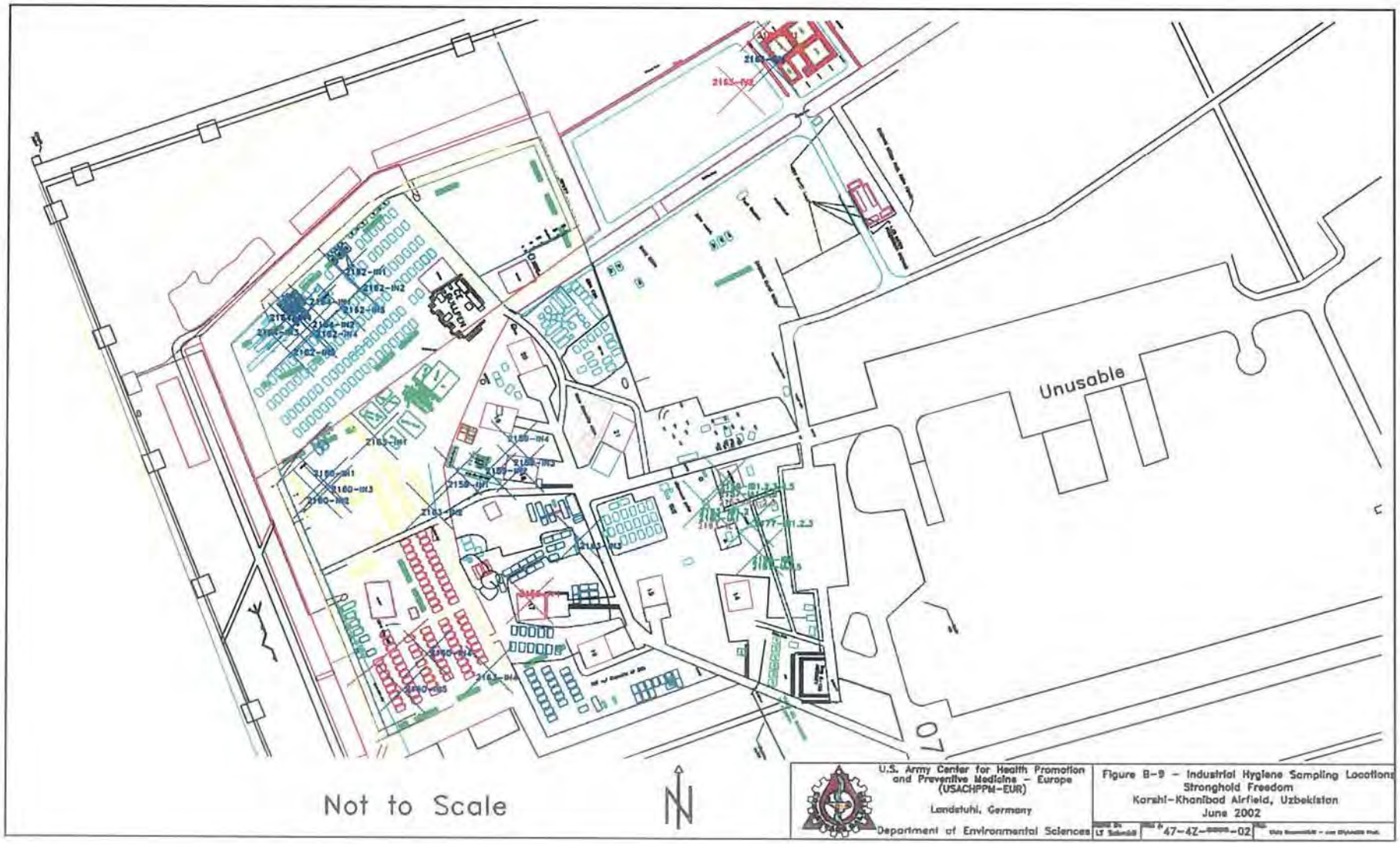
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



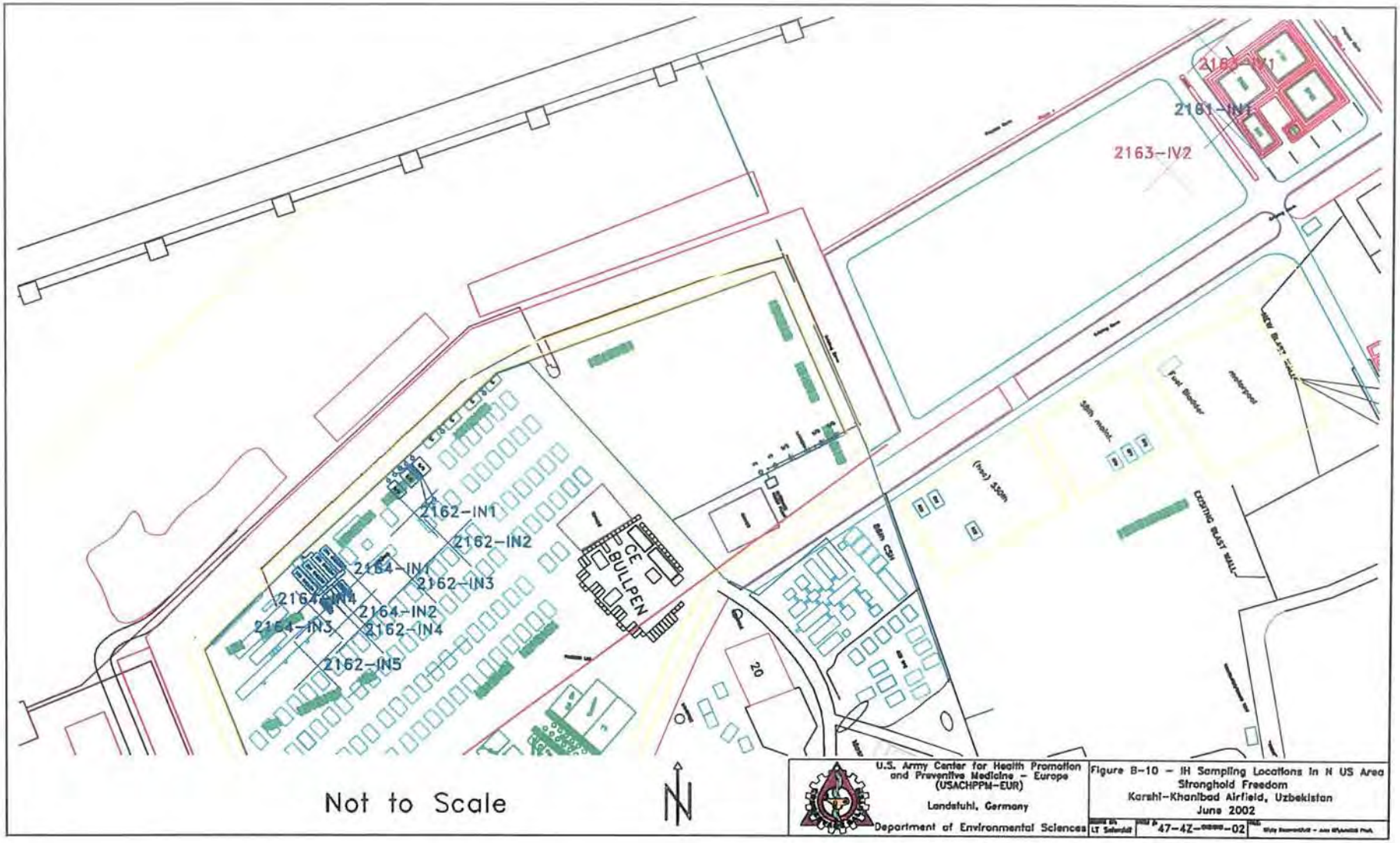
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



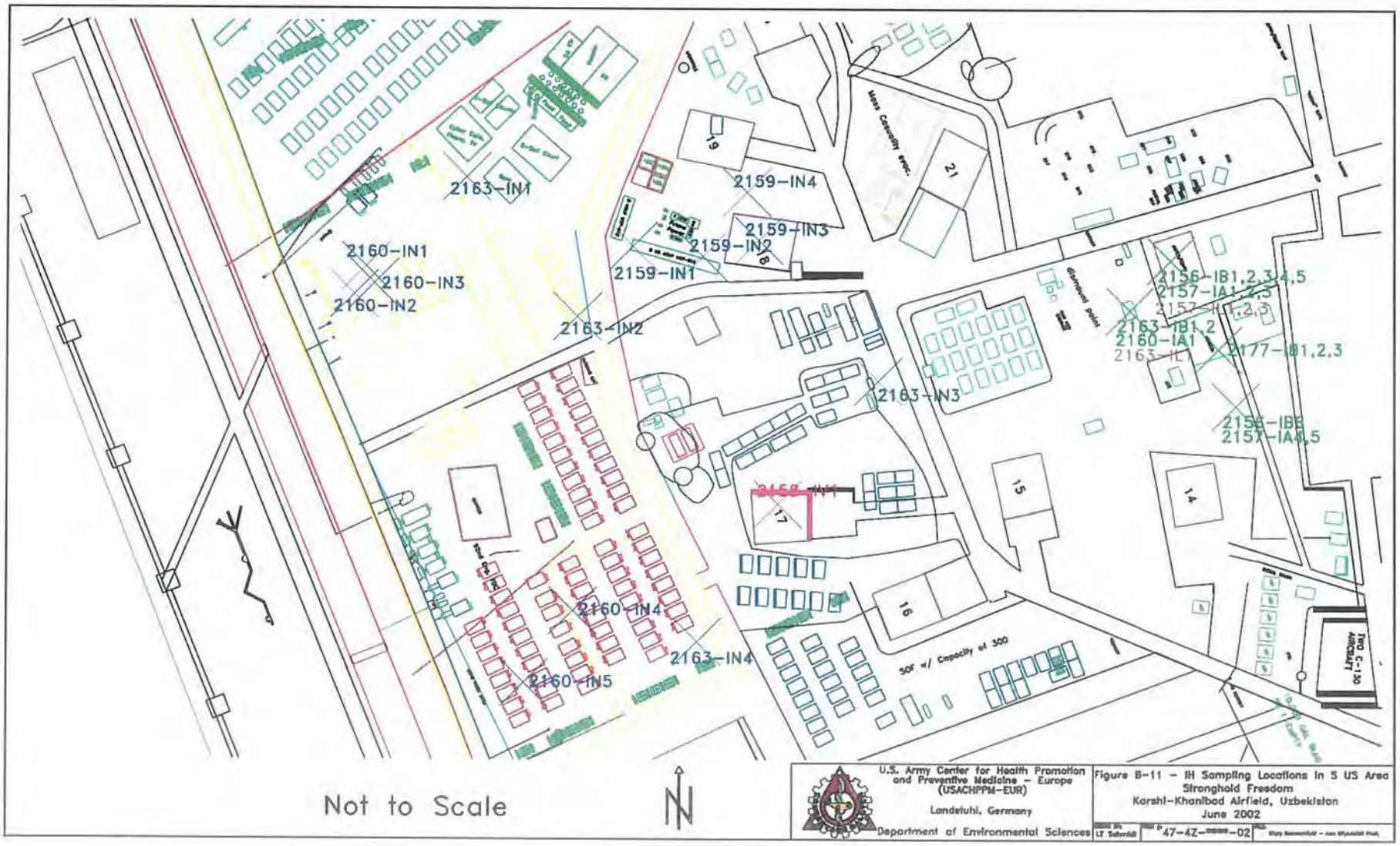
(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May - 14 June 2002



(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-1 (U) ~~(C//REL)~~. Radiological Results

Field ID	Analytical Parameters	Measurement	Units	Volume Sampled (m3)	Concentration (ng/m3)	Result	Units	Action Level	Reference	Date Taken
Radon Measurements										
2157-RA1	Radon Measurement	4	Bq/m3 EEC	10	0.0011	**0.06**	WLM/yr	4 WLM / yr	FGR 11, p 106	6 Jun 02 (2157[2])
2157-RA4	Radon Measurement	2	Bq/m3 EEC	10	0.0005	**0.03**	WLM/yr	4 WLM / yr	FGR 11, p 106	6 Jun 02 (2157[2])
2157-RA7	Radon Measurement	1	Bq/m3 EEC	10	0.0003	**0.01**	WLM/yr	4 WLM / yr	FGR 11, p 106	6 Jun 02 (2157[2])
2157-RA10	Radon Measurement	2	Bq/m3 EEC	10	0.0005	**0.03**	WLM/yr	4 WLM / yr	FGR 11, p 106	6 Jun 02 (2157[2])
2158-RA1	Radon Measurement	2	Bq/m3 EEC	10	0.0005	**0.03**	WLM/yr	4 WLM / yr	FGR 11, p 106	7 Jun 02 (2158[2])
2158-RA8	Radon Measurement	2	Bq/m3 EEC	10	0.0005	**0.03**	WLM/yr	4 WLM / yr	FGR 11, p 106	7 Jun 02 (2158[2])
Soil Samples										
2156-RS1	Soil - Uranium only	148	mg/kg	NA	NA	**148.00**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS2	Soil - Uranium only	2.46	mg/kg	NA	NA	**2.46**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS3	Soil - Uranium only	1.91	mg/kg	NA	NA	**1.91**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS4	Soil - Uranium only	2.18	mg/kg	NA	NA	**2.18**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS5	Soil - Uranium only	2.66	mg/kg	NA	NA	**2.66**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS6	Soil - Uranium only	2.19	mg/kg	NA	NA	**2.19**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS7	Soil - Uranium only	2.14	mg/kg	NA	NA	**2.14**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2156-RS8	Soil - Uranium only	1.87	mg/kg	NA	NA	**1.87**	mg/kg	50 mg/kg	AEPI, p 153	5 Jun 02 (2156[2])
2158-RS1	Soil - Uranium only	2.07	mg/kg	NA	NA	**2.07**	mg/kg	50 mg/kg	AEPI, p 153	7 Jun 02 (2158[2])
2158-RS2	Soil - Uranium only	2.03	mg/kg	NA	NA	**2.03**	mg/kg	50 mg/kg	AEPI, p 153	7 Jun 02 (2158[2])
Water sample										
2156-RH1	Nestle water - Uranium	0.00117	mg/kg	41	NA	**1.17**	ug/l	20 ug/l	AEPI, p 154	5 Jun 02 (2156[2])
Swipes										
2156-RW1	Rad Swipe - uranium	515	ng/sample	NA	NA	**0.80**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW2	Rad Swipe - uranium	380	ng/sample	NA	NA	**0.59**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW3	Rad Swipe - uranium	580	ng/sample	NA	NA	**0.90**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW4	Rad Swipe - uranium	235	ng/sample	NA	NA	**0.37**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW5	Rad Swipe - uranium	69	ng/sample	NA	NA	**0.11**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW6	Rad Swipe - uranium	92	ng/sample	NA	NA	**0.14**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2156-RW7	Rad Swipe - uranium	145	ng/sample	NA	NA	**0.23**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	5 Jun 02 (2156[2])
2158-RW1	Rad Swipe - uranium	379	ng/sample	NA	NA	**0.59**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	7 Jun 02 (2158[2])
2158-RW2	Rad Swipe - uranium	574	ng/sample	NA	NA	**0.89**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	7 Jun 02 (2158[2])
2158-RW3	Rad Swipe - uranium	150	ng/sample	NA	NA	**0.23**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	7 Jun 02 (2158[2])
2159-RW1	Rad Swipe - uranium	163	ng/sample	NA	NA	**0.25**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	8 Jun 02 (2159[2])
2159-RW2	Rad Swipe - uranium	236	ng/sample	NA	NA	**0.37**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	8 Jun 02 (2159[2])
2159-RW3	Rad Swipe - uranium	244	ng/sample	NA	NA	**0.38**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	8 Jun 02 (2159[2])
2159-RW4	Rad Swipe - uranium	249	ng/sample	NA	NA	**0.39**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	8 Jun 02 (2159[2])
2159-RW5	Rad Swipe - uranium	302	ng/sample	NA	NA	**0.47**	dpm/100 cm2	1000 dpm/100 cm2	AEPI, p 153	8 Jun 02 (2159[2])
Air samples										
2158-RA2	Air - TFA 41 - uranium	2.7	ng/sample	5.7	0.47	**1.23E-11**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2158-RA4	Air - TFA 41 - uranium	3.6	ng/sample	10.1	0.36	**9.23E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2158-RA6	Air - TFA 41 - uranium	4.6	ng/sample	10.1	0.46	**1.18E-11**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2158-RA9	Air - TFA 41 - uranium	3.4	ng/sample	10	0.34	**8.81E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2158-RA10	Air - TFA 41 - uranium	2.5	ng/sample	10	0.25	**6.48E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2157-RA2	Air - TFA 41 - uranium	1.7	ng/sample	19.8	0.09	**2.22E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	6 Jun 02 (2157[2])
2157-RA5	Air - TFA 41 - uranium	2	ng/sample	10.2	0.20	**5.08E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	6 Jun 02 (2157[2])
2157-RA8	Air - TFA 41 - uranium	2.1	ng/sample	10.1	0.21	**5.39E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	6 Jun 02 (2157[2])
2157-RA11	Air - TFA 41 - uranium	2.7	ng/sample	10	0.27	**6.99E-12**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	6 Jun 02 (2157[2])
Air samples - Hi Vol										
2158-RA3	Air - TFA S - uranium	129	ng/sample	60.2	2.14	**5.55E-11**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])
2158-RA5	Air - TFA S - uranium	53.5	ng/sample	60	0.89	**2.31E-11**	MBq/m^3	1.67e-7 MBq/m^3	FGR 11, p 110	7 Jun 02 (2158[2])

[1] Shaded samples are above action level (AL)

[2] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-2 (U) ~~(C//REL)~~. Soil Sampling Locations and Analytes.

SAMPLE ID	LOCATION DESCRIPTION	SURFACE OR SUBSURFACE	DISCRETE OR COMPOSITE	COLLECTION DATE	ANALYTES
2157-1ES	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2157-2ES	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2157-3ES	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2157-4ES	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2157-5ES	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2157-5ES (Duplicate[1])	Southwest Tent City	SURFACE	COMPOSITE	6 Jun 02 (2157[3])	Heavy Metals, PAHs, PCBs, Pesticides
2159-1ES	Between Headquarters/Hospital	SUBSURFACE - 0.75 m BGS[2]	DISCRETE	8 Jun 02 (2159[3])	Heavy Metals, PAHs, PCBs, Pesticides, VOCs, TPH
2159-2ES	Between Headquarters/Hospital	SUBSURFACE - 1.5 m BGS[2]	DISCRETE	8 Jun 02 (2159[3])	Heavy Metals, PAHs, PCBs, Pesticides, VOCs, TPH
2159-3ES	Hospital	SURFACE	COMPOSITE	8 Jun 02 (2159[3])	Heavy Metals, PAHs, PCBs, Pesticides
2159-4ES	Near Headquarters	SURFACE	COMPOSITE	8 Jun 02 (2159[3])	Heavy Metals, PAHs, PCBs, Pesticides
2159-5ES	Between Headquarters/Hospital	SURFACE	COMPOSITE	8 Jun 02 (2159[3])	Heavy Metals, PAHs, PCBs, Pesticides

[1]Duplicate sample of 2157-5S
[2] BGS - Below Ground Surface
[3] Julian Date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-3 (U) ~~(C//REL)~~. Soil Analytical Results - Heavy Metals

SAMPLE ID						2157-1ES	2157-2ES	2157-3ES	2157-4ES	2157-5ES	2157-5ES (Dup[8])
LOCATION DESCRIPTION						SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City
SURFACE OR SUBSURFACE						SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]						
HEAVY METALS											
Arsenic	mg/kg	2	3.8	2.7	1,100	7	4.8	4.5	4	3.3	3.9
Barium	mg/kg	5	140,000	100,000	No Std[6]	96	97	92	82	98	93
Beryllium	mg/kg	0.5	4,100	2,200	16,000	0.55	0.55	0.58	0.53	0.52	0.54
Cadmium	mg/kg	0.5	1,000	810	130	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Chromium (total)	mg/kg	5	No Std[6]	450	5,700	21	21	22	19	18	18
Cobalt	mg/kg	5	41,000	100,000	No Std[6]	6.8	6.9	7.3	6.3	5.9	6.1
Copper	mg/kg	5	82,000	76,000	No Std[6]	14	17	14	12	11	11
Lead	mg/kg	2.5	No Std[6]	750	2,200	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Manganese	mg/kg	5	41,000	32,000	No Std[6]	390	420	440	390	390	390
Mercury (inorganic)	mg/kg	0.1	No Std[6]	No Std[6]	33	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Molybdenum	mg/kg	5	10,000	10,000	1,300	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Nickel	mg/kg	5	41,000	41,000	No Std[6]	18	18	19	16	15	15
Selenium	mg/kg	5	10,000	10,000	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Silver	mg/kg	1	10,000	10,000	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Zinc	mg/kg	5	610,000	100,000	69,000	45	48	43	36	34	36

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-3 (U) ~~(C//REL)~~. Soil Analytical Results - Heavy Metals – Cont'd.

SAMPLE ID						2159-1ES	2159-2ES	2159-3ES	2159-4ES	2159-5ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital	Hospital	Near HQ	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]					
HEAVY METALS										
Arsenic	mg/kg	2	3.8	2.7	1,100	**4.9**	**4.9**	**4.4**	**5.2**	**4.9**
Barium	mg/kg	5	140,000	100,000	No Std[6]	**97**	**100**	**100**	**100**	**95**
Beryllium	mg/kg	0.5	4,100	2,200	16,000	**0.65**	**0.56**	**0.55**	**0.82**	**0.83**
Cadmium	mg/kg	0.5	1,000	810	130	**2.2**	**1.3**	**1.4**	BDL[5]	BDL[5]
Chromium (total)	mg/kg	5	No Std[6]	450	5,700	**28**	**23**	**23**	**28**	**26**
Cobalt	mg/kg	5	41,000	100,000	No Std[6]	**8.1**	**6.9**	**6.8**	**9.4**	**9.2**
Copper	mg/kg	5	82,000	76,000	No Std[6]	**54**	**48**	**29**	**17**	**17**
Lead	mg/kg	2.5	No Std[6]	750	2,200	**29**	**21**	**25**	**90**	**11**
Manganese	mg/kg	5	41,000	32,000	No Std[6]	**470**	**450**	**440**	**490**	**490**
Mercury (inorganic)	mg/kg	0.1	No Std[6]	No Std[6]	33	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Molybdenum	mg/kg	5	10,000	10,000	1,300	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Nickel	mg/kg	5	41,000	41,000	No Std[6]	**25**	**20**	**19**	**22**	**22**
Selenium	mg/kg	5	10,000	10,000	No Std[6]	**6.3**	**5.1**	BDL[5]	**6.3**	**6.4**
Silver	mg/kg	1	10,000	10,000	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Zinc	mg/kg	5	610,000	100,000	69,000	**110**	**79**	**100**	**50**	**51**

[1] MDL - Minimum Detection Level
[2] RBC - USEPA Region III Risk Based Concentrations for Industrial Soil
[3] PRG - USEPA Region IX Preliminary Remediation Goals for Industrial Soil
[4] MEG - Soil Military Exposure Guideline (from USACHPPM TG 230)
[5] BDL - Below Detection Limit
[6] No Std - No Standard Exists
[7] Julian date
[8] Duplicate sample of 2157-5S

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-4 (U) ~~(C//REL)~~. Soil Analytical Results – PAHs

SAMPLE ID						2157-1ES	2157-2ES	2157-3ES	2157-4ES	2157-5ES	2157-5ES (Dup[8])
LOCATION DESCRIPTION						SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City
SURFACE OR SUBSURFACE						SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]						
Polycyclic Aromatic Hydrocarbons (PAHs)											
Acenaphthene	mg/kg	0.01	120,000	38,000	1,300	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Acenaphthylene	mg/kg	0.01	No Std[6]	No Std[6]	Undetectable	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Anthracene	mg/kg	0.01	610,000	10,000	6.1	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Benzo(a)anthracene	mg/kg	0.01	7.8	2.9	2,500	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Benzo(a)pyrene	mg/kg	0.01	0.78	0.29	250	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Benzo(b)fluoroanthene	mg/kg	0.01	7.8	29	2,500	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Benzo(g,h,i)perylene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Benzo(k)fluoroanthene	mg/kg	0.01	78	2.9	3,100	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Chrysene	mg/kg	0.01	780	290	3,100	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Dibenz(a,h)anthracene	mg/kg	0.01	0.78	0.29	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Fluoranthene	mg/kg	0.01	82,000	30,000	42,000	BDL[5]	**0.01**	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Fluorene	mg/kg	0.01	82,000	33,000	90	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Indeno(1,2,3-cd)pyrene	mg/kg	0.01	7.8	2.9	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Naphthalene	mg/kg	0.01	41,000	190	220	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Phenanthrene	mg/kg	0.01	No Std[6]	No Std[6]	270	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Pyrene	mg/kg	0.01	61,000	54000	31,000	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]	BDL[5]
1-Methylnaphthalene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2-Methylnaphthalene	mg/kg	0.01	41,000	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-4 (U) ~~(C//REL)~~. Soil Analytical Results – PAHs – Cont'd.

SAMPLE ID						2159-1ES	2159-2ES	2159-3ES	2159-4ES	2159-5ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital	Hospital	Near HQ	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]					
Polycyclic Aromatic Hydrocarbons (PAHs)										
Acenaphthene	mg/kg	0.01	120,000	38,000	1,300	BDL[5]	**0.01**	BDL[5]	BDL[5]	BDL[5]
Acenaphthylene	mg/kg	0.01	No Std[6]	No Std[6]	Undetectable	BDL[5]	BDL[5]	BDL[5]	BDL[5]	**0.22**
Anthracene	mg/kg	0.01	610,000	10,000	6.1	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]
Benzo(a)anthracene	mg/kg	0.01	7.8	2.9	2,500	BDL[5]	**0.01**	BDL[5]	BDL[5]	BDL[5]
Benzo(a)pyrene	mg/kg	0.01	0.78	0.29	250	BDL[5]	**0.01**	BDL[5]	BDL[5]	BDL[5]
Benzo(b)fluoroanthene	mg/kg	0.01	7.8	29	2,500	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]
Benzo(g,h,i)perylene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]
Benzo(k)fluoroanthene	mg/kg	0.01	78	2.9	3,100	BDL[5]	**0.01**	BDL[5]	BDL[5]	BDL[5]
Chrysene	mg/kg	0.01	780	290	3,100	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]
Dibenz(a,h)anthracene	mg/kg	0.01	0.78	0.29	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Fluoranthene	mg/kg	0.01	82,000	30,000	42,000	BDL[5]	**0.04**	BDL[5]	BDL[5]	BDL[5]
Fluorene	mg/kg	0.01	82,000	33,000	90	BDL[5]	**0.01**	BDL[5]	BDL[5]	**0.12**
Indeno(1,2,3-cd)pyrene	mg/kg	0.01	7.8	2.9	No Std[6]	BDL[5]	**0.02**	BDL[5]	BDL[5]	BDL[5]
Naphthalene	mg/kg	0.01	41,000	190	220	**0.02**	**0.01**	BDL[5]	BDL[5]	**16**
Phenanthrene	mg/kg	0.01	No Std[6]	No Std[6]	270	BDL[5]	**0.05**	BDL[5]	BDL[5]	BDL[5]
Pyrene	mg/kg	0.01	61,000	54000	31,000	BDL[5]	**0.04**	BDL[5]	BDL[5]	BDL[5]
1-Methylnaphthalene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	**19**
2-Methylnaphthalene	mg/kg	0.01	41,000	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	**18**

[1] MDL - Minimum Detection Level
[2] RBC - USEPA Region III Risk Based Concentrations for Industrial Soil
[3] PRG - USEPA Region IX Preliminary Remediation Goals for Industrial Soil
[4] MEG - Soil Military Exposure Guideline (from USACHPPM TG 230)
[5] BDL - Below Detection Limit
[6] No Std - No Standard Exists
[7] Julian date
[8] Duplicate sample of 2157-5S

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-5 (U) ~~(C//REL)~~. Soil Analytical Results – PCBs

SAMPLE ID						2157-1ES	2157-2ES	2157-3ES	2157-4ES	2157-5ES	2157-5ES (Dup[8])
LOCATION DESCRIPTION						SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City
SURFACE OR SUBSURFACE						SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]						
Polychlorinated Biphenyls (PCBs)											
2,4',4-Trichlorobiphenyl (PCB No. 28)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2',5,5'-Tetrachlorobiphenyl (PCB No. 52)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2'4,5,5'-Pentachlorobeiphenyl (PCB No. 101)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2',3,4,4',5'-Hexachlorobiphnyl (PCB No. 138)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2',4,4',5,5'-Hexachloropiphnyl (PCB No. 153)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2',3,4,4',5,5'-Heptachlorobiphnyl (PCB No. 180)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Total PCB/German Waste Oil Reg	mg/kg	0.015	2.9	1.0	2.1	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]

Table C-5 (U) ~~(C//REL)~~. Soil Analytical Results – PCBs – Cont'd

SAMPLE ID						2159-1ES	2159-2ES	2159-3ES	2159-4ES	2159-5ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital	Hospital	Near HQ	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]					
Polychlorinated Biphenyls (PCBs)										
2,4',4-Trichlorobiphenyl (PCB No. 28)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2',5,5'-Tetrachlorobiphenyl (PCB No. 52)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	**0.0007**	BDL[5]	BDL[5]	BDL[5]	BDL[5]
2,2'4,5,5'-Pentachlorobeiphenyl (PCB No. 101)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	**0.0022**	**0.0013**	**0.0017**	BDL[5]	BDL[5]
2,2',3,4,4',5'-Hexachlorobiphnyl (PCB No. 138)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	**0.0059**	**0.0036**	**0.0043**	BDL[5]	BDL[5]
2,2',4,4',5,5'-Hexachloropiphnyl (PCB No. 153)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	**0.0033**	**0.0022**	**0.0025**	BDL[5]	BDL[5]
2,2',3,4,4',5,5'-Heptachlorobiphnyl (PCB No. 180)	mg/kg	0.0005	No Std[6]	No Std[6]	No Std[6]	**0.0009**	**0.0005**	**0.0006**	BDL[5]	BDL[5]
Total PCB/German Waste Oil Reg	mg/kg	0.015	2.9	1.0	2.1	**0.065**	**0.038**	**0.046**	BDL[5]	BDL[5]

[1] MDL - Minimum Detection Level; [2] RBC - USEPA Region III Risk Based Concentrations for Industrial Soil; [3] PRG - USEPA Region IX Preliminary Remediation Goals for Industrial Soil; [4] MEG - Soil Military Exposure Guideline (from USACHPPM TG 230); [5] BDL - Below Detection Limit
[6] No Std - No Standard Exists; [7] Julian date; [8] Duplicate sample of 2157-5S

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-6 (U) ~~(C//REL)~~. Soil Analytical Results – Pesticides

SAMPLE ID						2157-1ES	2157-2ES	2157-3ES	2157-4ES	2157-5ES	2157-5ES (Dup[8])
LOCATION DESCRIPTION						SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City	SW Tent City
SURFACE OR SUBSURFACE						SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])	6 Jun 02 (2157[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]						
Pesticides											
Aldrin	mg/kg	0.02	0.34	0.15	3	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
alpha HCH	mg/kg	0.02	0.91	0.59	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Atrazine	mg/kg	0.02	26	11	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Azinphosethyl	mg/kg	0.1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
beta HCH	mg/kg	0.02	3.2	2.1	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Chlorfenvinphos	mg/kg	0.1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
delta HCH	mg/kg	0.02	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Dieldrin	mg/kg	0.02	0.36	0.15	5.2	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Dimethoate	mg/kg	0.1	No Std[6]	180	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
gamma HCH (Lindane)	mg/kg	0.02	4.4	2.9	560	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Heptachlor	mg/kg	0.02	1.3	0.55	2	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Heptachlor Epoxide	mg/kg	0.02	0.63	0.27	1.5	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Hexachlorobenzene (HCB)	mg/kg	0.02	3.6	1.5	31	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Methoxychlor	mg/kg	0.05	10,000	4,400	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
o,p'-DDD	mg/kg	0.05	24	17	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
o,p'-DDE	mg/kg	0.05	17	12	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
o,p'-DDT	mg/kg	0.05	17	12	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
p,p'-DDD	mg/kg	0.05	24	17	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
p,p'-DDE	mg/kg	0.05	17	12	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
p,p'-DDT	mg/kg	0.05	17	12	52	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Parathionethyl	mg/kg	0.1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Parathionmethyl	mg/kg	0.1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]
Simazine	mg/kg	0.02	48	21	520	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]	BDL[5]

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-6 (U) ~~(C//REL)~~. Soil Analytical Results – Pesticides – Cont'd.

SAMPLE ID						2159-1ES	2159-2ES	2159-3ES	2159-4ES	2159-5ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital	Hospital	Near HQ	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE	SURFACE	SURFACE	SURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE	COMPOSITE	COMPOSITE	COMPOSITE
COLLECTION DATE						8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])	8 Jun 02 (2159[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]					
Pesticides										
Aldrin	mg/kg	0 02	0 34	0 15	3	BDL[5]	BDL[5]	BDL[5]		
alpha HCH	mg/kg	0 02	0 91	0 59	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Atrazine	mg/kg	0 02	26	11	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Azinphosethyl	mg/kg	0 1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
beta HCH	mg/kg	0 02	3 2	2 1	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Chlorfenvinphos	mg/kg	0 1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
delta HCH	mg/kg	0 02	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Dieldrin	mg/kg	0 02	0 36	0 15	5 2	BDL[5]	BDL[5]	BDL[5]		
Dimethoate	mg/kg	0 1	No Std[6]	180	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
gamma HCH (Lindane)	mg/kg	0 02	4 4	2 9	560	BDL[5]	BDL[5]	BDL[5]		
Heptachlor	mg/kg	0 02	1 3	0 55	2	BDL[5]	BDL[5]	BDL[5]		
Heptachlor Epoxide	mg/kg	0 02	0 63	0 27	1 5	BDL[5]	BDL[5]	BDL[5]		
Hexachlorobenzene (HCB)	mg/kg	0 02	3 6	1 5	31	BDL[5]	BDL[5]	BDL[5]		
Methoxychlor	mg/kg	0 05	10,000	4,400	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
o,p'-DDD	mg/kg	0 05	24	17	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
o,p'-DDE	mg/kg	0 05	17	12	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
o,p'-DDT	mg/kg	0 05	17	12	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
p,p'-DDD	mg/kg	0 05	24	17	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
p,p'-DDE	mg/kg	0 05	17	12	No Std[6]	**0.17**	BDL[5]	BDL[5]		
p,p'-DDT	mg/kg	0 05	17	12	52	BDL[5]	BDL[5]	**0.09**		
Parathionethyl	mg/kg	0 1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Parathionmethyl	mg/kg	0 1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]	BDL[5]		
Simazine	mg/kg	0 02	48	21	520	BDL[5]	BDL[5]	BDL[5]		

[1] MDL - Minimum Detection Level; [2] RBC - USEPA Region III Risk Based Concentrations for Industrial Soil; [3] PRG - USEPA Region IX Preliminary Remediation Goals for Industrial Soil; [4] MEG - Soil Military Exposure Guideline (from USACHPPM TG 230); [5] BDL - Below Detection Limit; [6] No Std - No Standard Exists; [7] Julian date; [8] Duplicate sample of 2157-5S

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-7 (U) ~~(C//REL)~~. Soil Analytical Results - TPH and VOC

SAMPLE ID						2159-1ES	2159-2ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE
COLLECTION DATE						8 Jun 02 (2159[7])	8 Jun 02 (2159[7])
PARAMETERS	UNITS	MDL[1]	RBC[2]	PRG[3]	MEG-Soil[4]		
TOTAL PETROLEUM HYDROCARBONS (TPH)							
TPH	mg/kg	1	No Std[6]	No Std[6]	No Std[6]	BDL[5]	**18,000**
VOLATILE ORGANIC COMPOUNDS (VOCs)							
1,1,1,2-Tetrachloroethane	mg/kg	0.01	220	7	No Std[6]	BDL[5]	BDL[5]
1,1,1-Trichloroethane	mg/kg	0.01	570,000	1,400	No Std[6]	BDL[5]	BDL[5]
1,1,2,2-Tetrachloroethane	mg/kg	0.01	29	0.9	No Std[6]	BDL[5]	BDL[5]
1,1,2-Trichloroethane	mg/kg	0.01	100	1.9	No Std[6]	BDL[5]	BDL[5]
1,1-Dichloroethane	mg/kg	0.01	200,000	0.76	No Std[6]	BDL[5]	BDL[5]
1,1-Dichloroethene	mg/kg	0.01	9.5	0.12	No Std[6]	BDL[5]	BDL[5]
1,1-Dichloropropene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
1,2,3-Trichlorobenzene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
1,2,3-Trichloropropane	mg/kg	0.01	2.9	0.0031	No Std[6]	BDL[5]	BDL[5]
1,2,4-Trichlorobenzene	mg/kg	0.01	20,000	3,000	No Std[6]	BDL[5]	BDL[5]
1,2,4-Trimethylbenzene	mg/kg	0.01	100,000	170	5,190	BDL[5]	**45**
1,2-Dibromo-3-chloropropane	mg/kg	0.01	4.1	4	210	BDL[5]	BDL[5]
1,2-Dibromoethane	mg/kg	0.01	0.067	0.048	No Std[6]	BDL[5]	BDL[5]
1,2-Dichlorobenzene	mg/kg	0.01	180,000	370	No Std[6]	BDL[5]	BDL[5]
1,2-Dichloroethane	mg/kg	0.01	63	0.76	No Std[6]	BDL[5]	BDL[5]
1,2-Dichloropropane	mg/kg	0.01	84	0.77	No Std[6]	BDL[5]	BDL[5]
1,3,5-Trimethylbenzene	mg/kg	0.01	100,000	70	No Std[6]	BDL[5]	**14**
1,3-Dichlorobenzene	mg/kg	0.01	61,000	52	No Std[6]	BDL[5]	BDL[5]
1,3-Dichloropropane	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
1,4-Dichlorobenzene	mg/kg	0.01	240	8.1	No Std[6]	BDL[5]	BDL[5]
2,2-Dichloropropane	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
2-Chlorotoluene	mg/kg	0.01	41,000	570	No Std[6]	BDL[5]	BDL[5]
2-Methoxy-2-methylpropane	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
4-Chlorotoluene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
Benzene	mg/kg	0.01	100	1.5	310	BDL[5]	BDL[5]
Bromobenzene	mg/kg	0.01	No Std[6]	92	No Std[6]	BDL[5]	BDL[5]
Bromochloromethane	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
Bromodichloromethane	mg/kg	0.01	92	2.4	No Std[6]	BDL[5]	BDL[5]
Bromoform	mg/kg	0.01	720	310	No Std[6]	BDL[5]	BDL[5]
Bromomethane	mg/kg	0.01	2,900	13	No Std[6]	BDL[5]	BDL[5]
Carbon tetrachloride	mg/kg	0.01	44	0.53	No Std[6]	BDL[5]	BDL[5]
Chlorobenzene	mg/kg	0.01	41,000	540	No Std[6]	BDL[5]	BDL[5]
Chloroethane	mg/kg	0.01	2,000	6.5	No Std[6]	BDL[5]	BDL[5]
Chloroform	mg/kg	0.01	20,000	0.52	No Std[6]	BDL[5]	BDL[5]
Chloromethane	mg/kg	0.01	440	2.7	3,700	BDL[5]	BDL[5]

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-7 (U) ~~(C//REL)~~. Soil Analytical Results - TPH and VOC – Cont'd.

SAMPLE ID						2159-1ES	2159-2ES
LOCATION DESCRIPTION						Between HQ/Hospital	Between HQ/Hospital
SURFACE OR SUBSURFACE						SUBSURFACE	SUBSURFACE
DISCRETE OR COMPOSITE						DISCRETE	DISCRETE
COLLECTION DATE						8 Jun 02 (21597)	8 Jun 02 (21597)
PARAMETERS	UNITS	MDL[1]	RBC2	PRG3	MEG-Soil4		
TOTAL PETROLEUM HYDROCARBONS (TPH)							
TPH	mg/kg	1	No Std6	No Std6	No Std6	BDL5	**18,000**
VOLATILE ORGANIC COMPOUNDS (VOCs)							
Dibromochloromethane	mg/kg	0.01	68	2.7	No Std[6]	BDL[5]	BDL[5]
Dibromomethane	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
Dichlorodifluoromethane	mg/kg	0.01	410,000	310	No Std[6]	BDL[5]	BDL[5]
Ethylbenzene	mg/kg	0.01	200,000	230	230	BDL[5]	**5.5**
Hexachlorobutadiene	mg/kg	0.01	73	32	No Std[6]	BDL[5]	BDL[5]
Isopropylbenzene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	**7.1**
Methylene chloride	mg/kg	0.01	760	21	No Std[6]	BDL[5]	BDL[5]
Naphthalene	mg/kg	0.01	41,000	190	220	BDL[5]	**11**
Styrene	mg/kg	0.01	410,000	1,700	No Std[6]	BDL[5]	BDL[5]
Tetrachloroethene (PCE)	mg/kg	0.01	110	19	No Std[6]	BDL[5]	BDL[5]
Toluene	mg/kg	0.01	410,000	520	520	BDL[5]	BDL[5]
Trichloroethene (TCE)	mg/kg	0.01	14	6.1	No Std[6]	BDL[5]	BDL[5]
Trichlorofluoromethane	mg/kg	0.01	610,000	2,000	No Std[6]	BDL[5]	BDL[5]
Trihalomethanes, total	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	BDL[5]
Vinyl chloride	mg/kg	0.01	7.9	0.83	No Std[6]	BDL[5]	BDL[5]
Xylene, total	mg/kg	0.01	4,100,000	210	210	BDL[5]	**16.8**
cis-1,2-Dichloroethene	mg/kg	0.01	20,000	150	No Std[6]	BDL[5]	BDL[5]
cis-1,3-Dichloropropene	mg/kg	0.01	57	1.6	No Std[6]	BDL[5]	BDL[5]
n-Butylbenzene	mg/kg	0.01	82,000	240	No Std[6]	BDL[5]	**15**
n-Propylbenzene	mg/kg	0.01	82,000	240	240	BDL[5]	**17**
p-Isopropyltoluene	mg/kg	0.01	No Std[6]	No Std[6]	No Std[6]	BDL[5]	**6.9**
sec-Butylbenzene	mg/kg	0.01	82,000	220	230	BDL[5]	**11**
tert-Butylbenzene	mg/kg	0.01	82,000	390	No Std[6]	BDL[5]	BDL[5]
trans-1,2-Dichloroethene	mg/kg	0.01	41,000	210	No Std[6]	BDL[5]	BDL[5]
trans-1,3-Dichloropropene	mg/kg	0.01	57	1.6	No Std[6]	BDL[5]	BDL[5]

[1] MDL - Minimum Detection Level
[2] RBC - USEPA Region III Risk Based Concentrations for Industrial Soil
[3] PRG - USEPA Region IX Preliminary Remediation Goals for Industrial Soil
[4] MEG - Soil Military Exposure Guideline (from USACHPPM TG 230)
[5] BDL - Below Detection Limit
[6] No Std - No Standard Exists
[7] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-8. Drinking Water Analytical Results - Inorganic/Physical Parameters

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
INORGANIC/PHYSICAL								
Alkalinity	mg/L	1	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**11**
Ammonia (as N)	mg/L	0.05	No Std[6]	3.4	3.4	No Std[6]	No Std[6]	BDL[7]
Bromide	mg/L	0.4	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Chloride	mg/L	5	250	600	600	600	No Std[6]	BDL[7]
Color	UNITS	1	15	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Conductivity	µmhos/cm	1	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**20**
Cyanide, free	mg/L	0.01	No Std[6]	2	2	2	0.2	BDL[7]
Fluoride	mg/L	0.1	2	No Std[6]	No Std[6]	No Std[6]	4	BDL[7]
Hardness (as $CaCO_3$)	mg/L	1	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**13**
Nitrite (as N)	mg/L	0.03	No Std[6]	No Std[6]	No Std[6]	No Std[6]	1	BDL[7]
Nitrate (as N)	mg/L	0.2	No Std[6]	No Std[6]	No Std[6]	No Std[6]	10	**0.4**
Total Nitrate-Nitrite (as N)	mg/L	0.03	No Std[6]	No Std[6]	No Std[6]	No Std[6]	10	**0.4**
pH	units	0.01	6.5 - 8.5	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**6.1**
o-Phosphate (as P)	mg/L	0.2	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Total Phosphorus (as P)	mg/L	0.05	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Sulfate (as SO_4^{2-})	mg/L	5	250	100	100	100	No Std[6]	BDL[7]
Total Dissolved Solids (TDS)	mg/L	5	500	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**47**
Turbidity	NTU	0.05	No Std[6]	No Std[6]	No Std[6]	No Std[6]	1.0	**0.15**

[1] MDL - Method Detection Limit
[2] NSDWR - U.S. National Secondary Drinking Water Regulation
[3] MCL - Maximum Contaminant Level
[4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230)
[5] OEBGD - Overseas Environmental Baseline Guidance Document
[6] No Std - No Standard
[7] BDL - Below Detection Limit
[8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-9 (U) ~~(C//REL)~~. Drinking Water Analytical Results - Heavy Metals

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
HEAVY METALS								
Aluminum	mg/L	0.005	0.05 - 0.2	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Antimony	mg/L	0.001	No Std[6]	0.002	0.002	No Std[6]	0.006	BDL[7]
Arsenic	mg/L	0.001	No Std[6]	0.1	No Std[6]	0.02	0.05	BDL[7]
Barium	mg/L	0.005	No Std[6]	No Std[6]	No Std[6]	No Std[6]	2	BDL[7]
Beryllium	mg/L	0.0002	No Std[6]	12	12	0.007	0.004	BDL[7]
Boron	mg/L	0.05	No Std[6]	1.7	0.4	0.4	No Std[6]	BDL[7]
Cadmium	mg/L	0.0003	No Std[6]	0.02	0.02	0.002	0.005	BDL[7]
Calcium	mg/L	0.5	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**4**
Chromium	mg/L	0.004	No Std[6]	0.7	0.7	0.1	0.1	BDL[7]
Cobalt	mg/L	0.025	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Copper	mg/L	0.01	1	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Iron	mg/L	0.1	0.3	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Lead	mg/L	0.001	No Std[6]	0.05	0.05	0.015	No Std[6]	BDL[7]
Magnesium	mg/L	0.1	No Std[6]	30	30	30	No Std[6]	**0.81**
Manganese	mg/L	0.002	0.05	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Mercury	mg/L	0.0002	No Std[6]	No Std[6]	No Std[6]	0.0007	0.002	BDL[7]
Molybdenum	mg/L	0.005	No Std[6]	No Std[6]	No Std[6]	0.02	No Std[6]	BDL[7]
Nickel	mg/L	0.002	No Std[6]	0.5	0.5	No Std[6]	0.1	BDL[7]
Potassium	mg/L	0.5	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Selenium	mg/L	0.001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0.05	BDL[7]
Silver	mg/L	0.005	0.1	0.023	0.023	No Std[6]	No Std[6]	BDL[7]
Sodium	mg/L	1	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Thallium	mg/L	0.0002	No Std[6]	0.003	0.003	No Std[8]	0.002	BDL[7]
Zinc	mg/L	0.001	5	No Std[6]	No Std[6]	1.3	No Std[6]	**0.012**

[1] MDL - Method Detection Limit; [2] NSDWR - U.S. National Secondary Drinking Water Regulation; [3] MCL - Maximum Contaminant Level; [4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230); [5] OEBGD - Overseas Environmental Baseline Guidance Document; [6] No Std - No Standard; [7] BDL - Below Detection Limit; [8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-10 (U) ~~(C//REL)~~. Drinking Water Analytical Results – VOCs

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
VOLATILE ORGANIC COMPOUNDS (VOCs)								
Benzene	mg/L	0.0005	No Std[6]	0.1	0.1	0.014	0.005	BDL[7]
Carbon tetrachloride	mg/L	0.0005	No Std[6]	2	0.07	No Std[6]	0.005	BDL[7]
Chlorobenzene (Monochlorobenzene)	mg/L	0.0005	No Std[6]	1	1	No Std[6]	0.1	BDL[7]
1,2-Dibromo-3-chloropropane (DBCP)	mg/L	0.0002	No Std[6]	0.09	0.024	0.009	0.0002	BDL[7]
1,2-Dibromoethane (EDB)	mg/L	0.00005	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0.00005	BDL[7]
1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	0.0005	No Std[6]	4.2	4.2	No Std[6]	0.6	BDL[7]
1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	0.0005	No Std[6]	5	5	No Std[6]	0.075	BDL[7]
1,2-Dichloroethane	mg/L	0.0005	No Std[6]	0.3	0.3	No Std[6]	0.005	BDL[7]
1,1-Dichloroethene	mg/L	0.0005	No Std[6]	1	0.5	No Std[6]	0.007	BDL[7]
cis-1,2-Dichloroethene	mg/L	0.0005	No Std[6]	2	1.5	No Std[6]	0.07	BDL[7]
trans-1,2-Dichloroethene	mg/L	0.0005	No Std[6]	9.4	0.7	No Std[6]	0.1	BDL[7]
1,2-Dichloropropane	mg/L	0.0005	No Std[6]	0.04	0.04	No Std[6]	0.005	BDL[7]
Ethylbenzene	mg/L	0.0005	No Std[6]	15	1.5	0.5	0.7	BDL[7]
Methylene Chloride (Dichloromethane)	mg/L	0.0005	No Std[6]	5	1	No Std[6]	0.005	BDL[7]
Styrene	mg/L	0.0005	No Std[6]	10	1	No Std[6]	0.1	BDL[7]
Tetrachloroethene (PCE)	mg/L	0.0005	No Std[6]	0.9	0.9	No Std[6]	0.005	BDL[7]
Toluene	mg/L	0.0005	No Std[6]	10	1	No Std[6]	1.0	**0.0005**
1,2,4-Trichlorobenzene	mg/L	0.0005	No Std[6]	0.06	0.06	No Std[6]	0.07	BDL[7]
1,1,1-Trichloroethane (Methyl Chloroform)	mg/L	0.0005	No Std[6]	50	20	No Std[6]	0.2	BDL[7]
1,1,2-Trichloroethane	mg/L	0.0005	No Std[6]	0.3	0.2	No Std[6]	0.005	BDL[7]
Trichloroethene (TCE)	mg/L	0.0005	No Std[6]	0.9	0.9	No Std[6]	0.005	BDL[7]
Vinyl Chloride	mg/L	0.0005	No Std[6]	1.2	1.2	No Std[6]	0.002	BDL[7]
Xylenes, Total	mg/L	0.0005	No Std[6]	20	20	No Std[6]	10	BDL[7]
2-Methoxy-2-methylpropane (MTBE)	mg/L	0.0005	No Std[6]	11.3	11.3	No Std[6]	No Std[6]	BDL[7]
Bromodichloromethane	mg/L	0.0005	No Std[6]	2.8	2.8	0.1	No Std[6]	BDL[7]
Dibromochloromethane	mg/L	0.0005	No Std[6]	No Std[6]	No Std[6]	0.9	No Std[6]	BDL[7]
Bromoform	mg/L	0.0005	No Std[6]	2	1	No Std[6]	No Std[6]	BDL[7]
Chloroform	mg/L	0.0005	No Std[6]	2	2	0.5	No Std[6]	**0.0021**
Total Trihalomethanes (TTHM)	mg/L	0.0005	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0.1	**0.0021**

[1] MDL - Method Detection Limit; [2] NSDWR - U.S. National Secondary Drinking Water Regulation; [3] MCL - Maximum Contaminant Level; [4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230); [5] OEBGD - Overseas Environmental Baseline Guidance Document; [6] No Std - No Standard; [7] BDL - Below Detection Limit; [8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-11(U) ~~(C//REL)~~. Drinking Water Analytical Results – Pesticides

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
PESTICIDES								
4,4-Methoxychlor	mg/L	0 0001	No Std[6]	0 03	0 03	No Std[6]	0 04	BDL[7]
Alachlor	mg/L	0 0001	No Std[6]	0 05	0 05	0 05	0 002	BDL[7]
Aldrin	mg/L	0 0001	No Std[6]	0 0001	0 0001	0 00013	No Std[6]	BDL[7]
Atrazine	mg/L	0 0001	No Std[6]	0 23	0 23	No Std[6]	0 003	BDL[7]
Chlordane	mg/L	0 0001	No Std[6]	0 03	0 03	0 003	0 002	BDL[7]
Dieldrin	mg/L	0 0001	No Std[6]	0 00023	0 00023	0 0002	No Std[6]	BDL[7]
Endrin	mg/L	0 00002	No Std[6]	0 01	0 007	0 002	0 002	BDL[7]
Heptachlor	mg/L	0 00002	No Std[6]	0 005	0 005	No Std[6]	0 0004	BDL[7]
Heptachlor epoxide	mg/L	0 00002	No Std[6]	0 005	No Std[6]	0 00006	0 0002	BDL[7]
Hexachlorobenzene	mg/L	0 0001	No Std[6]	0 026	0 026	0 0013	0 001	BDL[7]
Hexachlorocyclopentadiene	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0 05	BDL[7]
Lindane (gamma-BHC)	mg/L	0 00002	No Std[6]	0 2	0 2	0 2	0 0002	BDL[7]
Simazine	mg/L	0 0001	No Std[6]	0 01	0 01	0 02	0 004	BDL[7]
Toxaphene	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	0 005	0 003	BDL[7]
3-Hydroxycarbofuran	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Aldicarb	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0 003	BDL[7]
Aldicarb Sulfone	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0 003	BDL[7]
Aldicarb Sulfoxide	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0 004	BDL[7]
Baygon	mg/L	0 0001	No Std[6]	0 02	0 02	No Std[6]	No Std[6]	BDL[7]
Carbaryl	mg/L	0 0001	No Std[6]	0 5	0 5	No Std[6]	No Std[6]	BDL[7]
Carbofuran	mg/L	0 0001	No Std[6]	0 02	0 02	No Std[6]	0 04	BDL[7]
Methiocarb	mg/L	0 0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	BDL[7]
Methomyl	mg/L	0 0001	No Std[6]	0 03	0 03	No Std[6]	No Std[6]	BDL[7]
Oxamyl (Vydate)	mg/L	0 0001	No Std[6]	0 1	0 1	0 1	0 2	BDL[7]
2,4-Dichlorophenoxyacetate	mg/L	0 0001	No Std[6]	0 5	0 14	0 05	0 07	Not Analyzed
Pentachlorophenol (PCP)	mg/L	0 0001	No Std[6]	0 5	0 14	No Std[6]	0 001	Not Analyzed
Silvex (2,4,5-TP)	mg/L	0 0001	No Std[6]	0 09	0 09	No Std[6]	0 05	Not Analyzed

[1] MDL - Method Detection Limit; [2] NSDWR - U.S. National Secondary Drinking Water Regulation; [3] MCL - Maximum Contaminant Level; [4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230); [5] OEBGD - Overseas Environmental Baseline Guidance Document; [6] No Std - No Standard; [7] BDL - Below Detection Limit; [8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-12 (U) ~~(C//REL)~~. Drinking Water Analytical Results – PAHs

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
Polycyclic Aromatic Hydrocarbons (PAHs)								
Benzo-(a)-Pyrene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	0.005	0.0002	BDL[7]
Benzo-(b)-Fluoranthene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	0.05	No Std[6]	BDL[7]
Benzo-(g,h,i)-Perylene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	No Std[8]	No Std[6]	BDL[7]
Benzo-(k)-Fluoranthene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	0.5	No Std[6]	BDL[7]
Fluoranthene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	1.9	No Std[6]	BDL[7]
Indeno-(1,2,3-c,d)-Pyrene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	No Std[8]	No Std[6]	BDL[7]
Acenaphthene	mg/L	0.00004	No Std[6]	No Std[8]	No Std[8]	2.8	No Std[6]	BDL[7]
Acenaphthylene	mg/L	0.00004	No Std[6]	No Std[8]	No Std[8]	1.4	No Std[6]	BDL[7]
Anthracene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	47	No Std[6]	BDL[7]
Benzo-(a)-Anthracene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	0.05	No Std[6]	BDL[7]
Chrysene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	1.4	No Std[6]	BDL[7]
Dibenzo-(a,h)-Athracene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	No Std[8]	No Std[6]	BDL[7]
Fluorene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	1.9	No Std[6]	BDL[7]
Naphthalene	mg/L	0.00004	No Std[6]	0.25	0.25	0.17	No Std[6]	BDL[7]
Phenanthrene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	1.4	No Std[6]	BDL[7]
Pyrene	mg/L	0.00002	No Std[6]	No Std[8]	No Std[8]	1.4	No Std[6]	BDL[7]

[1] MDL - Method Detection Limit
[2] NSDWR - U.S. National Secondary Drinking Water Regulation
[3] MCL - Maximum Contaminant Level
[4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230)
[5] OEBGD - Overseas Environmental Baseline Guidance Document
[6] No Std - No Standard
[7] BDL - Below Detection Limit
[8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-13 (U) ~~(C//REL)~~. Drinking Water Analytical Results - PCBs, Asbestos, and Radionuclides

FIELD ID								2157-EW1
LOCATION DESCRIPTION								ROWPU Treated Water
COLLECTION DATE								6 Jun 02 (2157[8])
PARAMETERS	UNITS	MDL[1]	NSDWR[2]	15 L/day MEG[4] (5-day)	15 L/day MEG[4] (2-weeks)	15 L/day MEG[4] (1 year)	OEBGD[5] MCL[3]	
Polychlorinated Biphenyls (PCBs)								
PCBs, Total	mg/L	0.0001	No Std[6]	No Std[6]	No Std[6]	No Std[6]	0.0005	BDL[7]
Asbestos								
Fibers less than 10nm	1,000,000 fiber/L	0.07	No Std[6]	No Std[6]	No Std[6]	No Std[6]	7	BDL[7]
Radionuclides								
Gross Alpha Activity	pCi/L	3	No Std[6]	No Std[6]	No Std[6]	No Std[6]	15	BDL[7]
Gross Beta Activity	pCi/L	4	No Std[6]	No Std[6]	No Std[6]	No Std[6]	50	BDL[7]
Combined Radium-226 & -228	pCi/L		No Std[6]	No Std[6]	No Std[6]	No Std[6]	5	
Uranium, U235/U238 ratio	Unitless	Not Applicable	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**0.00721**
Uranium, Total	ug/L		No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**0.204**
Uranium Ratio Uncertainty	Unitless	Not Applicable	No Std[6]	No Std[6]	No Std[6]	No Std[6]	No Std[6]	**0.00024**

[1] MDL - Method Detection Limit
[2] NSDWR - U.S. National Secondary Drinking Water Regulation
[3] MCL - Maximum Contaminant Level
[4] MEG - Military Exposure Guideline - Water (from USACHPPM TG 230)
[5] OEBGD - Overseas Environmental Baseline Guidance Document
[6] No Std - No Standard
[7] BDL - Below Detection Limit
[8] Julian date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-14 (U) ~~(C//REL)~~. Ambient Air Sampling Locations and Analytes

SAMPLE ID	LOCATION DESCRIPTION	COLLECTION DATE	ANALYTES
Volatile Organic Compounds (VOCs) Samples			
2163-EV1	Center of Excavation in SSA (C3479)	12 Jun 02 (2163[1])	VOCs
2163-EV2	Adjacent to Excavation in SSA (C3486)	12 Jun 02 (2163[1])	VOCs
2163-EV3	Emptied Area of Tent City (C3492)[2]	12 Jun 02 (2163[1])	VOCs
2163-EV4	Emptied Area of Tent City (C3520)[2]	12 Jun 02 (2163[1])	VOCs
2163-EV5	Trip Blank (C3523)	12 Jun 02 (2163[1])	VOCs
2164-EV1	Tent City - Tent 216 (C3482)	13 Jun 02 (2164[1])	VOCs
2164-EV2	Tent City - Tent 113 (C3488)	13 Jun 02 (2164[1])	VOCs
2164-EV3	Tent City - Tent 155 (C3495)	13 Jun 02 (2164[1])	VOCs
2164-EV4	Tent City - Tent 261 (C3498)	13 Jun 02 (2164[1])	VOCs
2164-EV5	Bunker on Berm (C3499)[2]	13 Jun 02 (2164[1])	VOCs
2164-EV6	Bunker on Berm (C3511)[2]	13 Jun 02 (2164[1])	VOCs
2164-EV7	Trip Blank (C3516)	13 Jun 02 (2164[1])	VOCs
2165-EV1	West Corner of Hospital (C3484)	14 Jun 02 (2165[1])	VOCs
2165-EV2	North Corner of Hospital (C3490)	14 Jun 02 (2165[1])	VOCs
2165-EV3	East Corner of Hospital (C3491)	14 Jun 02 (2165[1])	VOCs
2165-EV4	South Corner of Hosptial (C3500)	14 Jun 02 (2165[1])	VOCs
2165-EV5	Headquarters (C3508)	14 Jun 02 (2165[1])	VOCs
2165-EV6	Bunker Next to Headquarters (C3513)	14 Jun 02 (2165[1])	VOCs
2165-EV7	Trip Blank (C3480)	14 Jun 02 (2165[1])	VOCs
MiniVol Samples			
2157-1EP	Eastern MiniVol - SSA	6-7 Jun 02 (2157-2158[1])	PM_{10}, Heavy Metals
2157-2EP	Western MiniVol - Tent City	6-7 Jun 02 (2157-2158[1])	PM_{10}, Heavy Metals
2158-1EP	Eastern MiniVol - SSA	7-8 Jun 02 (2158-2159[1])	PM_{10}, Heavy Metals
2158-2EP	Western MiniVol - Tent City	7-8 Jun 02 (2158-2159[1])	PM_{10}, Heavy Metals
2159-1EP	Eastern MiniVol - SSA	8-9 Jun 02 (2159-2160[1])	PM_{10}, Heavy Metals
2159-2EP	Western MiniVol - Tent City	8-9 Jun 02 (2159-2160[1])	PM_{10}, Heavy Metals
2160-1EP	Eastern MiniVol - SSA	9-10 Jun 02 (2160-2161[1])	PM_{10}, Heavy Metals
2160-2EP	Western MiniVol - Tent City	9-10 Jun 02 (2160-2161[1])	PM_{10}, Heavy Metals
2161-1EP	Eastern MiniVol - SSA	10-11 Jun 02 (2161-2162[1])	PM_{10}, Heavy Metals
2161-2EP	Western MiniVol - Tent City	10-11 Jun 02 (2161-2162[1])	PM_{10}, Heavy Metals
2162-1EP	Eastern MiniVol - SSA	11-12 Jun 02 (2162-2163[1])	PM_{10}, Heavy Metals
2162-2EP	Western MiniVol - Tent City	11-12 Jun 02 (2162-2163[1])	PM_{10}, Heavy Metals
2162-3EP	Blank	12 Jun 02 (2163[1])	PM_{10}, Heavy Metals

[1] Julian date
[2] Co-located samples

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-15 (U) ~~(C//REL)~~. Ambient Air Analytical Results - PM10 and Heavy Metals

SAMPLE ID					2157-EP1	2157-EP2	2158-EP1	2158-EP2	2159-EP1	2159-EP2
LOCATION DESCRIPTION					Eastern MiniVol - SSA	Western MiniVol - Tent City	Eastern MiniVol - SSA	Western MiniVol - Tent City	Eastern MiniVol - SSA	Western MiniVol - Tent City
COLLECTION DATE					6-7 Jun 02 (2157-2158[8])	6-7 Jun 02 (2157-2158[8])	7-8 Jun 02 (2158-2159[8])	7-8 Jun 02 (2158-2159[8])	8-9 Jun 02 (2159-2160[8])	8-9 Jun 02 (2159-2160[8])
PARAMETERS	UNITS	MDL[1]	24-Hour NAAQS[4]	1-Year Air-MEG[5]						
PARTICULATE MATTER (PM)										
Particulate Matter < 10 um (PM_{10})	ug/m[3]		150	70	**168.0**	**118.8**	**53.7**	**702.0**	**386.7**	**Invalid results**
HEAVY METALS										
Antimony	ug/m[3]	0.14	No Std[6]	No Std[6]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Arsenic	ug/m[3]	0.07	No Std[6]	1.1	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Beryllium	ug/m[3]	0.07	No Std[6]	0.014	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Cadmium	ug/m[3]	0.07	No Std[6]	0.24	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Chromium	ug/m[3]	0.07	No Std[6]	No Std[6]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Lead	ug/m[3]	0.14	No Std[6]	1.5	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Manganese	ug/m[3]	0.28	No Std[6]	0.34	BDL[1]	BDL[1]	BDL[1]	**0.33**	BDL[1]	BDL[1]
Nickel	ug/m[3]	0.07	No Std[6]	37	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Vanadium	ug/m[3]	0.28	No Std[6]	No Std[6]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]	BDL[1]
Zinc	ug/m[3]	0.69	No Std[6]	No Std[6]	**2.37**	**0.62**	BDL[1]	BDL[1]	BDL[1]	BDL[1]

[1] MDL - Minimum Detection Level
[2] RBC - USEPA Region III Risk Based Concentrations for Ambient Air
[3] PRG - USEPA Region IX Preliminary Remediation Goals for Ambient Air
[4] National Ambient Air Quality Standard
[5] Air-MEG - Military Exposure Guideline - Air (from USACHPPM TG 230)
[6] No Std - No Standard Exists
[7] BDL - Below Detection Limit
[8] Julian Date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-16 (U) ~~(C//REL)~~. Ambient Air Analytical Results - PM10 and Heavy Metals

SAMPLE ID					2160-EP1	2160-EP2	2161-EP1	2161-EP2	2162-EP1	2162-EP2	2162-EP3
LOCATION DESCRIPTION					Eastern MiniVol - SSA	Western MiniVol - Tent City	Eastern MiniVol - SSA	Western MiniVol - Tent City	Eastern MiniVol - SSA	Western MiniVol - Tent City	Blank
COLLECTION DATE					9-10 Jun 02 (2160-2161[8])	9-10 Jun 02 (2160-2161[8])	10-11 Jun 02 (2161-2162[8])	10-11 Jun 02 (2161-2162[8])	11-12 Jun 02 (2162-2163[8])	11-12 Jun 02 (2162-2163[8])	12 Jun 02 (2163[8])
PARAMETERS	UNITS	MDL[1]	24-Hr NAAQS[4]	1-Year Air-MEG[5]							
PARTICULATE MATTER (PM)											
Particulate Matter < 10 um (PM_{10})	ug/m^3		150	70	**183.0**	**163.9**	**102.5**	**85.4**	**147.0**	**109.1**	**0.0**
HEAVY METALS											
Antimony	ug/m^3	0.14	No Std[6]	No Std[6]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Arsenic	ug/m^3	0.07	No Std[6]	1.1	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Beryllium	ug/m^3	0.07	No Std[6]	0.014	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Cadmium	ug/m^3	0.07	No Std[6]	0.24	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Chromium	ug/m^3	0.07	No Std[6]	No Std[6]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Lead	ug/m^3	0.14	No Std[6]	1.5	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Manganese	ug/m^3	0.28	No Std[6]	0.34	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Nickel	ug/m^3	0.07	No Std[6]	37	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Vanadium	ug/m^3	0.28	No Std[6]	No Std[6]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]	BDL[7]
Zinc	ug/m^3	0.69	No Std[6]	No Std[6]	**0.94**	BDL[7]	BDL[7]	BDL[7]	BDL[7]	**1.23**	Not Avail

[1] MDL - Minimum Detection Level
[2] RBC - USEPA Region III Risk Based Concentrations for Ambient Air
[3] PRG - USEPA Region IX Preliminary Remediation Goals for Ambient Air
[4] National Ambient Air Quality Standard
[5] Air-MEG - Military Exposure Guideline - Air (from USACHPPM TG 230)
[6] No Std - No Standard Exists
[7] BDL - Below Detection Limit
[8] Julian Date

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-17 (U) ~~(C//REL)~~. Ambient Air Guidelines - Volatile Organic Compounds (VOCs)

FIELD ID									
LOCATION DESCRIPTION									
VOC TUBE NUMBER									
COLLECTION DATE									
PARAMETERS	UNITS	RBC[1]	PRG[2]	1-Hr Air-MEG[3] Minimal	1-Hr Air-MEG[3] Significant	1-Hr Air-MEG[3] Severe	8-Hr Air-MEG[3]	14-Day Air-MEG[3]	1-Year Air-MEG[3]
1,1,1,2-Tetrachloroethane	ug/m^3	**0.24**	**0.26**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**650**
1,1,2,2-Tetrachloroethane	ug/m^3	**0.031**	**0.033**	**20,600**	**34,300**	**686,000**	**7,000**	**200**	**83**
1,1,2-Trichloroethane	ug/m^3	**0.11**	**0.12**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**300**
1,1-Dichloroethane	ug/m^3	**510**	**520**	**Non-Detect**	**Non-Detect**	**12,144,000**	**400,000**	**9,800**	**3,420**
1,1-Dichloroethene	ug/m^3	**0.036**	**0.038**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**96**
1,1-Dichloropropene	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
1,2,3-Trichlorobenzene	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
1,2,3-Trichloropropane	ug/m^3	**0.0031**	**0.001**	**181,000**	**302,000**	**603,000**	**60,000**	**1,500**	No Std[4]
1,2,4-Trichlorobenzene	ug/m^3	**210**	**210**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**1,400**
1,2,4-Trimethylbenzene	ug/m^3	**6.2**	**6.2**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**3,060**
1,2-Dibromo-3-chloropropane	ug/m^3	**0.21**	**0.21**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**0.14**
1,2-Dibromoethane	ug/m^3	**0.0082**	**0.0087**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
1,2-Dichlorobenzene	ug/m^3	**150**	**210**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**1,400**
1,2-Dichloroethane	ug/m^3	**0.069**	**0.074**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**180**
1,2-Dichloropropane	ug/m^3	**0.092**	**0.099**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**22**
1,3,5-Trimethylbenzene	ug/m^3	**6.2**	**6.2**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**3,060**
1,3-Dichlorobenzene	ug/m^3	**110**	**3.3**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
1,3-Dichloropropane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
1,4-Dichlorobenzene	ug/m^3	**0.28**	**0.31**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**1,700**
2,2-Dichloropropane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
2-Chlorotoluene	ug/m^3	**73**	**73**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
4-Chlorotoluene	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
4-Isopropyltoluene	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Benzene	ug/m^3	**0.22**	**0.25**	**160,000**	**479,000**	**3,195,000**	**1,600**	**160**	**39**
Bromobenzene	ug/m^3	No Std[4]	**10**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Bromochloromethane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Bromodichloromethane	ug/m^3	**0.1**	**0.11**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Bromoform	ug/m^3	**1.6**	**1.7**	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	**130**
Carbon Tetrachloride	ug/m^3	**0.12**	**0.13**	**75,000**	**428,000**	**1,070,000**	**32,500**	**1,300**	**320**

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-17 (U) ~~(C//REL)~~. Ambient Air Guidelines - Volatile Organic Compounds (VOCs) Cont'd.

FIELD ID									
LOCATION DESCRIPTION									
VOC TUBE NUMBER									
COLLECTION DATE									
PARAMETERS	UNITS	RBC1	PRG2	1-Hr Air-MEG3 Minimal	1-Hr Air-MEG3 Significant	1-Hr Air-MEG3 Severe	8-Hr Air-MEG3	14-Day Air-MEG3	1-Year Air-MEG3
Chlorobenzene	ug/m^3	62	62	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Chloroform	ug/m^3	0.077	0.084	No Std[4]	430,000	3,174,000	48,000	500	210
cis-1,2-Dichloroethene	ug/m^3	37	37	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
cis-1,3-Dichloropropene	ug/m^3	0.63	0.48	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	14
Cyclohexane	ug/m^3	No Std[4]	21,000	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Cyclopentane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Decane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Dibromochloromethane	ug/m^3	0.075	0.08	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Dibromomethane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Ethylbenzene	ug/m^3	1.6	1,100	542,000	4,342,000	8,684,000	435,000	10,500	2,950
Hexachlorobutadiene	ug/m^3	0.08	0.086	32,000	107,000	320,000	240	5	5.2
Hexane	ug/m^3	210	210	528,000	880,000	3,872,000	180,000	4,300	4,300
Isooctane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Isopropylbenzene	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
m/p-Xylene	ug/m^3	730	730	650,000[5]	868,000[5]	3,906,000[5]	435,000[5]	10,600[5]	10,600[5]
Methyl Chloroform	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Methylcyclopentane	ug/m^3	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Methylene Chloride	ug/m^3	3.8	4.1	695,000	2,600,000	13,880,000	175,000	2,100	2,100
n-Butylbenzene	ug/m^3	150	37	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
n-Propylbenzene	ug/m^3	150	37	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	25
o-Xylene	ug/m^3	7,300	730	650,000[5]	868,000[5]	3,906,000[5]	435,000[5]	10,600[5]	10,600[5]
sec-Butylbenzene	ug/m^3	150	37	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	25
Styrene	ug/m^3	1,000	1,100	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	2,000
tert-Butylbenzene	ug/m^3	150	37	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
Tetrachloroethylene	ug/m^3	0.63	3.3	237,000	1,560,000	3,323,000	81,000	4,200	No Std[4]
Toluene	ug/m^3	420	400	309,000	716,000	2,374,000	109,000	11,000	4,600
trans-1,2-Dichloroethene	ug/m^3	73	73	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]
trans-1,3-Dichloropropene	ug/m^3	0.63	0.48	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]	No Std[4]

[1] RBC - USEPA Region III Risk Based Concentrations for Ambient Air
[2] PRG - USEPA Region IX Preliminary Remediation Goals for Ambient Air
[3] Air-MEG - Military Exposure Guideline - Air (from USACHPPM TG 230)
[4] No Std - No Standard Exists
[5] MEG-Air is based on Xylene (total)

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-18 (U) ~~(C//REL)~~. Ambient Air Analytical Results – VOCs

FIELD ID			2163-EV1	2163-EV2	2163-EV3	2163-EV4	2163-EV5
LOCATION DESCRIPTION			Center of Excavation in SSA	Adjacent to Excavation in SSA	Emptied Area of Tent City[5]	Emptied Area of Tent City[5]	Trip Blank
VOC TUBE NUMBER			C3479	C3486	C3492	C3520	C3523
COLLECTION DATE			12 Jun 02 (2163[3])	12 Jun 02 (2163[3])	12 Jun 02 (2163[3])	12 Jun 02 (2163[3])	12 Jun 02 (2163[3])
PARAMETERS	UNITS	MDL[1]					
1,1,1,2-Tetrachloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1,2,2-Tetrachloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1,2-Trichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloroethene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloropropene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,3-Trichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,3-Trichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,4-Trichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,4-Trimethylbenzene	ug/m^3	0.5	**6.9**	**4.5**	BDL[2]	BDL[2]	BDL[2]
1,2-Dibromo-3-chloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dibromoethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,3,5-Trimethylbenzene	ug/m^3	0.5	**4.2**	**3.5**	BDL[2]	BDL[2]	BDL[2]
1,3-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,3-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,4-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
2,2-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
2-Chlorotoluene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
4-Chlorotoluene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
4-Isopropyltoluene	ug/m^3	0.5	**2.1**	**1.9**	BDL[2]	BDL[2]	BDL[2]
Benzene	ug/m^3	0.5	BDL[2]	Invalid[4]	BDL[2]	BDL[2]	0
Bromobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromochloromethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromodichloromethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromoform	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Carbon Tetrachloride	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-18 (U) ~~(C//REL)~~. Ambient Air Analytical Results – VOCs – Cont'd

FIELD ID			2163-EV1	2163-EV2	2163-EV3	2163-EV4	2163-EV5
LOCATION DESCRIPTION			Center of Excavation in SSA	Adjacent to Excavation in SSA	Emptied Area of Tent City5	Emptied Area of Tent City5	Trip Blank
VOC TUBE NUMBER			C3479	C3486	C3492	C3520	C3523
COLLECTION DATE			12 Jun 02 (21633)	12 Jun 02 (21633)	12 Jun 02 (21633)	12 Jun 02 (21633)	12 Jun 02 (21633)
PARAMETERS	UNITS	MDL[1]					
Chlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Chloroform	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
cis-1,2-Dichloroethene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
cis-1,3-Dichloropropene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Cyclohexane	ug/m^3	0.5	BDL[2]	**0.5**	BDL[2]	BDL[2]	BDL[2]
Cyclopentane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Decane	ug/m^3	0.5	**13.9**	**18.2**	BDL[2]	BDL[2]	BDL[2]
Dibromochloromethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Dibromomethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Ethylbenzene	ug/m^3	0.5	**0.6**	**0.6**	BDL[2]	BDL[2]	BDL[2]
Hexachlorobutadiene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Hexane	ug/m^3	0.5	BDL[2]	Invalid[4]	Invalid[4]	BDL[2]	0
Isooctane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Isopropylbenzene	ug/m^3	0.5	**0 8**	**0.7**	BDL[2]	BDL[2]	BDL[2]
m/p-Xylene	ug/m^3	0.5	Invalid[4]	Invalid[4]	BDL[2]	BDL[2]	0
Methyl Chloroform	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Methylcyclopentane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Methylene Chloride	ug/m^3	0.5	BDL[2]	Invalid[4]	BDL[2]	Invalid[4]	0
n-Butylbenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
n-Propylbenzene	ug/m^3	0.5	**1.4**	**1.1**	BDL[2]	BDL[2]	BDL[2]
o-Xylene	ug/m^3	0.5	**0 9**	**0.8**	BDL[2]	BDL[2]	BDL[2]
sec-Butylbenzene	ug/m^3	0.5	**1 5**	**1.2**	BDL[2]	BDL[2]	BDL[2]
Styrene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
tert-Butylbenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Tetrachloroethylene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Toluene	ug/m^3	0.5	Invalid[4]	Invalid[4]	Invalid[4]	Invalid[4]	0
trans-1,2-Dichloroethene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
trans-1,3-Dichloropropene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Trichloroethene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]	BDL[2]

[1] MDL - Minimum Detection Level
[2] BDL - Below Detection Limit
[3] Julian Date
[4] Invalid Result - Field Blank Result is Greater Than 25% of Sample Result
[5] Co-located Samples

(U) ~~(S//REL)~~ Field Final Report, Environmental Site Survey and Operational Health Risk Assessment, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan, 31 May 2002 - 14 June 2002

Table C-19 (U) ~~(C//REL)~~. Ambient Air Analytical Results – VOCs

FIELD ID			2164-EV1	2164-EV2	2164-EV3	2164-EV4
LOCATION DESCRIPTION			Tent City - Tent 216	Tent City - Tent 113	Tent City - Tent 155	Tent City - Tent 261
VOC TUBE NUMBER			C3482	C3488	C3495	C3498
COLLECTION DATE			13 Jun 02 (2164[3])	13 Jun 02 (2164[3])	13 Jun 02 (2164[3])	13 Jun 02 (2164[3])
PARAMETERS	UNITS	MDL[1]				
1,1,1,2-Tetrachloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1,2,2-Tetrachloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1,2-Trichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloroethene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,1-Dichloropropene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,3-Trichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,3-Trichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,4-Trichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2,4-Trimethylbenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dibromo-3-chloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dibromoethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichloroethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,2-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,3,5-Trimethylbenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,3-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,3-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
1,4-Dichlorobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	**0.5**	BDL[2]
2,2-Dichloropropane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
2-Chlorotoluene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
4-Chlorotoluene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
4-Isopropyltoluene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Benzene	ug/m^3	0.5	BDL[2]	BDL[2]	**0.6**	**0.7**
Bromobenzene	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromochloromethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromodichloromethane	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Bromoform	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]
Carbon Tetrachloride	ug/m^3	0.5	BDL[2]	BDL[2]	BDL[2]	BDL[2]