Tuwaitha Nuclear Research Center (TNRC)

Information for Health Care Staff

What are conditions like at the Tuwaitha Nuclear Reactor Center (TNRC)?

The TNRC is 23,000-acre site 20 km (12.4 miles) south of Baghdad, which was the center of Saddam Hussein's nuclear research program. TNRC is comprised of 2 separate sites, a main complex (Sites A/B) which is comprised of approximately 90 buildings surrounded by 30-meter high berms; and a smaller area consisting of 3 buildings surrounded by a barrier-wall used to store processed uranium, also known as yellow cake (Site C). Many of the buildings at Sites A/B sustained damage from minor looting to bomb or missile damage. As such, TNRC contains buildings and facilities where sources of ionizing radiation could deliver to individuals' possible radiation exposure that exceeds U.S. and International radiation safety limits for the general public. From early April thru mid-June 2003, Soldiers and Marines were within or near the complex, and Soldiers are still providing security at this facility. Although some radiation measurements had been taken initially to assess potential radiation hazards, a comprehensive radiation health risk assessment had not been performed prior to June 2003.

What kind of assessment was done at TNRC?

A team from the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) conducted a survey 17 – 27 June 2003. The team consisted of experts in radiation, health physics, environmental science, and nuclear medical science. Thousands of direct reading measurements were taken, and hundreds of environmental samples were collected in and around buildings that were unlocked and structurally sound. A total of 22 buildings/areas with radioactive sources and/or radiological contamination were identified, and posted with warning signs and tape. A comprehensive health risk assessment was conducted using the sampling data collected to assess the potential radiation exposures to personnel who entered the TNRC, or who conducted operations in the vicinity of the TNRC. In addition, upper-bound radiation worse-case dose estimations were developed for hypothetical radiation exposure scenarios for personnel who may have entered the TNRC.

What were the conclusions of this assessment?

Based on the upper-bound dose estimates developed, Soldiers and Marines who conducted operations in, or within the vicinity of TNRC, had safe levels of radiation exposure. This conclusion is based on the fact that upper-bound dose estimates were all less than 25% of the U.S. Nuclear Regulatory Commission peacetime occupational standard for radiation exposure, which is 5 rem (5,000 millirem) per year. In addition, personnel dosimetry results of the USACHPPM survey team were well below any peacetime standard for radiation exposure to members of the general public. The exposures of the survey team are indicative of individuals having extensive contact with radiation sources at TNRC throughout a 10-day period. That's twice the average time that Soldiers are generally assigned to TNRC.

Some buildings containing radioactive materials and areas where radioactive contamination existed at TNRC were identified. They are identified in the following ways:

(see Figure "A")

(see Figure "B")

- "Radioactive" painted in red or black spray paint
- A sign stating "Caution Radioactive Materials" (Figure A)
- Yellow and purple (magenta) striped marking tape with a trefoil marking (Figure B)
- "Danger High Radiation Area, Do Not Enter" in black spray paint

The buildings where radiation sources were identified and areas where radiological contamination was found and clearly marked at TNRC do not present an immediate threat to an individual's health and safety, but individuals are instructed to avoid unnecessary exposure to radiation sources.

How would this radiation exposure affect an individual's health?

Everyone is exposed to natural background radiation during their daily activities. However, because some buildings/areas at TNRC were measured and found to contain additional radiation sources, three hypothetical exposure scenarios were developed to provide upper-bound estimates of potential radiation doses for Soldiers and Marines:

Category I – Personnel who conducted security sweeps of unlocked and structurally safe buildings and walked through contaminated areas at TNRC sites A/B and C.

Category II – Personnel who entered Sites A/B and C, but did not enter any buildings.

Category III – Personnel who did not enter either site.

Category	Reasonable Upper-Bound Dose Estimation (Rem)
I	1.1
II	0.024
III	0

The highest reasonable upper-bound dose would be for those in Category I who actually entered buildings and spent time in areas where radiological contamination has been identified. Our assessment of their maximum potential radiation exposure is less than 25% of the peacetime occupational dose limit of 5 rem in a year. Hence, it is unlikely that anyone received an overexposure to radiation and any doses received are not medically significant.

What actions were recommended to protect Soldiers?
Soldiers have been instructed to follow the posted signs indicating areas that they should not enter unless their mission dictates. Additionally, in order to further limit exposures, they have been told to perform required mission actions as quickly as possible and to then exit the area, if they must enter an area or building marked as containing radioactive material or contamination. They were additionally instructed to wash hands with soap and water as soon as possible after exiting an area marked as containing radioactive material, or if they suspect contact with radioactive material, and prior to eating, drinking, smoking, or applying lip-balm and face paint. Other instructions included noting the location of any objects suspected to contain radioactive material or contamination, leaving it alone, and contacting their unit's NBC officer.

What should I expect from returning personnel?
Service members may ask various questions about multiple real or perceived health concerns related to TNRC. Some may believe they were exposed to high levels of radiation and that they have not been told the truth. They may have symptoms they think are the result of these exposures, or they may feel well now, but report concerns regarding their future health.

Available indications from the theater are that the protective measures in place at TNRC remain effective. However, rumors and conflicting reports may have circulated, and your reassurances may not lessen their level of concern. Listen actively, show that you care about them and their concerns, and promise to do your best to help them. Avoid any temptation to contradict them, but don't necessarily agree with their concerns.

What medical follow-up is needed for individuals currently at the site or who have been there in the past?
Since the measurements taken do not indicate that radiation levels were high enough to affect anyone's health, no specific medical action is needed in terms of testing or follow-up. These individuals should not have any symptoms or signs, nor do we anticipate any delayed effects. The DOD Deployment Health Clinical Center (DHCC) at Walter Reed Army Medical Center is available as a resource, and mental health counseling may be appropriate, if a Soldier continues to be worried.

What can I do to build trust and rapport?
Patients undergoing evaluations for suspected military or deployment-related exposures are usually highly concerned. They may mistrust your statements and opinions, particularly if they view them as falsely reassuring. They may interpret seemingly positive news as confusing, incredible, or even as evidence of a cover-up. Remember, these patients have recently returned from a hostile environment where they were told they were probably exposed to environmental contaminants at some points in time. Do not take their mistrust and apprehension personally. There are many other potential reasons for this mistrust, such as well-known limits to the confidentiality of military health records, and the possible impact of health problems on one's future military career.

Some ways of reducing mistrust and building rapport include inviting patients to bring their spouse or 'significant other' to a follow-up appointment. Loved ones often are as concerned as the patient and may be even more mistrustful. Involving them in the visits is informative for them, and often improves patient-provider trust.

Another way to foster trust is to see the patient every 6-8 weeks, making sure to follow-up on all concerns and any available medical test results. This is an important and visible evidence of your compassion and commitment to the patient. If concerns do not resolve, consultation is probably appropriate.

Summary of key messages.

- Soldiers and Marines who conducted operations in, or within the vicinity of TNRC, had safe levels of radiation exposure.
- The measures in place at TNRC continue to protect all forces assigned to TNRC.

Where can I get more information?

U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)
Phone: 800-222-9698
http://chppm-www.apgea.army.mil

Program Manager for Environmental Medicine:
Phone: 410-436-2578

Program Manager for Health Physics:
Phone: 410-436-3502

DOD Health Affairs/Deployment Health Support Directorate
http://deploymentlink.osd.mil/

DOD Deployment Health Clinical Center
http://www.deploymenthealth.mil/main.asp

Armed Forces Radiobiology Research Institute (AFRRI)
http://www.afrri.usuhs.mil/index.html

For general information about ionizing radiation and public health issues, see the **U.S. Agency for Toxic Substances and Disease Registry (ATSDR)**, an agency of the U.S. Department of Health and Human Services, website:

ATSDR Toxicological Profile for Ionizing Radiation and Public Health Statement (September 1999)
http://www.atsdr.cdc.gov/toxprofiles/tp149.html
http://www.atsdr.cdc.gov/tfacts149.html.

ATSDR Toxicological Profile for Uranium and Public Health Statement (September 1999)
http://www.atsdr.cdc.gov/toxprofiles/tp150.html
http://www.atsdr.cdc.gov/tfacts150.html