



UNDER SECRETARY OF DEFENSE
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PERSONNEL AND
READINESS

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARY OF DEFENSE FOR ACQUISITION,
TECHNOLOGY AND LOGISTICS
ASSISTANT SECRETARY OF DEFENSE FOR HEALTH
AFFAIRS
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING

SUBJECT: Department of Defense Deployment Biomonitoring Policy and Approved
Bioassays for Depleted Uranium and Lead

The President, the Congress, and the Departments of Defense and Veterans Affairs have all expressed strong desires to better protect the health of servicemembers and veterans by improving the identification and documentation of hazardous exposures encountered during deployments. While environmental surveillance monitoring can provide evidence of hazardous materials in the air, water, and soil, it is not always available in the deployed setting. Biomonitoring (defined in Attachment 1) can help identify specific exposures to individual servicemembers through the detection of exposure biomarkers in biological media, e.g., blood and urine. However, more research is needed on biomarkers and only a few are ready to support clinical management of personnel exposed during deployment.

Bioassays in support of deployment operations are needed only when it is certain or likely that personnel have been exposed to hazardous chemical, biological, or physical agents and there is a need to document individual exposures. The use of biomonitoring must be carefully regulated and conducted under the operational cognizance of combatant command surgeons. The Military Services are responsible for identifying exposed individuals, acquiring samples, and conducting analyses.

The Department has developed criteria for the approval of bioassays to support deployment operations (Attachment 2). Bioassays for Depleted Uranium and lead (Attachments 3 and 4) are approved for use at this time to assess human exposures during or after deployment and combat operations. Clinical guidance providing more specific information will be posted to the Department of Defense Deployment Health Clinical Center website (www.pdhealth.mil).

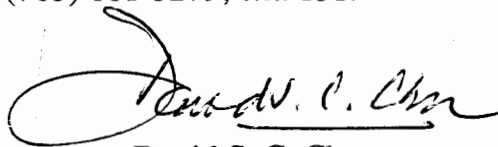
As the supporting science matures, the Services may make specific proposals for the systematic, programmed use of additional biomarkers to the Assistant Secretary of Defense for Health Affairs, who has approval authority. Health care providers retain the authority to order specific medical tests, including those to detect and measure additional



HA POLICY: 04-004

biomarkers, for individual patients. For any bioassays requiring in-theater collection due to short decay rates of the biomarkers, it is desirable that their use be operationally vetted during training exercises before approval for use during operations.

My point of contact is COL Daniel V. Sulka, Director Prevention and Protection, Deployment Health Support Directorate, (703) 681-3279, ext. 131.



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Attachments:

1. Definitions
2. Criteria for the Approval of Bioassays to be Used in Support of Deployment Operations
3. Guidance and Procedures for Depleted Uranium (DU) Bioassay, DU Urine Analysis, December 1, 2003
4. Guidance and Procedures for Lead Bioassay, Blood Lead Level [BPb] and Zinc Protoporphyrin Level [ZPP] Analysis, December 1, 2003

cc:

DUSD (I&E)/ER&S

DASD (CPP)

Commandant, US Coast Guard

Joint Preventive Medicine Policy Group (JPMPG)

ATTACHMENT 1

Definitions

Biomonitoring: the assessment of individual exposures to various substances, especially harmful chemicals, by measuring the parent compound or its metabolites in biological media (e.g., blood, urine, hair, and breath) of exposed personnel.

Bioassays: specific biomonitoring methods to assess biological specimens for changes resulting from exposure to materials foreign to the body (see biomarkers).

Biomarkers: indicators of changes or events in human biological systems, including cellular, biochemical, or molecular measures that are obtained from biological media. More specifically, biomarkers of exposure are parent chemicals, their metabolites, or products of interactions between a chemical foreign to the body and some target molecule or cell that is found within an organism.

ATTACHMENT 2

Criteria for the Approval of Bioassays to be Used in Support of Deployment Operations

Listed below are the characteristics that guide Department of Defense's selection and use of bioassays for systematic, programmed application in support of Force Health Protection during and after deployments and combat operations.

Bioassays:

- Must be used only for detecting personal exposures to hazardous chemical, biological, or physical agent(s) that are known or are likely to have occurred based on (a) environmental monitoring/industrial hygiene sampling or the use of automated detectors and alarms, (b) specific, known operational events occurring at locations and times that appear likely to have resulted in exposures to personnel, and/or (c) clinical indications determined by individual patient-provider assessments.
- Must be clinically validated, shown to be reliable in identifying the exposures of concern, and use accepted and certified laboratory procedures. Assays for use on clinical specimens should be used in a manner that is consistent with regulatory requirements.
- Must allow, due to potential operational impact, for joint, decentralized decision making between the line (command) and medical officers in determining when and for which personnel bioassays will be accomplished during deployments.
- Must be accomplished using biological specimens collected by field medical units or upon redeployment within the specified post-exposure timeframes.
- Must cause only minimal, if any, impact in theater to medical force structure and logistics (transport of supplies into the theater and movement of bioassay samples within or out of the theater for analysis).
- Must have accompanying clinical guidelines for their use, including health risk communication messages that clearly and accurately convey the results and meaning of the bioassays as they relate to one's health.
- Must be documented along with results in patient medical records and/or automated medical information management system.
- Should have normalized ranges in reference populations in order to allow for comparison of bioassay results.
- Results should be tied to exposure health standards; to risk of disease outcome; and/or to short and/or long-term clinical management (including secondary prevention, diagnosis, treatment, and clearance to return to work).
- Must not be accomplished under this policy for research purposes.

ATTACHMENT 3

Guidance and Procedures for Depleted Uranium (DU) Bioassay DU Urine Analysis

December 1, 2003

This guidance will remain in effect until deleted or superseded

1. References. See Appendix 1

2. Purpose. This guidance delineates the circumstances and the specific procedures the Military Services will follow to employ biomonitoring in assessing depleted uranium (DU) exposures to personnel during deployment and combat operations. It will ensure DU bioassays are performed consistent with an approved administrative protocol and with sound medical practices, maintaining the trust of our servicemembers, their families, and commanders.

3. Applicability. This guidance applies during deployment and combat operations to all Department of Defense personnel, including the US Coast Guard when assigned to the Navy during times of conflict; to government civilian employees and volunteers accompanying US forces; and to contractors within the terms of their contracts and any provisions for medical care/clinical assessment.

4. Background.

a. Depleted uranium is one of many potentially hazardous substances that personnel may encounter during deployment and combat operations. Other than physical trauma resulting from DU munitions, DU may be internalized in the body due to embedded fragments, or due to DU particulate wound contamination, inhalation, or ingestion. There are two potential health risks associated with exposure to large amounts of DU particulates or embedded fragments, heavy metal toxicity and other effects resulting from low-level radioactivity. Even though DU is 40% less radioactive than natural uranium, there is still a theoretical risk for radiation-induced health effects from inhaling or ingesting DU aerosols or residues. The bioassay procedures in this document are intended to provide specific guidance in quantifying DU exposures during deployments and/or combat operations.

b. DU bioassays involve the speciation of uranium isotopes to quantify the uranium body burden attributable to DU exposure. Once the uranium (DU and natural uranium) body burden is determined, any health risks and need for medical follow-up can be determined.

c. DU fragments from penetrators or armor fragments may become embedded in personnel when wounded during combat operations. Larger fragments are readily visible radiographically and appear similar to steel or lead fragments. A Radiation Detection, Indication and Computation (RADIAC) meter (AN/VDR-2 with the beta shield open, or equivalent) may help identify DU-contaminated wounds or burns and assist with wound cleansing. A negative reading does not necessarily provide positive assurance that an embedded fragment is not DU. Under no circumstances should any treatment of life-threatening injuries be delayed to obtain an AN/VDR-2 reading. Inhaled DU is not radiographically visible nor can it be detected using a RADIAC meter.

5. Policy. This policy updates the DU Bioassay Guidance in ASD(HA) Policy 0

5. Policy. This policy updates the DU Bioassay Guidance in ASD(HA) Policy 03-12, "Operation Iraqi Freedom Depleted Uranium (DU) Medical Management," May 30, 2003:

a. The Services are responsible for identifying potentially exposed personnel through proactive identification methods and through post-deployment screening using the Post-deployment Health Assessment Form, DD Form 2796.

b. Bioassays are medical tests that are used for clinical purposes. DU bioassays will be administered following coordinated decisions between line commanders and medical personnel based on the following categories of exposed/potentially exposed personnel.

(1) Level I – Personnel Struck by DU Munitions or DU fragments, or Who Were In, On, or Near (less than 50 Meters) an Armored Vehicle at the Time (or Shortly After) It Was Struck. These personnel may exceed peacetime standards for occupational exposures to uranium (Appendix 1, Reference 3). This exposure level is limited to personnel who were struck by DU munitions/fragments or who were in, on or less than 50 meters from an armored vehicle struck by DU munitions or DU armor fragments when breached by any munitions and to first responders who entered these vehicles to render aid to the crewmen. Further guidance for treating those with DU fragments is addressed in Appendix 1, Reference 2. DU bioassays are required for all personnel within this level. For hospitalized Level I patients, bioassays are to be administered on a priority basis as soon as their medical condition permits a urine sample. Other Level I personnel will have bioassays performed as soon as possible and within 180 days of their most recent DU exposure incident in order to obtain the best possible measurements. However, if more than 180 days have elapsed since exposure, personnel should still be assayed.

(2) Level II – Personnel Who Routinely Enter DU Damaged Vehicles as a Part of Their Military Occupational Specialty or Who Fight Fires Involving DU Munitions. Personnel in this exposure level may exceed peacetime standards for occupational exposures to uranium (Appendix 1, Reference 3). This level includes personnel who routinely enter vehicles containing DU dust to perform maintenance and recovery operations (other than first responders), intelligence operations, or battle-damage assessment. This level also includes personnel whose occupation requires fighting fires specifically involving DU munitions. DU bioassays are required for all personnel within this level. Bioassays are to be administered as soon as possible and within 180 days of their most recent exposure incident in order to obtain the best possible measurements. However, if more than 180 days have elapsed since exposure, personnel should still be assayed.

(3) Level III – Personnel with Incidental Exposure to DU. Examples of personnel in this level include individuals who may have driven through smoke from a fire involving DU munitions or who may have entered or climbed on or into battle-damaged vehicles infrequently (not as a first responder and not as job requirement to enter these vehicles). Bioassays are not required for personnel in this level, though a physician may choose to perform one based on individual medical indications or based on requests from potentially exposed personnel. Note: that handling intact DU munitions or spending time in DU armored vehicles (e.g., Abrams tanks) does not constitute an exposure where DU could become internalized within the body.

c. DU Bioassay Procedures

(1) Initial Urine Specimen. The purpose of an initial urine specimen is to obtain data used

in estimating the amount of soluble uranium internalized. Collection should begin not earlier than 24 hours after exposure and, if possible, within 180 days post-exposure. Urine collection should continue for a full 24 hours, beginning after the first morning void on day 1 and ending after first morning void on day 2. For individuals still in theater and where 24-hour collection may not be feasible, a minimum of a 120 milliliter first-void, spot urine sample should be collected and processed according to standard laboratory protocol. Should individuals present after 180 days post-exposure, proceed with the collection and analysis of a 24-hour initial urine sample, though it may be more difficult to accurately calculate their total uranium exposure.

(2) 7-10 day Urine Specimen. If collection of the initial 24-hour sample began no earlier than 24 hours after exposure and was completed as a full, 24-hour collection, collect another complete sample 7-10 days after exposure. A 7-10 day urine specimen and any subsequent specimens, which may be useful for monitoring uranium excretion, provide additional data to estimate the amount of insoluble uranium internalized. If collection of an initial sample began more than 48 hours following exposure, there is no requirement for 7-10 day sample, though clinicians may require additional samples for clinical management.

(3) Processing of Urine Samples. Process and forward urine specimens for DU isotopic analysis to laboratories with established analytical capabilities and QA/QC processes approved by the Service Surgeons General. Each laboratory request for an isotopic uranium analysis will include age, sex, height, and weight of the individual tested, date of exposure; date and time of urine collection; and type of sample (initial 24-hour [which includes all urine collected in the 24 hour period], initial spot, or 7-10 day). A statement must be included on the laboratory request specifying that results must be normalized to urine creatinine (e.g., nanograms of uranium per gram of urine creatinine) and normalized to the volume of the urine sample (nanograms of uranium per liter of urine). For a 24-hour sample, indicate the timeframe of the complete urine collection. If the urine creatinine test is accomplished locally, it must be run on a small aliquot of urine taken from the entire sample collected. If the urine creatinine test is not done locally, all samples should be frozen and transported in an insulated container to the laboratory performing the analysis (laboratory should be contacted for specific shipping instructions). Alternative methods of preservation and shipment of specimens collected in-theater may be determined by operational medical requirements consistent with authoritative guidance from DoD subject matter experts.

d. Embedded fragments. Forward any embedded fragments removed from injured personnel to an appropriate laboratory for analysis of the metal composition. Enter results into the individuals' medical records.

e. Health Risk Communication. A health care provider will inform each individual of the purpose of the bioassay, the results, the meaning of the results, and any required or recommended follow-up. Suggested risk communication messages for use by health care providers are included below; additional guidance may be found at www.pdhealth.mil. Service subject matter experts may also be contacted for assistance.

In the event urine tests indicate elevated uranium levels: We have determined that you have levels of (naturally occurring and/or depleted) uranium in your urine that are elevated above what is generally expected based on levels of uranium found in the general US population. Naturally occurring uranium is found in both water and food

supplies, and each of us has background levels of uranium in our bodies. DU has only 60% of the radioactivity of naturally occurring uranium.

About 70 US 1991 Gulf War veterans who may have been exposed to DU as a result of inhaling DU dust and/or due to retained embedded DU fragments have been medically evaluated and some followed up for nearly 12 years. While high uranium exposures have the potential to cause various types of illnesses such as kidney disease or cancer, none of the Gulf War veterans that have been medically followed have experienced any illnesses attributable to DU exposure, so the risks of any such illness appear to be very low. We will, however, continue to closely monitor the health of those previously exposed, and if we see evidence that DU may cause illness, we will contact you. Based upon what we presently know, we have no reason to believe your uranium levels will have any negative impacts upon your health. I can assure you that we will continue to follow-up with you to ensure your health is taken care of. If you have any concerns, I would be happy to address them now; or if you or your family have questions or concerns, please don't hesitate to come back and we can discuss them. Do you have any questions?

f. Services will enter laboratory bioassay results and risk communication messages delivered into the individuals' medical records, the Service's automated medical record system, and a case management system for tracking. In addition, Services will ensure that results for all bioassays are archived and retrievable.

g. Post-deployment Health Assessments (DD Form 2796). When the DD Form 2796 is completed, the appropriate health care provider will follow-up on all positive answers to DU exposure to determine the servicemember's assessed exposure levels. Personnel who are included in Levels I and II will be handled in accordance with this guideline and with additional Post-Deployment Health Assessment guidance (www.pdhealth.mil).

Appendix (1) References

APPENDIX 1
References

1. US Army Regulation (AR) 40-5, October 15, 1990, "Preventive Medicine."
2. Memorandum, US Army Medical Command, April 9, 1999, "Policy for the Treatment of Personnel Wounded by Depleted Uranium Munitions."
3. US Army Regulation (AR) 11-9, May 28, 1999, "The Army Radiation Safety Program"
4. USACHPPM Technical Guide 211, "Radiobioassay, Collection Labeling and Shipping Requirements, U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)," July 1998.
<http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG211.pdf>
5. "DoD- VA Clinical Practice Guideline for Post-Deployment Health Evaluation and Management," December 2001. <http://www.pdhealth.mil/main.asp>
6. American National Standards Institute (ANSI), HPS N13.22-1995, "Bioassay Programs for Uranium," 1996.
7. US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), "Uranium Toxicological Profile and Public Health Statement," September 1999. <http://www.atsdr.cdc.gov/toxprofiles/tp150.html>
8. National Sciences Technology Council, Executive Office of the President, Presidential Review Directive (PRD) 5, "A National Obligation Planning for Health Preparedness for and *Readjustment of the Military, Veterans, and their Families after Future Deployments,*" August 1998.
9. Joint Staff Medical Readiness Division (J4), Joint Staff Capstone Document, "Force Health Protection – Healthy and Fit Force, Casualty Prevention, Casualty Care and Management," undated. <http://deploymentlink.osd.mil/pdfs/capstone.pdf>
10. Department of Defense Instruction (DoDI) 6490.3, "Implementation and Application of Joint Medical Surveillance for Deployments," August 7, 1997.
11. Assistant Secretary of Defense for Health Affairs Policy 03-012, "Policy for the Operation Iraqi Freedom (OIF) Depleted Uranium (DU) Medical Management," May 30, 2003.
<http://www.ha.osd.mil/policies/default.cfm>

ATTACHMENT 4

**Guidance and Procedures for Lead Bioassay:
Blood Lead Level [BPb] and Zinc Protoporphyrin Level [ZPP] Analysis**

December 1, 2003

This guidance will remain in effect until deleted or superseded

1. References. See Appendix 1

2. Purpose. This guidance delineates the circumstances and the specific procedures the Military Services will follow to employ bioassay procedures in the assessment of lead exposure of personnel occurring during deployment and combat operations. It will ensure lead bioassays are performed consistent with administrative protocol and with sound medical practices, maintaining the trust of our servicemembers, their families, and commanders.

3. Applicability. This guidance applies during deployment and combat operations to all Department of Defense personnel, including the US Coast Guard when assigned to the Navy during times of conflict; to government civilian employees and volunteers assigned to US forces; and to contractors within the terms of their contracts and any provisions for medical care.

4. Background. Lead is one of the common environmental contaminants. The amount of lead in air, water, soil, food, and other sources may be significantly increased by contributions from human activities. These activities include handling, processing, use, transport, storage, and disposal of lead-containing substances. Bioassays document the amount of lead that has been absorbed into the body and its effect on an important enzyme.

5. Policy.

a. Bioassays are medical tests used for clinical purposes. Lead bioassays will be accomplished for all personnel who are known or suspected to have been exposed to significant levels of lead. Bioassays will be administered as a result of coordinated decisions between commanders and medical personnel on the following categories of exposed or potentially exposed personnel.

(1) Level I: Personnel With Exposure to Significant Lead Levels. This level includes personnel who may or may not be exhibiting symptoms associated with lead toxicity. A determination of significant exposure to lead is made when either the results of industrial hygiene or environmental sampling and analysis, performed in accordance with Service guidelines, indicate the presence of lead, or when intelligence or a commander (with medical input) establishes that lead exposure may have occurred. Operations that may cause lead exposures include: bivouac or sustained operations in industrial or commercial areas currently/previously used for lead operations or storage; heavy weapons firing; and tank, howitzer, and armored vehicle maintenance. Significant exposures occur when an accepted exposure standard has been exceeded and, in the opinion of a trained medical professional, may result in excessive lead uptake leading to toxic effects. Use USACHPPM Technical Guides TG 230 and TG 248 (http://chppm-www.apgea.army.mil/armydocs.asp?pub_type=TG) and US occupational lead exposure standard (29 CFR 1919.1025) for personnel routinely exposed to lead to determine acceptable lead exposure levels for deployed personnel. Personnel in Level 1 require lead bioassays (See para 5b).

(2) Level II: Personnel Routinely Exposed to Lead as a Result of their Assigned Duties (Occupational). This level includes only those personnel who as a result of their assigned duties (their peacetime, in-garrison jobs, as well as their duties during deployment) include routine exposure to lead fumes (Ref: DoDI 6055.1, DoDM 6055.5, and CFR 1910.1025). Duties with potential for lead exposure include welding, cutting, brazing, and blasting on lead paint surfaces; radiator repair; and indoor firing range duty. These individuals, contingent upon industrial hygiene sampling ($30\mu\text{g}/\text{m}^3$ for 30 or more days a year), should be enrolled in their service occupational medical surveillance programs, which requires semi-annual lead bioassays.

(3) Level III: Personnel with Incidental Exposure to Lead. This level consists of personnel who have spent time in the general vicinity of known/suspected lead use or contamination, but who were not expected to have received significant lead exposure based on estimated or known lead concentration levels in the air, soil or water, and the duration of time spent in the area. Bioassays for lead are not required for these personnel, though a physician may choose to perform one based on medical indications.

b. **Lead Bioassay Procedures.** Obtain both components of the lead bioassay (blood lead level [BPb] and zinc protoporphyrin level [ZPP]) after exposure and follow with additional bioassays as necessary based on exposure data, clinical findings, to support on-going clinical management of exposed personnel. For symptomatic personnel, perform bioassays as soon as practical. For lead-exposed asymptomatic personnel, accomplish bioassays, as necessary, to support clinical management of exposed personnel not later than three months after exposure. Medical recommendations for the treatment and disposition of personnel based upon the results of lead bioassays and the associated clinical findings are medical determinations. These determinations will be made in accordance with sound medical practice and guidance provided in Appendix 2.

c. **Health Risk Communication.** A health care provider will inform each individual of the purpose of the bioassay, the results, the meaning of the results, and any required or recommended follow-up. Suggested risk communication messages for use by health care providers are included in Appendix 2; additional guidance may be found at www.pdhealth.mil. Service subject matter experts may also be contacted for assistance.

d. **Medical Record Documentation.** Enter the bioassay results, the risk communication messages delivered, and the need for any additional assays into the individual's medical record and into the Service's automated medical record system.

e. **Post-deployment Health Assessments (DD Form 2796).** Upon completion of DD Form 2796, the appropriate health care provider will follow-up possible lead exposures to determine whether individual servicemembers fall into either Level I or II. These personnel will be handled IAW with this guideline and with Post-Deployment Health Assessment guidance. If the time between presumed exposure and collection of a specimen exceeds four months, bioassays are not required.

Appendixes:

1. References
2. Health Risk Communication Messages

APPENDIX 1

REFERENCES

1. Clinical Laboratory Improvement Amendments ("CLIA" Program). 57CFR 7139; Section 493.1 of 1988 as amended.
<http://www.cms.hhs.gov/clia/> and <http://www.phppo.cdc.gov/clia/regs/toc.asp>
2. US Army Regulation (AR) 40-5, October 15, 1990, "Preventive Medicine."
3. "DoD- VA Clinical Practice Guideline for Post-Deployment Health Evaluation and Management," December 2001. <http://www.pdhealth.mil/main.asp>
4. Abadin H and Llados F, eds., US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), "Toxicological Profile for Lead," July 1999.
5. National Sciences Technology Council, Executive Office of the President, Presidential Review Directive (PRD) 5, "A National Obligation; Planning for Health Preparedness for and Readjustment of the Military, Veterans, and their Families after Future Deployments," August 1998.
6. Joint Staff Medical Readiness Division (J4), Joint Staff Capstone Document, "Force Health Protection – Healthy and Fit Force, Casualty Prevention, Casualty Care and Management," undated. <http://deploymentlink.osd.mil/pdfs/capstone.pdf>
7. Department of Defense Instruction (DoDI) 6490.3, "Implementation and Application of Joint Medical Surveillance for Deployments," August 7, 1997.
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9. Department of Defense Instruction (DoDI) 6055.5-M: "Occupational Medical Surveillance Manual," May 1998.
<https://www.denix.osd.mil/denix/Public/ES-Programs/Safety/Documents/6055.5/manual.html>
10. "Tri-service Reportable Medical Events, Guidelines and Case Definition Version 1.0," Army Medical Surveillance Activity, July 1998.
http://amsa.army.mil/documents/DoD_PDFs/Jul98TriServREGuide.pdf
11. US Army Center for Health Promotion and Preventive Medicine (USACHPPM), "Technical Guide 248, Guide for Deployed Preventive Medicine Personnel on Health Risk Management," August 2001.
<http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG248.pdf>

12. US Army Center for Health Promotion and Preventive Medicine (USACHPPM) "Technical Guide 230, Chemical Exposure Guidelines for Deployed Military Personnel," January 2002, (Version 1.2 Updated April 26, 2002).
http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG230_2003.pdf
13. US Army Center for Health Promotion and Preventive Medicine (USACHPPM), "Reference Document (RD) 230, A Companion Document to Technical Guide (TG) 230: Chemical Exposure Guidelines for Deployed Military Personnel," January, 2002, (Version 1.2 Updated April 26, 2002).
http://chppm-www.apgea.army.mil/desp/pages/samp_doc/TG230/RD%20230%202002.pdf
14. US Army Field Manual 4-02, "Force Health Protection in a Global Environment," February 13, 2003.
15. 29CFR 1910.1025, Ch XVII (7-1-01), "Lead."

APPENDIX 2

Health Risk Communication Messages (Lead Exposures)

The exposure levels (low, moderate, and high) provided below are provided as reasonable guidelines to express magnitude of exposure. Sample risk communication messages associated with each exposure level are provided to use in conveying the bioassay results to the patients; they are intended as starting points for discussion. Consult www.pdhealth.mil for additional guidance.

Low-level lead exposures

Low-level lead exposure criteria are met based on one or more of the following: environmental sampling with average Pb concentration in air less than $10 \mu\text{m}^3$ over a two-week period; or $1.5 \mu\text{m}^3$ averaged on an annual basis; and/or a blood lead bioassay ([BPb] less than $25 \mu\text{dl}$ and [ZPP] less than $50 \mu\text{dl}$). Suggested risk communication message:

Environmental monitoring has been performed to measure the amount of lead in the (Specify air, water, soil, food, other source). Although lead has been detected in the air (or other source), the samples have shown that the level is low (Provide level). Based upon this level and the time (or amount of substance) that you were exposed, your present or future health has not been harmed.

Lead has no biological function in the body, and it is best to minimize lead exposure. The body has defenses to control lead exposure including barriers to prevent lead absorption (uptake), as well as methods to eliminate lead once it is absorbed. The amount of lead measured in your blood and its effect on the formation of your red blood cells have demonstrated that your exposure to lead has not resulted in absorption of a medically-significant amount of lead into your body, or of an effect that can be measured by these tests (bioassays).

Lead is found in nature and it has been widely used in products by humans for many centuries. The lead level that was found (Specify in the air and/or in your blood) is less than the levels that are commonly found in occupational or environmental exposures in the United States.

Do you have any questions at this time? If you have any questions or concerns after you leave, you can contact us at any time.

Moderate-level lead exposure

Moderate-level lead exposure criteria are met based on the following: environmental lead exposure levels that exceed US occupational health standards or Army TG 230 guidelines with average Pb concentration in air greater than $10 \mu\text{g}/\text{m}^3$ over a two-week period; and/or over $1.5 \mu\text{g}/\text{m}^3$ averaged on an annual basis and less than $3.0 \mu\text{g}/\text{m}^3$, or the individual is asymptomatic, but has a blood lead level [BPb] ranging from 25 to $50 \mu\text{g}/\text{dl}$ and/or a zinc protoporphyrin level [ZPP]

from 50-100 µg/dl that is not attributable to another etiology. Suggested risk communication message:

Environmental monitoring has detected lead in the (Specify air, water, soil, food, other source) and has demonstrated that the level (Provide level) is above an acceptable concentration. If your exposure is not controlled, this level could result in harm to your present or future health. The immediate priority is to control your exposure to lead by following these steps: "List specific steps"

Lead has no biological function in the body, and it is best to minimize lead exposure. The amount of lead measured in your blood and its effect on your red blood cell formation have demonstrated that your exposure to lead has reached a medically-significant point that requires attention. The effects of lead are reversible when the amount of lead in your body is reduced and further excessive lead exposure is controlled. The use of a drug to increase the elimination of lead is not necessary and presents additional risks to your health.

Lead can affect several different organ systems in the body, including the blood, nervous, kidney, and reproductive systems. Your medical examination did not find any effects (or has determined the following effects to be related to lead toxicity -- list) in these or other organ systems. You will receive medical follow-up with evaluation of your lead exposure, periodic lead bioassays, and assessment of the effectiveness of the measures to reduce lead exposure.

Do you have any questions at this time? If you have any questions or concerns after you leave, you can contact us at any time. If you have any change in your health status, or if there is a question regarding the recommended measures to prevent further excessive lead exposure, please contact the medical department immediately.

High-level lead exposure

High Level lead exposure criteria are met based on the following: environmental lead exposure levels that exceed US standards or Army TG 230 guidelines with average Pb concentration in air greater than 20 micrograms per cubic meter (µg/m³) over a two-week period; and/or greater than 3.0 µg/m³ averaged on an annual basis; or the lead bioassay reveals a blood lead level [BPb] in excess of 50 µg/dl and/or a zinc protoporphyrin level [ZPP] greater than 100 µg/dl not attributable to another etiology. The individual may be either asymptomatic or exhibit symptoms related to lead toxicity. Suggested risk communication messages:

Environmental monitoring has measured the amount of lead in the (Specify air, water, soil, food, other source) and has demonstrated that the level (Provide level) is considered excessive by United States or Army standards. If your exposure is not controlled, this level could result in harm to your present or future health. The immediate treatment is to control your exposure to lead. This will be done by the following these steps "List specific steps"

Lead has no biological function in the body and it is best to control and minimize lead exposure whenever possible. The amount of lead measured in your blood and its effect on the formation of your red blood cells have demonstrated that your exposure to lead has reached a medically-significant point that requires prompt attention. These effects of lead are reversible when the amount of lead in your body is reduced and further excessive lead exposure is controlled. The use of a drug (chelating agent) to increase the elimination of lead is often not necessary and may present additional risks to your health. The use of a chelating agent may be considered for your medical treatment, but its use and side effects will be discussed with you.

Lead can affect several different organ systems in the body, including the blood, nervous, kidney, and reproductive systems. Your medical examination did not find any effects (or has determined the following effects to be related to lead toxicity) in these or other organ systems (Specify if related to lead toxicity). You will receive medical follow-up with repeated evaluation of your lead exposure, periodic lead bioassays, and assessment of the effectiveness of the measures to reduce lead exposure.

Do you have any questions at this time? You will be assigned to a named healthcare provider (Provide name) to closely follow your progress over the next several weeks. If you have any questions or concerns after you leave, you can always contact us (or the named provider) at any time. If you have any change in your health status, or if there is a question regarding the measures to prevent further excessive lead exposure, please contact the medical department immediately.