



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

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WASHINGTON, DC 20301-3000

SEP 21 2007

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY OF THE ARMY
(ENVIRONMENT, SAFETY & OCCUPATIONAL
HEALTH)
DEPUTY ASSISTANT SECRETARY OF THE NAVY
(ENVIRONMENT)
DEPUTY ASSISTANT SECRETARY OF THE AIR
FORCE (ENVIRONMENT, SAFETY & OCCUPATIONAL
HEALTH)

SUBJECT: Actions in Response to Perchlorate Releases

This memorandum provides additional policy regarding actions for DoD perchlorate releases at DoD installations, Base Realignment and Closure (BRAC) sites, Formerly Used Defense Sites (FUDS), and ranges other than operational ranges. The policy applies to sites in the United States, territories and possessions.

Under the Defense Environmental Restoration Program (DERP) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), DoD has authority to undertake actions where deemed necessary to protect public health or the environment consistent with the National Oil and Hazardous Substances Spill Contingency Plan at facilities under DoD jurisdiction or where the sole source of a release is from a DoD facility. These actions can span the spectrum from Preliminary Assessments/Site Inspections through Remedial Actions. *Promulgation of a Maximum Contaminant Limit (MCL) or similar regulatory standard is not a precondition for taking an action to assess the risk from a release of a contaminant.* The "Provisional Values" white paper (Attachment 1) jointly developed by DoD, EPA, and the Environmental Council of States (ECOS) provides details on how to establish toxicity values for use in risk assessments when there are no toxicity values in the EPA Integrated Risk Information System, and thus likely no regulatory standards. The paper has been endorsed by EPA and the military Services. Risk assessors within DoD should be directed to follow the methodology described in the paper.

The DUSD (I&E) memorandum of January 26, 2006 provided policy with respect to perchlorate sampling and established a "level of concern" of 24 ppb as a departure point for site-specific risk assessments. DoD adopted the 24 ppb level based on the conclusions reached by the National Academy of Sciences following rigorous scientific review. Since the issuance of the 2006 DUSD (I&E) memorandum, some states have



established Maximum Contaminants Levels (MCLs) for, Public Health Goals, and/or soil screening levels for perchlorate.

The following perchlorate goal is hereby established and will be included in the Defense Installations Strategic Plan:

- For sampling data as of the end of FY-06, active and closed installations (excluding operational ranges) and FUDS with perchlorate detections above 24 ppb or an applicable regulatory standard, shall ensure that appropriate actions have been initiated, programmed, or determined not required by the end of FY-08.

Attachment 2 is a list of installations and FUDS that had detections of perchlorate above the 24 ppb DoD level of concern based on historical sampling records. We have attempted to populate the table for some installations based on information previously provided. Please review the attachment to ensure the accuracy/currency of the data, indicate the actions and regulators' concurrence for each installation, and add any installations/FUDS we may have missed. Please provide your responses by October 19, 2007.

Examples of "an applicable regulatory standard" mentioned in the perchlorate goal include a promulgated State MCL for perchlorate at installations that are public water suppliers in that State, or perchlorate limits established in a Clean Water Act permit. Thus, in addition to actions taken under the DERP, please ensure that permitted point source wastewater discharges associated with perchlorate manufacturing, processing or de-militarization are reviewed. Irrespective of current state permit requirements, risk management actions may be warranted to reduce discharges to receiving water bodies.

My point of contact for any questions regarding this policy is Ms. Shannon Cunniff at (703) 604-1529, Shannon.cunniff@osd.mil.



Alex A. Beehler

Assistant Deputy Under Secretary of Defense
(Environment, Safety and Occupational Health)

Attachments:
As stated

IDENTIFICATION AND SELECTION OF TOXICITY VALUES/CRITERIA FOR
CERCLA AND HAZARDOUS WASTE SITE RISK ASSESSMENTS
IN THE ABSENCE OF IRIS VALUES

Introduction

The ECOS-DoD Sustainability Work Group's Emerging Contaminants Task Group prepared this paper based on discussions held at the February 2006 Work Group meeting that identified the selection of toxicity values/criteria for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and hazardous waste sites in the absence of an Integrated Risk Information System (IRIS) value as a specific Risk Assessment issue to be addressed by the Task Group. Risk Assessment was prioritized as an item to be addressed by the Task Group at the November 2005 Forging Partnerships on Emerging Contaminants Forum.

Issue:

Toxicity value/criteria identification is a crucial step in conducting risk assessments. EPA's Office of Superfund Remediation and Technology Innovation (OSRTI) has developed a hierarchy of sources of toxicity information for use in Superfund risk assessments. However, other environmental programs and health and environmental agencies may have developed their own hierarchies for selecting toxicity values and may have different criteria for implementing peer review processes and addressing scientific uncertainties with toxicity values/criteria used in conducting health risk assessments. For example, some States have developed their own specific toxicity values and risk assessment criteria within their States regulatory framework, which may supplement or supersede US EPA guidance for that State's uses. This document is not intended to supersede such State values or regulations but rather to provide guidance and a suggested framework for identification and selection of toxicity criteria/values as the need arises.

The purpose of this paper is to provide recommendations on the identification and selection of toxicity values for those chemicals for which an IRIS toxicity value is not available.

Background:

The EPA Risk Assessment Guidance for Superfund (RAGS), Volume I Human Health Evaluation Manual (Part A) of December 1989 recommended a hierarchy for selecting toxicity factors and justified it by indicating that toxicity information may change rapidly; therefore, the most recent, high quality data should be used. EPA's IRIS was the first step in the hierarchy. At that time, EPA's Health Effects Assessment Summary Tables

(HEAST) was the second most current choice. The third tier in the hierarchy was other EPA documents although it was specifically stated that other document values may not necessarily have been verified by the RfD (Reference Dose) or CRAVE (Cancer Risk Assessment Verification Effort) Work Groups¹. RAGS specifically stated, “The use of up to date verified information is preferred to the use of interim information and, therefore, toxicity information should be obtained from other EPA references only if information could not be found in IRIS and HEAST. Before using references other than those cited in IRIS and HEAST, check with ECAO [Environmental Criteria and Assessment Office].”

On December 5, 2003, EPA’s Office of Superfund Remediation and Technology Innovation (OSRTI) issued guidance as Directive 9285.7-53. This Directive provided a new hierarchy for selecting human health toxicity values to reflect that HEAST values were not being updated and may not have been through an adequate peer review. A tiered approach was developed to prioritize the selection of chemical toxicity data; this hierarchy is directly based on the quality of the underlying toxicity database and the extent of peer review. The tiered approach hierarchy is:

- Tier 1 – EPA’s IRIS. The toxicity values listed in IRIS are considered to be validated and have undergone rigorous peer review. The completion of IRIS assessments is a multi-step process including internal peer review, EPA program and regional office review, federal interagency review, and external peer review with a public notice and comment period. The various steps are described in IRIS Track, if one opens and reviews the status of any assessment currently presented <http://cfpub.epa.gov/iristrac/index.cfm>. The assessment methodologies used for both IRIS and PPRTV assessments are available on this webpage: <http://www.epa.gov/iris/backgr-d.htm>
- Tier 2 – EPA’s Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by the EPA’s Superfund program for use in site specific risk assessments. However, the PPRTVs are developed in a shorter period of time and although these assessments undergo external peer review, their development does not include Agency and interagency review as is done with the IRIS assessments. Furthermore, their development typically includes a limited evaluation of information on mode of action, other toxicological end points, and other information that provides a better understanding of the toxicology of these chemicals. Often, the amount of relevant information on the toxicity of these chemicals is less because fewer studies have been conducted and reported. However, the PPRTVs are generally the best quantification of the dose-response scientific data that is available at the time they are developed because the PPRTVs utilize current information and methodologies.

¹ The CRAVE and RfD workgroups no longer exist.

- Tier 3 – Other Toxicity Values – Tier 3 includes additional EPA/non-EPA sources of toxicity information. Priority should be given to sources of information that are most current, peer reviewed, transparent and publicly available. Example sources for Tier 3 include the California Environmental Protection Agency (Cal EPA) toxicity values, the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Level and HEAST Table values.

OSRTI Directive 9285.7-53 specifically states “In general, draft toxicity assessments are not appropriate for use until they have been through peer review, the peer review comments have been addressed in a revised draft, and the revised draft is publicly available”. However, there are some agencies applying and requiring that the draft toxicity assessments be used in health risk assessments.

Numerous chemicals are now undergoing scientific review and others will be in the future. Sometimes a difference of opinion over chemical-specific toxicity values results in a conflict when performing a site-specific risk assessment for a given chemical (e.g., TCE, perchlorate). Scientific debate regarding proposed toxicity values and adoption by some agencies of these values has in some instances resulted in conflicts over site-specific risk assessments for certain chemicals among various responsible parties, and state health and environmental agencies.

There is a need for a consistent approach to identify toxicity values. It should be noted that EPA/OSRTI did not attempt to identify all Tier 3 sources when it developed the 2003 hierarchy. EPA/OSRTI expects to identify other Tier 3 sources, and is open to other potential Tier 3 sources that States, DoD (or other parties) may propose. Nothing in this paper should be construed as an attempt to limit such flexibility on the part of the States or other parties.

It is also important that flexibility in the selection of the best toxicity value at a point in time be retained. This is described in the OSRTI directive. The OSRTI directive “provides guidance for the sources of toxicity information that should generally be used in performing human health risk assessments at ...Superfund sites.” It acknowledges that “..in some cases more recent, credible and relevant data may come to the Agency’s attention.”, and states that “EPA and state personnel may use and accept other technically sound approaches, either on their own initiative, or at the suggestion of potentially responsible parties, or other interested parties.” This discussion in the OSRTI directive is in the context of all sources of toxicity values, including IRIS.

Development of PPRTVs, Tier 2 sources, is described below. Discussion of Tier 3 sources and recommendations for identifying Tier 3 toxicity values follows.

Development of PPRTVs

Many chemicals found at hazardous waste sites have not yet been evaluated by the IRIS program. In order to quantitatively evaluate the risk of these chemicals before they have been evaluated by the IRIS program, EPA has developed the Provisional Peer-Reviewed Toxicity Values (PPRTVs), which represent the second tier of human health toxicity values for the EPA Superfund and Resource Conservation and Recovery Act (RCRA) hazardous waste programs. The PPRTVs are developed specifically for use in site-specific risk assessment for the EPA Superfund Program, although the RCRA program has also found them useful for their risk assessments. The development of these values provides a useful paradigm for how to address chemicals without IRIS values and what characteristics these toxicity values should ideally possess. These characteristics can also be used to evaluate Tier 3 sources to help select from among divergent toxicity values produced by different public health agencies.

Because the PPRTVs have been developed specifically for EPA's Superfund program, they have not undergone the Agency and interagency review required for toxicity values to be placed in IRIS. For this reason, they can be developed more expeditiously, but they have not been promoted for use in other EPA or non-EPA programs. However, because they are developed using the same type of data sources analyzed with the same level of scrutiny and were developed specifically for use at hazardous waste sites they may be useful to other programs. We encourage EPA to make the PPRTVs publicly available for others to use in hazardous waste site risk assessment and encourage their use where appropriate. Although they appear in the Superfund program hierarchy ahead of toxicity values produced by organizations other than EPA, typically PPRTVs will not be developed if toxicity values of similar quality have already been produced by other organizations such as ATSDR or California EPA. PPRTVs are typically developed at the request of regional EPA risk assessors or as part of the process to replace HEAST.

Characteristics of PPRTVs

A PPRTV is more than a simple toxicity value and includes a support document that describes the general toxicity characteristics of a chemical and basis for development of the PPRTV. As the "provisional" designation for toxicity values connotes less detail in the write-up than for values developed for IRIS, the primary focus for provisional value development will be on the following critical elements:

1. Selection of critical study (or studies),
2. Selection of appropriate dose-response model in deriving toxicity values,
3. Uncertainty factor selection,
4. p-RfD/p-RfC calculation,
5. Carcinogenicity weight-of-evidence classification,
6. Slope factor/unit risk calculation, and
7. Confidence evaluation.

The PPRTV development is consistent with Agency methodologies and practices for the development of toxicity values [including oral reference doses (RfDs) and inhalation

reference concentrations (RfCs) for noncancer toxicity and slope factors and inhalation unit risks for cancer risk]. PPRTVs are derived after a review of the relevant scientific literature using the methods, sources of data, and guidance for value derivation used by the EPA IRIS Program. All provisional peer-reviewed toxicity values receive internal review by two EPA scientists and external peer review by at least three, and typically five, scientific experts. PPRTVs differ in part from IRIS values in that PPRTVs do not receive the Agency and interagency review provided for IRIS values. EPA's ORD and OSRTI jointly developed standard operating procedures for deriving PPRTVs.

Peer review is an important part of the development of PPRTVs. In general, there is a preference for risk assessments that have been externally and independently peer reviewed. The charge questions that are the focus of the external peer review for the PPRTV support documents include the following:

- Is sufficient and appropriate detail available to substantiate the quality and accuracy of the PPRTV manuscript?
- Have all studies been correctly selected, interpreted, and adequately described for the purpose of this document? Comment on the representation of the most important studies, those that define or directly support (or contradict) the quantitative assessment (including uncertainty factors), or support the classification of carcinogenicity.
- Discuss the extent to which the assessment is consistent with EPA's Risk Assessment Methodologies, especially the cancer guidelines or noncancer guidance and whether any departures are reasonable and adequately discussed. Considerations include selection of critical studies, endpoints, relevant toxicokinetic/toxicodynamic data, classification of carcinogenicity, and support for uncertainty factors. This particular charge is meant to address the more general qualitative issues of the guidance.
- Discuss the extent to which the assessment for the derived provisional RfD, RfC, SFO (oral slope factor), and/or IUR (inhalation unit risk) is valid. Comment on the validity and reasonableness of the quantitative derivation and the use of appropriate dose-response models.
- Discuss the extent to which the uncertainties associated with the assessment have been adequately characterized. Comment on the general presentation of uncertainties and whether uncertainties not directly captured in the aggregate Uncertainty Factor are adequately discussed in the "Statement of Confidence"
- Provide any other suggestions for improving the scientific credibility of the assessment.

Because the science and available information evolve, PPRTVs were initially derived with a three-year life-cycle that allowed for frequently used PPRTVs to be reassessed at the end of their three years and renewed or revised, as appropriate. However, PPRTVs are now moving towards a continuous update cycle. If an IRIS value becomes available for a chemical with a PPRTV, it will replace the PPRTV. Sometimes available

information is not sufficient to derive a PPRTV, and some PPRTV support documents conclude that a PPRTV cannot be derived based upon the available information.

Other Sources of Toxicity Values

In addition to IRIS and PPRTVs, there are a number of other sources of toxicity values. The quality of these values varies widely and depends on the depth of the toxicity data base, the scientific quality and rigor of the underlying risk assessment and the scope of peer review. Such assessments are generally more acceptable when the methods used for the assessments have been previously established and publicly available and have been themselves peer reviewed. Some available values, such as ATSDR MRLs and Cal EPA criteria have undergone an extensive literature review, a rigorous data analysis using up to-date guidance and methods to derive a toxicity value, and have been thoroughly peer reviewed. However, it should be noted that ATSDR MRLs are limited to non-cancer effects only. At the other end of the spectrum, there may be chemicals with no values and little or no available toxicity information, or outdated studies which are no longer consistent with current methodologies and practices.

IRIS toxicity values are publicly available at <http://www.epa.gov/iris/>. The PPRTV database is not publicly available, but toxicity values for use on site-specific risk assessments from it may be obtained by contacting the EPA Superfund Program (in Headquarters or in an EPA Regional Office) and being placed on the PPRTV Registered User list. Upon request EPA will send PPRTV assessments to persons on this list. As discussed earlier, the OSRTI hierarchy describes these as Tier 1 and Tier 2 sources. As also discussed above, the OSRTI hierarchy describes other sources of toxicity values as Tier 3.

There appears to be no available database with a comprehensive list of potential values for compounds lacking IRIS values. Possible sources, by no means inclusive, include U.S. Federal Agencies, States, International Agencies (UN), Foreign Governments (Canada, Netherlands), and various non-governmental organizations. Potential pitfalls in these sources include values that are administrative and were not derived using risk assessment, values that include risk management considerations (MCLs), outdated values that were derived using outdated studies and analysis, or values for which documentation of the studies and the analysis of the studies that entered in to the derivation of the values are not available. In some cases, providing toxicity studies are available, a value may need to be derived de novo. Overall, developers of risk assessments need to independently assess the quality of such studies and corroborate data amongst pertinent studies to the extent possible. In this case, the study from which the value is derived (and all studies considered), the analysis of the studies, and calculations to derive the value should be provided to all interested parties. The analysis and derivation of the value should follow current guidance, and some form of peer review should also be included.

In some instances, no information on the chemical may be available. In this situation, an alternative is to identify a chemical surrogate and use its toxicity value as a surrogate for the chemical without data (source chemical). This approach, of course, introduces considerable uncertainty which must be discussed in any risk assessment using this surrogate value. An important point to consider in choosing a surrogate is identification of a chemical with a similar structure and metabolism to the source chemical. Particularly important is the identification of metabolites associated with toxicity as well as similarities or differences in metabolism, disposition and elimination that exist between the two chemicals.

Identification of other available toxicity values is important, and chemicals should not be dropped from a risk assessment because of a lack of an available IRIS value. In the future, information may be developed as to the toxicity of the dropped chemical or it may have been removed from the suite of chemicals to be analyzed, thereby losing important data and causing the public, regulators and stakeholders to be deprived of potentially useful information. Important chemicals with an insufficient toxicity database should be referred to bodies such as the EPA or the National Toxicology Program for consideration for future testing.

Recommendations

The ECOS-DoD Sustainability Work Group generally supports the use of the OSRTI hierarchy to help identify human health toxicity values for use in site-specific risk assessments. Unless compelling scientific reasons suggest otherwise (e.g. newly published peer-reviewed scientific research), IRIS toxicity values would generally be used when available, and in the absence of IRIS values, then PPRTVs would generally be used. EPA, States and DoD recognize the obligation to protect human health and the environment pursuant to federal and state mandates by using the best available toxicity data and reserve the right to do so. The EPA, States and DoD advocate the use of the following preferences to identify or rank toxicity values. These may also be used when an agency or party would like to propose an alternative to a toxicity value. An understanding of the available sources of toxicity data and the strengths and weaknesses of each source is necessary to select the most appropriate toxicity value for use in a risk assessment, whether the chemical is an “emerging contaminant” with relatively little toxicity data available or a familiar contaminant with an evolving data set.

1. There should be a preference for transparent assessments (in which toxicity values are derived), that clearly identify the information used and how it was used.
2. There should be a preference for assessments which have been externally and independently peer reviewed, where reviewers and affiliations are identified. Other things being equal, there should also be a preference for assessments with more extensive peer review. Panel peer reviews are considered preferable to letter peer reviews.

3. There should be a preference for assessments that were completed with a previously established and publicly available methodology. Methodologies that themselves were externally peer reviewed are preferred over those that were not externally peer reviewed.
4. While there should be a preference for assessments using established methodologies to derive toxicity values, these methodologies should also be informed by the current best scientific information and practices. New assessment methodologies should provide reproducible results and meet quality assurance and quality control requirements.
5. There should be a preference for assessments that consider the quality of studies used, including the statistical power or lack thereof to detect effects; that corroborate data amongst pertinent studies; and that make best use of all available science.
6. There should be a preference for assessments and values which are publicly available or accessible. There may be a further preference for toxicity assessments that invited and considered public comment (as well as, but not in lieu of, external peer review).
7. Other things being equal, there should be a preference for toxicity values that are consistent with the duration of human exposure being assessed. For example, an externally peer reviewed subchronic reference dose (RfD) should be preferred to an externally peer reviewed chronic RfD when assessing an exposure of 2 years for non-cancer toxicity.

The Work Group supports as an overriding principle, that the States, EPA, DoD, and other risk assessors should not be seeking to identify higher or lower toxicity values. Rather, the effort should continue to be to identify the best, or most scientifically defensible, toxicity value. When an agency is unable to identify a scientifically defensible toxicity value, for example due to the lack of relevant toxicological studies or lack of an appropriate surrogate for a given chemical, the site-specific risk assessment should identify this as an uncertainty in the risk characterization.

The recommendations in this paper are intended for site-specific risk assessments that are currently in development or are started after publication of this Issue Paper. As mentioned earlier in this Issue Paper, other environmental programs and health and environmental agencies may have developed their own hierarchies and criteria for selecting toxicity values and conducting health risk assessments. Some States have developed their own specific toxicity values and risk assessment criteria which within their States regulatory framework may supplement or supersede US EPA guidance. The intent of this document is not to supersede such State regulations but rather to provide guidance and a suggested framework for identification and selection of toxicity

ATTACHMENT 1

ECOS-DoD Sustainability Work Group
Emerging Contaminants Task Group
Risk Assessment Provisional Values subgroup Issue Paper

4/23/07

criteria/values as the need arises. When there are challenges or questions regarding alternative toxicity values, we believe that following this systematic process for ranking values can facilitate resolution. Furthermore, using the preferences described above may help minimize disputes regarding human health toxicity values and we encourage their use.

ATTACHMENT 2
DoD Installations/FUDs with Perchlorate Detections Over 24 ppb

Installations/FUDs with perchlorate above 24 ppb	Action Initiated? (Yes/No)	Type of Actions (see list at bottom of page 8); may use more than one; specify if underway or completed	Regulator Concur w/action? (Yes/No)	Comments
Army				
Aberdeen Proving Ground	Yes	D-underway		Perchlorate detected in aquifer under training range that supplied water for City of Aberdeen. Extensive investigation has shown perchlorate levels falling and are consistently under the DoD/EPA level of Concern. Installation is working closely with regulators.
Camp Bonneville	Yes	D-underway E-completed		A Feasibility Study is being conducted to address groundwater contamination in the area. Monitoring data in the area shows almost no groundwater migration and a small plume area. Soil removal actions were conducted at the Demo 1 and Landfill 4 areas to remove likely source areas for munitions constituents, including perchlorate.
Camp Bullis	Yes	H-conducting response action under RCRA.		
Camp Navajo	Yes	B-completed		Latest surface water and wastewater sampling all ND.
Fort Dix	Yes	H-sampling underway		Army will continue groundwater sampling once closure permit is obtained.
Fort Huachuca	Yes	H-underway; working with regulators		Installation is working with AZ regarding detections, however no exposure pathway has been found.
Fort McClellan	Yes	A-completed		The installation is in discussions with regulators regarding the perchlorate detections in soil; perchlorate detections are below soil PRG.
Fort Ord (BRAC)				Affected area with soil contamination contained and no migration believed therefore no further action planned.

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Fort Riley	Yes	D-underway H- sampling underway	Yes	Perchlorate detected in an OB/OD site. Very limited potential for exposure pathway. Installation is working with EPA Region VII and KDHE and will continue sampling groundwater for 3 more years and then determine if further action is needed.
Fort Wingate Depot Activity	Yes	H- RCRA clean up		The clean up schedule and goals for the sites with elevated perchlorate levels are included in the RCRA permit issued by the NM Environmental Department.
Iowa Army Ammunition Plant	Yes	B-completed		Maximum perchlorate detection was 28 ppb. Subsequent groundwater sampling has been non-detect. No further action is warranted.
KCDA Nike 60, Gardner, KS	Yes	C-completed		Site Inspection reports for the control and launcher areas, which were finalized in 2005, concluded no DoD-related contaminants of concern were present at this site.
Lake City AAP	Yes	D-underway		Perchlorate will be addressed in groundwater ROD along with other contaminants of concern.
Letterkenny Army Depot	Yes	H-sampling underway		Perchlorate added to site permit requirements.

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Longhorn Army Ammunition Plant	Yes	D-underway G-underway	Yes	A fluidized bed reactor was added to a TCE groundwater treatment system in 2001 to remove perchlorate from an effluent. There is no groundwater use and actions were taken to protect Caddo Lake (drinking water supply). Soil covers were placed over two soils sites which contained high perchlorate concentrations to prevent runoff into streams. Final RODs are being developed to address remaining soil contamination through soils removal and disposal. All actions have been fully coordinated with EPA Region 6 and Texas.
Massachusetts Military Reservation (MMR) Note: Although an active range, MMR retained herein due to enforcement orders and active cleanup	Yes	E-completed G-underway	Yes	Removal actions have been completed for contaminated soils. Groundwater contaminated with RDX and perchlorate is being remediated through a groundwater treatment system in place and operating. All investigations and actions were fully coordinated with EPA Region 1 and Massachusetts. Groundwater remedy to address explosives and perchlorate under the Impact Area Groundwater Study Program is underway.
Milan Army Ammunition Plant	Yes	A-completed		Soil samples show perchlorate below soil PRG.

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Picatinny Arsenal	Yes	D-underway E-completed H-conducting an IRP investigation and monitoring per state regulations		15 CY of soil contaminated with lead and perchlorate were excavated and disposed under a 2004 Removal Action. Groundwater contamination is isolated with no receptors, installation and state are working on perchlorate issues.
Pueblo Chemical Depot				
Pyrite Canyon				
Shumaker NAD, Camden, AR "Landfill"				
Radford Army Ammunition Plant	Yes	H- sampling underway		Army continues to monitor as part of RCRA requirements. No remedial actions have been taken at this time. A risk assessment will address perchlorate contamination.
Ravenna Army Ammunition Plant	Yes	B-completed		Perchlorate in groundwater and surface water samples was not greater than 25ppb.
Red River Army Depot	Yes	A-completed		Soil samples show perchlorate below soil PRG. For surface water and waste water the State required a plan for perchlorate control; follow on sampling has shown lower levels.

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Redstone Arsenal	Yes	B-completed D-underway		Perchlorate was detected in soil and groundwater. A Remedial Investigation report was completed in July 2005. A Feasibility Study is underway to analyze remedial options. A health risk evaluation was conducted for surface water off-base -- No health risk to recreational users and residents. Sampling showed non-detectable levels in Tennessee River. Municipal water system supplies drinking water. There is no human consumption of groundwater either on-base or off-base, thus no threat to human health. The Arsenal is working closely with EPA and Alabama Department of Environmental Management (ADEM). Based on evaluations so far, there does not appear to be a threat to public health.
Spring Valley	Yes	H-sampling underway		USACE is proposing installation of additional monitoring wells and sampling.
Yuma Proving Ground	Yes	A-completed		Soil samples show perchlorate below soil PRG.
Air Force				
Arnold Air Force Base	Yes	C-completed D-underway D-FY08-15 projects	Yes	Drinking water not affected. RCRA response action is addressed under EQ program. As of 1 Aug 07: Response action beyond sampling will <u>not</u> be initiated before 30 Sep 07. RIP/RC is <u>not</u> achievable by 2010. RFI is complete and CMS is underway. Latest biannual groundwater monitoring downstream shows samples below action levels.
Beale Air Force Base	Yes	H-Coordinating with regulators		Perchlorate was detected in groundwater but drinking water supplies have not been affected by perchlorate

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Edwards Air Force Base	Yes	C- completed D-underway E-complete F-underway G- FY11-20	Yes	Drinking water supplies are not affected. Perchlorate was detected in soil and groundwater. As of 1 Aug 07: RIP/RC is <u>not</u> achievable by 2010. Perchlorate is included in pilot treatment project underway with last project programmed in FY08.
Hill Air Force Base	Yes	H-Groundwater sampling-underway D- RI completed	Yes	Drinking water not affected. As of 1 Aug 07: Response action beyond sampling will <u>not</u> be initiated before 30 Sep 07. Unknown whether or not RIP/RC can be achieved by 2010. Groundwater sampling is planned for FY08-27.
Holloman Air Force Base	Yes	H. Retesting		Drinking water not affected.
Kirtland Air Force Base	Yes	B-underway H- groundwater sampling-completed	Yes	Drinking water not affected. Air Force has had discussions with regulators regarding detections in soil- no drinking water pathways have been determined. As of 1 Aug 07: If applicable, any response action beyond sampling would not be initiated before 30 Sep 07.
Vandenberg Air Force Base	Yes	F-underway G-underway	Yes	Drinking water not affected. As of 1 Aug 07: Dual phase extraction placed into operation at Site 9 in Oct 03 as an Interim Remedial Action (IRA). An in situ bio-augmentation (ISB) pilot study was implemented in Mar 05. Dual phase extraction and pilot study are both currently ongoing. An EECA to expand the ISB pilot study has been approved and the pilot study is being expanded. FY07 PBC programmed. RIP/RC is achievable by 2010.
Navy				

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Allegany Ballistics Laboratory				Note: Navy has indicated that new data will be provided for all installations
Crane NSWC				
El Toro, MCAS (Former)				
Indian Head NSWC				
McGregor NWIRP				
Morris Dam NCCOSC				
Seal Beach NWS Detachment Concord				
White Oak NSWC (Former)				

ATTACHMENT 2
DoD Installations/FUDs with Perchlorate Detections Over 24 ppb

Types of Action:

- A. Soil samples are below applicable soil screening levels – no further action required
- B. Latest sampling indicates that water/wastewater/drinking water samples are below applicable regulatory standards/permit limits or 24 ppb (whichever lower) – no further action required
- C. Perchlorate is included in PA/SI underway or completed (specify if underway or completed)
- D. Perchlorate is included in RI/FS underway or completed (specify if underway or completed)
- E. Perchlorate is included in removal action underway or completed (specify if underway or completed)
- F. Perchlorate is included in pilot treatment project underway (specify if underway or completed)
- G. Perchlorate is included in remedial action underway or completed (specify if underway or completed)
- H. Other (describe)