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Chairman Ortiz, Ms. Davis, and distinguished members of the Subcommittee, I appreciate the opportunity to appear before you today to address the Department of Defense's (DoD's) activities associated with emerging contaminants and environmental restoration at active and Base Realignment and Closure (BRAC) installations, and Formerly Used Defense Sites (FUDS).

Defense Environmental Restoration Program

The Department of Defense is cleaning up property and protecting human health and the environment from contamination resulting from past military activities. The Department's cleanup effort, the Defense Environmental Restoration Program (DERP), actually predates the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which forms the basis for most of the federal cleanup work in the United States. The DERP is conducted at over 31,000 sites at over 4,600 active installations, Base Realignment and Closure (BRAC) installations, and Formerly Used Defense Site (FUDS) properties. DoD cleanups occur in all 50 states, the District of Columbia, and U.S. Commonwealths and Territories, with more than $1.8 billion annual budget and an estimated $32.6 billion cost-to-complete measured from Fiscal Year 2007. CERCLA and its implementing regulation, commonly referred to as the National Contingency Plan (NCP), provide the main framework and process for study and clean up under the DERP. DoD considers "emerging contaminants" as contaminants for which there are no published toxicity values or standards, or the values or standards are evolving. Emerging contaminants are addressed under DERP using the same risk-based CERCLA cleanup process as other contaminants of concern.

Like CERCLA, the DERP is a mature program with its cleanup sites managed according to risk to provide the most protection of human health and the environment at the earliest opportunity. DoD and its Components have years of experience developing cost estimates for cleanup. These estimates are integrated into DoD's Planning, Programming, and Budget Execution process using realistic DERP environmental restoration goals based on a "worst first" cleanup philosophy that tackles the complex higher risk sites first to achieve the greatest risk reduction within DoD's resources. Meeting these goals is predicated on stable and predictable DERP funding built upon site specific information from the bottom-up for the two main components of DERP:

- Installation Restoration Program (IRP) – which the Department has been using since the 1980s to address the release of hazardous substances and pollutants or contaminants resulting from past practices that pose human health or environmental risks; and
- Military Munitions Response Program (MMRP) –While the military has been cleaning up unexploded ordnance since DERP began, the Department formally established goals in 2001 to manage environmental responses to unexploded ordnance, discarded military munitions, and munitions constituents. This category does not include any operational range, operating storage or manufacturing facility, or permitted facility for the treatment or disposal of military munitions.

As of the end of FY 2006, DoD has achieved "remedy in place" or "response complete" ("RIP/RC") for response actions at about 23,000 IRP sites, or approximately 83 percent. The IRP RIP/RC percentage for active installations is 85 percent (16,833 out

of 19,796), for BRAC locations 85 percent (4,275 out of 5,010), and for FUDS properties 67 percent (2,014 out of the 3,021).

In 2001, the Department formally established the Military Munitions Response program (MMRP) under DERP. As of the end of FY 2006, there are 3,316 MMRP sites at about 1,900 current and former Defense properties. DoD completed response actions at about 25 percent or 821 of these sites, of which 226 sites are at active installations, 122 sites are at BRAC installations, and the remaining 473 sites are at FUDS properties.

Risk Management in DoD Cleanup

Relative Risk Prioritization to Achieve Maximum Risk Reduction

DoD employs a risk management approach in prioritizing investigation and response efforts which focuses first on response actions to address higher relative risk and then, when resources become available, focuses on addressing longer-term, risk management actions. This risk management approach applies to all environmental restoration program sites at active installations and FUDS properties.

The DERP uses two similarly devised, risk-based frameworks to prioritize response actions at IRP and MMRP sites. IRP sites use a relative-risk site evaluation protocol that evaluates relative risk (high, medium, or low relative-risk) based on the nature and extent of contamination (including emerging contaminants) found at a site, the potential for contaminants to migrate, and an assessment of potential impacts on populations and ecosystems. MMRP sites are prioritized using the Munitions Response Site Prioritization Protocol (MRSPP). The MRSPP evaluates relative risk by reviewing the hazards of unexploded ordnance and discarded military munitions; the unique, acute effects of any chemical warfare material; potential chronic health hazards posed by

munitions constituents including emerging contaminants; and possible impacts on human populations and ecosystems. The phases for investigation and cleanup under DERP are similar for each program and are based on CERCLA and the NCP. DoD established one program goal for all high relative risk sites at active installations and FUDS properties in the Installation Restoration Program: nearly all remedy in place or response complete (RIP/RC) by FY 2007. Current projections are that 89 percent of DoD's high-relative risk sites will achieve that goal.

Another long term goal is achieving RIP/RC for all (high, medium, and low-relative risk sites) IRP sites at active installations by the end of FY 2014, which current projections show nearly all DoD active installations will attain. The corresponding long term IRP goal for FUDS is the end of FY 2020, and reflects the differences in the kinds of sites included in the FUDS program, such as the larger number of MMRP sites and clean up of sites with multiple parties other than DoD. The FUDS program focuses on the cleanup of contamination on property transferred out of DoD before October 17, 1986. Although DoD no longer owns these properties, it works closely with regulators and current property owners to achieve environmental restoration program goals. FUDS IRP sites are currently expected to achieve about 92 percent RIP/RC by the FY 2020 goal.

Conversely, under the BRAC program, the Department cleans up sites located on military installations identified for closure or realignment in a series of special legislation since 1988. BRAC 2005 will result in 24 major base closures, 24 major realignments and 765 minor actions. BRAC 2005 differs from the prior BRAC rounds because the majority of the installations to be closed under BRAC 2005 have been performing

environmental remediation work for many years. The Department has achieved RIP/RC at 85 percent of legacy BRAC IRP sites and 63 percent of BRAC 2005 IRP sites.

The FUDS program is also working to improve progress towards program goals through performance reviews and annual objectives. Beginning in 2000, the Department initiated a series of enterprise-wide reforms to transform business practices. Through the Army's strategic plan, the Corps of Engineers has increased the emphasis on progress towards program goals, with specific annual objectives to meet RIP/RC. Headquarters, Corps of Engineers, also conducts quarterly Command Performance Reviews to ensure that Districts and Divisions achieve their goals. And lastly, the Army improved accuracy and stability of cost to complete estimates, reducing cost growth, stabilizing cost estimates, and increasing overall fiscal accountability.

Risk Assessment for Environmental Response Actions

While the Department uses prioritization tools to focus its program and resources on assessing and addressing potential high relative risks first, the need to conduct response actions usually is determined by conducting a site-specific risk assessment consistent with CERCLA, and the NCP, and EPA guidance. Emerging contaminants and other contaminants of concern are identified and evaluated during the remedial investigation and corresponding baseline risk assessment process. Risk assessments and the results of site characterization efforts are used by DoD to determine if individuals or populations may be exposed to contaminants from a site, the potential risks associated with that exposure, and the response action required. Risk assessments are conducted for emerging contaminants, along with other more common contaminants of concern. DoD assesses contaminants during risk assessments using site-specific exposure scenarios and

uses published toxicity values to characterize risks to both current and potential future populations, consistent with U.S. Environmental Protection Agency (EPA) guidance. Also consistent with EPA guidance, when no published toxicity values are available (as may be the case for emerging contaminants), DoD uses the best available current science to evaluate the risks in determining the need for a response at a site.

Emerging Contaminants—Perchlorate Background

Perchlorate is both man-made and naturally occurring. Since the 1940s, DoD has used potassium and ammonium perchlorate as oxidizers in explosives, pyrotechnics, rocket fuel, and missiles. Perchlorate is by far the most efficient and stable propellant oxidizer available. The high ignition temperature, controllable burn rate, and stable chemical characteristics of perchlorate reduce its handling and storage risks as well as the likelihood of unexpected detonations.

Private industry uses perchlorate in explosives, air bags, matches, dyes, road flares, fireworks, and paints. Other commonly used chemicals, such as chlorine bleach and perchloric acid, are also thought to contribute to perchlorate found in the environment.[1] Perchlorate is also found naturally in some agricultural fertilizers and occurs naturally through atmospheric deposition that has occurred over thousands of years as evidenced by its build up in desert environments. However, perchlorate is highly soluble in water and EPA and several states have taken or are considering measures to address public health concerns.

[1] Massachusetts Department of Environmental Protection. August 2005, draft report. Occurrence and Sources of Perchlorate in Massachusetts.

Dispelling Some Myths About DoD and Perchlorate.

There are two misperceptions about DoD and perchlorate. First, while it is sometimes stated that DoD will not initiate response actions for perchlorate without the promulgation of a Maximum Contaminant Level (MCL), this is not true. Seven specific examples are discussed in detail below. Second, while DoD is a major *purchaser* of perchlorate it is not the sole user of perchlorate, nor does it appear from the data examined, that DoD facilities are a major source of perchlorate *detections* in drinking water. Provided further below are summary results from DoD's assessments of perchlorate at DoD installations and Formerly Used Defense Sites, as well as findings by researchers and state regulators that support this statement.

Irrespective of MCL promulgation, DoD has been taking appropriate response actions for perchlorate, and for contaminated sites that include perchlorate, under a number of statutory authorities and in coordination with EPA and State regulators. "Response action" is a term of art under CERCLA that includes site investigations to risk assessments and remedial actions. In many cases, the Department has conducted expeditious soil cleanups as removal actions in accordance with the National Contingency Plan. Removal actions can be taken before formal Records of Decision (RODs) are completed but are coordinated with regulators. Likewise, pilot treatment projects – such as the treatment unit at Edwards Air Force Base – can be constructed and placed into service as part of the investigation stage even before RODs are signed. These pilot treatment projects often remove substantial contamination as part of the feasibility and verification process conducted prior to deploying the technology fully. Thus, RODs alone are not an effective measure of an agency's response or cleanup activities.

Prior to the National Academy of Sciences review of perchlorate science in January of 2005 and EPA's subsequent posting of a reference dose, no final federal peer-reviewed toxicity values for perchlorate had been adopted. Yet, before 2005, while the risks to human health related to low levels of perchlorate were being determined, DoD initiated responses at sites determined by risk assessments to pose a potential risk to the public and the environment, using best available toxicity information at the time.

DoD has worked hard to dispel the myth that action cannot be taken until an MCL exists; in fact, the Department has been developing with EPA and the Environmental Council of States (ECOS) a series of white papers to provide information and improve coordination regarding cleanup of emerging contaminants. The Department has also established a process within DoD to identify emerging contaminants at an early stage, determine if they are used by DoD, assess the impacts of potential changes in regulatory status, and develop proactive risk management options for DoD program managers to respond to these chemicals.

Initial reactions by public and regulators are often that DoD must be the source of perchlorate contamination because of the portrayal of perchlorate releases almost singularly from rocket fuel. As States and local authorities examine the evidence more closely, they are coming to different conclusions. For example:

On April 10, 2007 the California House Natural Resources Committee, Subcommittee on Water and Power, led by Rep. Grace F. Napolitano (D-CA), held an oversight field hearing on "Sustainable Water Supplies for the West: Part 1 – Protecting Groundwater Resources." At the hearing, Mr. Robert E. Martin, General Manager, East Valley Water District, Highland, CA provided the following testimony:

"Based upon research conducted by our regional water quality control board (Santa Ana Region), we have concluded that our perchlorate problem can be traced back to fertilizer brought in from South America in the early 20th century and used on orange groves that are now part of our service area. Since these deliveries were made generations ago and land ownership has changed, often many times, there is little hope of our securing funding help from principal responsible parties. This means that the customers of the East Valley Water District will have to bear the cost of building and operating complex perchlorate treatment systems."

In a March 14, 2005 letter to EPA Assistant Administrator Ben Grumbles, Mr. Robert Golledge, Commissioner, Massachusetts Department of Environmental Protection stated the following:

"In March 2004, the Department initiated the process to establish a drinking water maximum contaminant level (MCL) for perchlorate by promulgating regulations requiring all public water supplies to test for perchlorate. Several rounds of sampling have been completed statewide. Nine public water supplies have detected perchlorate, seven of the nine have perchlorate ranging from just below 1 ppb to slightly above 3 ppb. However, two water supplies had greater than 45 ppb, one as high as 1300 ppb. When confronted with the perchlorate plume at Massachusetts Military Reservation in 2001, most thought the primary source of perchlorate contamination was the result of military training activities. None of the nine water supplies that have tested positive for perchlorate in Massachusetts appear to have any connection to military bases or activities."

DoD Perchlorate Policy

DoD has had perchlorate policies specifically directing perchlorate assessment since November 2002. DoD's most recent perchlorate policy, released in January 2006, requires perchlorate sampling in drinking water, groundwater, and wastewater discharges. In this policy, DoD also established a 24 part per billion (ppb) level of concern in water that is based on the science review by the National Academy of Sciences and EPA's reference dose. The DoD "level of concern" is simply a departure point for site-specific risk analyses. Site-specific risk analyses may include consideration of the relative source contribution of perchlorate in food and water. DoD has complied, and will continue to comply with applicable Federal or state standards regarding perchlorate.

DoD's Integrated Risk Management Approach to Perchlorate

DoD has adopted a three-pronged approach to risk management of perchlorate -- assessment of potential releases, taking appropriate response actions where necessary, and investing in research and development.

Assessment of Potential Releases

The myth that DoD facilities are the only major source of perchlorate exposure is not supported by data collected by government and non-governmental entities. While the Department does have sites with perchlorate releases, these releases are mostly confined to DoD installations and are being addressed under the DERP in coordination with regulators. DoD sites most likely to have perchlorate releases from past activities are rocket motor testing areas, rocket motor overhaul or "hog-out" facilities and detonation pits for unwanted munitions. These activities and/or the releases are now controlled.

Cumulatively through FY 2006, perchlorate sampling has been conducted at 237 DoD installations or former properties. The majority of samples taken at sites where perchlorate releases may have occurred have resulted in either "non-detects" or levels well below 24.5 ppb, which is a translation of the current EPA reference dose to a drinking water equivalent level; in fact, of the 146 installations that reported sampling in FY 2006, only nine installations reported a detection between 4 ppb and 24 ppb in any media: drinking water, surface water, groundwater, or soil. Eight installations indicated detection above 24 ppb in any of these media. Some of these detections are in point-source wastewaters subject to limits in state discharge permits. Since 2004, sampling results have been posted on our publicly accessible web site (https://www.denix.osd.mil/denix/Public/Library/Water/Perchlorate/perchlorate.html).

Perchlorate has been a particular concern in California. DoD and the State of California worked collaboratively to develop a prioritization protocol for assessing DoD sites with *potential* perchlorate releases -- 924 current and Formerly Used Defense Sites (FUDS) in California were jointly reviewed by DoD and the State – so far, 97 percent of these sites do not currently appear to contain perchlorate nor pose a threat to drinking water related to perchlorate. The remaining three percent have some confirmation sampling underway or the completed assessments are still being reviewed by Californian regulatory agencies.

In addition to the California perchlorate study, the FUDS program has undertaken a systematic approach to reviewing FUDS properties to identify, evaluate, and sample properties where perchlorate is likely to be found. The first step was a munitions review where 1,137 types of munitions were reviewed to determine potential perchlorate and

other constituents content. Approximately 125 types of munitions were found to contain perchlorate with quantities that ranged widely from grams to trace amounts. The second step was screening all of the FUDS properties for historical use or storage of perchlorate, approximately 1000 of those FUDS properties were identified as having some potential for having had perchlorate on site. The third and final step in the FUDS perchlorate review is a thorough site-specific evaluation. Archival and munitions review information is used to make determinations about the potential for perchlorate releases and the need for sampling of site environmental media. Based on that review, DoD conducts a site inspection (SI), collecting samples to determine if perchlorate was released to soil, groundwater, or surface water, and if the releases were related to past DoD operations. During the site inspection (SI) phase, DoD conducts sampling for munitions constituents including perchlorate. Sampling for perchlorate has begun at some sites. DoD's goal, as established by Congress, is to complete all the MMRP SIs by FY 2010. The FUDS program continues to work towards meeting this goal.

Research sponsored by DoD and other agencies is also helping to answer questions about the natural and other man-made sources of widespread, low levels of perchlorate occurring in numerous states across the nation. New results from research are being published and are particularly enlightening:

- Fireworks. About 200 million pounds of fireworks were consumed in the U.S. in 2003. More than 90% of that perchlorate is imported and not captured in domestic production/purchase statistics. A fireworks' charge contains up to 70% potassium perchlorate. A lake was studied before and after fireworks

displays. After the displays, perchlorate in surface water rose from a pre-display mean of 0.04 ppb to a maximum of 44 ppb in one sample collected. [2]

- Road flares. There are 20-40 million road flares sold in the U.S. annually with about 10 grams of potassium perchlorate per 15 minute flare. Many flares are not completely burned when used. Field tests measuring runoff from a flare on I-95 showed a maximum concentration leaving the highway and flowing to streams of 314,000 ppb.[3]
- Consumer Products. Perchlorate is found in a number of electrochemically-prepared consumer products that can be released to the environment such as herbicides and sodium hydroxide. It is also present in household bleach with concentrations increasing with storage length.[4] [5] [6]
- Fertilizers. A great deal of the widespread low level contamination in agricultural regions results from the use of imported fertilizers from Chile which is high in perchlorate. This fertilizer is still being imported and imports have been increasing over the past decade. Ironically, this fertilizer is often

[2] Wilkin, R. T., Fine, D. D., Burnett, N. G. (2007). Perchlorate Behavior in a Municipal Lake Following Fireworks Displays. Sci. Technology *41*(11), 3966-3971.

[3] Aziz, C. E., Borch, R., Nicholson, P., and Cox, E. (2006). *Perchlorate environmental occurrence, chemistry, toxicology, and remediation technologies* (Gu, B., Coates, J. Ed). Springer Science and Business Media, Inc.

[4] Aziz, C. E., Borch, R., Nicholson, P., and Cox, E. (2006). *Perchlorate environmental occurrence, chemistry, toxicology, and remediation technologies* (Gu, B., Coates, J. Ed). Springer Science and Business Media, Inc.

[5] Massachusetts Department of Environmental Protection. August 2005, draft report. Occurrence and Sources of Perchlorate in Massachusetts.

[6] Kang. N., Anderson, T., Jackson, W. A. (2006). *Photochemical formation of perchlorate from aqueous oxychlorine anions*. Analytica Chimica Acta. 567 (1), pp 48-56.

used on organically grown crops. Other organic fertilizers, such as those that use kelp, also contain low levels of perchlorate. [7] [8] [9]

- Natural sources. Perchlorate occurs naturally in the environment as a result of both dry and wet deposition. There are a number of natural deposits around the world with high levels of perchlorate. The U.S. Geological Survey has identified a large area of naturally occurring perchlorate in west Texas. [10] [11]

DoD sponsored research on analytical techniques has been especially rewarding. Using scientifically valid isotopic analyses techniques, The Department is now able to distinguish clearly between naturally occurring perchlorate and that which is manufactured. On-going research shows promise in using the same techniques to distinguish between various types of manufactured perchlorate. With an ability to differentiate between different sources of perchlorate, responsible parties can be identified with greater confidence, as can sources that may be contributing to perchlorate exposures.

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[7] Dasgupta, P. K., Martinelango, P. K., Jackson, W. A., Anderson, T. A., Tian, K., Tock R. W., Rajagopalan, S. (2005). *The origin of naturally occurring perchlorate: The role of atmospheric processes*. Environmental Science Technology. 39(6). pp 1569-1575.

[8] Snyder, S. A., Pleus, R. C., Vanderford, B. J., Holady, J. C. (May 2006). Analytica Chimica Acta. 567(1). pp 26-32.

[9] Dasqupta, P. K., Dyke, J. V., Kirk, A. B. Jackson, W. A. (2006). *Perchlorate in the United States: Analysis of relative source contributions to the food chain*. Environmental Science Technology. 40(21) pp 6608-6614

[10] Rao, B., Anderson, T. A., Orris, G. J., Rainwater, K. A., Rajagopalan, S., Sandvig, R. M., Scanlon, B. R., Stonestrom, D. A., Walvoord, M. A., Jackson, W. A. (2007). *Widespread natural perchlorate in unsaturated zones of the Southwest United States*. Environmental Science Technology.

[11] Rajagopalan, S., Anderson, T.A., Fahlqist, L., Rainwater, K. A., Ridley, M., Jackson, W. A. (2006). *Widespread presence of naturally occurring perchlorate in high plains of Texas and New Mexico.* Environmental Science Technology. 40(10) pp 3156-3162.

Response Actions

DoD has been taking appropriate response actions related to perchlorate releases. Well before there was any clear regulatory requirement, DoD began response and cleanup actions at a number of bases including the following:

- Massachusetts Military Reservation (MMR). Groundwater contaminated with RDX and perchlorate is being remediated through a groundwater treatment system. Removal actions have been completed for contaminated soils. All investigations and actions have been fully coordinated with EPA Region 1 and the Commonwealth of Massachusetts.
- Longhorn Army Ammunition Plant, Texas. 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 the State of Texas.
- Naval Weapons Industrial Reserve Plant (NWIRP) McGregor, Texas. At McGregor, the Navy's in-situ biological treatment system is treating perchlorate in groundwater and soil; this is the first – and world's largest – full-scale bio-wall application for groundwater remediation of perchlorate and volatile organic compounds. Recent groundwater data shows a marked decrease in the amount of perchlorate in groundwater. In fact, last October, the NWIRP McGregor became

the very first U.S. Navy facility to receive a "Ready for Reuse" determination from EPA. This verifies that environmental conditions at the property are protective of human health and the environment for its current and future commercial, industrial and agricultural uses. A Record of Decision was completed.

- White Oak, Maryland. White Oak has a number of RODs. The RODs primarily address other key contaminants but the treatment systems put in place under the RODs are also addressing perchlorate. All actions have been coordinated with EPA Region 3 and State of Maryland and both agencies concurred with the remediation goal for perchlorate.
- Redstone Arsenal, Alabama. 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 and it was determined that there is no health risk to recreational users and residents as a 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. Sampling showed non-detectable levels of perchlorate in the Tennessee River. The Arsenal is working closely with EPA and Alabama Department of Environmental Management (ADEM).
- Vandenberg Air Force Base, California. Perchlorate was detected in groundwater but drinking water supplies have not been affected by perchlorate. The Air Force initiated a pilot treatment process that uses injections of lactate and a de-chlorinating agent. The pilot study was successful – both TCE and perchlorate

were removed to non-detectable levels in one month. Planning is underway to scale up the pilot treatment process to complete TCE and perchlorate removal at this site.

- Edwards Air Force Base, California. Perchlorate was detected in soil at Edwards. Drinking water supplies have not been affected by perchlorate. In May 2003, Edwards AFB implemented a pilot project/treatability study to evaluate the effectiveness of using ion-exchange technology for perchlorate removal from contaminated groundwater. As of January 2007, the system has treated 32.1 million gallons and removed 133.7 pounds of perchlorate from the groundwater. Edwards also performed a field study that examined the effectiveness of a soil flushing technique to remove perchlorate contamination from the soil. Preliminary results indicate almost complete removal of perchlorate from the soil column. Cleanup actions are continuing.

Research and Development

DoD has invested over $114 million in research related to perchlorate toxicity, treatment technologies, perchlorate substitutions in munitions and training materials, perchlorate recycling and analytical and detection advancements. The Department's investments are paying dividends – DoD has advanced the state-of-technology regarding perchlorate treatment in water and has found suitable substitutes for a number of military-specific applications.

For example, the Department's research and development has achieved advances in ex-situ treatment using bio-reactors and ion exchange, and in-situ treatment using bioremediation, permeable reactive barriers, substrate injection, soil composting, and

phytoremediation. In Fiscal Years 2005 through 2007, DoD competitively selected and deployed six water treatment technology demonstrations in California in Rialto, Colton, Fontana, West Valley and East Valley. Both the water purveyors and the California Department of Health Services were involved. These projects added approximately 5,000 gallons per minute of new treatment capacity in the Inland Empire region with significant cost reduction potential in capital and operation and maintenance costs.

Regarding military unique applications, research and development has led to finding perchlorate substitutes for ground burst simulators and hand grenade simulators. These simulators accounted for a majority of expended perchlorate on Army training ranges in past years. Production of the replacement is scheduled to begin in 2008. Work is underway to eliminate perchlorate in pyrotechnic flare compositions. Lab-scale testing has identified perchlorate-free red, green, and yellow signal flare compositions and they are currently in the full-scale demonstration phase. Alternative approaches to some ammonium perchlorate-based solid rockets are in various stages of development, testing and evaluation. The alternatives must meet high performance specifications and have a low environmental burden. No drop-in replacement exists for heavy load missiles or launch vehicles.

DoD TCE Response Actions

Trichloroethylene, or TCE, is another contaminant of concern that is addressed as needed in the DERP. TCE has been used as a solvent for cleaning metal parts by industry and business throughout the United States. Due to past disposal practices TCE has become a common contaminant in groundwater. TCE has been found in at least 852 of the 1,430 National Priorities List (NPL) sites identified by the EPA. DoD currently has

424 installations and FUDS properties with ongoing environmental restoration activities in which TCE has been identified.

As discussed earlier, site specific risk assessments are developed using toxicity values for contaminants. In the case of TCE, EPA is revising their draft chemical risk assessment for TCE in light of a review of the science by the National Academy of Sciences. In the absence of an IRIS value or promulgated standards, DoD follows the hierarchy in the 2003 OSWER guidance and DoD-EPA-ECOS Provisional Values paper in selecting toxicity values for use in site-specific risk assessment. When new toxicity values are issued by EPA, DoD will use these values in future risk assessments and to evaluate the continued viability of past remedial actions. Where a site-specific assessment indicates that a release presents an unacceptable risk to human health or the environment, DoD is taking appropriate response actions at active installations, closed installations, and FUDS. DoD has been taking appropriate response actions related to releases of TCE for many years. The DERP Annual Report to Congress provides summaries of cleanup actions at DoD installations. This report is publicly available at https://www.denix.osd.mil/denix/Public/News/OSD/DEP2006/deparc2006.html

While cleanup to address past releases continues, the Department has worked continually to reduce the use of TCE and other toxic solvents where suitable replacements can be found. To reduce the risk of exposure to TCE and to prevent the release of TCE into the environment, DoD now requires strict handling procedures and pollution prevention measures. The Department has replaced products containing TCE with other types of cleaning agents such as citrus-based agents, mineral oils and other non-toxic solutions. The Department's search for safer and greener alternatives to

trichloroethylene in degreasing operations dates back more than ten years, with efforts by Army's Holston Ammunition Plant, Barstow's Marine Corps Logistics Base (MCLB) and Kelly Air Force Base. These efforts resulted in reducing the Army's use of TCE by 61% and entirely eliminating MCLB's TCE usage, despite an increase in workload over the same time period. Under EPA's 17 Chemical Reduction Plan that included TCE, Kelly's original goal of 50% overall reduction was actually surpassed (59%) and was achieved ahead of schedule by two years. Other efforts include the study of alternative processes such as baking soda blasting for paint removal on aircraft and the Defense Logistics Agency's outreach to the community on alternative chemicals, such as biobased cleaners.

Conclusion

DoD has, and will continue to take, appropriate response actions for TCE, perchlorate, and other contaminants. The latest round of DoD-wide perchlorate sampling data shows that the Department is taking appropriate response actions for perchlorate and DoD installations, overall in the situations examined, do not appear to be a significant source of perchlorate releases to the nation’s drinking water. DoD has acted responsibly at each step as the science and understanding of perchlorate and other contaminants has evolved. Protection of human health and the environment is an important component of DoD’s mission.

In closing, I sincerely thank the Committee for this opportunity to highlight the Department’s response activities related to chemical contaminants.