



OFFICE OF THE UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND
READINESS

The Honorable Roger F. Wicker
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

AUG - 7 2025

Dear Mr. Chairman:

The Department's response to section 1092 of the National Defense Authorization Act for Fiscal Year 2024 (Public Law 118-31), "Red Hill Health Impacts," is enclosed.

This report reviews the Department of Defense's (DoD) activities to support individuals and families exposed to the November 2021 Red Hill fuel release. It describes programs and services available to individuals exposed to the petroleum; current research on petroleum exposure; and other DoD activities pertinent to the Red Hill public health response. This report also describes DoD strategies for communicating and engaging with stakeholders, and summarizes data and analyses relevant to Red Hill.

Thank you for your continued strong support for the health and well-being of our Service members, veterans, and their families. I am sending similar letters to the other appropriate congressional committees.

Sincerely,



Melynn Carson, MD
Performing the Duties of the Deputy Under
Secretary of Defense for Personnel and
Readiness

Enclosure:
As stated

cc:
The Honorable Jack Reed
Ranking Member





OFFICE OF THE UNDER SECRETARY OF DEFENSE
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PERSONNEL AND
READINESS

The Honorable Mike D. Rogers
Chairman
Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

AUG - 7 2025

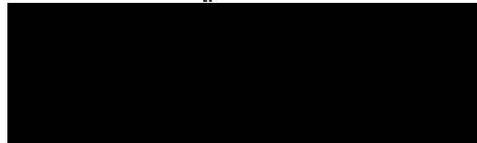
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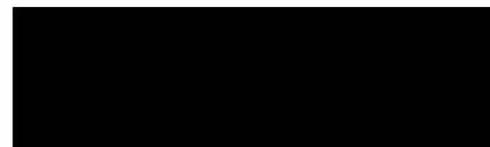
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As stated

cc:
The Honorable Adam Smith
Ranking Member





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PERSONNEL AND
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The Honorable Mitch McConnell
Chairman
Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, DC 20510

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As stated

cc:
The Honorable Chris Coons
Ranking Member





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WASHINGTON, D.C. 20301-4000

**PERSONNEL AND
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The Honorable Ken Calvert
Chairman
Subcommittee on Defense
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

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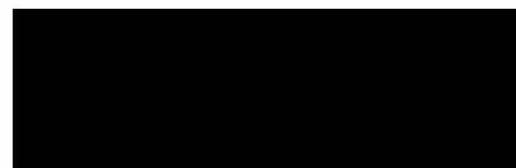
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Merlynn Carson, MD
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Enclosure:
As stated

cc:
The Honorable Betty McCollum
Ranking Member





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**PERSONNEL AND
READINESS**

The Honorable Jerry Moran
Chairman
Committee on Veterans' Affairs
United States Senate
Washington, DC 20510

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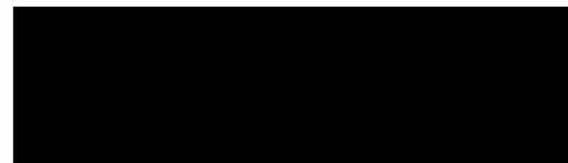
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Merlynn Carson, MD
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Enclosure:
As stated

cc:
The Honorable Richard Blumenthal
Ranking Member





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WASHINGTON, D.C. 20301-4000

PERSONNEL AND
READINESS

The Honorable Mike Bost
Chairman
Committee on Veterans' Affairs
U.S. House of Representatives
Washington, DC 20515

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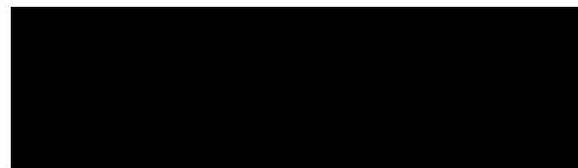
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Marilynn Carson, MD
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As stated

cc:
The Honorable Mark Takano
Ranking Member





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PERSONNEL AND
READINESS

The Honorable Bill Cassidy, M.D.
Chairman
Committee on Health, Education, Labor, and Pensions
United States Senate
Washington, DC 20510

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cc:
The Honorable Bernie Sanders
Ranking Member





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**4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000**

**PERSONNEL AND
READINESS**

The Honorable Brett Guthrie
Chairman
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515

AUG - 7 2025

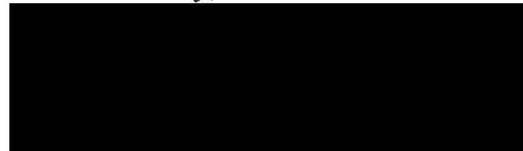
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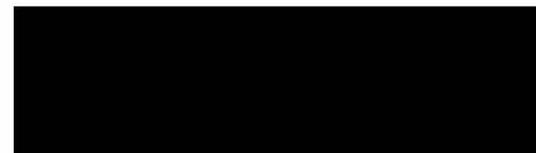
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Merlynn Carson, MD
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Readiness

Enclosure:
As stated

cc:
The Honorable Frank Pallone, Jr.
Ranking Member



Report to the Appropriate Congressional Committees



Red Hill Health Impacts

August 2025

The estimated cost of this report or study for the Department of Defense (DoD) is approximately \$21,000 which includes \$10 in expenses and \$21,000 in DoD labor.
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EXECUTIVE SUMMARY

This report is in response to section 1092 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2024 (Public Law 118–31), “Red Hill Health Impacts.” The November 2021 release of Jet Propellant-5 (JP-5) aviation fuel from the Red Hill Bulk Fuel Storage Facility into the Joint Base Pearl Harbor-Hickam (JBPHH) drinking water system directly exposed thousands to a toxicologic hazard and led to an ongoing public health response. This report reviews the Department of Defense’s (DoD) activities to support those exposed to the fuel release. Complicating risk management is the absence of validated individual measures of exposure; limited information on the long-term risks of exposure to petroleum products and fuel additives, particularly in specific subgroups such as children, women, older adults, and those with chronic conditions; and heterogeneous, multisystem clinical presentations that have been challenging for clinicians to satisfactorily explain.

In October 2022, after the establishment of the DoD Red Hill Senior Steering Group, the Defense Health Agency (DHA), on behalf of the Under Secretary of Defense for Personnel and Readiness and the Assistant Secretary of Defense for Health Affairs, emerged as the principal action office to implement the DoD’s commitment to take care of Service members and families exposed to the Red Hill fuel release. In addition, DHA was sensitive that 10 percent of the exposed population had no DoD affiliation, and this 10 percent had similar concerns about the long-term health implications of the fuel exposure. Three broad themes have emerged from this review of activities to understand the health impacts of the Red Hill fuel release.

First, DoD has deliberately emphasized engaging with independent subject matter experts from the interagency and non-Federal actors, who can bring outside perspectives to the Red Hill response. For example, the University of Hawai‘i (UH) has received an award to implement a Red Hill Independent Health Registry to monitor individuals exposed to the fuel release and better understand the long-term health implications of exposure. The National Academies of Sciences, Engineering, and Medicine is beginning the rigorous process to publish an independent consensus study report on the potential long-term health risks of the JP-5 exposure based on the strongest scientific evidence. DoD has also benefited from invaluable expertise and experiences shared by the Department of Veterans Affairs (VA) and Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR).

Second, DoD, through the DHA Red Hill Communication Plan, recognizes that honesty, transparency, humility and mutual respect are imperative to address lingering anger, distrust, frustration, loss of confidence, and sense of betrayal previously communicated by the affected community. DHA has assembled a portfolio of communication platforms, including e-updates, public website, organizational email box, webinars, and other outreach activities to ensure those exposed to the fuel release are informed and are heard.

Finally, complementing efforts to bring in outside expertise to the Red Hill public health response, DoD will remain actively engaged to take care of those exposed to the Red Hill fuel release. The Red Hill Defense Occupational and Environmental Health Readiness System (DOEHRS) Registry will operate indefinitely as the official record of DoD-affiliated persons exposed through residence, work, school, daycare, or other means. The Individual Longitudinal

Exposure Record (ILER) will enable current and future generations of VA clinicians, benefits administrators, and researchers to recognize veterans' exposure to the Red Hill fuel release as well as other occupational and environmental hazards. The Red Hill Clinic and Under Secretary of Defense for Personnel and Readiness designation authorizing medical evaluations for non-TRICARE-eligible beneficiaries are supporting individuals with health concerns that they attribute to the fuel release. DHA will continue to educate and train Military Health System (MHS) staff members to promote optimal, sensitive patient- and family-centered care for individuals exposed to the fuel release who are dispersed worldwide.

This report describes current gaps in knowledge and several promising activities and initiatives that will be updated and expanded upon in future annual reports to Congress. Going forward, DoD will remain committed to acknowledging the gravity of the Red Hill fuel release and implications for the future health of those exposed.

BACKGROUND

On November 20, 2021, a rupture of a fire suppression line that contained JP-5 aviation fuel from a prior leak in May 2021 entered and contaminated the JBPHH drinking water system.¹ Beginning November 28, 2021, the Hawai'i Department of Health began receiving numerous reports from households served by the JBPHH drinking water system that the drinking water tasted and smelled like fuel. The Hawai'i Department of Health issued a drinking water advisory on November 29, 2021.² After initial confusion over which residential neighborhoods served by the JBPHH water system were at risk and inconsistent water use recommendations, all residents in the impacted military family housing areas were eventually advised to stop all drinking, bathing, and washing with the contaminated water. Following a systematic flushing and testing plan developed by the Interagency Drinking Water System, the Hawai'i Department of Health removed the drinking water advisory for the last affected residential areas on March 18, 2022.³ No individual-level validated measures of exposure from environmental sampling; biological specimens; or questionnaires to estimate exposure routes and magnitude of exposure are available for individuals served by the JBPHH water system. The total number of individuals exposed or at risk for exposure to the JP-5 and fuel additives has been estimated to exceed 90,000.⁴

DoD acknowledges residents' concerns about ongoing exposure risks beyond the initial November 2021-March 2022 exposure window, including in response to a Honolulu Board of Water Supply report of a potential contamination plume in a shuttered well in August 2024. In March 2024, DoD expanded eligibility to seek care at the Red Hill Clinic to current residents of military family housing with concerns over drinking water quality.

REPORT FRAMING

This report is in response to section 1092 of the NDAA for FY 2024, which directs the Secretary of Defense to “review the Federal programs and services available to individuals exposed to petroleum; review current research on petroleum exposure in order to identify additional research needs; and undertake any other review of activities that the Secretary determines to be appropriate.”⁵ In addition, DoD addresses the required report elements specified in section 1092, which include strategies for communicating and engaging with stakeholders on the Red Hill Incident; the number of impacted and potentially impacted individuals; measures and frequency of follow-up to collect data and specimens related to exposure, health and developmental milestones as appropriate; and a summary of data and analyses on exposure, health, and developmental milestones for impacted individuals. The structure of this report is organized around the required review elements in section 1092.

¹ (Department of the Navy, 2022).

² (Hawai'i Department of Health, 2021).

³ (Hawai'i Department of Health, 2022).

⁴ (United States Environmental Protection Agency, About Red Hill Fuel Releases, 2024).

⁵ (Public Law 118-31, 2023).

REVIEW OF DOD ACTIVITIES ADDRESSING RED HILL HEALTH IMPLICATIONS

Review Element 1: Federal Programs and Services

In this section, DHA summarizes the Federal programs and services currently available to individuals exposed to the Red Hill fuel release, including whether the program and service applies to all exposed individuals or a subset of the exposed population. These programs and services include:

- Red Hill DOEHRS Registry (DoD-affiliated only);
- ILER (DoD-affiliated only);
- Federal funding for the Red Hill Independent Health Registry (All exposed individuals);
- DHA Red Hill Public Health Communication Plan (All exposed individuals);
- Red Hill Clinic (Hawai'i) (All exposed individuals in Hawai'i);
- Under Secretary of Defense for Personnel and Readiness Designation Authorizing Medical Evaluations for Non-TRICARE-Eligible Beneficiaries (All exposed individuals in Hawai'i); and
- Other Activities to Support Health Care Needs (Primarily individuals covered by TRICARE or VA health care).

Red Hill DOEHRS Registry

DOEHRS is the official DoD system of record for managing information related to known and potential occupational and environmental exposures — in garrison as well as in deployed settings.⁶ It is a web-based system with access limited to DoD public health personnel. Risks from hazardous exposures are compared with published exposure standards when available. DOEHRS enables public health personnel, supervisors, and commanders to manage risk from potential hazards and conduct health surveillance. One limitation of DOEHRS that was encountered with the Red Hill fuel release was that only DoD-affiliated personnel could be included in DOEHRS in accordance with the System of Record Notice.⁷ Such personnel included members of the Armed Forces; DoD civilian employees; DoD contractors; and spouses and dependents of members of the Armed Forces and DoD-affiliated personnel. It did not include, however, the exposed population who had no DoD affiliation. Many of these non-DoD-affiliated individuals included residents of the Iroquois Point housing area on the leeward side of O'ahu.

Soon after the fuel release and with the cooperation and subject matter experts provided by Army Public Health Center, the Navy and Marine Corps Public Health Center established the Red Hill DOEHRS Registry. This registry contained the names and identifying information of individuals exposed to the Red Hill fuel release, but it did not include any protected health information, such as medications, diagnoses, physical examination findings, or laboratory results. The Red Hill DOEHRS Registry was initially populated with names obtained from

⁶ (Defense Health Agency Solution Delivery Division, DOEHRS-IH Fact Sheet, 2023).

⁷ (Department of Defense Privacy, Civil Liberties, and Freedom of Information Directorate, 2013).

military family housing rosters. Later, after DHA took operational responsibility for the Red Hill DOEHRS Registry, JBPHH worker rosters were entered into the DOEHRS Registry. Accordingly, the Red Hill DOEHRS Registry automatically enrolled all DoD-affiliated individuals known to DoD who lived or worked in areas served by the JBPHH water system. The exposure criteria for the Red Hill DOEHRS Registry included any individual who lived, worked, or visited any areas served by the JBPHH water system at any time from November 20, 2021 to March 18, 2022, dates that corresponded to the fuel release and lifting of the Hawai'i Department of Health water advisory.

Immediately after the Red Hill DOEHRS Registry was established, it was recognized that some individuals not previously captured on housing and worker rosters but who met eligibility for the DOEHRS Registry would want to enroll. Army Public Health Center initiated a call center line to allow such individuals to enroll. After DHA established an organizational email account, such requests to be enrolled in the Red Hill DOEHRS Registry were handled by DHA staff.

As of August 7, 2024, there were 55,115 unique individuals in the Red Hill DOEHRS Registry. Individuals in the Red Hill DOEHRS Registry are organized by a Potentially Exposed Population (PEP) corresponding to each of the 24 military housing areas exposed to the fuel release. In addition, there were separate PEPs for JBPHH workers, JBPHH non-lodging visitors, JBPHH lodging visitors, and unborn children at the time of the fuel release. There were 5,779 individuals who were exposed to the fuel release through both residence and work on the JBPHH water system, and they were entered into two PEPs, one for the specific housing area and one for the JBPHH workers.

The Red Hill DOEHRS Registry serves as the official DoD record listing DoD-affiliated individuals exposed to the fuel release. ATSDR defines an exposure registry as a “system of ongoing follow up of people who have had documented environmental exposures.”⁸ The Red Hill DOEHRS Registry, as currently configured however, lacks the ability to provide ongoing follow up, and thus does not meet the ATSDR formal definition of an exposure registry.

ILER

VA and DoD have jointly established the ILER to provide a comprehensive longitudinal review of an individual's potential exposures throughout a military career.⁹ ILER compiles exposure data from multiple data sources including DOEHRS and supports VA clinicians, benefits administrators, and researchers. Information in the Red Hill DOEHRS Registry flows into ILER, including for military family members. Individuals not in the Red Hill DOEHRS Registry, such as non-DoD-affiliated persons, do not appear in the ILER. VA staff members are only able to view ILER records on Veterans.

MHS healthcare staff members operating in the MHS GENESIS electronic health record are also able to view an individual's ILER through the ILER Critical Exposures tab in Power Chart. In addition, a “Smart Zone Alert” within the patient's health record prompts staff

⁸ (Agency for Toxic Substances and Disease Registry, Glossary of Terms, 2024).

⁹ (Defense Health Agency Solution Delivery Division, ILER Fact Sheet, 2023).

members to review the patient's ILER Critical Exposures, which include the Red Hill fuel release exposure as well as other hazardous exposures. Thus, MHS staff members can recognize a patient was exposed to the Red Hill fuel release at the point of care during a patient healthcare visit.

Federal Funding for the Red Hill Independent Health Registry

While the Independent Red Hill Health Registry is not directly a Federal program or service, it is included in this section because Federal funding from the Red Hill transfer account was used to fund this registry's operating costs through FY 2029. DHA recognizes that many members of the Red Hill community have understandably felt anger, frustration, disillusionment, loss of confidence, and a sense of betrayal toward the Navy, which was responsible for the Red Hill fuel release, as well as other DoD Components involved in addressing the response, including DHA.¹⁰ Such negative sentiments have been expressed in surveys, focus groups, public meetings, individual conversations, and congressionally-mediated queries.

The then-Director, DHA stated in March 2023 that a long-term Red Hill health registry should operate outside of DHA. This direction was congruent with ATSDR's public recommendation for a third-party registry for individuals exposed to the Red Hill fuel release.¹¹ DHA has consistently articulated that a long-term independent registry is necessary to best understand the health implications of the Red Hill fuel release, especially in view of the unknown long-term effects of fuel exposure in drinking water particularly in vulnerable populations like children.

With congressional approval, DoD used funds in the Red Hill transfer account, drawn from the one-billion-dollar appropriation dedicated to DoD Red Hill-related operations for FY 2023-2024, to resource an independent Red Hill registry. UH distinguished itself as capable, motivated, and publicly trusted to design and execute an independent Red Hill registry. On March 15, 2024, UH was accepted into the Joint Disaster Medicine and Public Health Ecosystem (Ecosystem) operated by the Uniformed Services University of the Health Sciences' National Center for Disaster Medicine and Public Health (NCDMPH). Once in the Ecosystem, UH applied for and received a subaward from NCDMPH to plan and execute the Red Hill Health Registry.¹² The total subaward through September 30, 2024 includes a total amount of \$27.16 million (M) inclusive of UH indirect costs. The involvement of the Henry M. Jackson Foundation for the Advancement of Military Medicine permitted DoD to fund multiple years of the Red Hill Independent Health Registry. In addition to monitoring the health of those exposed to the Red Hill fuel release over time, UH will leverage the registry to connect individuals and families to services and provide educational program offerings. Under an interagency agreement with DHA beginning FY 2025, ATSDR will provide technical assistance to UH in implementing the Red Hill Independent Health Registry drawing upon ATSDR's extensive experience with environmental exposure registries.

¹⁰ (Red Hill Community Representation Initiative, 2024).

¹¹ (Agency for Toxic Substances and Disease Registry, Presentation to Red Hill Fuel Tank Advisory Committee, 2022).

¹² (University of Hawai'i, 2024).

DHA has emphasized in public health communications that UH has full independence to plan and execute the registry to support those exposed to the fuel release. DoD will not approve the registry design, questionnaires, findings, and conclusions, and will not receive individual-level data. DoD researchers interested in using de-identified Red Hill Independent Health Registry data for an epidemiologic investigation would be required to adhere to the same requirements for institutional review board approval applicable to any external investigator.

DHA Red Hill Public Health Communication Plan

In May 2023, DHA approved a communication plan to address the ongoing Red Hill response. Themes of this plan included institutional commitments to patient and family-centered care and understanding any potential long-term health implications of the fuel release. The plan components included regular e-updates, public website, organizational email box, webinars, small group listening sessions, and individual outreach.¹³ All of these components were implemented over the ensuing 15 months. In addition, DHA envisioned community input into the Red Hill independent health registry, which is part of the planning being conducted by UH.

- **E-updates:** DHA used work and personal email addresses in the Red Hill DOEHRS Registry, supplemented by e-update subscriptions open to anyone, to build a listserv of 39,804 e-update subscribers. DHA sent ten e-updates from July 2023-August 2024 on various topics including DHA activities, resources for individuals exposed to the fuel release, independent registry, public website, public webinars, virtual small group listening sessions, and the upcoming National Academies of Sciences, Engineering, and Medicine consensus study on the Red Hill fuel release. The e-updates proved a convenient and informative means to reinforce key messages from DoD and other stakeholders. For example, in e-update #9 (announcing the UH subaward for the Red Hill Independent Health Registry) DHA advertised the UH website where interested persons could obtain updates on the Red Hill Independent Health Registry. And DHA emphasized the need to voluntarily enroll (“opt in”) in the Red Hill Independent Health Registry.
- **Public website:** DHA established a dedicated single source for all DoD-related Red Hill public health information (<https://ph.health.mil/topics/campaigns/red-hill-public-health/Pages/default.aspx>). The site includes information on DHA actions, the Red Hill Clinic, Secretarial Designation policy for TRICARE-ineligible individuals, health recommendations, Red Hill Independent Health Registry, Red Hill DOEHRS Registry, and how to stay informed. Past webinars were archived for on-demand viewing. A fact sheet for healthcare providers caring for patients exposed to the Red Hill fuel release is available for individuals seeing a new healthcare provider: (<https://ph.health.mil/PHC%20Resource%20Library/redhill-doctor-guidance.pdf>).
- **Organizational email box:** DHA established an organizational email box (dha.redhill@health.mil) to answer questions and receive comments pertaining to the Red Hill public health response. DHA emphasized that the organizational mailbox is

¹³ (Defense Health Agency Public Health, 2024).

not secure and not appropriate for individual health questions or concerns, which should be directed to an individual's healthcare provider. Most of the greater than 2,000 email queries received to date have been to confirm or request enrollment in the Red Hill DOEHRS Registry. The organizational email box is monitored daily on duty days by DHA staff members.

- **Webinars:** DHA held three public webinars open to anyone without pre-registration requirements. They were held on January 9, 2024; April 9, 2024; and July 16, 2024. DHA provided a brief update and was dedicated to answering questions from those exposed to the fuel release. All the webinars were immediately posted to the public website for on-demand viewing following the live sessions.
- **Small group listening sessions:** DHA requested interested community members to participate in small group listening sessions held in June 2024. Two sessions included a total of seven individuals. The primary purpose of the sessions was for community members to share their experiences engaging the MHS and TRICARE civilian network healthcare systems to help DHA identify opportunities to improve patient- and family-centered care.
- **Individual outreach:** DHA established an outreach coordinator position in December 2023 to directly support individuals exposed to the Red Hill fuel release who had public health questions and concerns. The outreach coordinator monitored the organizational email box and facilitated the small group listening sessions.

Red Hill Clinic

Defense Health Network Indo-Pacific established the Red Hill Clinic at Branch Health Clinic Makalapa on JBPHH in January 2023.¹⁴ Eligibility to the Red Hill Clinic originally was limited to:

- Permanent residence in housing served by the JBPHH water system anytime from November 20, 2021-March 18, 2022;
- Full- or part-time work in any facility served by the JBPHH water system anytime from November 20, 2021-March 18, 2022;
- Attended school or daycare in facility served by the JBPHH water system anytime from November 20, 2021-March 18, 2022; or
- Individual reports persistent, worsening, or new symptoms that individual attributes to the November 2021 Red Hill fuel release or current concerns over drinking water quality in military family housing served by the JBPHH water system.

The Red Hill Clinic, which opened in January 2023 and, as a result of diminishing utilization, is currently open one half-day per week, integrated into clinical operations at the Branch Health Clinic Makalapa on JBPHH. No travel benefit is authorized for individuals outside of Hawai'i to access the clinic. Primary care staff members conduct an initial history and

¹⁴ (Naval Health Clinic Hawai'i, 2024).

physical examination for patients with health concerns related to the Red Hill fuel release. When indicated, referrals for specialty care are made. The Red Hill Clinic was not designed to supplant ongoing overall healthcare provided by one's primary care team. The Red Hill Clinic focuses on evaluating and treating health concerns specifically related to the fuel exposure. In March 2024, eligibility was expanded to current residents of military family housing, who may have concerns over drinking water quality.

As of August 7, 2024, the Red Hill Clinic has evaluated 246 TRICARE-eligible patients. Specialty referrals have included gastroenterology (18), dermatology (40), neurology (13), and behavioral health (7).

Under Secretary of Defense for Personnel and Readiness Designation Authorizing Medical Evaluations for Non-TRICARE-Eligible Beneficiaries (Secretarial Designation)

On March 10, 2023, the then-Under Secretary of Defense for Personnel and Readiness, exercising secretarial designation authority, authorized non-TRICARE-eligible beneficiaries who were exposed to the November 2021 Red Hill fuel release to receive a medical evaluation at the Red Hill Clinic. On February 28, 2024, the Secretarial Designation status was extended through March 10, 2025, and eligibility was expanded to current residents of military family housing who may have concerns over drinking water quality. As of August 7, 2024, the Red Hill Clinic has evaluated 13 patients under the Secretarial Designation program, with less than five referrals in total for gastroenterology, dermatology, and neurology.

Other Activities to Support Health Care Needs

DHA has emphasized the importance of all MHS staff members having familiarity with the Red Hill fuel release since some exposed individuals continue to report ongoing symptoms that they attribute to the fuel and military active duty families are dispersed worldwide. DHA has updated the TRICARE managed care support contractors' case managers on the complex health care needs of some TRICARE beneficiaries exposed to the fuel release. DHA has briefed primary care leads at the Defense Health Networks, and additionally sends Red Hill updates to the 36,000 MHS providers who subscribe to DHA Primary Care Updates.

The consistent message to MHS staff members is that some individuals exposed to the fuel release continue to present complex medical problems and MHS staff members should understand the context of the Red Hill fuel exposure in providing optimal patient and family-centered care. DHA has reinforced that some patients' heterogeneous symptoms may not be well explained despite extensive medical evaluations, and the long-term health risks of the fuel exposure are unknown, underscoring the importance of a long-term exposure registry to monitor individuals' health and quality of life.

Individuals who have received care outside of the MHS have reported variable levels of healthcare provider familiarity with the Red Hill fuel release. The fact sheet for healthcare providers discussed previously can help all healthcare providers quickly understand the fuel release incident and clinical management recommendations. With the limited understanding of the long-term health implications of the fuel release, however, healthcare providers have largely

been unable to provide evidence-informed evaluation and treatment plans specific to the fuel release.

For veterans, DHA has supported Red Hill-related training activities led by the VA Health Outcomes Military Exposures (HOME) Division for VA and other healthcare providers. In 2024, VA HOME staff included Red Hill content at the Military Environmental Exposures Symposium held during the American College of Preventive Medicine’s annual conference; the VA virtual day of learning; and a VA clinical webinar on Red Hill for healthcare providers. DHA also reviewed Red Hill Health content on VA and ATSDR webpages to ensure consistent messaging across the interagency.

Review Element 2: Current Research and Research Needs

In this section, DHA summarizes what is known of the health effects of fuel exposure, gaps in knowledge, and future research priorities. Lines of effort to better understand the health implications of the fuel exposure include:

- Leveraging ATSDR Toxicologic Expertise;
- National Academies of Sciences, Engineering, and Medicine Consensus Study; and
- Congressionally Directed Medical Research Program (CDMRP) Toxic Exposures Research Programs (TERP).

Leveraging ATSDR Toxicologic Expertise

DHA has recognized that institutional toxicologic expertise in understanding the short, medium, and long-term health effects of fuel exposure, including exposure to JP-5 fuel additives, resides with ATSDR. The Hawai‘i Department of Health requested technical assistance from ATSDR immediately after the fuel release. ATSDR’s most visible involvement in Red Hill was deploying personnel to rapidly conduct two public Assessment of Chemical Exposures (ACE) surveys on convenience samples of individuals exposed to the fuel release.¹⁵ Through the ACE program, ATSDR supports State and local health departments with rapid epidemiological assistance following a large-scale toxic release.¹⁶ In addition, following the Red Hill fuel release, ATSDR summarized known health effects of the fuel exposure for the Hawai‘i Department of Health which informed the State public health response.

The most comprehensive ATSDR report on health effects of fuel exposure is found in the “Toxicological Profile for JP-5, JP-8, and Jet A Fuels”, last updated in March 2017.¹⁷ This peer-reviewed publication was developed under the sanction of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, section 104(i)(1), which directs the Administrator of ATSDR to prepare toxicological profiles for hazardous substances most commonly found at facilities on the CERCLA National Priorities List that pose the most significant potential threat to human health. The focus of the profiles is on health and

¹⁵ (Agency for Toxic Substances and Disease Registry, Red Hill Emergency Response, 2024).

¹⁶ (Agency for Toxic Substances and Disease Registry, Assessment of Chemical Exposures Program, 2024).

¹⁷ (Agency for Toxic Substances and Disease Registry, 2017).

toxicologic information, and each toxicological profile includes a brief fact sheet (ToxFAQs™) and public health statement in nontechnical language.

In summary, the ATSDR toxicological profile states that very little is known of the human health effects caused by jet fuels, including JP-5. Studies of military personnel have suggested that inhalational exposure can affect the nervous system, including changes in reaction time and other tests of neurological function. Kerosene, which is a similar fuel oil that has been studied following accidental or intentional exposure, can lead to cough, difficulty breathing, abdominal pain, vomiting, drowsiness, restlessness, and convulsions. Animal studies have identified liver damage, decreased immune response, impaired performance on neurological function tests, impaired hearing, and skin damage. It is unknown whether jet fuel exposure is associated with cancer. It is unknown whether exposure in childhood or in utero leads to unique or higher risk of health effects.

At the request of the Hawai'i Department of Health, ATSDR is currently conducting a public health assessment to evaluate community exposures to chemical releases from the Red Hill Bulk Fuel Storage Facility since 2005.¹⁸ Unfortunately, Red Hill has experienced multiple additional fuel releases in the past. Some of the more notable recent incidents have included the release of approximately 27,000 gallons of JP-8 jet fuel in January 2014, and about 21,000 gallons of JP-5 on May 6, 2021.¹⁹ Past fuel releases, however, were not associated with the mass reporting of drinking water that tasted and smelled like fuel or the reporting of acute health effects as occurred with the November 2021 fuel release, which would have triggered an immediate public health investigation. ATSDR is using environmental data and health information collected since 2005 when ATSDR completed a public health assessment for the Pearl Harbor Naval Complex.

DHA has also consulted with medical toxicologists in DoD, ATSDR, Hawai'i Department of Health, and academic institutions. The collective feedback from these discussions has uniformly been that the long-term health effects from the amount of exposure experienced by individuals affected by the Red Hill fuel release are unknown based on previous toxicologic research.

However, some individuals exposed to the Red Hill fuel release have expressed frustration over ongoing health symptoms. In ATSDR's ACE Follow Up Survey, conducted in September 2022 (10 months after the fuel release) a convenience sample of 986 people completed surveys, with 80 percent reporting health symptoms in the previous 30 days, of which 65 percent expressed high or very high confidence that the symptoms were related to the water contamination incident. The most commonly reported symptoms were headache, anxiety, dry or itchy skin, fatigue, and difficulty sleeping. DHA has also received direct reports from individuals who report a myriad number of symptoms affecting multiple organ systems particularly the neurologic and gastrointestinal systems.

¹⁸ (Agency for Toxic Substances and Disease Registry, Public Health Assessment Activities, 2024).

¹⁹ (United States Government Accountability Office, 2024).

National Academies of Sciences, Engineering, and Medicine Consensus Study

Given the gaps in understanding the long-term health effects of the Red Hill fuel release, DHA consulted with the National Academies of Sciences, Engineering, and Medicine (National Academies) in July 2023 on whether the National Academies' expertise, scientific rigor, independence, and past proven success could be leveraged to support the community of exposed individuals. DHA presented the Red Hill public health response for discussion at the National Academies' Committee on Toxicology annual meeting in September 2023.

DHA also found an active and engaged partner in VA HOME, which placed high priority on fully understanding the health implications of the Red Hill fuel release, given the transition of today's Service members to tomorrow's veterans. VA HOME and DHA collaborated to award a task order (on July 9, 2024) to the National Academies to publish a consensus study report on "Clinical Follow Up and Care for Those Impacted by the JP-5 Releases at Red Hill."²⁰ The consensus study process is anticipated to result in a final peer-reviewed report by the end of FY 2026. The process is comprised of committee formation, data gathering, and report development. VA HOME and DHA were particularly interested in the National Academies' track record (including community engagement) as a critical component in the consensus study process, as demonstrated in the National Academies' "Guidance on PFAS Exposure, Testing, and Clinical Follow-Up" consensus study report.²¹

The statement of task for the National Academies includes:

- Engage with those exposed during the Red Hill fuel release, to gain knowledge and understanding of the issues, such as health conditions and symptoms; experiences with clinical care following the Red Hill exposure; and other pertinent information.
- Review current scientific evidence to determine potential long-term health risks of exposure to JP-5. The review will consider reports from authoritative bodies (such as the Veterans Health Administration, Environmental Protection Agency (EPA), National Toxicology Program, International Agency for Research on Cancer, and Agency for Toxic Substances and Disease Registry) that describe putative health effects following JP-5 exposure.
- Determine the strength of evidence for the spectrum of putative health effects following the Red Hill exposure, based on the review of current evidence. The committee will pay particular attention to health conditions and symptoms noted by those exposed during the Red Hill fuel release.
- Review existing clinical guidance for the health risks associated with exposure to JP-5, and, considering the harms and benefits of potential increased clinical follow-up for patients, issue evidence-informed clinical management recommendations in caring for patients exposed during the fuel release.

²⁰ (National Academies of Sciences, Engineering, and Medicine, 2024).

²¹ (National Academies of Sciences, Engineering, and Medicine, 2022).

- Review any available exposure assessments and models created during the public health response to the Red Hill fuel release to determine how estimates of an individual’s exposure level could best inform clinical follow-up and care of patients.
- Provide recommendations on clinical surveillance, testing, and care for those exposed at Red Hill that the sponsoring agencies can consider when developing their clinical guidance for exposed patients.
- Identify research needs to support improved patient follow-up and decision-making for benefits for those exposed at Red Hill.

CDMRP TERP

As part of the CDMRP, Congress appropriated a total of \$60M for the TERP in FY 2022-2023 and \$30M in FY 2024.²² The vision of the TERP is to “prevent, minimize and mitigate the impact of military-related toxic exposures and improve the health and quality of life of those affected.” The mission of the TERP is to “support impactful research aimed at identifying the cause and understanding the health outcomes, comorbidities and pathological mechanisms associated with military-related toxic exposures to facilitate the prevention, diagnosis and treatment of the visible and invisible diseases and symptoms impacting Service members, their Families, Veterans and the American public.”

Research proposals are openly solicited through Investigator-Initiated Research Award, Translational Research Award, and Clinical Trial Award funding opportunities. Awards are made to extramural and intramural DoD organizations with direct cost limits ranging from \$500,000 to \$2.5 million, depending on the award mechanism. All research applications are evaluated by scientists, clinicians, and consumers using CDMRP’s two-tiered review process.

The TERP includes the following overarching Program Goals:

- Elucidate mechanisms of how military-related toxic exposures result in adverse effects;
- Diagnose the effects of military-related toxic exposures;
- Predict and prevent military-related toxic exposures; and
- Develop therapeutics, treatments, and strategies to minimize symptoms and disease progression associated with military-related toxic exposures.

The TERP includes the following equally important topic areas: 1) Neurotoxin Exposure; 2) Gulf War Illness and Its Treatment; 3) Airborne Hazards and Burn Pits; and 4) Other Military Service-Related Toxic Exposures in General, Including Prophylactic Medications, Pesticides, Organophosphates, Toxic Industrial Chemicals, Materials, Metals and Minerals.

²² (Department of Defense Congressionally Directed Medical Research Programs, 2024).

Research addressing the health effects of the Red Hill fuel release is within scope of the TERP. The TERP is currently supporting two relevant projects. The first includes an evaluation of the endocrine, reproductive and developmental effects of JP-5 exposure in model systems. The other study seeks to identify molecular signatures of benzene exposures to facilitate the development of detection assays that will indicate whether an individual has been exposed.

Pending future Congressional appropriations for the TERP, DHA, interagency partners, and other stakeholders in the Red Hill health response may encourage investigators to submit research proposals that address the gaps in understanding Red Hill health impacts, ranging from basic science to clinical trials.

Review Element 3: Other Activities

In this section, DHA summarizes other activities pertinent to the Red Hill health response, including:

- EpiData Center (EDC) Healthcare Encounter Analyses; and
- CDC Medical Record Review (February 2023).

EDC Healthcare Encounter Analyses

The EDC is currently aligned under the Defense Centers for Public Health-Portsmouth. As stated above, the Red Hill DOEHRS Registry is the official record of DoD-affiliated individuals exposed to the Red Hill fuel release. The DoD Identification Number in the Red Hill DOEHRS Registry can be matched with corresponding healthcare encounter data for care received at a military medical treatment facility (MTF) or by a TRICARE civilian network healthcare provider.

The EDC previously analyzed healthcare encounter data among TRICARE beneficiaries in the Red Hill DOEHRS Registry by examining acute fuel-related symptoms and conditions before and after the November 20, 2021 fuel release.²³ EDC analysis relied on analyzing large data sets, and did not include individual medical record reviews. Examples of acute fuel-related symptoms and conditions included: headaches, dizziness, cough, shortness of breath, nausea, diarrhea, abdominal pain, dermatitis, throat pain, chest pain, conjunctivitis, and behavioral health conditions. The EDC conducted a separate analysis specific to behavioral health symptoms and conditions. These analyses were publicly posted on the Commander Naval Region Hawai'i website: <https://cnrh.cnic.navy.mil/Operations-and-Management/Red-Hill/>. As expected, there were acute increases in most symptoms and conditions that were known or postulated to be acute effects from fuel release, but trends reverted to historical norms after several weeks and months.

Going forward, the EDC will evolve the approach to analyzing healthcare encounters among individuals exposed to the Red Hill fuel release in two ways. First, the EDC will be postured to examine newly developed conditions that are hypothesized to arise as a medium or long-term health effect from the exposure. To date, no clinician or public health official has reported to DHA a novel health effect from the Red Hill fuel release that would warrant further

²³ (Defense Centers for Public Health – Portsmouth EpiData Center, 2023).

epidemiologic investigation. Secondly, individuals have self-reported perceived clusters of various conditions, including migraine headaches, eosinophilic esophagitis, irritable bowel syndrome, peripheral neuropathy, and Raynaud's syndrome. These self-reported clusters may be evaluated using standard processes currently under development, for investigating non-communicable disease clusters. Restricting epidemiologic analysis to medical conditions already known to be associated with the toxicologic effects of petroleum exposure may hinder discovery of novel findings given the limited knowledge of health implications from community exposure to JP-5.

CDC Medical Record Review (February 2023)

The then-Director, DHA requested epidemiologic assistance (EPI-AID) from the CDC on November 16, 2022. As discussed above, ATSDR completed two public ACE surveys, but medical record reviews of patients with suspected fuel-related symptoms or conditions were desired to complement the prior surveys. No ACE survey data was allowed to identify individuals at risk for fuel-related medical problems, as survey participants were promised confidentiality.

Importantly, CDC did not conduct a random sample of medical records to review. Rather, CDC and DHA agreed to focus on records that had a high likelihood of symptoms and/or conditions related to acute fuel exposure by focusing on International Classification of Diseases-10 diagnosis codes consistent with toxic exposure or symptoms or conditions that matched the EDC list of symptoms and conditions compatible with acute fuel exposure. In addition, CDC focused medical record reviews on children and people who were pregnant at the time of the fuel release. The final total of 653 medical records reviewed included 405 who were coded as having a toxic exposure; 170 who had a symptom or condition compatible with acute fuel exposure; 162 children; and 104 people who were pregnant. These four categories were not mutually exclusive; a patient could have been represented in more than one category (e.g., child who also had a symptom or condition compatible with acute fuel exposure).

CDC developed two case definitions pertinent to the Red Hill fuel release. A “worsening pre-existing condition/symptom” was defined as present before the November 20, 2021 fuel release, but clinical evidence of worsening in more than two visits after the fuel release. A “new persistent condition/symptom” was defined as a new condition/symptom documented on or after the 20 November 2021 fuel release and lasted at least 3 months.

Overall, 69 percent of medical records had documentation of exposure to the Red Hill fuel release. Among the 653 medical records reviewed, 357 (55 percent) had either worsening of a pre-existing condition/symptom or at least one new persistent condition/symptom. The most commonly reported conditions/symptoms included migraine, chronic pain, gastroesophageal reflux, headache, rash, and anxiety/worry/fear.

As noted above, since the medical record review was not a random sample of individuals exposed to the fuel release, no conclusions could be made on the proportion of total population exposed to the Red Hill fuel release that had either worsening of a pre-existing condition/symptom or a new persistent condition/symptom. The medical record review,

however, reinforced the need for the long-term independent registry to monitor health outcomes, as is being developed by UH.

OTHER REPORT ELEMENTS

Section 1092 of the NDAA for FY 2024 mandates that the report address:

- (A) strategies for communicating and engaging with stakeholders on the Red Hill incident;
- (B) the number of impacted and potentially impacted individuals;
- (C) measures and frequency of follow-up to collect data and specimens related to exposure, health, and developmental milestones as appropriate; and
- (D) a summary of data and analyses on exposure, health, and developmental milestones for impacted individuals

This section will review these mandatory report elements, reiterating any relevant plans and activities discussed in the preceding section and providing additional information where available.

Strategies for Communicating and Engaging with Stakeholders

DHA defines stakeholders in the Red Hill incident broadly, including but not limited to the community of persons exposed to the Red Hill fuel release; the people of Hawai‘i; Hawai‘i Department of Health; UH; Hawai‘i civic authorities; interagency (ATSDR, VA, EPA); National Academies; academic medical toxicologists; and DoD Components as well as Joint Task Force-Red Hill and Navy Closure Task Force-Red Hill.

DHA communicates with stakeholders frequently and executed all elements included in the Red Hill Public Health Communication Plan for individuals exposed to the fuel release (including e-updates, website, organizational email account, webinars, and individual outreach). DHA also pursued a policy of candid communications in a spirit of mutual respect for the community, to take the first steps toward collective healing from what for many was a traumatic, life-changing event.

DHA has valued regular touchpoints with other stakeholders to ensure coordination of effort and situational awareness. DHA has held weekly synchronization meetings with ATSDR and VA staff and participates in a quarterly call hosted by ATSDR that includes Hawai‘i Department of Health, DoD, and EPA. DHA has supported the Hawai‘i Fuel Tank Advisory Committee by being available to answer committee and public questions.

The Red Hill Independent Health Registry, led by UH, will conduct an additional and complementary program of education and outreach to the community of impacted persons and other stakeholders, including healthcare providers.

Number of Impacted and Potentially Impacted Individuals

The Red Hill DOEHRS Registry includes 55,115 DoD-affiliated individuals. While this figure is the official DoD count of exposed DoD-affiliated individuals, there are ongoing efforts to fully capture all DoD-affiliated exposed individuals.

The Red Hill Independent Health Registry will be authorized to enroll all individuals exposed to the fuel (release regardless of DoD affiliation). DHA is committed to maximizing enrollment in this registry. In addition to disseminating information widely to the population exposed to the fuel release, greater enrollment mitigates selection bias that might limit generalizability of any research conclusions. DHA and UH have completed a data sharing agreement which authorizes UH to receive work and personal email addresses from the Red Hill DOEHRS Registry to facilitate awareness and recruitment.

Measures and Frequency of Follow Up

There are no validated measures of individual exposure. All individuals in the Red Hill DOEHRS Registry are treated as having exposure without stratification into sub-categories of exposure. At this point, no medical toxicologist has stated that there may be validated measures of exposure derived from biomonitoring.

The Red Hill Independent Health Registry will define measures of health, quality of life, and other pertinent individual-level data that may be used to develop models to reconstruct exposure. The Red Hill Independent Health Registry will also define the recommended periodicity of data collection.

Currently, there are no plans for mass collection of biological specimens for the Red Hill Independent Health Registry.

Future reports to Congress will include the measures and frequency of follow up being conducted on individuals exposed to the fuel release.

Summary of Data and Analyses

The CDC ACE surveys and medical record reviews (EPI-AID), and the EDC healthcare encounter analyses were previously summarized. The DHA Red Hill website lists all peer-reviewed publications related to Red Hill.

In addition, the UH Economic Research Organization released the results of an online survey conducted in July 2023 using a convenience sample of 174 respondents who previously participated in one of the two ATSDR ACE surveys.²⁴ The respondents noted high levels of adverse impact on mental health (81 percent) and physical health (73 percent). In addition, 84 percent of water users served by the JBPHH water system continue to use alternative sources of water. Satisfaction with the DoD's response was lower than that of the State government and

²⁴ (University of Hawai'i Economic Research Organization, 2024).

other non-DoD Federal Agencies. The number of responses limits generalization to the entire population of exposed persons.

CONCLUSION

This report reviewed DoD activities to support those exposed to the Red Hill fuel release. Independent expertise has been indispensable to bringing fresh, unbiased perspectives to the Red Hill response. A forward-leaning DHA Red Hill Communication Plan has recognized that lingering anger, distrust, frustration, loss of confidence, and sense of betrayal demands an approach valuing honesty, transparency, humility and mutual respect. While valuing the contributions of non-DoD experts, DoD remains actively engaged to take care of those exposed to the Red Hill fuel release.

DoD looks forward to providing future updates on actions to fully understand the health impacts of the Red Hill fuel release, which will inform individuals, healthcare professionals, researchers, and civil authorities. The success of these actions will be judged by the numerous stakeholders, most importantly, those individuals and families exposed to the Red Hill fuel release.

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DEFINITIONS

Consensus Study Report: A report published by the National Academies of Sciences, Engineering, and Medicine that documents the evidence-based consensus on the study's statement of task by an authorizing committee of experts. Reports typically include findings, conclusions, and recommendations based on information gathered by the committee and the committee's deliberations. Each report has been subjected to a rigorous and independent peer-review process and it represents the position of the National Academies on the statement of task.

DOEHRS – Industrial Hygiene: A web-based information system that captures occupational and environmental health risk data, and actively monitors biological, chemical, and physical health hazards that impact Department of Defense personnel worldwide.

EPI-AID: A formal request to CDC for epidemiologic assistance

Exposure Registry: Defined by ATSDR as “a system of ongoing follow up of people who have had documented environmental exposures.”

ILER: A web-based application that provides DoD and VA personnel with the ability to link Service member and veteran data to known exposures, ensuring the efficient and effective continuity of individualized health care.

MHS GENESIS: The Military Health System's modern electronic health record that provides a single health record for Service members, veterans, and their families.

Secretarial Designee Program: The program established under 10 U.S.C. § 1074(c) to create by regulation an eligibility for health care services in MTFs as well as dental treatment facilities for individuals who have no such eligibility under 10 U.S.C., Chapter 55.

Statement of Task: The specific set of questions to be addressed by a National Academies of Sciences, Engineering, and Medicine study.

ACRONYMS

ACE	Assessment of Chemical Exposures
ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control and Prevention
CDMRP	Congressionally Directed Medical Research Programs
DHA	Defense Health Agency
DoD	Department of Defense
DOEHRS	Defense Occupational and Environmental Health Readiness System
EDC	EpiData Center
EPA	Environmental Protection Agency
FY	Fiscal Year
HOME	Health Outcomes Military Exposures
ILER	Individual Longitudinal Exposure Record
JBPHH	Joint Base Pearl Harbor-Hickam
JP-5	Jet Propellant-5
MHS	Military Health System
MTF	military medical treatment facility
NCDMPH	National Center for Disaster Medicine and Public Health
NDAA	National Defense Authorization Act
PEP	Potentially Exposed Population
TERP	Toxic Exposures Research Program
UH	University of Hawai'i
VA	Department of Veterans Affairs