



NVLSP
NATIONAL VETERANS LEGAL SERVICES PROGRAM

**NVLSP And VLSC White Paper
Confirming That Veterans Who Served in Guam
from 1958-1980 Were Likely Exposed
to Dioxin-Containing Herbicide Agents
Including Agent Orange**

Issued May 2020

Updated February 11, 2021



Yale Law School

Veterans Legal
Services Clinic

February 2021 Revision

This February 2021 revision is released to reflect subsequent developments and information on herbicide usage in Guam gathered after the May 2020 release of the original white paper, to include an EPA-directed soil sampling report published in July 2020 and recently issued decisions of the Board of Veterans' Appeals. In addition to analyzing this new information, this revision re-assesses the timeline for probable exposure to dioxin-containing herbicides of Guam veterans based on further evaluation of the evidence and expands the timeline accordingly.

Introduction

The National Veterans Legal Services Program (“NVLSP”) partnered with the Veterans Legal Services Clinic (“VLSC”) of the Jerome N. Frank Legal Services Organization at Yale Law School to evaluate whether existing evidence satisfies the U.S. Department of Veterans Affairs (“VA”) legal standard to establish that veterans who served on Guam from 1958 to 1980 were exposed to dioxin-containing herbicide agents, such as Agent Orange. The relevant VA standard of proof is whether it is “as likely as not” that these veterans were exposed to herbicide agents. This white paper assesses available evidence solely in light of this VA standard to confirm locations and time periods on Guam where dioxin exposure for former service members is at least “as likely as not.” We are pleased to share this white paper with the VA and veterans of Guam seeking service-connection for illnesses associated with dioxin-containing herbicide exposure, such as Agent Orange.

We conclude that existing evidence establishes that it is, at the very least, “as likely as not” that veterans who served in Guam from 1958 to 1980 were exposed to Agent Orange and other dioxin-containing herbicides. Official government accounts and credible veteran testimony demonstrate significant dioxin exposure pathways among Guam veterans as a result of spraying, mishandling, and disposal in documented areas. Widespread dioxin exposure is further supported by scientific evidence of dioxin contamination from U.S. Environmental Protection Agency (“EPA”) and the Department of Defense (“DoD”) testing at these sites during the 1980s and 1990s. Accordingly, many veterans of Guam are entitled to disability compensation stemming from actual exposure to dioxin-containing herbicides for any diseases that the Secretary has associated with such exposure based on findings from the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine.

Below, we explain in depth the evidence and legal basis for our conclusion. This white paper is accompanied by an appendix of selected relevant sources to document veterans’ claims of service connection for illnesses associated with dioxin exposure.

The weight of the evidence strongly shows that veterans who served on Guam from 1958 to 1980 were exposed to herbicides containing dioxin.

I. The Rules Governing Entitlement of Veterans Who Served in Guam to Service-Connected Disability Benefit

Veterans who incur or aggravate a disability during service are eligible for disability benefits upon establishing that the disability was service-connected. 38 U.S.C. § 1110; 38 C.F.R. § 3.303. To establish entitlement to service-connected disability benefits from the VA, the evidence in the veteran’s claims file must prove (1) the existence of a current disability, (2) a precipitating event or injury during service, and (3) some nexus between the current disability and precipitating event or injury during service. *See Caluza v. Brown*, 7 Vet. App. 498, 506 (1995), *aff’d*, 78 F.3d 604 (Fed. Cir. 1996); *Rabideau v. Derwinski*, 2 Vet. App. 141, 143 (1992). While disabilities must have been “incurred” during service, diseases diagnosed after service still render a claimant eligible for a grant of service connection. 38 C.F.R. § 3.303(d).

The first component, existence of a current disability, can be established by competent medical or lay evidence. VA regulations define competent medical evidence as that “provided by a person who is qualified through education, training, or experience to offer medical diagnoses, statements, or opinion,” and can include statements in medical treatises or “authoritative writings such as medical and scientific articles and research reports or analyses.” 38 C.F.R. § 3.159(a)(1). A lay person’s statement may also be competent if it does not require “specialized education, training or experience . . . [or] if it is provided by a person who has knowledge of facts or circumstances and conveys matters that can be observed and described by a lay person,” *id.* § 3.159(a)(2), or if it reports on a contemporaneous diagnosis or describes symptoms that support a subsequent medical diagnosis. *Jandreau v. Nicholson*, 492 F.3d 1372, 1377 (Fed. Cir. 2007).

The second component, an in-service injury or event, requires evidence that the event, injury, or disease that led to the current disability actually occurred during service. This evidence is usually medical, but can in some cases be provided by a lay observer. The standard used to evaluate this evidence is “as likely as not”—it must be as likely as not that an in-service injury or event actually occurred. “When there is an approximate balance of positive and negative evidence regarding any issue material to the determination of a matter, the Secretary shall give the benefit of the doubt to the claimant.” 38 U.S.C. § 5107(b); 38 C.F.R. § 3.102; *see also Gilbert v. Derwinski*, 1 Vet. App. 49, 53 (1990).

The third and final component, a causal nexus, requires a link between an event or occurrence during service and the current disability. Medical evidence can provide this nexus by showing (1) a direct causal link between the current disability and something that occurred during service, (2) aggravation during service of a condition that existed prior to service, (3) a current disability that did not manifest itself during service, but is presumed by statute or regulation to have been associated with some occurrence during service; (4) a current disability resulting from a medical condition that is itself connected to service; or (5) a current disability resulting from an injury caused by VA healthcare, training and rehabilitation services, or VA compensated work therapy. Establishing a nexus generally requires competent medical evidence, which the VA is often required to assist the veteran in obtaining. Medical nexus between the disability and a precipitating in-service event or injury is also evaluated under the “as likely as not” standard and guarantees the veteran the benefit of the doubt in situations where the evidence is in equipoise. 38 U.S.C. § 5107(b); 38 C.F.R. § 3.102.

Congress has mandated by statute, and the VA by regulation, that when particular circumstances are met, the VA shall apply two different types of presumption that help a veteran become entitled to disability benefits. These presumptions promote administrative efficiency and facilitate prompt access to benefits for many disabled veterans. One type of presumption is a presumption of exposure to a dangerous substance. For instance, all veterans who served in Vietnam are presumed to have been exposed to toxic herbicides used in support of the United States and allied military operations there. 38 U.S.C. § 1116(a)(3); 38 C.F.R. § 3.307(a)(6)(i). A second type of presumption established by Congress or the VA is a presumption regarding the connection between certain injuries or diseases and military service. For instance, the VA will presume a nexus between exposure to toxic herbicides during military service and certain enumerated disabilities or diseases. 38 C.F.R. § 3.309(e). To become entitled to disability benefits, therefore, veterans who served in Vietnam need only provide medical evidence that the veteran currently suffers from one of the diseases which

VA presumes results from exposure to toxic dioxin-containing herbicides like Agent Orange. 38 U.S.C. § 1116(a); 38 C.F.R. § 3.307(a); 38 C.F.R. § 3.309(e).

Veterans who did not serve in Vietnam, while currently ineligible for the presumption of exposure, are entitled to a presumption of service connection for any disease presumed by the VA to result from exposure to toxic herbicides by merely proving that they were exposed to a toxic herbicide agent during service. 38 C.F.R. § 3.309(e) (“[I]f a veteran was exposed to an herbicide agent during active military, naval, or air service, [those] diseases shall be service-connected if the requirements of § 3.307(a)(6) are met.”). An herbicide agent is defined as “a chemical in an herbicide used in support of the United States and allied military operations in the Republic of Vietnam during the period beginning on January 9, 1962, and ending on May 7, 1975, specifically: 2,4-D; 2,4,5-T and its contaminant TCDD; cacodylic acid; and picloram.” 38 C.F.R. § 3.307(a)(6)(i). Of note, VA’s regulation identifies particular chemical constituents—which are present in a wide variety of herbicides—rather than names specific tactical herbicides. Therefore, there is no legal significance to any distinction between rainbow herbicides (such as Agent Orange or Agent Blue) and commercial variants containing the same toxic dioxins. The VA intended this presumption of service connection to extend to veterans who did not serve in Vietnam but were nevertheless exposed to herbicide agents. *See* 66 Fed. Reg. 23166 (May 8, 2001) (“[I]f a veteran who did not serve in the Republic of Vietnam, but was exposed to an herbicide agent defined in 38 C.F.R. § 3.307(a)(6) during active military service, has a disease on the list of diseases subject to presumptive service connection, VA will presume that the disease is due to the exposure to herbicides.”). Veterans who do not exhibit one of the designated diseases retain the right to establish service connection with proof of direct causation. *Combee v. Brown*, 24 F.3d 1039, 1042 (Fed. Cir. 1994); *see also* 38 C.F.R. § 3.303(d).

Under the applicable legal standards, veterans who served on Guam and suffer from a disability presumed by the VA to result from toxic herbicide exposure need only fulfill the first and second components of the service connection criteria—exposure to a toxic herbicide and the current presence of an enumerated disease or disability—as the nexus component is satisfied by the presumption of service connection. 38 C.F.R. § 3.309(e). Veterans who served on Guam and suffer from a disability *other* than those designated by the VA are not eligible for the presumption of service connection but may still establish service connection by submitting additional evidence that the disability was at least as likely as not incurred by toxic herbicide exposure during service.

II. The Evidence Strongly Shows that Veterans who Served on Guam From 1958 to 1980 Were Exposed to Herbicides Containing Dioxin

A. Background on the Use by the United States During the Vietnam War of Toxic Herbicides, including Agent Orange

Between 1962 and 1971, DoD sprayed toxic herbicides widely in Vietnam. The best-known tactical herbicide, Agent Orange, is a 50-50 mixture of two compounds: 2,4-Dichlorophenoxyacetic acid (2,4-D) and 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T). The latter compound yields a highly toxic dioxin biproduct, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), during the manufacture process. In addition to Agent Orange, other toxic herbicides used during this period also yielded 2,4-D, 2,4,5-T, and 2,3,7,8-TCDD. NATIONAL ACADEMIES OF SCIENCES, VETERANS AND AGENT ORANGE: UPDATE 11, at 27 (2018).

The biological effects of exposure to 2,4-D, 2,4,5-T and 2,3,7,8-TCDD are well-documented. Numerous studies have demonstrated that, even in very minimal amounts, exposure can cause myriad immune system disorders, types of cancer, reproductive health deficiencies that last for generations, neurologic disorders, metabolic and cardiovascular disorders, respiratory disorders, gastrointestinal and digestive diseases, kidney and urinary disorders, chronic skin disorders, eye problems, and bone conditions. *See generally id.* After the conflict, veterans who were exposed to herbicides containing 2,3,7,8-TCDD began to develop a host of serious diseases, such as cancer, Parkinson's disease, and diabetes, which they believed were associated with exposure to herbicides during the war. *See H. Rep. No. 98-592 (1984).*

The Veterans Administration (now Department of Veterans Affairs) (VA) first received claims asserting disabilities stemming from Agent Orange and other toxic herbicide exposure from service in Vietnam in 1977. For years, the VA issued blanket denials to veterans seeking disability compensation and medical coverage for conditions arising from exposure to these toxic herbicides. *See Barton F. Stichman, Between the Courts and Congress*, in *THE LEGACY OF VIETNAM VETERANS AND THEIR FAMILIES: SURVIVORS OF WAR* 302 (Dennis K. Rhoades et al., eds. 1995).

Towards the end of the twentieth century, Congress enacted legislation in response to mounting scientific evidence that herbicides containing dioxin caused a slew of serious health conditions. The Veterans' Dioxin and Radiation Exposure Compensation Standards Act, Pub. L. No. 98-542, § 5, 98 Stat. 2725, 2727-29 (1984), and the Agent Orange Act of 1991, Pub. L. No. 102-4, § 2, 105 Stat. 11 (1991), established a presumption of exposure to Agent Orange and other toxic dioxin-containing herbicides for veterans who served in Vietnam, including its inland waterways, and designated a list of diseases known to result from such exposure. Under the legal standard, if a veteran incurs a listed disease and served in Vietnam, that veteran is presumptively entitled to disability benefits. 38 U.S.C. § 1116(a)(3). This presumption was later interpreted to include Vietnam's territorial waters. *Procopio v. Wilkie*, 913 F.3d 1371 (Fed. Cir. 2019). The VA also promulgated regulations that extended the presumption of exposure to include veterans who served in or near the Korean DMZ or stateside on C-123 aircraft used to spray Agent Orange in Vietnam. 38 C.F.R. § 3.307(a)(6)-(7).

As veterans who served outside of Vietnam during the same period but came into contact with these toxic herbicides began to exhibit similar serious health conditions, the VA articulated a presumption of service connection. *See* 66 Fed. Reg. 23166 (May 8, 2001). Under this presumption, a veteran with a diagnosis that appears on the associated diseases list need only establish "as likely as not" exposure to become entitled to disability benefits. Those who do not receive this presumption may still establish service connection upon a showing of direct evidence of causation under an "as likely as not" standard. *Combee v. Brown*, 24 F.3d at 1042; *see also* 38 C.F.R. § 3.303(d).

In some individual cases, the VA has granted service-connected disability compensation and medical coverage for veterans exposed to toxic herbicides during service on Guam during the Vietnam era. *See infra* Section II.D.

B. Military Operations and Herbicide Use in Guam

The United States Territory of Guam is a small island (210 square miles) in the western Pacific approximately 3,300 miles west of Hawai'i and 1,500 miles east of the Philippines. Since World War II,

Guam has been a centerpiece of U.S. military operations in the Asia-Pacific region. See U.S. DEP'T OF DEF., INDO-PACIFIC STRATEGY REPORT (June 1, 2019). Guam is sometimes termed the “tip of the spear” for U.S. military capabilities in the Pacific, with nearly a third of the island’s land area controlled by active U.S. military installations. See Neil Weare & Rodney Cruz, *Guam, America’s Forgotten Front Line*, N.Y. TIMES (Aug. 14, 2017).

During the Vietnam conflict, Guam became “the site of the most immense buildup of air power in history.” See Jeffrey N. Meyer, *Andersen AFB’s Legacy: Operation Linebacker II*, ANDERSEN AIR FORCE BASE NEWS (Dec. 18, 2017). At the height of bombing operations during Vietnam, three-quarters of all U.S. B-52 aircraft available for operations in Southeast Asia were based in Guam. *Id.* As a result of this rapid and massive buildup, service members on Guam “were packed into [] dorms, with spill-overs residing in temporary steel dorms called Tin City” or “Canvas Courts, a collection of tent shelters . . . [E]ven the base gymnasium [was] converted to living quarters to house all of the Airmen.” *Id.*

Beyond housing shortages, the rapid airpower buildup in Guam presented an acute need to control fire risks using herbicides. With annual rainfall above 90 inches per year (more than quadruple the annual average at Pearl Harbor and nearly double that of Hanoi, Vietnam), the threat of brush fires during Guam’s dry season was a paramount concern for the island’s military leadership during the Vietnam conflict. On March 21, 1969, the U.S. Navy’s Guam-based newspaper ran a front-page story announcing a water shortage after firefighters and local volunteers responded to more than 40 fires in a single week. See *Take Fire, Add Water, Get Huge Water Shortage*, CROSSROADS PACIFIC (Mar. 21, 1969). The Commander of Naval Forces Marianas Guam advised residents to “cease such things as watering the lawns, washing cars, and any other water usage that consumes a large amount of water” as a result of these shortages. A month later, the Navy reported that a single military fire station had responded to 23 grass fires during a three-week period, noting that “the heat of an exhaust from a motorcycle was enough to start a fire.” See *Fire Threat Still Remains*, CROSSROADS PACIFIC (Apr. 25, 1969). Because of the unique climate conditions of the island, the high concentration of key military assets, and significant water shortages, the need to manage vegetation with herbicides was far greater in Guam than in other military installations elsewhere in the United States or Southeast Asia.

Similarly, DoD’s expedient and unregulated disposal of hazardous wastes on Guam during this period created significant exposure risk for 2,3,7,8-TCDD and dioxin-containing herbicides. See Section II.C, below. Prior to the Installation Restoration Program and Resource Conservation and Recovery Act of 1976, Guam’s military units disposed of large amounts of hazardous and other wastes by burying waste piles or pushing wastes over cliff-lines into makeshift dumpsites in low-lying areas near the ocean. See U.S. DEP’T OF AIR FORCE, EPA SUPERFUND RECORD OF DECISION: ANDERSEN AIR FORCE BASE (Dec. 2003), at 1-1. DoD also dumped military wastes into the Government of Guam-controlled Ordot Landfill into the 1970s. See *Guam v. United States*, 341 F. Supp. 3d 74, 76-78 (D.D.C. 2018). The Ordot Landfill, now an EPA Superfund site, was an uncapped, unlined landfill that leaked significant amounts of hazardous waste into Guam’s Lonfit River until 2011. See *id.* (noting that Agent Orange is among the chemicals that DoD disposed at Ordot). Improper hazardous waste disposal created additional exposure risks for large numbers of Guam veterans serving near these disposal sites, many of which are adjacent to housing and recreational areas. See U.S. DEP’T OF AIR FORCE, INSTALLATION RESTORATION PROGRAM (IRP) PHASE 1: RECORDS SEARCH ANDERSEN AIR FORCE BASE, GUAM, at 4-37-4-38 (1985).

In 2018, the Government Accountability Office (GAO) examined records and shipping logbooks

in response to a House Report directing GAO to “review the government’s handling of Agent Orange on Guam.” GAO concluded that the use and storage of Agent Orange on Guam could neither be conclusively proved nor disproved based on available records, in part because some potentially relevant DoD records have been lost or destroyed.

C. Evidence of TCDD-Containing Herbicide Exposure Among Guam Veterans: 1958-1980

In light of GAO’s conclusions, the Veterans Legal Services Clinic of the Jerome N. Frank Legal Services Organization at Yale Law School and the National Veterans Legal Services Program conducted a comprehensive review of available evidence to determine whether it is “as likely as not”—the VA’s legal standard—that those who served on Guam were exposed to herbicide agents. For members of the armed forces who served on Guam from 1958 to 1980, VLSC and NVLSP conclude that it is more likely than not that these veterans were exposed to herbicides containing dioxin.

The evidence supporting this conclusion includes official government documents describing widespread practices of herbicide spraying, mishandling, and improper disposal prior to enactment of federal hazardous waste regulations in 1976. Those documents are supported by 1980s and 1990s soil testing conducted on Andersen Air Force Base—designated an EPA Superfund Site in 1992—revealing high concentrations of 2,3,7,8-TCDD and other dioxin pollution in areas where individual veterans recall disposing of Agent Orange and other toxic herbicides. Veteran advocacy around the issue of toxic herbicide exposure on Guam prompted the most recent soil sampling conducted by U.S. EPA, Guam EPA, and DoD in 2018 and 2019. These newest sampling efforts detected both 2,4-D and 2,4,5-T, as well as the toxic TCDD byproduct. Together, these official accounts, empirical studies, and numerous individual affidavits confirm in detail the storage, spraying, and disposal of Agent Orange and other toxic dioxin-containing herbicides in Guam, especially at the following sites:

- Guam cross-island fuel pipeline and road
- Andersen Air Force Base (AAFB) and AAFB annexes
- AAFB and AAFB Annex perimeters
- The Marianas-Bonins Command (MARBO) Annex
- AAFB flight line and surrounding areas
- USAF or U.S. Navy fuel storage facilities
- USAF or U.S. Navy power stations
- Areas near Urunao Beach or Ritidian Point
- Military landfills, waste piles, and over-the-cliff dumpsites
- Fire-fighter training areas
- Polaris Point and submarine tender support facilities

The federal government’s own accounts of military pollution in Guam evidence widespread herbicide exposure among veterans who served there during the 1960s and 1970s. These documents identify large-scale mishandling and improper disposal of herbicides in Guam during this period, and subsequent soil testing is consistent with veterans’ claims that dioxin-containing tactical and commercial herbicides, including Agent Orange, were used on the island. An instructional guide on herbicide usage on Guam issued by the U.S. Navy Civil Engineer Corps in August 1958 recommends and

describes the use of 2,4-D and 2,4,5-T on Guam, strongly implying the application of dioxins on Guam at least as early as 1958. See 2 PAUL B. SOUDER, BUREAU OF YARDS AND DOCKS, GUAM SOILS CONSERVATION SERIES 26 (1958). Likewise, a DoD Environmental Impact Statement acknowledges the use of 2,4,5-T on Guam until 1980. DEPARTMENT OF THE NAVY, DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE DISPOSAL AND REUSE OF SURPLUS NAVY PROPERTY IDENTIFIED IN THE GUAM LAND USE PLAN (GLUP '94) 3-82 (1999).

Prior to the passage of the Resource Conservation and Recovery Act of 1976 (RCRA), disposal and remediation of toxic wastes on Guam was effectively unregulated. In 1987, ten years after RCRA took effect, GAO found that Guam's DoD installations were "not in compliance with RCRA requirements," and that, on AAFB in particular, "[m]ost of the violations causing noncompliance were of a serious nature, and many were repetitive." U.S. GOV'T ACCOUNTABILITY OFF., GAO 87-87, HAZARDOUS WASTE: DOD INSTALLATIONS IN GUAM HAVING DIFFICULTY COMPLYING WITH REGULATIONS 12 (1987). Into the 1980s, DoD regularly mishandled and improperly disposed of massive quantities of herbicides and other chemicals, often with no records or remedial action addressing risks to human health. *Id.* at 17 (concluding that, as of 1987, eight of nine maintenance shops and facilities toured by GAO were still discharging hazardous pollutants directly into storm drains or onto the ground, leading directly into an aquifer).

Official accounts of improper herbicide and toxic waste disposal prior to RCRA are the strongest indicator of dioxin exposure pathways affecting large numbers of veterans who served on Guam. EPA and DoD documents describe a widespread practice among Guam-based military units of disposing of military wastes by pushing them over the edge of cliff-lines into low-elevation areas adjacent to military sites after World War II. See U.S. DEP'T OF AIR FORCE, EPA SUPERFUND RECORD OF DECISION: ANDERSEN AIR FORCE BASE (Dec. 2003); see also Robert A. Underwood, *News Release: Contamination Study to Narrow its Focus to Guam*, Office of Congressman Robert A. Underwood (Nov. 27, 2001) (noting GAO inquiry into contaminated cliff-line properties formerly used by the U.S. military at Ritidian Point and Harmon, Guam). The two best-documented over-the-cliff dumpsites are at Urunao Beach, at the base of the cliff-line marking the westernmost boundary of AAFB. See U.S. DEP'T OF AIR FORCE, DRAFT ENVIRONMENTAL IMPACT STATEMENT: GUAM CLEANUP OF URUNO [sic] BEACH (Feb. 1987), at II-1-2. An initial government inspection of these Urunao dumpsites identified, in addition to many other types of waste and unexploded munitions, dozens of fifty-five-gallon drums, remnants of rusted storage drums, and large amounts of other military wastes "rusted beyond recognition." *Id.* at II-1. USAF noted that "[t]he 55-gallon drums are in such deteriorated condition that the contents no longer remain and have evaporated or leached into the ground." *Id.* at IV-14. The Board of Veterans' Appeals has awarded service connection to at least two veterans who described pushing herbicide barrels, including barrels of Agent Orange, off these cliffs into the dumpsites at Urunao. See No. 17-41 737, 2019 WL 7822858, at *3 (BVA Nov. 1, 2019); No. 10-21 420, 2013 WL 6992004, at *2 (BVA Nov. 14, 2013).

Official government accounts also demonstrate widespread mishandling of herbicides amidst widespread spraying, often without documentation or attempts to mitigate public health risks. A 1985 Environmental Impact Statement related to Air Force cleanup efforts in Guam offers concrete examples of herbicide and pesticide mishandling by military units or activities on the island, including a 100-gallon herbicide spill from a tank trailer near Tarague Beach in 1972 and a 1,500-gallon herbicide spill at the Harmon tank annex in 1984. See U.S. AIR FORCE, INSTALLATION RESTORATION PROGRAM (IRP) PHASE 1: RECORDS SEARCH ANDERSEN AIR FORCE BASE, GUAM, at 4-37-4-38 (1985). With respect to the 1972 herbicide spill at Tarague, the EIS notes that "no report of this incident or related action is available."

Id. at 4-38. GAO's 1987 investigation of DoD's noncompliance with federal hazardous waste laws found that even after developing and implementing hazardous waste regulations for Guam, Air Force and Navy officials failed to "ensure that all personnel handling hazardous wastes know the proper procedures" for handling, storing, and disposing of hazardous wastes, and eliminate "significant discrepancies" on disposal documents. See GAO 87-87, at 23. GAO also concluded that the Navy and Air Force had "inadequate . . . education and training programs for personnel on the dangers of mishandling these wastes." See *id.* at 27.

Records of EPA soil testing for 2,3,7,8-TCDD/dioxin near the Urunao dumpsites confirm veteran accounts that Agent Orange and other tactical herbicides were disposed at this site. In 1997, USAF identified dioxins as a "Contaminant of Concern" at Urunao after taking notice of the large quantity of rusted 55-gallon drums found during initial inspection of these dumpsites. See U.S. DEP'T OF AIR FORCE, EPA SUPERFUND RECORD OF DECISION: ANDERSEN AIR FORCE BASE (Dec. 2003), at 1-1. In 1996, USAF—with the support of EPA—decided to undertake soil testing to evaluate the potential presence of hazardous wastes at the dumpsites. This testing revealed numerous sites with concentrations of 2,3,7,8-TCDD/dioxin exceeding EPA risk standards. See *id.* at 2-18-2-19 ("Dioxins and arsenic had cumulative [cancer] risks exceeding USEPA's risk goal Dioxins were the only [contaminant of concern] with cumulative risks exceeding USEPA's risk goal of 10^{-6} .").

According to EPA's official soil testing results, concentrations of 2,3,7,8-TCDD/dioxins exceeded EPA's risk standards and remediation goals by a significant margin. At the time of USAF and EPA testing, EPA Region IX's preliminary remediation goal ("PRG") for dioxins near residential areas was 3.90 nanograms per kilogram. See *id.* tbl. 2-3. USAF and EPA's soil testing maps show sites with dioxin levels as high as 513.03 nanograms per kilogram, more than 150 times greater than the EPA PRG. See *id.* figs. 2-4 to 2-10 (site AAFB06UBS015). Dozens of sites where USAF conducted surface and subsurface testing for dioxins show well above EPA PRGs. See *id.* These dumpsites are fewer than three miles from two of AAFB's most frequented recreation sites during this period: NCS beach (recreational swimming hole created by controlled detonation in 1968), and Ritidian Point. See *UDT Men Stage Big Blow-up on NCS Beach: Deep Hole Dug by Explosives*, NCS GUAM COMMUNICATOR (Nov. 1, 1968).

The record of herbicide contamination on AAFB itself indicates widespread dioxin exposure among Guam veterans. AAFB, which has been a Superfund site on the EPA National Priorities List (NPL) since 1992, has dozens of sites where federal authorities have identified improper disposal of chemicals and other military wastes. See U.S. ENVTL. PROTECTION AGENCY, *Superfund Site: Andersen Air Force Base, Yigo, GU*. According to a 1996 USAF Installation Restoration Program investigation, AAFB had identified no fewer than 50 sites around the base where chemicals may have spilled, leaked, or been stored or disposed of. See U.S. DEP'T OF AIR FORCE, INSTALLATION RESTORATION PROGRAM (IRP) PHASE 1: RECORDS SEARCH ANDERSEN AIR FORCE BASE, GUAM (1985). This includes large amounts of military waste "buried in two landfills at the south end of the North Field runways from 1946 to the late 1970s." AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, U.S. DEP'T HEALTH AND HUMAN SERVS., PUBLIC HEALTH ASSESSMENT FOR ANDERSEN AIR FORCE BASE GUAM (Jan. 4, 2002).

A 2002 Public Health Assessment of AAFB by the Centers for Disease Control ("CDC") reported dioxin levels thousands of times above CDC's levels of concern for dioxin in soil near residential areas (1 part per billion). *Id.*; see U.S. ENVTL. PROTECTION AGENCY, DIOXIN FACTS (July 1984). For example, at Site No. 31, identified as a "Chemical Storage Area," CDC reported dioxin levels as high as 130ppm, 130,000

times above CDC's level of concern. AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, PUBLIC HEALTH ASSESSMENT FOR ANDERSEN AIR FORCE BASE (Jan. 4, 2002), at A-15. At Site No. 5, a former Main Base Landfill, "[d]ioxin was detected at concentrations above CVs in surface soil." *Id.* at A-3. And at another site, Site No. 26, CDC reported dioxin levels as high as 19,000 ppm, 19 million times above CDC's residential level of concern. *Id.* at A-12. This last statistic led AAFB to be labeled "one of the most toxic places on the planet." Jon Mitchell, *Poisons in the Pacific: Guam, Okinawa, and Agent Orange*, JAPAN TIMES (Aug. 7, 2012).¹

Similarly, a 2010 remedial investigation by the U.S. Navy identified a drum disposal area and burn pit (IRP Site No. 78) where dioxin levels exceeded both residential and industrial remediation goals by significant margins. See U.S. DEP'T OF NAVY, FINAL REMEDIAL INVESTIGATION FOR IRP SITE 78 (June 2010), at 3-3. The Navy noted that "several areas of empty drums were identified on the eastern boundary of the site" and that "TCDD TEQ was detected at 17 surface soil samples at concentrations ranging from 5.59 to 121 nanograms per kilogram," significantly above both the residential (3.9 ng/kg) and industrial (16ng/kg) remediation goals. *Id.* IRP Sites No. 26 & 78 are just two among dozens of waste piles, chemical disposal areas, burn pits, and other makeshift landfills where herbicides are likely to have been improperly disposed. See U.S. DEP'T OF AIR FORCE, PRELIMINARY ASSESSMENT/SITE INSPECTION WORK PLAN FOR IRP SITES 56, 57, 58, 70, 71, 72, 73, 74, 75, AND 76 AT NORTHWEST FIELD (2006) (noting—on Northwest Field alone—buried waste piles and disposal sites containing chemical drums at Sites 57, 58, 72, 73, 75, and 76). Many more sites have been identified in official federal government documents assessing military pollution in Guam.

Soil sampling in 2018 and 2019 conducted jointly between EPA, Guam EPA, and DoD to assess the presence of toxic dioxins on Guam detected 2,4-D, 2,4,5-T, and 2,3,7,8-TCDD congeners. Sampling in April and November of 2018 detected 2,4-D and 2,4,5-T, but was widely assailed for failing to test for 2,3,7,8-TCDD. The EPA ordered follow-up testing that was conducted in October 2019 with the assistance of a Guam veteran directing sampling locations based upon direct knowledge of herbicide application on Guam. This sampling revealed TCDD dioxin congeners in eight out of ten sampling locations. WESTON SOLUTIONS, GUAM CHLORINATED HERBICIDES INVESTIGATION—OCTOBER 2019 DATA RESULTS (2020). Similarly, eight out of ten sampling locations yielded a toxic equivalency quotient that exceeds EPA screening levels for residential soil and indicated potential harmful exposure to humans as well as a need for further investigation and potential remediation. *Id.* at 4. The 2019 sampling analysis concluded that "it is probable that TCDD dioxin congener concentrations detected in soils are associated with chlorinated herbicides." *Id.* at 5. While sampling with such distance to herbicide application and use poses inescapable challenges associated with ground alteration, rapid decomposition of certain constituent chemicals, and erosion, as discussed further below, these soil samples collectively demonstrate the highly probable application of toxic herbicides on Guam and the dioxin exposure threat posed to veterans who served there.

Together, these official government accounts of herbicide mishandling, improper hazardous waste disposal, and high concentrations of 2,3,7,8-TCDD/dioxin across this small tropical island

¹ Years later, CDC issued a correction claiming that the 19,000ppm dioxin statistic reported for AAFB Site. No. 26 was published in error. Even accepting CDC's errata correction, there is abundant evidence of dioxin contamination across AAFB resulting from mishandling and improper storage or disposal of chemical wastes such as herbicides.

establish exposure pathways to support claims of service connection based on herbicide exposure, and are consistent with veteran accounts of both tactical and commercial herbicide spraying, storage, and disposal during the 1960s and 1970s.

D. Board of Veterans' Appeals Decisions Finding that Veterans Who Served on Guam Were Exposed to Herbicides Containing Dioxin

The Board of Veterans' Appeals ("BVA") has credited veteran testimony describing toxic herbicide spraying on Guam on numerous occasions, granting service connection for disabilities linked to toxic herbicide or dioxin exposure on Guam from 1958 to 1980. These decisions, though non-precedential, demonstrate the BVA has found veteran testimony persuasive regarding the presence of Agent Orange and Agent Blue on Guam, among other toxic herbicides. Additionally, these decisions include statements from the Joint Services Records Research Center (JSRRC) and the Armed Forces Pest Management Board (AFPMB) supporting the possibility that dioxin-containing commercial herbicides were used on Guam. These dioxin-containing herbicides were regularly sprayed on Guam by veterans both on foot and from trucks with trailers. The locations sprayed included the cross-island pipeline, the perimeter of AAFB, the perimeter of the AAFB flight line, and fuel storage facilities.

A veteran stationed at AAFB from 1972 to 1973 testified it was his responsibility to load and unload drums of Agent Orange from trucks. No. 10-21 420, 2013 WL 6992004, at *2 (BVA Nov. 14, 2013). This testimony is specific: the veteran recalls that drums were often black with an orange or blue band around them, and that his superiors specifically instructed him to pick up "drums of Agent Orange." *Id.* The veteran also recounts dumping these drums off of the Urunao cliffs, an account substantiated by an EPA December 2003 Superfund Record of Decision which states that waste was dumped at Urunao. U.S. DEP'T OF AIR FORCE, EPA SUPERFUND RECORD OF DECISION: ANDERSEN AIR FORCE BASE (2003). Several other veterans describe seeing barrels or cannisters of herbicides on or near AAFB. *See* No. 190902-67257, 2020 WL 3562872, at *2 (BVA Apr. 23, 2020); No. 10-38 395, 2019 WL 4659781, at *1 (BVA Jan. 7, 2019). Another veteran who worked as a vehicle mechanic while stationed at AAFB from 1966 to 1967 described performing maintenance on the trucks used for Agent Orange spraying. No. 11-23 141, 2015 WL 6946958, at *1 (BVA Sept. 24, 2015). This veteran stated the herbicide was sprayed on the perimeter of the base.

Additional veterans granted service-connection also provided testimony to substantiate the specific locations of herbicide spraying and disposal on Guam in the period from 1958 to 1980. One veteran, stationed on Guam from 1968 to 1970, testified that he was tasked with spraying "toxic chemicals" on the surrounding flight line of AAFB, along with airplanes. No. 14-04 080, 2016 WL 2648416, at *4-5 (BVA Mar. 3, 2016). This veteran's responsibilities were similar to the vegetation control duties of another veteran who served on Guam and who was required to spray Agent Orange and other toxic herbicides on the perimeter of the flight line. Several other veterans' credible testimony corroborates these claims of herbicide spraying on the flight line of AAFB. *See* No. 18-31 582, 2020 WL 1545330, at *2 (BVA Jan. 9, 2020); No. 16-44 107, 2018 WL 9681658, at *2-3 (BVA Nov. 21, 2018); No. 13-28 148A, 2018 WL 9732614, at *3 (BVA July 2, 2018). Another veteran stationed on AAFB from 1970 to 1971 witnessed herbicide spraying to clear vegetation around the perimeter of the airbase and around the MARBO housing complex, where he slept. No. 09-13 094, 2015 WL 9696592, at *4 (BVA Nov. 12, 2015). A fuel specialist stationed at AAFB intermittently from 1968 to 1978 testified in this veteran's case that he mixed Agent Orange and other toxic herbicides (both tactical and

commercial) and sprayed them on the flight line, around the security fences, and at the MARBO complex. *Id.* This testimony substantiates both the locations and specific protocol for spraying. Another veteran who was stationed at AAFB from 1964 to 1966 testified that he witnessed spraying outside of the barracks and around the runways. No. 04-07 278, 2013 WL 6575790, at *4 (BVA Oct. 30, 2013). A veteran stationed at the Naval Communications Station on Guam from 1974 to 1977 also witnessed herbicide spraying on the runways, antennas, and perimeter fences. No. 15-30 770, 2019 WL 4506568, at *2 (BVA July 30, 2019).

These veterans' accounts of herbicide spraying and disposal on Guam from 1958 to 1980 and BVA grants of service-connection construct a consistent narrative of exposure to Agent Orange and other toxic dioxin-containing herbicides among Guam veterans. In addition to these successful cases, the Board has remanded over fifty veterans' cases from 2018 to 2020 for further fact-finding based in part on the veterans' claims of herbicide spraying and exposure.

Despite a lack of official records substantiating the presence of tactical herbicides in Guam, in several cases that were ultimately decided in the veterans' favor, official records supported the fact that commercial herbicides were routinely used on Guam. For example, though the JSRRC has routinely denied that Agent Orange or other tactical herbicides were used or stored on Guam, correspondence between the JSRRC and the EPA's Guam Program Manager acknowledged the possibility that spraying of commercial herbicides may have occurred. No. 13-08 000, 2018 WL 9741608, at *1 (BVA June 5, 2018). The BVA also consulted the Armed Forces Pest Management Board (AFPMB) in one veteran's case, as the AFPMB was responsible for commercial herbicides:

The AFPMB noted that Federal Supply catalogs for the relevant period showed that 22 commercial products were available for purchase, and that five of these products contained 2,4-D, three of the products contained 2,4,5-T, and one contained picloram, and none contained cacodylic acid. The AFPMB noted, saliently, that the dioxin contaminant TCDD was formed as a byproduct of the manufacturing process of 2,4,5-T. . . . The AFPMB has indicated that of the 22 commercial herbicides possibly used at Andersen Air Force Base, 9 contained an herbicide agent.

No. 09-11 085A, 2018 WL 1687517, at *5 (BVA Feb. 6, 2018).

Thus, the BVA decisions support a conclusion that, though official records do not establish that tactical herbicide agents were present on Guam, dioxin-containing commercial herbicides were used there. Combined with the weight of the many veterans' credible testimony, there exists clear and consistent evidence that dioxin-containing herbicides were used on Guam from 1958 to 1980.

E. Consistent Veteran Accounts of Herbicide Spraying in Guam

Additional accounts of exposure to Agent Orange and other dioxin-containing herbicide spraying on Guam are recounted in declarations and affidavits. These accounts create a consistent and credible record of toxic herbicide spraying on Guam from 1958 to 1980 that is supported by official accounts of herbicide handling and disposal during this period. *See* Section II.C, *supra*. Consistent with the BVA accounts, these declarations and affidavits corroborate reports of routine toxic herbicide spraying on Guam by veterans both on foot and from trucks with trailers. Locations of spraying

recounted in these affidavits are consistent: the cross-island pipeline, the perimeter of AAFB, the perimeter of the AAFB flight line, and fuel storage facilities.

One veteran in particular, Master Sergeant Leroy G. Foster, recounts in an affidavit that he was tasked with spraying both Agent Orange and Agent Blue on Guam while serving in the Air Force. Foster Aff. ¶ 1-4, Sept. 15, 2009. MSgt. Foster was stationed on Guam at AAFB from 1969-1971, where he was responsible for vegetation control. He recounts preparing, mixing, and spraying the herbicides in multiple locations across Guam, using a truck with a tank trailer for spraying. The locations that MSgt. Foster attests to spraying regularly include the entire cross-island pipeline, the fuel valve pits, the security fences surrounding the flight line, and the fuel storage facilities. Foster Aff. ¶ 3, Sept. 15, 2009.

This account is corroborated by institutional records. First, MSgt. Foster's health record shows treatment for acne due to herbicide exposure while stationed at AAFB in 1968. Foster Aff. at 2, Sept. 15, 2009. Chloracne is linked directly to dioxin exposure. See Andrew T. Patterson et al., *Skin Diseases Associated with Agent Orange and Other Organochlorine Exposures*, 74 J. AM. ACAD. DERMATOLOGY 143, 146 (2016). As chloracne has a short latency period after dioxin exposure, this contemporaneous medical record lends considerable support to MSgt. Foster's account. *Id.* Second, MSgt. Foster's performance report documents that one of his official duties was ensuring continuous vegetation control on a scheduled basis. Foster Aff. at 3-5, Sept. 15, 2009. Finally, a U.S. Navy Draft Environmental Impact Statement confirms that 2,4,5-Trichlorophenoxy acetic acid (2,4,5-T) was used for weed control along power lines and power substations. DEP'T OF NAVY, DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE DISPOSAL AND REUSE OF SURPLUS NAVY PROPERTY IDENTIFIED IN THE GUAM LAND USE PLAN (GLUP '94) (1999), at 3-82. 2,4,5-T is an herbicide agent for the purposes of presumptive service connection, 38 C.F.R. § 3.307(a)(6)(i), and a component of Agent Orange.

MSgt. Foster's account is further substantiated by other veterans' affidavits. SSgt. Ralph A. Stanton recounts witnessing MSgt. Foster regularly spraying Agent Orange and other herbicides during this time period. Stanton Aff. ¶ 2-4, Sept. 14, 2009. SSgt. Stanton was stationed at AAFB from 1969-1970 and came in contact with Foster's spraying on multiple occasions. They both went on to develop conditions associated with toxic herbicide exposure including chloracne and heart disease. See 38 U.S.C. § 1116(a)(2). SSgt. Stanton further describes witnessing Foster spraying near the MARBO Annex Barracks, where many service members stationed in Guam lived. A highly-contaminated part of the AAFB EPA Superfund Site, the MARBO Annex has been unoccupied since 1996. See U.S. DEP'T OF AIR FORCE, SECOND FIVE-YEAR REVIEW OF RECORD OF DECISION FOR MARBO ANNEX OPERABLE UNIT, USAF INSTALLATION RESTORATION PROGRAM (Aug. 2009). SSgt. Stanton also identified the location where MSgt. Foster mixed and prepared the herbicides prior to spraying EPA Super-fund Site Number 27. Stanton Aff. ¶ 1, Jan. 15, 2013. Included in this affidavit is a photo circa 1970 showing the drum storage lot, in which an Agent Blue drum is clearly identifiable, further confirming Foster's account. Another Guam veteran from this period, Brian Moyer, was stationed at Naval Base Guam, Guam from 1974-1976 and also recounts seeing sailors spraying herbicides along the fence line with a small trailer spray rig. Moyer Aff. ¶ 11, Jan. 24, 2017. This matches statements by both Foster and Stanton.

As described above, this narrative is consistent with the federal government's own accounts of herbicide and other toxic waste handling and disposal on Guam, as well as soil testing indicating high concentrations of 2,3,7,8-TCDD and dioxins at specific sites where these veterans claim to have used or disposed of Agent Orange.

III. Loss of Records Cannot Rebut the Abundant Evidence Above That Veterans Who Served on Guam from 1958 to 1980 Were Exposed to Herbicides Containing Dioxin

As discussed above, the existing evidence establishes that it is as likely as not, indeed more likely than not, that veterans who served in Guam from 1958 to 1980 were exposed to herbicides containing dioxin. Some government officials, however, have attempted to rely on the loss of military records or the absence of other evidence to reach the conclusion that veterans who served in Guam from 1958 to 1980 were not exposed to Agent Orange or other herbicides containing dioxin.

The law is clear, however, that in assessing whether a veteran who served on Guam was at least as likely as not exposed to herbicides containing dioxin, the VA cannot validly rely on the *absence* of records or other evidence as *negative* evidence. See *Fountain v. McDonald*, 27 Vet. App. 258, 273 (2015); *Buczynski v. Shinseki*, 24 Vet. App. 221, 223-24 (2011) (“the Board may not consider the absence of evidence as substantive negative evidence”); *McClendon v. Nicholson*, 20 Vet. App. 79, 85 (2006). Thus, the VA cannot rely on this evidence to rebut the showing above that those who served on Guam from 1958-80 were at least as likely as not exposed to Agent Orange or other toxic dioxin-containing herbicides.

As discussed below, some government officials have seized on lost military records and the inherent limitations on soil sampling decades after-the-fact in an effort to rebut claims of exposure. Loss of records has compounded the injustice of VA’s refusal to recognize a presumption of exposure for Guam veterans. Individual veterans should not and cannot be penalized for an incomplete evidentiary record when DoD has failed to maintain this record, or to resolve and refute extensive evidence of toxic herbicide exposure.

A. Incomplete Documentary Record

DoD failed to maintain a complete documentary record relevant to whether Guam veterans were exposed to herbicides containing dioxin. DoD procured approximately 13.9 million gallons of Agent Orange between 1963 and 1968—shipping 12.1 million gallons, or approximately 87%, to the Vietnam theater almost exclusively by sea. *Id.* at 25. At least one of these cargo shipments is known to have stopped in Apra Harbor, Guam while transiting to Vietnam, and three more stopped in Guam while returning to the United States. GAO was unable to procure all of the logbook records for their review and could not reach a definitive conclusion on the presence of Agent Orange on Guam. Furthermore, these logbooks cannot account for cargo offloaded or unloaded by crews at these port calls, nor for smaller-scale transfer and supply operations among the thousands of vessels that transited between Guam and the Southeast Asia theater of operations during this period. *Id.* at 27.

The documentary record does, however, confirm both DoD storage and use of commercial herbicides on Guam during the conflict in Vietnam. A 1968 report by the Naval Supply Depot states that Public Works sprayed herbicides semi-annually for vegetation control along the fuel pipeline between AAFB and the Supply Depot. *Id.* at 33. Some of these commercial herbicides likely contained the same dioxins present in Agent Orange, namely n-butyl 2,4,5-T and its toxic byproduct 2,3,7,8-TCDD. A 1974 Navy manual on commercial herbicide use for public works and installation managers lists multiple herbicides containing n-butyl 2,4,5-T. U.S. NAVY DISEASE VECTOR ECOLOGY AND CONTROL CENTERS, RECOMMENDATIONS FOR CHEMICAL CONTROL OF DISEASE VECTORS AND ECONOMIC PESTS 23 (1974). Draft

environmental assessments from 1999 and 2009 by Naval Facilities Engineering Command, Pacific confirmed the presence on Guam of dioxins common to both Agent Orange and commercially-available herbicides. While use of these herbicides on Guam is unassailable, records of procurement and use are not available due to short retention requirements for such routine transactions and applications. See GAO-19-24, *supra*, at 34.

GAO concluded in November 2018 after a thorough analysis of DoD Agent Orange records that the surviving documentary record neither proves nor disproves the presence of Agent Orange on Guam during the Vietnam conflict. U.S. GOV'T ACCOUNTABILITY OFF., GAO-19-24, AGENT ORANGE: ACTIONS NEEDED TO IMPROVE ACCURACY AND COMMUNICATION OF INFORMATION ON TESTING AND STORAGE LOCATIONS 20 (2018). Because of an incomplete documentary record, GAO did not offer a conclusion on the presence of Agent Orange on Guam.

The important point is that GAO's conclusion that the record neither proves or disproves the presence of Agent Orange in Guam does not answer the question analyzed in this White Paper. In order to decide a VA disability claim filed by a veteran who served in Guam, there is no need for formal proof to some degree of certainty of the presence of Agent Orange or toxic herbicides in Guam. The question in such claims is whether, considering the extensive evidence that does exist on the subject – as incomplete as it may be -- it is at least as likely as not that a Guam veteran was exposed. In other words, under the law, the incomplete documentary record cannot validly be relied upon to conclude that there is less than a 50% probability that Agent Orange or other toxic dioxin-containing herbicides were present on Guam.

B. Limitations on Testing

Because DoD's shipping and herbicide records are incomplete, soil sampling for chemicals associated with Agent Orange has been employed in more recent attempts to prove or disprove Agent Orange presence on Guam during the 1960s and 1970s. However, several factors limit the probative value of recent soil sampling on Guam. The half-lives of Agent Orange's two chemical constituents—n-butyl 2,4-D and n-butyl 2,4,5-T—are acknowledged to range from days to a few months. *Id.* at 46. Guam's tropical climate, with intense rain, winds, and sunlight coupled with frequent typhoons, accelerates deterioration to further limit the time-range for detectability. The half-life of the dioxin 2,3,7,8-TCDD is significantly longer, but DoD and EPA soil sampling in April and November 2018 did not test for this contaminant. *Id.* And as GAO has noted, the probative value of its detection is limited by multiple alternative sources of production, including waste incineration. *Id.*

Fifty years after the time period in question, 2,4-D or 2,4,5-T soil sampling cannot disprove the presence of Agent Orange on Guam. Agent Orange's chemical composition and the scope of time elapsed since application limit definitive conclusions from sampling techniques. Short half-lives for detectability, as well as alternative origins on Guam—ranging from commercial herbicides to waste incineration—impede drawing an unqualified conclusion on Agent Orange. Sampling for 2,4-D or 2,4,5-T on the current timeline is inherently indeterminate on the Agent Orange question; a failure to detect these two compounds after five decades has little probative value on the presence of Agent Orange on Guam in the 1960s and 1970s. See *Id.* at 45-52.

Despite these limitations, recent government sampling efforts demonstrate a toxic health

threat to veterans and increase the probability that Agent Orange and other dioxin-containing herbicides were applied on Guam. U.S. EPA, Guam EPA, and DoD carried out 2,4-D and 2,4,5-T soil sampling in April and November 2018. Critics challenged both the selection of sampling sites and decision to not test for 2,3,7,8-TCDD. Nevertheless, sampling still found trace amounts of n-butyl 2,4,5-T. John O'Connor, *Soil Sampling Finds Traces of Agent Orange Components*, GUAM DAILY POST (Dec. 24, 2019), https://www.postguam.com/news/local/soil-sampling-finds-traces-of-agent-orange-components/article_6501a1c4-255e-11ea-9047-537889adf9f9.html. This detection increases the likelihood that Agent Orange was present on Guam. Likewise, detections of 2,3,7,8-TCDD from October 2019 sampling further confirm a toxic health threat to veterans and increase the probability of Agent Orange presence. John O'Connor, *Report recommends further probe into Agent Orange use on Guam Sampling*, GUAM DAILY POST (Jul. 7, 2020), https://www.postguam.com/news/local/report-recommends-further-probe-into-agent-orange-use-on-guam/article_c886e19a-bf56-11ea-9c4a-8358fa4dcd13.html. While sampling cannot disprove the presence of Agent Orange on Guam, sampling has confirmed a toxic dioxin health threat to Guam veterans, even given the half-life deterioration and the passage of time.

C. Legal Implications

Incomplete or destroyed DoD records do not disprove the use of Agent Orange on Guam. Neither DoD's incomplete storage and shipping records nor inherently limited soil testing methodologies can be treated as negative evidence in assessing an individual veteran's claim for disability compensation for Agent Orange-related illnesses through service on Guam. *See Fountain*, 27 Vet. App. at 273; *Buczynski*, 24 Vet. App. at 223-24; *McClendon*, 20 Vet. App. at 85. Individual veterans cannot lawfully be penalized for DoD's incomplete recordkeeping and retention. Most importantly, available empirical data strongly indicates the use of dioxin-containing herbicides, tactical or commercial, on Guam.

IV. Conclusion

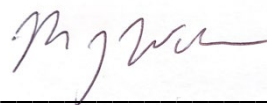
The evidence presented above demonstrates that veterans who served on Guam from 1958 to 1980 were at least "as likely as not" exposed to toxic dioxin-containing herbicides, such as Agent Orange. Both scientific and lay evidence, including the sworn statements of numerous veterans already credited by the BVA, establishes the exposure of these veterans to tactical and commercial herbicides. The accompanying appendix compiles relevant sources supporting this white paper's legal conclusions. Under the relevant VA legal standard, these veterans are therefore entitled to presumptive service connection for diseases associated with Agent Orange.

Respectfully,



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