

Agent Orange Record

Frequently Asked Questions

War Legacies Project

What is Agent Orange?

- Agent Orange was one of a class of color-coded herbicides that U.S. forces sprayed over the rural landscape of Viet Nam, Laos and Cambodia, to kill trees, shrubs and crops over large areas.
- Agent Orange was an equal mixture of two phenoxy herbicides, [2,4-Dichlorophenoxyacetic acid](#) (2,4-D) and Dioxin-contaminated [2,4,5-trichlorophenoxyacetic acid](#) (2,4,5-T).
- More than [12 million gallons](#) of Agent Orange and [8 million gallons](#) of Agents White, Blue, Purple, Pink and Green were used between 1961 and 1971.

What is Dioxin?

- 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD), also known as Dioxin, is a class of persistent organic pollutants (POPs) that resulted from the deliberately accelerated production of 2,4,5-T. When the herbicide 2,4,5-T was manufactured at a higher temperature than recommended Dioxin is produced.
- Agents Pink, Purple and Green also contained 2,4,5-T and were contaminated with Dioxin.
- Dioxin is not absorbed by most plants nor is it water soluble. It can attach to fine soil particles or the sediment and be carried downstream or settle in the bottom of bodies of water. Only plants in the zucchini family or water locust can absorb Dioxin.
- Dioxin is a persistent organic pollutant that is toxic over a long period of time—a scale of many decades—and does not degrade readily.

What are the health effects of Dioxin?

- Dioxin shortens human life and impacts health across generations.
- The U.S. National Toxicology Program (NTP) and the International Agency for the Research on Cancer list Dioxin (TCDD) as a “known human carcinogen.”
- In animal epidemiological studies, Dioxin is shown to be teratogenic (i.e., fetus deforming).
- Dioxin is an endocrine disrupting chemical that mimics or blocks proteins in cells affecting multiple body systems.

What are the environmental effects of Agent Orange and the other herbicides?

- Some effects persist in the form of Dioxin’s accumulation in the food chain and ecologically degraded landscapes.
- Soil erosion and landslides are among the many other effects of herbicides that can result in the sharp decline of soil nutrient levels and alter topographical features. In the hilly and mountainous areas of Viet Nam and Laos, these effects introduced invasive species of low-value grasses.

What can be done to address Dioxin's impacts?

- Dioxin's present-day impacts can be slowed or halted by genetic counselling and inhibiting Dioxin exposure pathways in the human food chain, as well as by remediation of contaminated sites.
- The adverse effects of Dioxin on human health can be ameliorated in most cases if detected early. In other cases it cannot be fully corrected because Dioxin can permanently alter intricate internal cellular and chemical balances and result in early mortality.

When were herbicides sprayed in Viet Nam and Laos?

- The first testing of herbicides in Viet Nam was conducted in August 1961. The U.S. Air Force aerial spraying program, Operation Hades (later renamed Operation Ranch Hand), took place between January 1962 and February 1971.
- The first recorded spraying in Laos occurred in January 1965.

How much of Viet Nam was sprayed?

- Twenty-four percent of Viet Nam—7,813 square miles of upland and mangrove forests and 781 square miles of crops—was sprayed (an area roughly the size of New Hampshire).
- Thirty-four percent of the regions sprayed were sprayed more than once. Parts of the upland forests were sprayed more than [four times](#).
- Parts of southern Laos and parts of Cambodia along the border of Viet Nam were also sprayed.

What happened to the remaining barrels of herbicides after the spraying ended?

- As part of Operation Pacer Ivy, a total of 2.3 million gallons of Agent Orange were destroyed on Johnston Island in the South Pacific in 1977 on the incinerator ship M/T Vulcanus.

What diseases do the U.S. government associate with Agent Orange?

- In 1991, Congress passed Public Law 102-4 which required the National Academy of Sciences to review the [medical and scientific research](#) on the health effects of exposure to the herbicides used during the war in Viet Nam. To date, the NAS has found sufficient evidence of association between exposure to the herbicides and soft-tissue sarcoma, non-Hodgkin's lymphoma, chronic lymphocytic leukemia, Hodgkin's disease and chloracne, Hypertension and monoclonal gammopathy of undetermined significance (MGUS).
- The NAS found limited or suggestive evidence of an association between exposure to the herbicides and laryngeal cancer, cancer of the lung, bronchus or trachea, prostate cancer, bladder cancer, multiple myeloma, AL amyloidosis, peripheral neuropathy, Porphyria cutanea tarda, Parkinson disease and Parkinsonism or Parkinson-like syndromes, Ischemic heart disease, stroke and hypothyroidism.
- There is still no consensus at the NAS to whether Type II Diabetes should be considered to have sufficient evidence or limited/suggested evidence of association with Agent Orange exposure. The [VA](#) does not yet compensate claims for hypertension, stroke, and MGUS.

What birth defects does the VA compensate veterans for?

- Those eligible for compensation are children of male veterans with spina bifida and children of female veterans with Achondroplasia, cleft lip and cleft palate, congenital heart disease, congenital talipes equinovarus (clubfoot), esophageal and intestinal atresia, Hallerman-Streiff syndrome, hip dysplasia, Hirschsprung Disease, hydrocephalus due to aqueductal stenosis, hypospadias, imperforate anus, neural tube defects (including spina bifida, encephalocele, and anencephaly), Poland syndrome, pyloric stenosis, syndactyly 2 (fused digits), tracheoesophageal fistula, undescended testicle or Williams syndrome.
- Children of female veterans may also qualify for disability if they have a birth defect that has no known cause or no family history of such conditions. Compensation for the children of female veterans is recognized as only linked to their service in the war, not exposure to herbicides or Dioxin.

How many people were exposed to the Dioxin-contaminated herbicides in Viet Nam and Laos?

- [Researchers](#) estimate the number of Vietnamese civilians exposed to the wartime use of herbicides to be 2.1 to 4.5 million.
- At least a million soldiers from the Army of the Republic of Viet Nam (ARVN), as well as the Vietnam National Liberation Front (NLF) and North Vietnamese Army, were potentially exposed.
- There is ongoing research to determine the number of Vietnamese who may have post-war exposure via Dioxin hotspots.
- In Laos, the population of the sprayed districts is estimated to be less than 200,000 people.

How many people are believed to be exposed to the Dioxin-contaminated herbicides in the U.S.?

- The VA estimates that any of the 2.8 million U.S. veterans who “had their boots on the ground” in Viet Nam between 1962 and 1975 were exposed.
- This number excludes veterans who served in the Navy off the coast of Viet Nam or those who flew over Viet Nam from bases outside of Viet Nam. It also excludes non-Vietnamese civilians and those who served outside of Viet Nam (e.g., in Korea, Thailand, Cambodia, Laos, Puerto Rico and various places in the U.S.), where the Dioxin-contaminated herbicides were used, tested and sprayed.
- As of 2020, those who served on ships within 12 nautical miles off the coast of Viet Nam or Cambodia are presumed to be exposed to the herbicides and eligible for VA benefits.

How many people have suffered adverse health effects from the Dioxin?

- The [Vietnam Red Cross](#) estimates that up to three million Vietnamese live with a disability or illness associated with Agent Orange exposure, of which 150,000 are children.
- The Viet Nam Association of Victims of Agent Orange is currently conducting a survey to identify those who suffer from an illness or birth defect associated with the herbicides.

- As of [2018](#), over 750,000 veterans have received some level of compensation from the VA. Many more claims are still pending.

What is the lifespan of Dioxin?

- The half-life of Dioxin depends greatly on where it is located. In humans, the half-life is believed to be between 7 and 15 years, though it can be as high as 20 years.
- The half-life of Dioxin in the environment varies depending on what type of soil it's in and how deep that soil lies. The sun breaks down Dioxin, so it is believed that the half-life for Dioxin on the surface is between one and three years. If the Dioxin is buried under the surface or deep in the sediment of rivers and other bodies of water, the half-life of Dioxin can be more than 100 years.

What is the “safe” level of Dioxin?

- The [World Health Organization](#) believes that the safe, monthly intake of Dioxin is 70 picogram/kg of body weight.
- The highest level of Dioxin recorded in a human in Vietnam was over 1,000 ppt, approximately 200 times the level found in the blood of those living in industrialized nations and more than 400 times the level found in the blood of those living in the north Viet Nam. People in industrial nations, such as the U.S., have a baseline of 2-to-5 ppt Dioxin in their blood.
- The general standard in most countries is that Dioxin should not exceed 1,000 ppt toxic equivalents (TEQ) in soil and 100 ppt in sediment. The average level of Dioxin found in the soil of industrialized nations is less than 12 ppt.
- The U.S. Agency for Toxic Substance and Disease Registry has determined that levels higher than 1,000 ppt TEQ in soil require intervention, surveillance, research, health studies, community and physician education, and exposure investigation.

What are “Dioxin hotspots”?

- Hatfield Consultants (Canada) found that “Dioxin hotspots” exist in areas where herbicides were stored or where it was transported. [Research](#) is still being conducted to identify the level of Dioxin contamination in all of the suspected hotspots throughout southern Viet Nam. Vietnamese officials believe that there are up to 28 potential Dioxin hotspots.
- [Three such significant hotspots](#) have been identified (e.g., Da Nang, Phu Cat and Bien Hoa air bases), though others may exist. Dioxin levels have been found to be as high as 365,000 ppt at the Da Nang base, 185,000 ppt at the Bien Hoa base and 236,000 ppt at the Phu Cat base.

How are “hotspots” cleaned and what is the cost?

- The first step is to construct barriers around the hotspots to keep the local population from being further exposed. Second, containment measures, such as constructing concrete caps, drainage ditches and sediment tanks, must be implemented to prevent further Dioxin contamination in secondary sites.

- The clean-up of 90,000 cubic meters of soil and sediment at the Da Nang Base using in-pile thermal destruction totaled \$116 million, while the containment of 7,500 cubic meters of soil at Phu Cat totaled \$5 million. The clean-up of over 500,000 cubic meters of soil at [Bien Hoa](#) is estimated to cost \$500 million.

What is the U.S. position on Agent Orange?

- The U.S. has consistently held that there is [no scientific evidence](#) linking “Agent Orange” to adverse health effects especially birth defects, a stance that previously hindered normalization of U.S. relations with Viet Nam.

What has the U.S. done to help the Vietnamese address the impacts of the Dioxin-contaminated herbicides?

- In 2002, the U.S. and Viet Nam held a joint scientific conference, “Human Health and Environmental Effects of [Agent Orange-Dioxin],” in Hanoi and signed a research memorandum of understanding.
- In 2003, the U.S. EPA began a \$2.4 million project with the Vietnamese to investigate the severity of contamination at the Da Nang air base.
- In 2007, U.S. Congress for the first time allocated \$3 million to “address remediation of Dioxin hotspots in Viet Nam and to support public health programs in the surrounding communities.”
- Since [2007](#), \$381.4 million has been allocated by Congress since address Agent Orange impacts in Viet Nam. Of this amount, \$94.3 million has been allocated for health and disability programs in seven of the most heavily sprayed provinces of Viet Nam.

What have non-governmental organizations (NGOs) done to address Agent Orange-Dioxin in Viet Nam?

- The [Ford Foundation](#), one of the leading NGOs dealing with Agent Orange-Dioxin, provided \$17.1 million in 78 grants to Viet Nam. Ford increased awareness about Agent Orange-Dioxin and encouraged new donors such as UNICEF, The Atlantic Philanthropies and the Bill & Melinda Gates Foundation to get involved.
- The [Vietnam Association of Victims of Agent Orange](#) (VAVA), with chapters throughout Viet Nam and over 400,000 members, was established in 2004 in order to raise support for those believed to be affected by Agent Orange and to advocate for their needs. VAVA runs rehabilitation centers throughout Viet Nam.
- The Vietnam Red Cross raises funds to support the needs of those believed to be ill or disabled from the herbicides.
- Other foreign NGOs include: Children of Vietnam, the Vietnam Veterans of America Foundation, CHEER Vietnam, Humanity & Inclusion, and Vietnam Assistance for the Handicapped. These organizations have provided rehabilitation, medical, educational and income-generating services.

What has the Vietnamese government done to address Agent Orange?

- The Vietnamese first began to officially address Agent Orange in October 1980 when the 10-80 Committee under the Ministry of Health was developed. In 1999, this task was transferred to a multi-ministerial committee led by the Ministry of Environment and

Natural Resources called Committee 33 to research the impacts of Dioxin. In 2018, the Office of the National Steering Committee on the Settlement of Post-war Unexploded Ordnance and Toxic Chemical Consequences (Office 701) was established. Office 701 is overseen by the Ministry of Defense which works with the U.S. on all clean-up projects.

- The National Action Center for Toxic Chemicals and Environmental Treatment was also established in 2019 to coordinate with USAID-funded health and disability programs.
- The Vietnamese government also provides monthly stipends to people officially certified as “Agent Orange victims” with an illness or disability associated with Agent Orange-Dioxin. To also qualify, people must have served in south Viet Nam as part of the North Viet Nam Army or the National Liberation Front, or be the child or grandchild of someone who served in the south. These benefit payments range from about \$15 to \$75 a month depending on the severity of the condition.
- The [Vietnamese government](#) as of 2016 was allocating \$230 million yearly to assist 330,000 Agent Orange victims.