

Condensed Summary of *Review and Analysis: Did the United States Transport, Off-Load and Use Commercial 2,4,5-T Herbicides with Unknown Amounts of Dioxin TCDD on Military Base Grounds in Panama Canal Zone between 1948 and 1999?*

Tony Farrell, December 2, 2023

The community of Panama Canal Zone Veterans and civilians have much to be thankful for in the research and publications of Dr. Kenneth Olson and the Merry Band of Retirees research team, especially regarding Olson's latest paper, titled *Review and Analysis: Did the United States Transport, Off-Load and Use Commercial 2,4,5-T Herbicides with Unknown Amounts of Dioxin TCDD on Military Base Grounds in Panama Canal Zone between 1948 and 1999?*ⁱ

My purpose is to condense Dr. Olson's 25-page paper down to almost 4 pages, summarizing important points for the Panama Canal Zone Veteran reader. To that end, a few notes are in order:

- Headings and numbering are from the original
- References to end notes in the content have been removed.
- Only minor grammatical corrections have been made and appear within brackets ([]).
- Highlighting mine.
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2. Findings

Chlorophenoxyacetic acid herbicide, 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), was developed in the late 1940s and was determined to be toxic. An intake rate of 10 mg/kg/day of 2,4,5-T can cause adverse alterations in organisms. In addition, the manufacturing process for 2,4,5-T can contaminate this commercial herbicide with unknown amounts of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). TCDD is an unanticipated contaminant created during the manufacture of the herbicide 2,4,5-T. TCDD has a very long half-life and does not degrade easily. TCDD is not water soluble and can adhere to leaf surfaces, organic material, fine soil particles and sediments which can be carried downstream by runoff water flow into wetlands, ponds and lakes such as Lake Gatun. Dioxin TCDD can bio-accumulate in aquatic species and become bio-magnified throughout the food chain. In most waters, TCDD particles attach to and are deposited with sediment, but can be returned to the water when sediment is re-suspended. Panama lake and river waters, which are shallow and easily churned by wind and wave action, results in sediment re-suspension, preventing elimination from the aquatic system.

2.4. Use of 2,4,5-T on Worldwide US Military Bases and Other Areas

On military bases in the Panama Canal Zone and around the world, the United States' decision to use 2,4,5-T has also impacted the local environment and human health. The chemical manufacture, transport, disposal and storage of 2,4,5-T herbicide has affected human health. The civilian and military workers, who handled and moved this commercial 2,4,5-T herbicide around the world, including Panama, have been affected. Between 1948 and 1999, the United States military base commanders around the world had the ability to order and use commercial herbicides containing dioxin TCDD. The herbicide 2,4,5-T, with unknown amounts of dioxin TCDD, was

transported, according to shipping records, to Panama Canal Zone ports, including Balboa and Cristobal, and distributed to the US military bases in Panama Canal Zone by rail or truck.

3. Results

3.2. Panama Vietnam Era Veterans and Panamanian Civilian Exposure to Dioxin TCDD

While serving in Panama Canal Zone including Fort Sherman, the US Jungle School, many Vietnam Era veterans came in contact with 2,4,5-T with unknown amounts of dioxin TCDD that was sprayed on military bases. The military personnel, serving in the Panama Canal Zone, were told that the herbicides, including 2,4,5-T with unknown amounts of dioxin TCDD, were harmless. The herbicide handlers, including both Panamanian civilians and United States soldiers, were apparently told they did not need protective gear. The herbicide often came in contact with the skin of the military personnel and civilian ground crews who were spraying it. The empty herbicide barrels were washed often without protective gear and poured out on the ground by hand. After cleaning the barrels, the rinse water was poured on the soil surface. Dioxin TCDD, which is the most toxic of all the dioxins and dioxin-like compounds, was either leached into the soil and groundwater or transported off-site during monsoon rains. Dioxin TCDD was attached to sediment and transported by overland flow into the waterways and Lake Gatun. Commercial spraying could have resulted in TCDD remaining in the soils.

3.3. Transport and Fate of Commercial Herbicide 2,4,5-T Containing Contaminant Dioxin TCDD

A United States Government Accountability Office (GAO) report confirmed that the Military Sea Transportation Service chartered merchant vessels directly to carry tactical herbicides through the Panama Canal. There are shipping documents which support the presence of commercial

2,4,5-T herbicide containing unknown amount of dioxin TCDD having been in the Panama Canal Zone. A December 1976 Environmental Sampling Report for the Panama Canal Zone showed chlorophenoxy herbicides were detected in the soil samples from the Canal Zone. The Centers for Disease Control and Prevention identified the chlorophenoxy herbicides as 2,4,5-T based herbicide containing TCDD.

3.4. US Federal Government and Military Use of Commercial Herbicides with 2,4,5-T with Dioxin TCDD Contaminant in Panama Canal Zone

Commercial herbicides containing 2,4,5-T and unknown amount of dioxin TCDD were used on the U.S. military base grounds in the Panama Canal Zone. The DOD did not really claim (my opinion) commercial herbicides such as 2,4,5-T were never requisitioned, handled, offloaded, and applied by military personnel or Panamanian civilians to the perimeter fences and military base grounds. DOD only stated that tactical herbicides including Agent Orange were never “off [loaded]”. The VA has since used this claim to justify not providing benefits to those exposed to herbicides containing dioxin TCDD (both tactical and commercial) while serving in Panama Canal Zone. It is also assumed that any spraying done only involved commercially available herbicides which officials have long indicated were harmless to humans including herbicide 2,4,5-T with unknown amounts of dioxin TCDD. There is now a mountain of evidence that this is not true.

4. Conclusions

The use of herbicides containing 2,4,5-T with unknown amounts of TCDD continued on the Panama military bases after the American-Vietnam war was over. The dioxin TCDD levels in the Panama Canal Zone environment, including the water and soils, continued to increase with seasonal and annual applications of herbicides containing the contaminant dioxin TCDD. Pesticides and chemicals flowed into Lake Gatun via surface runoff either in solution or attached to

the sediment. These pesticides included 2,4,5-T containing TCDD, can bio-accumulate in fish and birds and enter into the food supply and were eaten by humans. The extent of the current pesticide, herbicide and chemical contamination on former U.S. military base grounds in Panama Canal Zone, in Lake Gatun and the Panama Canal channel is unknown.

The Panama Canal Zone military base personnel and Panamanians handling the transfer of the 2,4,5-T herbicide could have been exposed to dioxin TCDD. The 2022 PACT Act provided the “presumption of exposure to dioxin TCDD” of US Air Force veterans who served in Guam and Thailand during the Vietnam War. However, the US veterans who served or were trained at one of the eight Panama Canal Zone military bases including Fort Sherman’s Jungle School Training Operations Center, were not covered by the PACT Act. Why? This omission needs to be corrected. Many of the US Vietnam Era Veterans who served or trained in Panama Canal Zone have died from various diseases on the official VA list of diseases that can result from exposure to dioxin TCDD. Their advocates are asking that these veterans also be extended the “presumption of exposure” granted by the 2022 PACT Act to the Vietnam Era Veterans, as those who served in Guam and Thailand. More than 300,000 Vietnam Era Veterans who served in the Panama Canal Zone and may [have] been exposed to dioxin TCDD during the Vietnam War and their families would like these veterans to be included in the “presumption of exposure to dioxin TCDD” provisions of the PACT act or similar future legislation.

ⁱ Olson, K. R. (2023) Review and Analysis: Did the United States Transport, Off-Load and Use Commercial 2,4,5-T Herbicides with Unknown Amounts of Dioxin TCDD on Military Base Grounds in Panama Canal Zone between 1948 and 1999?. Open Journal of Soil Science, **13**, 490-515.
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