

## **A BRIEF SUMMARY OF HATFIELD/10-80 DIVISION WORK ON THE AGENT ORANGE DIOXIN ISSUE IN VIET NAM**

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I am honoured to have been invited by the Government of Viet Nam to speak at this conference, and would like to thank the delegates, VAVA and the conference organizers for your hospitality and kindness.

I would like to briefly summarize what is known to date regarding the Agent Orange dioxin issue in Viet Nam. I will present the main results of scientific research conducted by the 10-80 Division of the Ministry of Health (Viet Nam) and Hatfield Consultants Ltd. (Canada) over the past 12 years. Specifically, I will summarize the results of our earlier research undertaken in Aluoi District, as well as more recent investigations of dioxin 'Hot Spots' around former US military installations in South Viet Nam. Since my time is short, I have highlighted the key issues related to the environmental impacts of Agent Orange dioxin, to help decision-makers and the international community better understand the current situation, and to help solve this long-term problem.

Since 1994, Hatfield and 10-80 have worked together on Agent Orange dioxin investigations in several provinces of Viet Nam. It is important to note that, as early as 1970, a number of key Vietnamese and international researchers have been involved in scientific investigations of Agent Orange impacts in Viet Nam, including Prof. Dr. Hoang Dinh Cau, Dr. Le Cao Dai, Prof. Dr. Vo Quy, Dr. Arthur Westing, Dr. Arnold Schecter, and many others. These individuals made significant contributions to our understanding of the impacts of Agent Orange dioxin on the environment and people of Viet Nam.

The following are some well-known facts about Agent Orange and dioxins. It is estimated that 10-12% of South Viet Nam was sprayed with Agent Orange and other herbicides, and that over 600 kg of dioxins were released into the environment. Dioxin is a highly toxic, very persistent chemical compound that can remain in the environment for decades or perhaps hundreds of years. Because it is long lasting, and is lipophilic (i.e.,

dioxin 'sticks' to human fat), it can be taken up in food and deposited in various animal organs, including human blood and human milk.

Dioxin has been linked to certain cancers and immunological problems in humans. Laboratory studies on animals also reveal high levels of toxicity.

The principal concern today regarding dioxin in the environment of Viet Nam is that people living near former US military installations continue to be exposed to dioxin-contaminated lands and food products. Even people born after the war are at risk of dioxin contamination, but with simple mitigation measures, this problem can be solved.

Through the use of dioxin-laden herbicides, the Viet Nam war has left a legacy of environmental contamination that continues to this day.

There were 2 main impacts of Agent Orange applications in South Viet Nam during the 1960's:

a) Ecological destruction; and, b) Effects on human health.

**The ecological impacts** of Agent Orange usage include destruction of upland forested areas (approximately 2.0 million hectares destroyed), destruction of approximately 55% of all the mangrove forests in Viet Nam, and severe reduction in wildlife and bird populations in these lands. The majority of these areas have not fully recovered. In Aluoi District, where 10-80/Hatfield has undertaken comprehensive research, the number of mammal species, for example, was reduced from 40 to 5 species; the number of birds dropped significantly from 160 species to 25 species.

In terms of **human health effects**, Agent Orange and dioxin has been linked to a variety of cancers, immunological diseases and the birth defect *spina bifida*. There is also a link between Agent Orange and Type 2 diabetes.

### **What were the lessons learned from Hatfield/10-80 research in Viet Nam?**

Firstly, our research provided solutions for people living near the contaminated A So base in Dong Son commune. The source of contamination at a dioxin hot spot was identified as originating from a former US military installation, and the People's Committee took

appropriate measures to raise awareness of the problem, and relocated some local people to reduce their exposure to future dioxin contamination.

Secondly, we developed a comprehensive and repeatable methodology to assess dioxin contamination throughout Viet Nam. This included environmental chemistry, epidemiology and public health studies to trace the movement of dioxin from the original point source soils and sediment to the food chain, movement up the food chain, and into human blood and breast milk.

Thirdly, the 10-80/Hatfield 'Hot Spot Theory' was developed from our Aluoi work. This theory involves the view that the distribution of dioxin in other regions of southern Viet Nam is similar to that seen in Aluoi District; that is, sprayed areas are not highly contaminated, but former US bases had the highest potential of being significantly contaminated with Agent Orange dioxin. People living in sprayed areas were certainly at risk of dioxin contamination during and for several years after the war; however, over time, the dioxin levels in sprayed areas have declined significantly.

Fourthly, the dioxin levels recorded in hot spots near former US military installations at Da Nang, Bien Hoa and Phu Cat are above accepted international guidelines. If these hot spots were found in many western countries, regulatory agencies would require action immediately. Mitigation measures are required to eliminate potential exposure of the population living immediately downstream of these former US bases.

Lastly, the results of the Aluoi District work were published in the international scientific literature for comparison with dioxin-contaminated spots in other parts of the world. International recognition of the scientific work undertaken in Viet Nam is an essential first step to dealing with clean-up of these dioxin hot spots.

## **CONCLUSIONS AND RECOMMENDATIONS**

1. The dioxin problem in Viet Nam is manageable. The vast majority of the land and agricultural products in Viet Nam is **not** contaminated by dioxins.
2. Through the research undertaken in Aluoi District, 10-80/Hatfield has shown that those areas aerielly sprayed with Agent Orange

- during the war are no longer contaminated with high levels of dioxin today. Levels of dioxin found in soils of most areas of Viet Nam are low, and are below international guidelines. These areas do not, in general, pose a human health threat. This is good news for Viet Nam.
3. However, soils and sediments immediately downstream of some former US military installations in Viet Nam continue to pose a human health threat to the local Vietnamese population living in these areas. These are generally small geographic areas, and they are few in number, but population densities are high. Of most concern is direct contact with soils, and consumption of fish and duck internal organs (especially fatty tissues), from lakes near former US military installations, including the hot spots at Bien Hoa, Da Nang and Phu Cat.
  4. Protection of the human populations living near these 3 main hot spots should be the first priority. Community-based awareness raising programs are needed in these hot spot areas to help people reduce their exposure to dioxins.
  5. The exact locations of the hot spots on former US bases must be identified. The technology is available to clean these sites up, once the precise location of the source of contamination is delineated and contained.
  6. Financial assistance is required to deliver humanitarian assistance to people who have been affected by exposure to dioxins in Viet Nam, and to help clean up the hot spots.
  7. Information on dioxin levels in Viet Nam needs to be published in the international scientific literature, including results of recent studies of human populations and the environment.
  8. International collaboration and information sharing is key to moving the process forward, so that future generations of Vietnamese can be protected from exposure to dioxin and other toxic chemicals.