

187737

History and Maps of the Former Tactical Herbicide Storage and Loading Sites in Vietnam

December 2006

Submitted by
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William B. Andrews, MBA, PE

for

Office of the Under Secretary of Defense
William Van Houten
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Contract No. DAAD19-02-D-0001
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Battelle

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Battelle Columbus
Prime Contractor



A. L. Young Consulting, Inc.
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Mr. William J. Van Houten
Assistant Director
Environmental Readiness and Safety Group
Office of the Under Secretary of Defense (Installations and Environment)
Crystal Gateway 2, Suite 1500
1225 Jefferson Davis Highway
Arlington, VA 22202

RE: Contract No. DAAD19-02-D-0001 Task Number 05204 Subtask g, **Vietnam Tactical Herbicide Mapping Project**

Dear Mr. Van Houten,

Please find enclosed the report: **History and Maps of the Former Tactical Herbicide Storage and Loading Sites in Vietnam**. This deliverable was prepared under Task 05204 for the Scientific Services Program that is sponsored by the US Army Research Office and is managed by Battelle under Contract No. DAAD19-02-D-0001. This product was completed for Battelle under a subcontract to A. L. Young Consulting, Inc., and with the assistance of Battelle's Environmental Scientists Mr. Mark Tinianow and Ms. Ellen Baptiste-Carpenter, Duxbury, MA. This task was completed to support a follow-on activity discussed at the Joint US-Vietnam Agent Orange and Dioxin Remediation Workshop, that you jointly sponsored in Hanoi, Vietnam, 16-18 August 2005.

This report reflects a summary of the historical information obtained from Department of Defense technical reports, books and manuals on the RANCH HAND and US Army Chemical Corps operations in Vietnam during the Vietnam War, and from oral histories collected from numerous Vietnam veterans who served in Operation RANCH HAND, Operation PACER IVY, or as USAF Bioenvironmental Engineers at key air bases in Vietnam.

Sincerely,



William B. Andrews, MBA, PE
Strategic Projects Market Manager



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1810 Tranquility Road
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27 December 2006

Mr. William Andrews, MBA, PE
Strategic Projects Market Manager
Battelle Memorial Institute
P.O. Box 999, MSINK9-53
Richland WA 99352

Dear Mr. Andrews,

Please find enclosed with this letter the Final Report on: **History and Maps of the Former Tactical Herbicide Storage and Loading Sites in Vietnam**. This report is in fulfillment of the Third Task under Subcontract No. 206818 between Battelle Memorial Institute and A. L. Young Consulting, Inc.

This project was initiated as a result of our visit to Hanoi, Vietnam in August 2005. It is intended to provide some historical information on where the United States Military and the Military of the former Republic of South Vietnam temporarily stored and maintained the "Tactical Herbicides" used in Operation RANCH HAND, by the US Army Chemical Corps, and by elements of Army of the Republic of Vietnam (ARVN). It is important to remember that when the tactical herbicides arrived in Vietnam, ownership transferred to the Government of the Republic of Vietnam. Thus, it was the decisions by the Commanders of the ARVN Units as to where the drums of tactical herbicides would be stored, and how the empty drums would be disposed of on the air bases selected to support the operational defoliation and crop destruction programs during the Vietnam War. This document summarizes the historical information on the seven air bases in Vietnam that were used as storage, aircraft loading, and/or where the re-drumming for Operation PACER IVY occurred. A map image of each of these air bases has been prepared identifying the locations where storage and transfer operations may have occurred.

I wish to acknowledge the assistance of Professor James L. Regens and Mr. James Gunter, University of Oklahoma for their assistance in obtaining and preparing the initial crash maps of the selected air bases in the former Republic of Vietnam, and Battelle's Technical Specialists Mr. Mark Tinianow and Ms. Ellen Baptiste-Carpenter for obtaining and preparing satellite images of those air bases.

Sincerely,

Alvin L. Young, Ph.D.
A. L. Young Consulting, Inc.

Visiting Professor
Institute for Science and Public Policy
The University of Oklahoma

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14. ABSTRACT

The United States Department of Defense and Vietnam's Ministry of Defense jointly sponsored a workshop on "Agent Orange and Dioxin Remediation" in Hanoi, Vietnam on August 16-18, 2005. One of the objectives of the workshop was to open a dialogue with Vietnamese scientists and engineers on how to evaluate former tactical herbicide storage or loading sites in Southern Vietnam. As a follow-up to the August 2005 workshop, the US Department of Defense initiated the Vietnam Tactical Herbicide Mapping Project. The purpose of this project was to gather historical information that could be provided to the Government of Vietnam on where the United States Air Force (USAF) and the former Army of the Republic of Vietnam (ARVN) temporarily stored and maintained inventories of the "Tactical Herbicides" used in USAF's "Operation RANCH HAND", as well as by the US Army Chemical Corps, and by elements of the ARVN. This Report is the product of the Mapping Project. It describes the tactical herbicides identified in the Mapping Project. It provides "best estimates" on the quantities of those herbicides distributed to former Allied air bases in Southern Vietnam, and it identifies approximate locations on those air bases where tactical herbicides may have been stored and loaded on aircraft used in RANCH HAND, by ARVN, or the US Army Chemical Corps in support of tactical operations. In addition, sites were described where re-drumming of Herbicide Orange occurred in 1971-1972 in support of "Operation PACER IVY" (which involved the transport of remaining inventories of Herbicide Orange to Johnston Island). Recent "satellite images" (from the QuickBird or Ikonos Satellites) were overlaid with the following air bases or sites where the tactical herbicides were temporarily stored in support of tactical operations: Tan Son Nhut Airport, Bien Hoa Air Base, Da Nang Air Base, Phu Cat Air Base, and Nha Trang Air Base. In addition, routine maintenance and transportation activities in support of Operation PACER IVY occurred at Bien Hoa Air Base, Da Nang Air Base, and Tuy Hoa Air Base. Lastly,