Fort Detrick

Archive Search Report (ASR)

Findings for Field Testing of 2,4,5-T and Other Herbicides

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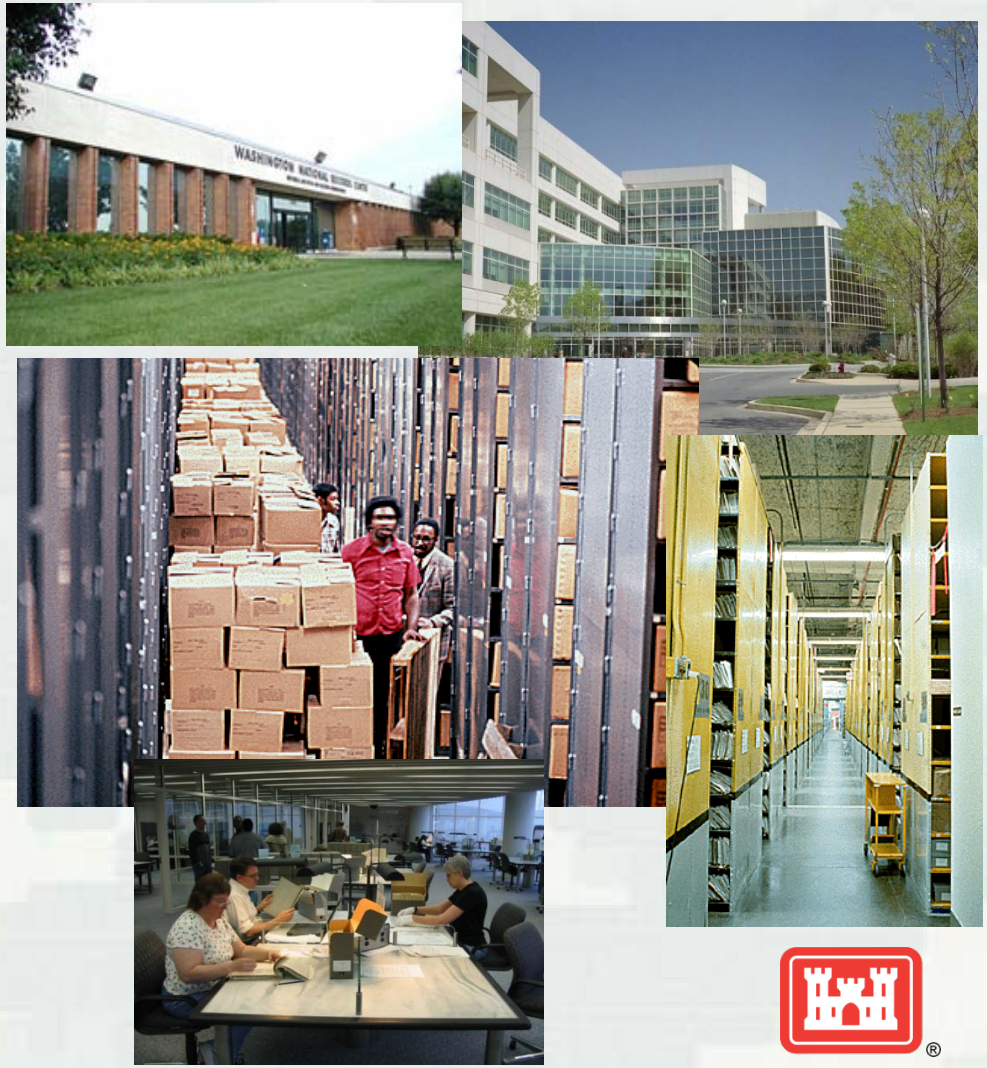
Outline

- Archive Search Report (ASR)
- Field Testing of 2,4,5-T and other herbicides
- Differences from Preliminary Findings
- Scope of ASR and brief Real Estate history
- Review 2,4,5-T and Testing at Detrick
- Locations and Amounts
- Acquisition, Storage, Disposal and Facility Maintenance of herbicides

Archive Search Report (ASR)

- Compiles information from historical materials stored at various off-site record storage facilities and analyzes it to determine the location and scope of past activities, which potentially resulted in environmental contamination.
- Reviewed thousands of boxes of records - most of which are located in archives and not at Detrick.



ASR Findings for Field Testing of 2,4,5-T

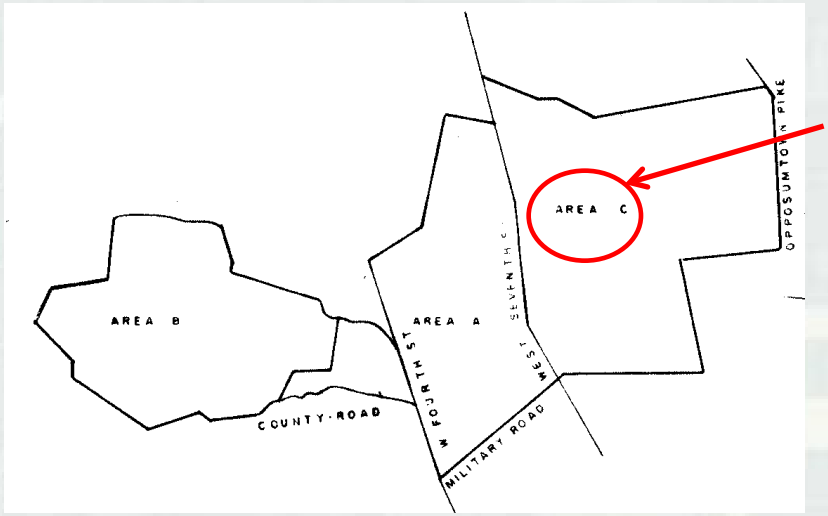
- Army Environmental Command and U.S. Army Garrison Fort Detrick requested archive search to focus first on use and testing of 2,4,5-T compounds due to concern of dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD)), a manufacturing byproduct of 2,4,5-T.
- Preliminary findings report of 27 October 2010; finalized and presented to RAB in February 2011, which relied on analysis of previously identified reports
- ASR is researching all historical activities. A companion ASR volume to be published separately will document the findings on the broader potential sources of environmental contamination.

Additions from Preliminary Findings

- More information based on review of more archival records
- Amounts of 2,4,5-T tested outdoors at Detrick **totaled ~22 pounds versus previously reported ~17 pounds**
- Analysis of arsenic related herbicides
- History of Crops Division, Chemical Branch herbicide efforts
- Real Estate history
- Section on acquisition, storage, equipment cleaning, disposal and facility maintenance of herbicides

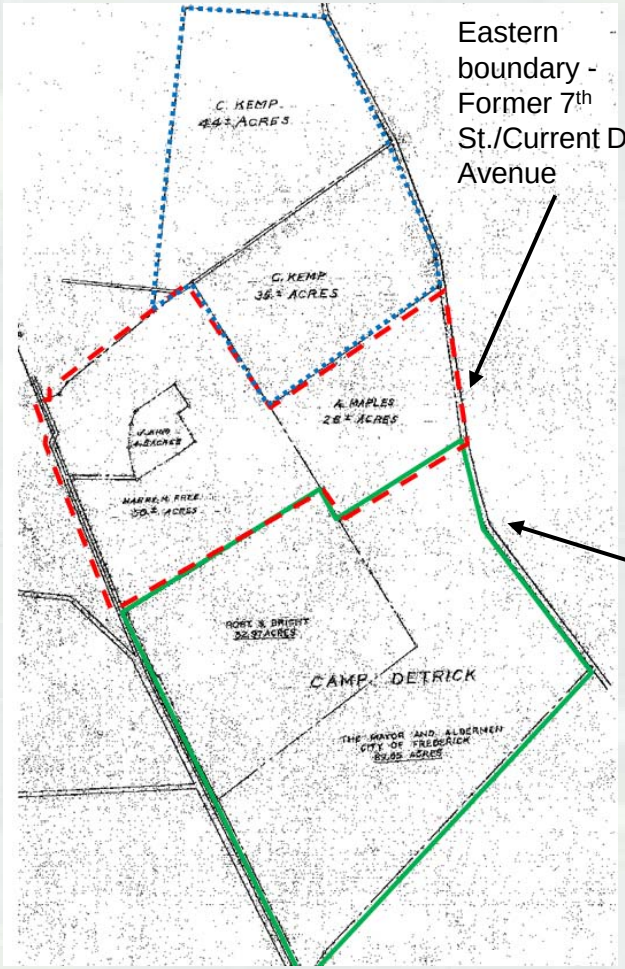
Scope of ASR

- Fence to fence evaluation for Areas A (main post), Area B and Area C Water & Waste Water Treatment Plants.



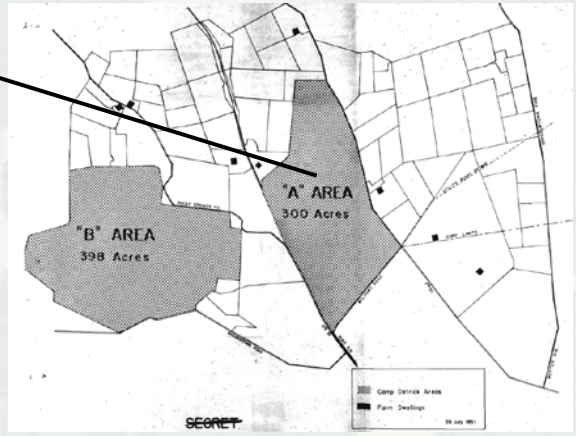
Note: term **"Area C"** potentially confusing as in 1950s referred to the eastern expansion of Detrick in 1952; part of current **Area A**.

Real Estate - WWII to 1951

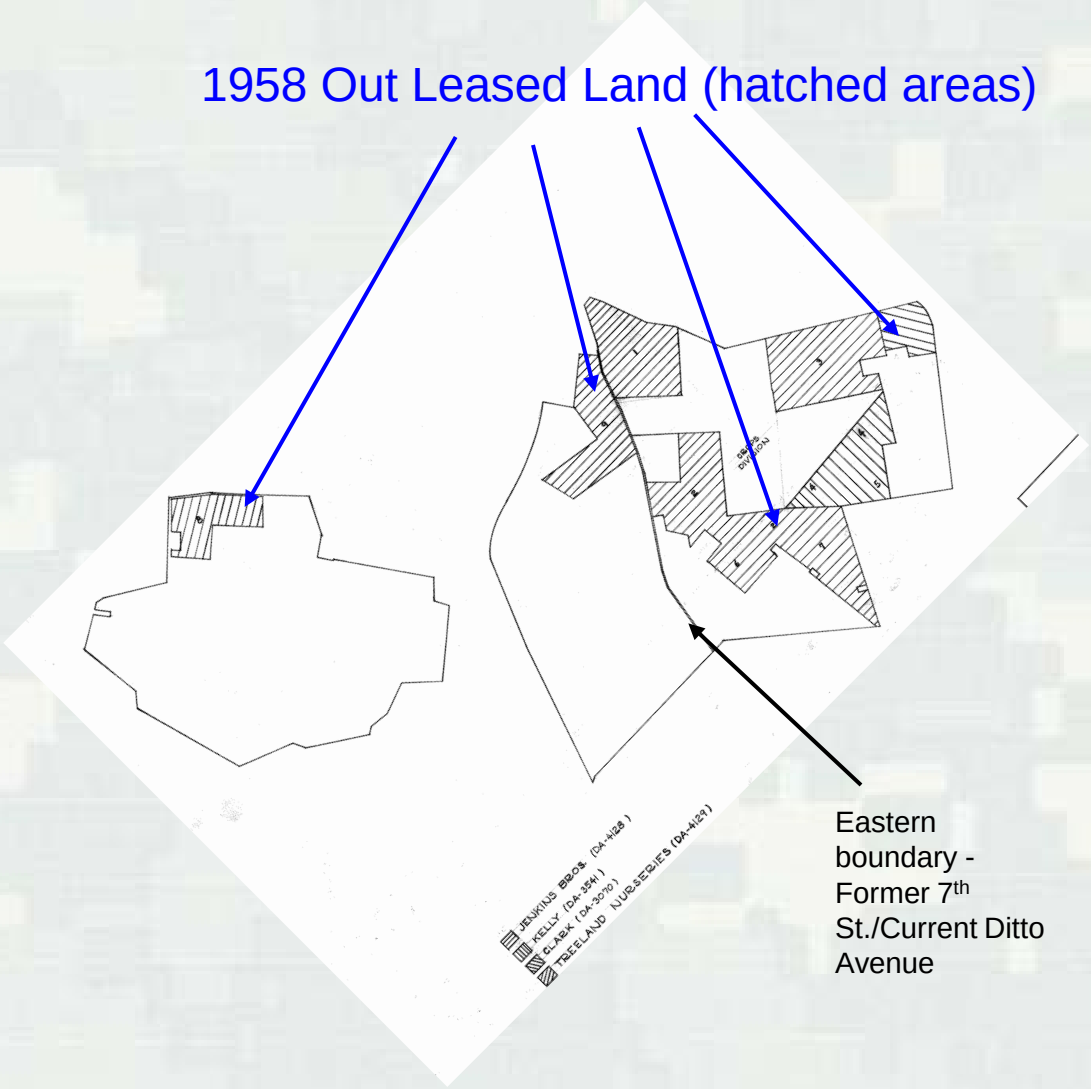


Eastern boundary - Former 7th St./Current Ditto Avenue

- ***Green Polygon*** *– WWII Boundary of Camp Detrick*
- ***Red Dashed Polygon*** *– July 1946 Addition*
- ***Blue Dotted Polygon*** *– March 1947 Addition*



1952 Addition & Out-leasing



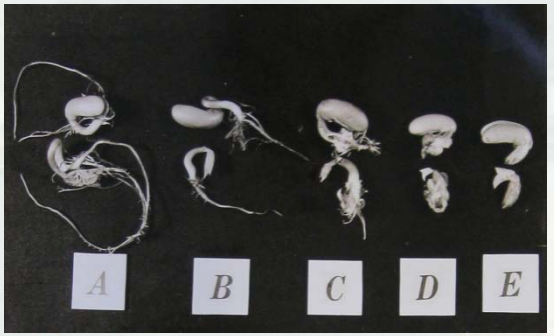
- 502.76 acres added between former West 7th Street (current Ditto Ave) and Opossumtown Pike for Crops Division
- Detrick out leased unused areas (hundreds of acres) between 1958 to 1985

2,4,5-T General

- One of numerous organic herbicides tested by Crop Division between 1944 and early 1970s
- 2,4-D and 2,4,5-T sold commercially to anyone in late 1940s, 1950s and 1960s as weed killers
- Military defoliant or herbicide Agent Orange (Agent LNX) 50/50 mix of:
  - n-butyl ester of 2,4-dichlorophenoxyacetic acid (2,4-D)
  - **n-butyl ester of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T)**
- By the late 1960s, it became known that the manufacture of 2,4,5-T was contaminated with 2,3,7,8-tetrachlorodibenzodioxin (TCDD), a dioxin
- Use of 2,4,5-T halted in 1970s for all food crops other than rice; all uses terminated in 1985
- 2,4-D remains in commercial use today as weed killer

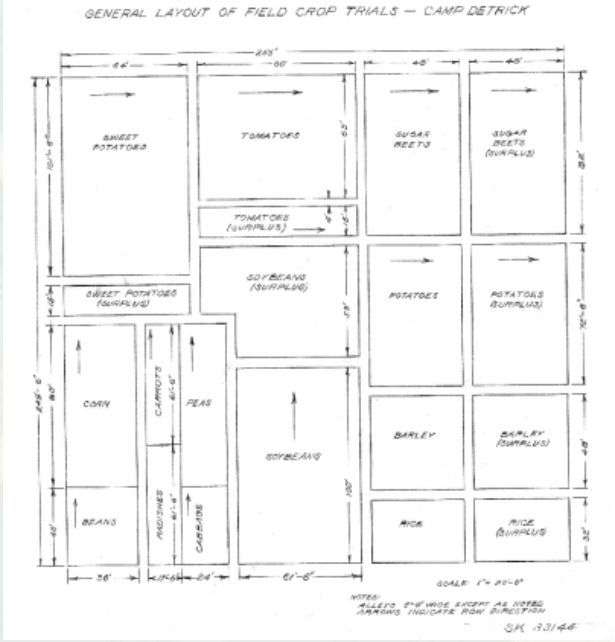
WWII Research on “Plant Growth Inhibitors” or “LN” agents

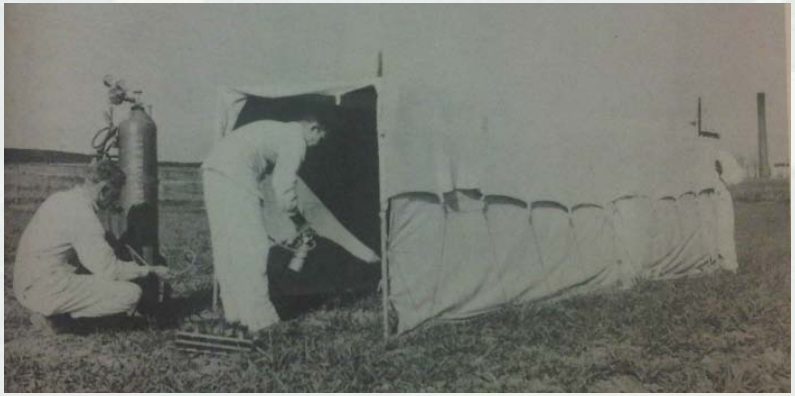
- April 1944 – mission assigned to Chemical Branch of Crops Division
- **Phase 1 Testing** – Preliminary evaluation or screening of potential chemicals in lab and greenhouse (very small amounts)
  - Over a thousand chemicals screened in WWII, eventually 10s of thousands screened in very minute amounts
  - LN-8 (2,4-D) – became standard other LN chemicals compared to; commercial 2,4-D still in use

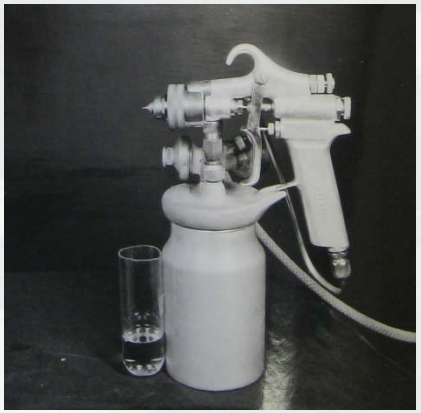


Secondary Screening

- **Phase 2 Testing** – Small Field Trials (plots at Fort Detrick)
  - Test plots small - typically 6 by 18 feet size
  - Applied with handheld sprayers (or bicycle wheeled cart)
  - Drifting of spray limited with a movable shelter
  - Application rates expressed in “pounds per acre”, but actual amounts applied in grams because plots are so small

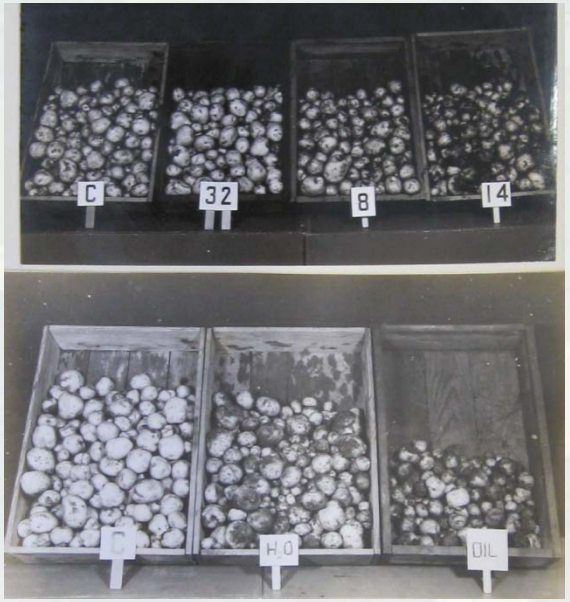


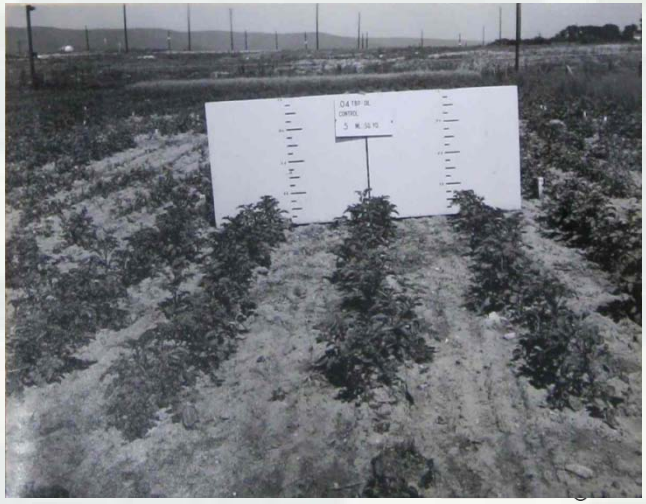


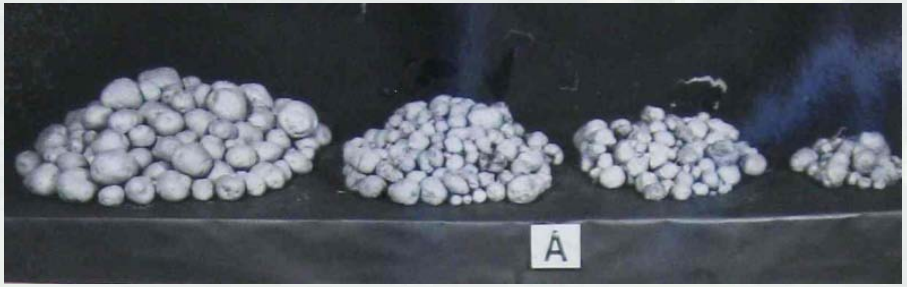


1944-68 Crops Field Research at Detrick

- Results measured by amount of crops produced or plant height
- Primary objectives:
  - most effective herbicide for reducing yield of various crops and causing defoliation of woody plants;
  - best methods of application
  - effects of the herbicides on plant growth during different stages of development.



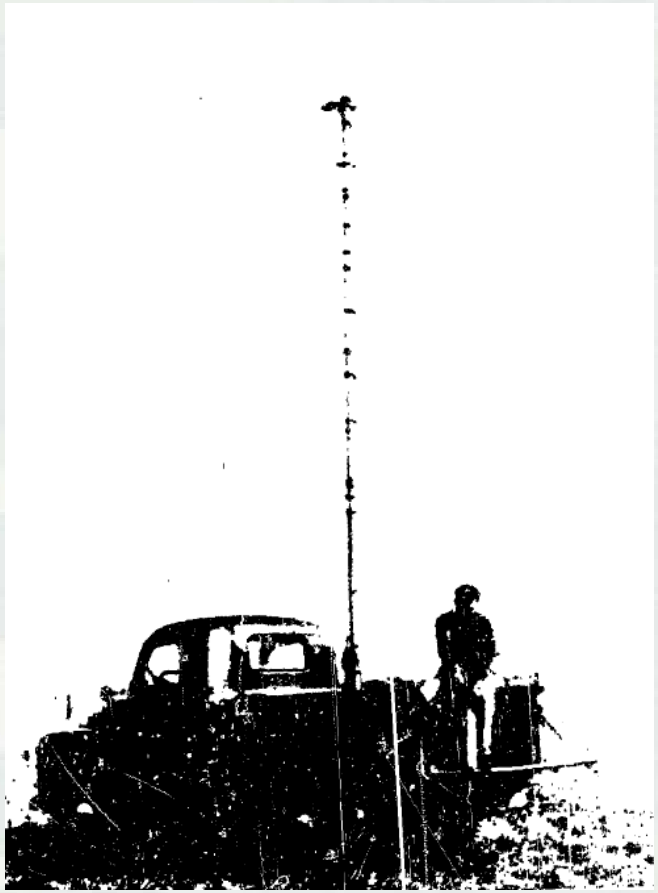




Large-scale Dissemination Tests

- **Phase 3 Testing** – Larger aerial spraying field dissemination trials occurred at other installations beginning in WWII and continuing into 1950s and 1960s. Detrick personnel participated, but tests were not at Detrick.
- Locations other than Fort Detrick have been publically listed by the Department of Veterans Affairs web site since at least 2008: http://www.publichealth.va.gov/docs/agentorange/dod_herbicides_outside_vietnam.pdf

1953 Truck Mounted Spray Test

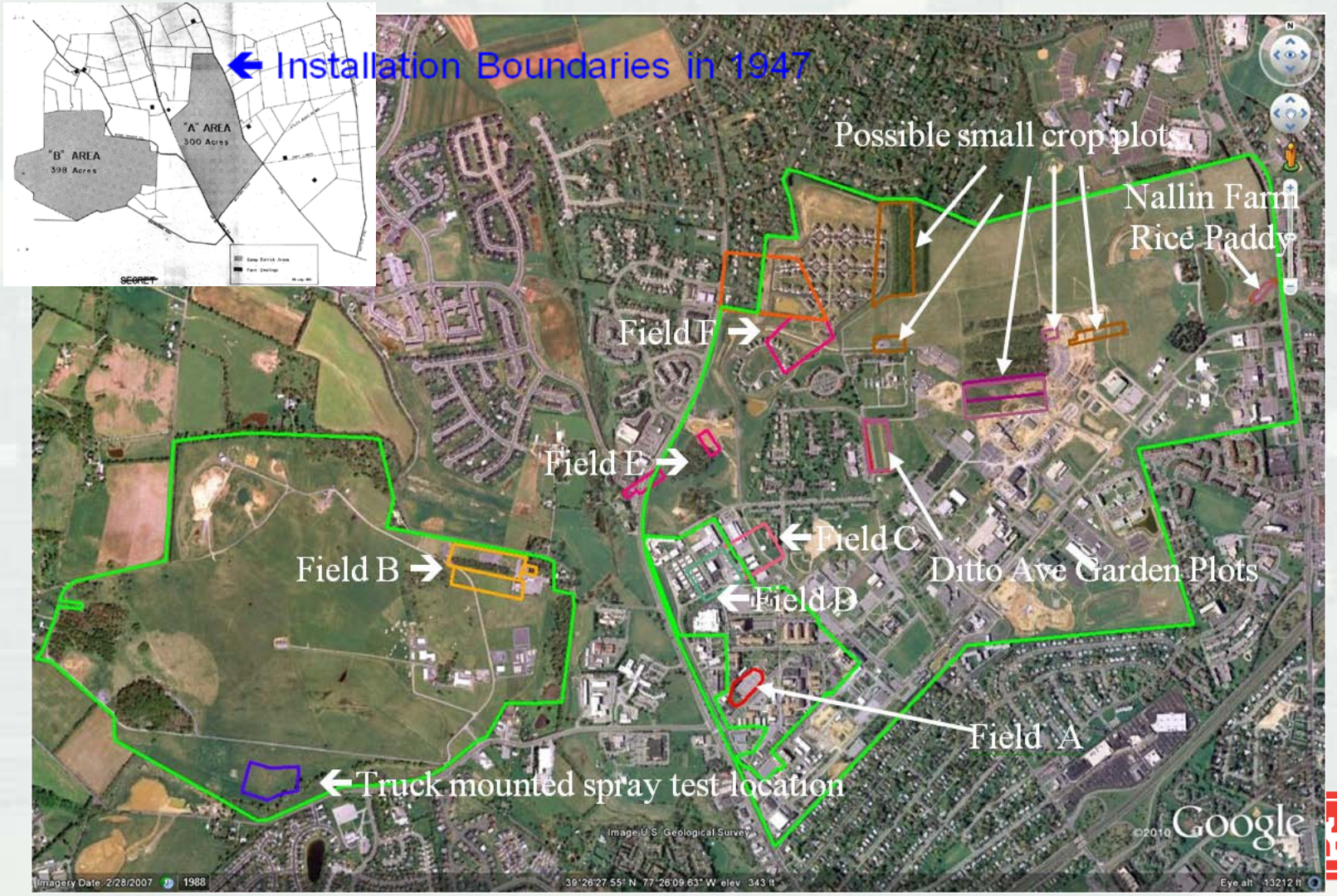


- Applied to rows of soybeans and sweet potatoes in Area B by truck mounted sprayer along ~240 foot perpendicular path; just over a hundred grams estimated used

No aerial herbicide spray tests at Detrick, BUT…

- Tests on Area B test grid included aerial munition tests (from poles, towers, balloon, helicopter, airplane)
- All tests identified involved **no fill (empty) or simulant agent**
- At least one test involved aircraft spraying with simulants
- Simulant agent dispersal test on Area A

Identified Locations – Current Imagery



Fields outside current Fort Detrick

- Areas were part of installation from 1947-57
- Part of land trade in 1957 with private land owners, when State rerouted current Rosemont Avenue and Yellow Spring Road allowing for the closing of 7th Street (current Ditto Ave.) to the public through Detrick
- No clear small grid plots, but under cultivation
- Areas will be considered in future investigations

Total Estimated Amounts of 2,4,5-T compounds tested at Detrick based on Preliminary ASR

- Estimate on confirmed tests **about 22 pounds between 1944 and 1968** *(~17 pounds reported in Feb. 2011)*
- Comparison - USDA determined the average farm use rate of 2,4,5-T in 1969 was 0.24 to 2 lbs per acres with an average of 0.48 lbs per acres (ex.: 100 acres farm would use 48 lbs in one year)
- Estimate of arsenic related herbicides about 12.5 pounds

Historical Context

U.S. 2,4,5-T use rates for the year 1969

Appendix table 1.--Cost of 2,4,5-T and application, all domestic uses, United States, 1969

Use category	Acres treated	Materials: Pounds per acre	Materials: Cost per pound	Materials: Total cost	Application: Cost per acre	Application: Total cost	Total cost of material and application
	1,000 acres	Pounds	Dollars	1,000 dollars	Dollars	1,000 dollars	1,000 dollars
Farm use:							
Hay, pasture, and rangeland	2,441	0.24	2.75	1,611	1.00	2,441	4,052
Other crops	671	1/.59	2.75	1,093	1.00	671	1,764
Other farm use	339	2.00	2.75	1,865	1.00	339	2,204
Total farm use	3,451	.48	2.75	4,569	1.00	3,451	8,020
Nonfarm use:							
Federal Government	296	2.22	2.75	1,807	5.00	1,480	3,287
Lawn and turf	1,200	.50	2.75	1,650	1.00	1,200	2,850
Rights-of-way	2,175	2.01	2.75	12,022	10.00	21,750	33,772
Private nonfarm forests	430	2.07	2.75	2,448	3.00	1,290	3,738
Aquatic areas	81	2.00	2.75	446	2.00	162	608
Other uses	306	1.91	2.75	1,607	2.00	612	2,219
Total nonfarm use	4,488	1.62	2.75	19,980	5.90	26,494	46,474
Total all uses	7,939	1.12	2.75	24,549	3.77	29,945	54,494

1/ Calculated weighted average of individual crops and crop groupings (0.59233).

8,892,000 lbs

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Undocumented Amounts

- Actual amount could differ as a result of undocumented test data
  - Published reports located along with unpublished laboratory notebooks, though not all laboratory notebooks available.
- Potential unconfirmed amounts expected to be similar to amounts identified *(i.e. magnitude in 10s of lbs or less not 100s of lbs)*

Aerial view of Building 1301, Crops Division – September 1966

Acquisition of Herbicides

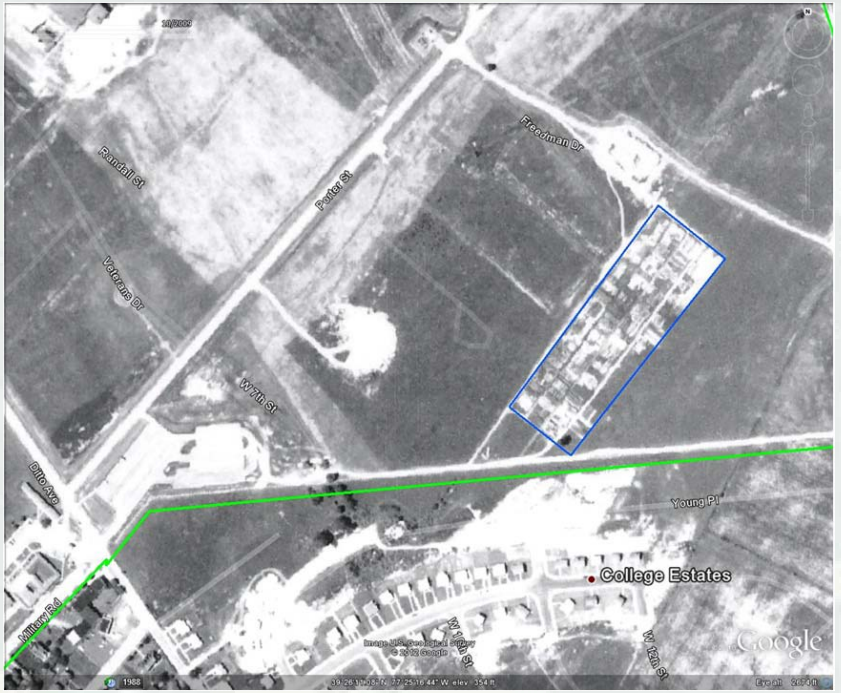
- Initial screening amounts (lab, greenhouse and small plots) generally made in house
- Large field trials - produced by contract (i.e. 2,4-D produced in WWII)
- LNA & LNB (butyl esters of 2,4-D and 2,4,5-T) standard anticrop herbicides in March 1953 with procurement specs
- Air Force acquired LNA & LNB, but surplused it later in 1950s
- Crops Division acquires about 200 drums in 1955-56 for dissemination trials at other locations; drums stored outside at Detrick
- Remaining stock transferred to US Department of Agriculture in 1959 and used in tests elsewhere

Acquisition of Herbicides

- 1958 Federal specifications for 2,4,5-T as standardized items which differs from military type by volatility (evaporation), but manufacture of either type of 2,4,5-T includes dioxin
- Government's supply and logistics organizations would handle acquisition, storage and distribution (not Detrick)
- July 1963 – military specs established for 55-gallon drums of LNA & LNB
- December 1965 – military spec established for 55-gallon drum of LNX (i.e. 50/50 mix of LNA & LNB or Agent Orange)
- Military supply and logistics organizations would handle acquisition, storage and distribution of LNA, LNB & LNX (not Detrick)
- Disposal of remaining bulk military stock of Orange conducted on a ship off of Johnston Island in the South Pacific Ocean, summer 1977

Storage of Herbicides

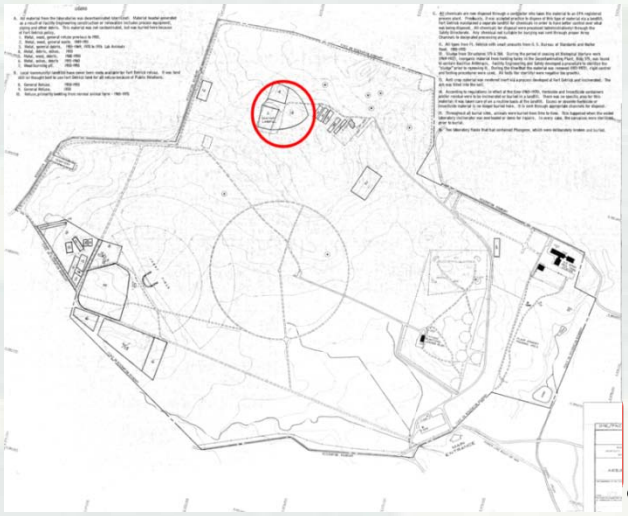
- Limited storage space required for the laboratory and small field trials (not bulk or depot storage)
- In 1955-56, Crops Division acquired approximately 200 drums of LNA and LNB and placed it in open storage



Area A – Open Storage Area – Aerial Imagery 9 August 1958

Disposal of Herbicides

- No documentation located for 1940s, 1950s and most of 1960s
- 1969 Detrick Regulations, specify that no herbicides will be disposed of through the installation's drainage system and that "*Excess quantities of these chemicals will be placed in containers with an identifying label attached, and will be disposed of by Decontamination Branch by burial at the Grid Area*" (i.e., Area B)
- 1977 Installation Assessment previously reported burial of herbicides in disposal Pit 14 at Area B from 1965 to 1971.
  - Area capped and GW sampling has shown no herbicide contamination.
  - Tables indicate total disposal volume of 2,4,5-T from 1970 and 1971 – 4.18 drums & 100 lbs



Facility Maintenance Use

- Military installation groundskeepers used 2,4,5-T to control weed and brush growth, such as along fence lines, lawns and around ammunition magazines in the late 1940s to early 1970s
- Use in accordance with Armed Forces Pest Control (Management) Board
- Specific records on such use not permanent, hence few details for Detric found``

Weed Control in Area A – February 1958

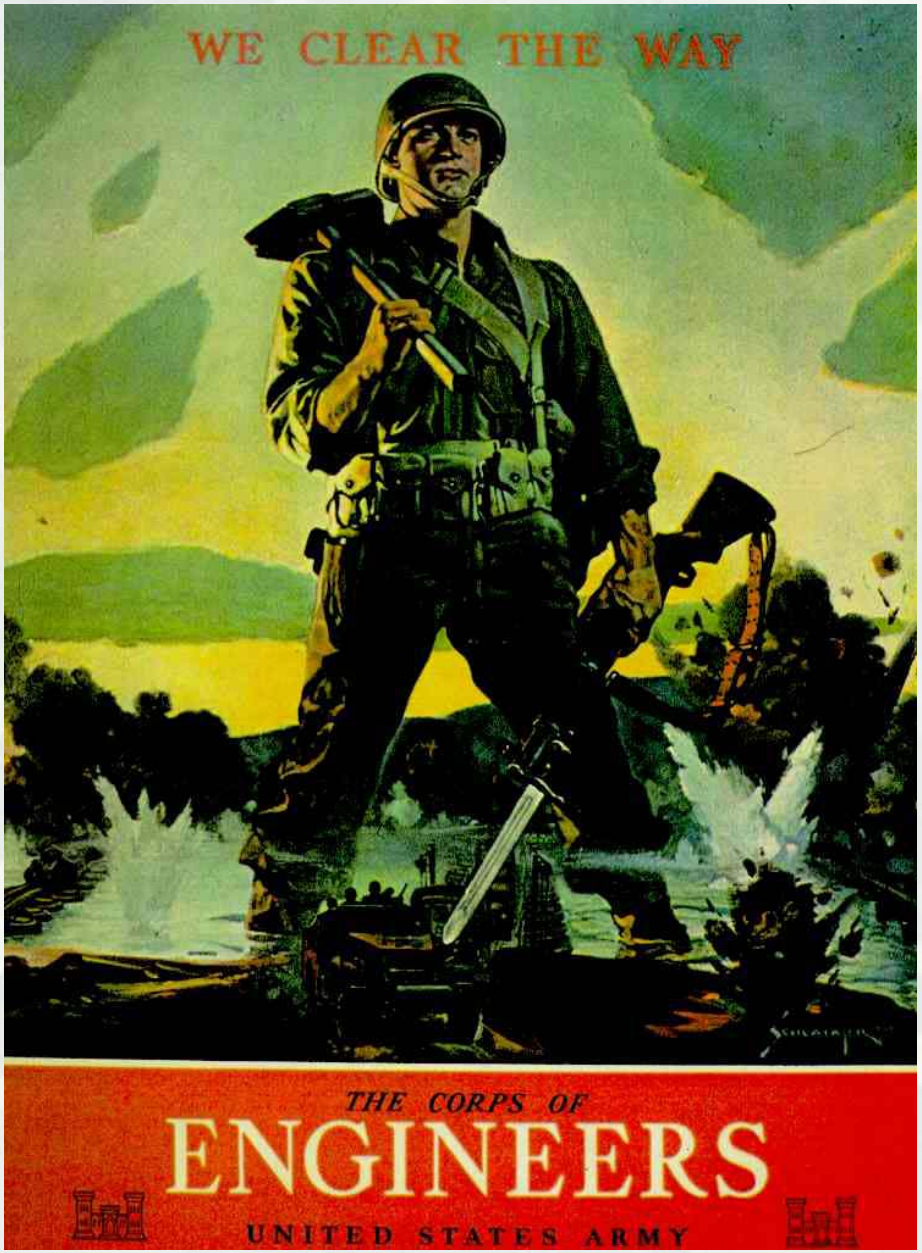
- August 1951, arsenic based herbicide sprayed along fence line killed 8 cows grazing on adjacent land

2,4,5-T at Detrick Summary

- Amounts of 2,4,5-T tested outdoors at Detrick small (in grams) totaling ~22 pounds
- Typically used hand sprayers with shelters to prevent spraying adjacent plots; no aerial herbicide spray dissemination tests at Detrick (tests occurred elsewhere by Detrick personnel)
- Historic small crop locations identified from aerial imagery and descriptions
- Detrick mission not to acquire and store bulk amounts, but did have some surplus in open storage in 1950s
- Total volume in 1970-71 disposed of in Pit 14 in Area B– 4.18 drums & 100 lbs of 2,4,-T; sampling has shown no herbicide contamination

What's next?

- Detrick and USAEC will develop a sampling program to determine if any contamination remains from 2,4,5-T testing
- Companion ASR documenting other historical activities and potential sources of environmental contamination due in Summer 2012



Questions?