US Army Corps of Engineers

Archives Search Report
Operational History for Potential Environmental Releases
Fort Detrick

Frederick, MD
16 June 2014

Prepared by
U.S. Army Corps of Engineers St. Louis District
Prepared for
U.S. Army Environmental Command (USAEC)
and
U.S. Army Garrison Fort Detrick

ARCHIVES SEARCH REPORT
TABLE OF CONTENTS

APPENDICIES

TABLE OF FIGURES

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY AND CONCLUSIONS

ASR Purpose and Scope: In August 2010, based on public concerns regarding the past Biological Warfare (BW) Research, Development, Test and Evaluation (RDT&E) program at Fort Detrick, the U.S. Army Environmental Command (USAEC) and the U.S. Army Garrison Fort Detrick requested an Archives Search Report (ASR) to document past RDT&E activities and identify the potential for environmental releases that may have resulted from those activities. Following the demilitarization of the offensive BW program in the early 1970s, Fort Detrick disbanded the former technical library and in general did not retain the records pertaining to past RDT&E efforts, thus an archive search was required to relocate this material at the various elements of the National Archives and Records Administration and a number of other record repositories. In the simplest terms, the ASR investigation looked at quantities of chemicals, agents and materials used, the locations of their use and/or disposal, and the potential for their release into the environment, to help the U.S. Army Garrison Fort Detrick and U.S. Army Environmental Command (USAEC) determine if there is any hazard remaining on or migrating from the site.

Because the primary public concern at the time the ASR was initiated related to Agent Orange, the ASR team's priority was completing a report on the use of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), the component of Agent Orange contaminated with dioxin. The results of that portion of the archive search investigation are published in a separate volume: ASR Findings for Field Testing of 2,4,5-T and Other Herbicides, 4 April 2012.

This volume reports the archive search findings related to the use and potential releases of other chemicals and agents historically used at Fort Detrick.

Fort Detrick History: In March 1943, the Army's Chemical Warfare Service (CWS) acquired the rights to Detrick Field, which the Army previously used as a pilot training center and landing field. This was done to establish **Camp Detrick,** the center of the United State's fledgling offensive and defensive BW RDT&E program. Camp Detrick housed the main laboratories and research facilities for investigating biological agents and developing the dispersal methods or weaponization means for those agents, along with providing limited production capabilities of BW agents.

BW testing using agents and simulants that mimicked an agent included small scale laboratory tests and tests within enclosed chambers located inside buildings. Larger-scale open-air field tests conducted at Detrick were limited to use of BW simulants or a limited amount of anti-crops agents. Army installations located elsewhere provided large-scale production facilities or field locations for pathogen tests. Investigators Tests conducted with the pathogenic agents included bacteria, rickettsia, viruses, fungi, or toxins derived from living organisms.

Following WWII, the mission remained essentially the same even as the Army renamed the organization the Biological Warfare Laboratories (BWL), U.S. Army Biological Laboratories and variations thereof and upgraded the post designation to Fort Detrick in 1956. In the 1940s-1950s, the Army increased the size of the installation, which is currently covers 1,153.13 acres on four non-contiguous parcels: the built-up main post (Area A), a field test grid (Area B) and separate water and sewage treatment plants on the Monocacy River (Area C).

The most significant transformations at Fort Detrick occurred after the November 1969 U.S. policy change renouncing the use of lethal biological agents and weapons, and all other methods of BW. This change directed that U.S. BW research would be confined to defensive measures, such as immunization and safety measures. Subsequently in 1971 and 1972, the U.S. Army Garrison, Fort Detrick became separate from the renamed and downsized U.S. Army Biological Defense Research Laboratory; the Army placed Fort Detrick under the Surgeon General and began converting a large portion of the post into cancer research facilities under the National Institutes of Health (NIH).

In the following years, the Garrison at Detrick essentially acted as its landlord providing centralized base operational support services for an ever increasing number of tenants, to carry out their missions. In the following four decades, the primary missions on base became biomedical research and development, medical logistics, materiel management and global telecommunications. Fort Detrick remained under the control of the Army Surgeon General, starting in 1994 as a U.S. Army Medical Command (MEDCOM) facility and serving as headquarters for the U.S. Army Medical Research and Materiel Command (USAMRMC) as well as headquarters for a number of subordinate elements. The most widely known of which is the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) and its research into naturally occurring infectious diseases conducted at the Biosafety Level 4 facility on base. In 2011, the Army officially transferred Garrison to the U.S. Army Installation Management Command (IMCOM), which provides a uniform structure for managing U.S. Army installations.

From its beginning the primary safety concern at Fort Detrick was the release of BW agents being investigated at the facility into the environment. As such, Fort Detrick made extensive efforts to contain BW agents within the laboratories, test chambers, pilot plants and other facilities on the installation. Additionally, Detrick prohibited open air testing of BW agents on post, limiting the field tests to the use of BW simulants, non-toxic substance that mimicked the properties of the pathogens being tested in the laboratories. Field test also included a limited amount of anti-crops agents, the testing of which was timed in order to eliminate any potential threat to local crops.

Fort Detrick developed decontamination methods to sterilize facilities and material contaminated during the RDT&E activities in order to continue their safe use or to prepare them for safe disposal. The sterilization methods included treating any potentially contaminated effluent or gases (air) that could possibly have come in contact

with BW agents. The decontamination and/or sterilization methods developed involved thermal treatment (heat/incineration) and/or chemical treatment. The use of chemicals for decontamination/sterilization, as well as in experimental reagents, refrigeration, pest control and other historical activities at Fort Detrick may have resulted in environmental releases. The environmental releases include both intentional disposal activities and unintended releases through accidental spills or normal use of materials later found to present a potential threat to the environmental.

Summary of Findings: The ASR reviewed the operations involved with the BW program including the agents used (anti-personnel, anti-animal and anti-crop agents), decontamination methods and in particular the chemicals used to effect sterilization. The ASR investigation also reviewed the BW RDT&E facilities including the laboratories, enclosed test chambers, pilot plants, incinerators, sanitary and contaminated sewage systems, solid waste disposal and landfills, open air or exterior test grids / ranges including one south of Frederick in the Monocacy Valley used with simulants. The ASR also identified known BW specific operations with Trichloroethylene (TCE) and perchloroethylene (PCE), ammunition storage, training ranges (conventional munitions), pest control activities, petroleum, oil and lubricants (POL) facilities and other support operations including the use of radioactive materials.

The ASR compared the findings for those operations with the environmental investigations undertaken by the Army for the Installation Restoration Program (IRP) of the Defense Environmental Restoration Program (DERP). When applicable the Fort Detrick IRP FTD site numbers (i.e. IRP FTD) are noted for clarity along with the status based on the 2012 Installation Action Plan. For example. the Skeet Range is IRP FTD 29, No Further Action (NFA) Decision Document (DD)). The ASR located many sites that are currently undergoing environmental investigations. To the extent that the ASR identifies potential sites that are not, nor have ever been, investigated, the Army, through DERP, has initiated the remedial investigation process under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The main findings are a follows:

BW Agents Potential

Although Detrick preformed investigations with BW anti-personnel agents in the laboratory, enclosed test chambers and other facilities in the Restricted Area located within the current Area A, Detrick had strict policies against performing such test elsewhere on the installation, including the Area B Test Grid. No field or open air anti-personnel or anti-animal tests with BW agents are documented to have occurred at Detrick.

BW agents generally come in the form of pathogenic bacteria, rickettsia, viruses, fungi and toxins derived from living organisms (as opposed to synthetic chemicals or poisons). Because of the nature of working BW agents, Detrick kept the facilities and locations where the agents were tested, and hence where contamination could potentially occur;

separate from the remainder of the post. This was designated as the Restricted Area or Limited Area. From the beginning, Detrick made safety a top priority. There were strict guidance and safety procedures for working within the Restricted Area and with the BW agents. Since the slightest leak in the process equipment or laboratory operations presented a danger to Detrick personnel and the surrounding community, Detrick instituted a vigilant monitoring and sampling program to detect any escape of BW agents. Methods to decontaminate the contaminated areas and facilities, sterilization of personnel and equipment in order to remove hazards also were developed and diligently followed.

Open air field testing at Detrick was limited to the use of BW simulants, which are substances or microorganisms that represent, or mimic, the physical and biological characteristics of an agent.The two most commonly used BW agent simulants were *Serratia marcescens* (SM), a simulant for pathogenic bacteria, and *Bacillus subtilis* var. *niger*, more commonly referred to as *Bacillus globigii* (BG), a simulant for pathogenic spores. Other commonly used simulant were fluorescent particles, zinc cadmium sulfide (ZnCdS) and *Aspergillus fumigatus* (AF), a fungus simulant.

Detrick did conduct a limited amount of field or open air tests with anti-crops biological pathogens in Area A.[i] The outdoor tests with anti-crop pathogenic agents included work in garden plots using Southern Blight (*Sclerotium rolfsii*) conducted in 1944 and 1945 on sugar beets and potatoes and experiments using shotgun shells and 20 mm projectiles in 1948 an 1950 to disperse a cereal grain rust (Wheat Stem Rust). In 1949, Detrick worked on developing the best methods for harvesting plant agents and intentionally infected cereal plants with rusts on several moderate size fields.

Unlike anti-personnel and anti-animal agents, anti-crop pathogens could be developed and tested in the field without risk to Detrick personnel or the local community when precautions were taken to prevent infection of local crops. Typical precaution were growing an infected crop (e.g. rice blast) in an area where that crop is not typically grown (Frederick County, MD) or planting infected crops later in the season, after plants in the community passed the point of infection (i.e. growing a spring- type cereal crop in areas where winter-type versions of those crops are grown).

After the U. S. renounced offensive and retaliatory use of BW in November 1969, the Army formulated guidelines for BW demilitarization plans and initiated plans for disposal of all anti-crop material at Fort Detrick. The Army destroyed the Rice Blast (*Pircularia oryzae*) stores at Detrick by inactivating the spores with Carboxide gas (10% ethylene oxide and 90% carbon dioxide), followed by incineration with the ash being tilled into the soil at Disposal Pit 13 in Area B (see section 5.7.2). The BW demilitarization plans also included decontamination of all of the buildings and equipment in the contaminated area and certifying them as clean for reuse, release to non-Army agencies or standby closure. The certification process occurred between 1971 and

[i] Detrick activities with chemical anti-crops agents or herbicides are covered in the companion volume: ASR Findings for Field Testing of 2,4,5-T and Other Herbicides, 4 April 2012

1973 and involved some 79 structures (see section 5.6.3). This occurred for all but four buildings due to concerns with *Bacillus anthracis* spores (anthrax) possibly remaining in the building foundation, cracks and pores. Later investigations determined no further action was required and three of the buildings remain in use (201, 263 and 375). The fourth (470) was razed (IRP FTD 01 NFA).

The intensive decontamination procedures ensured the sterilization of material and facilities of BW agents at Fort Detrick. However, in 1972, sludge in the bottom of the holding tanks at the decontamination plant (Building 384) showed the presence of *Bacillus anthracis* spores and it could not be heat treated to a temperature necessary to sterilize the sludge. As such, Detrick buried approximately 25 tons of this material in Pit 12 of Area B after treating it with hypochlorite in the holding tanks and at the burial pit.[1] Later environmental investigations recommended monitoring of the potential hazards related to the presence of *Bacillus anthracis* cysts in the soil. By 1988, an environmental audit of Fort Detrick determined it was unlikely that live BW material was disposed of at Detrick and noted that it is highly unlikely that BW agents would survive in the subsurface environment. However, during a 2001-2004 removal action vials containing live pathogens in medical wastes were found at Area B-11. All intrusive work was temporarily suspended at the disposal area until additional safety measures and testing procedures were in place. The interim removal action was completed in 2004 (IRP FTD 49 Long Term Monitoring (LTM)).

Decontamination Chemicals Potential

Operation of the Detrick infrastructure required use of decontamination chemicals for the sterilization of personnel, equipment and facilities resulting from the investigation BW agents when applying heat was an impractical or ineffective method (e.g. destroying delicate and valuable equipment) (see section 5.6.2)[ii]. Disposal of the used decontamination chemicals is not well elaborated in the available documentation, but it appears that typically that liquid material went into the "contaminated" sewer line system for processing. The contaminated sewer line was where potentially contaminated effluent from the Restricted Area was piped from drains in the floor of the test areas to holding tanks that stored material until they were treated in batch mode. Heat and steam to achieve temperatures high enough to kill any live biological agents (IRP FTD 03 NFA). After treatment, the effluent was tested for organisms, and when cleared, was released into the non-contaminated sanitary sewer system.

The primary chemicals used in decontamination activities at Detrick were the following (in alphabetic order):

- Beta (β)-propiolactone (BPL)

[ii] Non-chemical decontamination methods such as using ultraviolet (UV) lamps, raising effluent temperatures or using water steam sprays were not considered as producing a distinctive environmental contamination potential or pathway. Incineration is discussed separately.

- Calcium hypochlorite (as HTH (high-test hypochlorite) and bleaching powder)
- Ethylene imine
- Ethylene oxide as Carboxide gas (10% ethylene oxide and 90% co_2) and as 19% ethylene oxide and 81% Freon 12)
- Formaldehyde (formalin, a 37% solution of formaldehyde in water and paraformaldehyde)
- Sodium hypochlorite (aka. Liquid bleach or "Clorox")

The following chemicals were also used, or suggested for use, in decontamination activities at Detrick (in alphabetic order):

- Asboloxane
- CC2 (impregnate)
- Chlorine
- CWS screening smokes: oil smoke, white phosphorus, HC (hexachoroethane) and FS (liquid smoke consisting of a mixture of sulfur trioxide and chlorosulfonic acid) smoke
- DANC (decontaminating mixture of CC no. 1 (a chlorine mixture) and acetylene tetrachloride)
- Detrochlorite (calcium hypochlorite ant thickening agents, surfactants and water)
- Detroxide (12% ethylene oxide and 88% dichlorodifluoromethane)
- Formaldehyde - methanol
- Halazone (chlorine based water purifier)
- Lysol
- Mercuric chloride (1 to 1000 and 70% alcohol)
- Methyl bromide
- Peracetic acid (PAA)
- Phenol
- Propylene glycol
- Quaternary compounds (Rocca1, Purasan, Hyamine)
- Sodium hydroxide (aka lye or caustic soda)
- Sodium or potassium hydroxide (e.g. Drano)
- Super tropical bleach (STB, chlorinated lime [calcium hypochlorite] and calcium oxide with 30 percent available chlorine))
- Triethylene glycol

Further discussion of disposal methods for used decontamination chemicals is in the Liquid Waste Disposal and Incinerator Sections that follow.

Solid Waste Disposal

Following standard practices of the time, Detrick separated non-salvageable material into burnable waste that went to an incinerator and non-burnable waste that went to a landfill.

Detrick also divided solid waste into two classes: potentially contaminated from the restricted areas, that went through decontamination procedures first and uncontaminated solid waste from the administrative and housing areas. During WWII, Detrick had several incinerators on post for burning of combustible solid material (see section 6.5).

Complete details of that initial solid waste disposal process are not confirmed, but would appear to correspond with those from early 1947. At that time Detrick generated about 3,000 pounds of refuse a day from within the Restricted Area, with about two-thirds being incinerated in post Incinerator 523 and the other third incinerated in the City of Frederick incinerator, along with an additional 1,500 pounds daily from the rest of the post (total of about 2,500 pounds a day to the city). Detrick sent two loads of non-combustible material to the city dump daily in 1947 as well. In January 1948, Detrick opened Incinerator 1112 at the Monocacy disposal plant to incinerate all noncontaminated rubbish (IRP FTD 54 LTM). It was operated until replaced by the Incinerator Plant, Building 393 in 1975 (IRP FTD 46 NFA). Also in 1948, Detrick developed a non-burnable trash pit in Area B, apparently ending use of the Frederick dump. Over time, Detrick developed various Disposal Areas in Area B, including a landfill that currently continues to operate (see section 6.7.2). Between 1994 and 2004 Detrick conducted Phase I and Phase II Remedial Investigations for Areas B and C. Numerous environmental investigations of the Area B disposal areas (IRP FTD 49, 50, 51, 69, 70 & 71 LTM) have been made and the resulting reports document the findings. Remedial actions including removal actions and capping of the disposal areas have been completed. By 1957, Detrick established a contaminated combustible Burn Pit in Area A that operated though the 1960s. By 1970, the former burn pit was grassed over and was developed into a storm water pond by 2011 (IRP FTD 11 NFA). Detrick also operated a rubble disposal pit that was replaced by the Helipad by 1974 (IRP FTD 09 NFA) (see section 6.7.3.1). Previous environmental investigations of these areas by the IRP resulted in No Further Action decision documents (IRP FTD 11 NFA and IRP FTD 09 NFA). This investigation found no clear evidence of a disposal, or landfill operation, relating to a reported “Disposal Area 17” in Area A used until 1947 between Buildings 538 and 560 (IRP FTD 08 NFA) (see section 6.7.3.2).

Liquid Waste Disposal

One of the measures employed at Fort Detrick to avoid any potential release of BW agents was the use of a separate “contaminated” sewer system, in addition to the regular sanitary sewer system. Liquid waste from within the Restricted Area where work with infectious agents occurred (see section 6.6.3) including decontamination chemicals, laboratory waste, pesticides, surplus chemical, etc. was handled by the contaminated sewer system. The regular sanitary sewer system handled the effluent from the rest of the post as well as the treated sewage from the contaminated system (see section 6.6.2).

Sewer System

Potentially contaminated effluent from the Restricted Area was piped through the “contaminated” sewer system to holding tanks that stored the material and regulated the

flow rate so the material could be go to the treatment plants in batches. A heating coil, heat exchangers and steam were used to raise the temperature in the treatment plants high enough to kill any live biological agents (IRP FTD 03 NFA). After treatment, the effluent was tested to ensure its safety, and when cleared, it was released into the non-contaminated sanitary sewer system to be processed with ordinary sewage. The remainder of the installation sewage, being typical of regular military installations, was handled as such. Initially the City of Frederick municipal system handled the non-contaminated sanitary sewage, but went to the once the Detrick-specific sewage treatment facility located about two miles east of Area A at the Monocacy River, once it was available.

During WWII, the Army initially established three effluent sterilization plants: 280, 314 and 519, which operated until the new Decontamination Plant 375 (IRP FTD 01 NFA) along with the associated holding tanks (Building 384) became operational in 1953. This rendered the earlier facilities obsolete, resulting in their subsequent disposal. (see section 6.6.3). Detrick sampled the sewage plants several times each day, typically at the most likely sources of leaks (e.g. valves, flanges, pumps shafts), to ensure sterility of the effluent and the tightness of the equipment. If the plant tested positive for agent, Detrick decontaminated the plant with steam, a hypochlorite solution, formaldehyde or sodium hydroxide. The sewage decontamination process appears to be effective; however as noted above, in 1972 sludge in the bottom of the holding tanks at the decontamination plant (Building 384) showed the presence of *Bacillus anthracis* spores (anthrax) and it could not be heat treated to a temperature necessary to sterilize the sludge. As such, Detrick buried approximately 25 tons of this material in Pit 12 of Area B after treating it with hypochlorite in the holding tanks and at burial.[2] Later environmental investigations recommended monitoring of the potential hazards related to the presence of *Bacillus anthracis* cysts in the soil. By 1988, an environmental audit of Fort Detrick determined that it was unlikely that live BW material was disposed of at Detrick and noted that it is highly unlikely that BW agents would survive in the subsurface environment. This area was partially capped in 1990 with remaining portions capped with an impermeable liner in 2010.[3] The ASR investigation did not identify any other instances of contaminated sludge.

By the mid 1950s, Detrick allowed use of the sludge from the Monocacy River sewage disposal plant as fertilizer on-post. It also was being used off-post by the 1960s. Based on standard Army guidance from the time, it appears likely this practice existed from the time Detrick opened the Monocacy plant in 1948 (see section 6.6.2). Prior to that, sewage from Detrick went to the City of Frederick municipal system and the ASR did not identify the disposition of sludge from that facility. Exact locations of the application of the sewage sludge are undetermined. However, review of historic aerial photography could identify likely areas that received fertilizer application of sewage sludge. The selling of sludge by Fort Detrick to local farmers for fertilizer was confirmed as a common practice by the late 1980s.

Other Liquid Waste Disposal

Disposal of the used decontamination chemicals is not well elaborated in the available documentation, but it appears those liquid materials typically went into the "contaminated" sewer system for processing. The pilot plants and other facilities in the restricted area had floor drains where wash water used to clean the chamber could wash onto the floor and down the drain. From the floor drain it went to a sump, waste disposal tank or blow cases, all of which flowed into the contaminated sewer system. The materials then would be treated in the decontamination plants, using heat. After sampling to ensure there was no live organisms, it was released into the regular sanitary sewer system. This appears to be a common practice for handling facility decontamination, although a comprehensive analysis of all the plumbing of the buildings in the restricted area was not undertaken.

Not all waste liquids went into the sewer system. By 1952, Detrick directed that large quantities of acid, used cleaning solution or contaminated flammable liquids were not to be poured down building drains but rather stored in carboys for removal and disposal by the Decontamination Branch; however, it is unclear how the branch personnel made final disposal at that time. Although this ASR investigation did not uncover additional information to confirm these reports, site plans indicate chemical, herbicide and insecticide disposal on-site from 1965, and the 1977 Installation Assessment noted that "*Pit 11 – was used from 1955 to 1970 to dispose of acids and chemicals.*" [4] By 1969, Fort Detrick Regulations[iii] specify that "*No pesticides, herbicides or rodenticides will be disposed of through the Fort Detrick drainage system. 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).[5] Subsequently numerous environmental investigations of the Area B disposal areas (IRP FTD 49, 50, 51, 69, 70 & 71 LTM) have been made and the resulting reports document the findings. Remedial actions including removal actions, capping of the disposal areas and long term monitoring have been completed or are in place.

Incinerators

Fort Detrick used incinerators for several purposes such as the disposal of solid combustible waste (contaminated and uncontaminated), to decontaminate some noncombustible waste items before burial and as a means to decontaminate vent or exhaust gases (e.g. sterilize the air) from contaminated facilities. Ash disposal procedures for the WWII era solid waste incinerators are unclear and the ultimate location of ash disposal undetermined. Area B burial pit descriptions indicate receiving ashes from 1955-60 and 1970 but do not mention the previous burial locations (IRP FTD 49, 50, 51, 69, 70 & 71 LTM). Investigation of the area surrounding the former 1112 incinerator stack in 1999 identified a nearby ash disposal area in Area C (IRP FTD 54 LTM). Subsequently, Detrick removed all visible ash to the extent practicable and disposed of the material at the active Area B landfill and also implemented institutional

[iii] The 1963 Fort Detrick Safety Regulations do not mention pesticides.

controls to prevent contact with any remaining ash material buried on the site in Area C. With the exception of the investigation of the area surrounding and downwind of the former 1112 incinerator stack in 1999, it is not clear that any environmental assessment has been performed on the specific constituents or the potential effects of airborne effluent released from incinerators at Detrick.

Information from the ASR shows that during the WWII era, Detrick had five solid waste incinerators in use: 257, 289, 312, 523 and 530 which was adjacent to 523. Detrick also listed Building 507 as both an incinerator and a laboratory, so that building's use is unclear. By 1946, Detrick only had 312 and 523 on line and by early 1947 Detrick was only using 523 to incinerate about 2,000 pounds daily with about 2,500 additional pounds a day going to the City of Frederick incinerator (i.e. about 40% from the Restricted Area and 60% rest of the post). In January 1948, Detrick added incinerator, Building 1112, at the Monocacy disposal plant for all the non-contaminated rubbish but continued to use Incinerator 523 to burn rubbish from within the Restricted Area. On occasion Detrick continued to send non-contaminated refuse to the Frederick City Incinerator for burning when Incinerator 1112 was undergoing repairs. In 1955, Detrick requested permission to dismantle the smoke stack from Incinerator 257 and in 1956 Detrick received permission to dispose of Incinerator 289 because it was no longer needed. In the early 1970s, Detrick lists Incinerator 312 in "standby" status and Incinerator 523 was apparently razed. With the construction of a new Incinerator Plant, Building 393 in 1975, consisting of two Municipal Solid Waste (MSW) incinerators on the western side of Area A, Detrick demolished Incinerator 1112. Incinerator 312 remains standing.

Ash disposal procedures for the WWII era incinerators are unclear and the ultimate location of ash disposal undetermined. Area B burial pit descriptions indicate receiving ashes from 1955-60 and 1970 but do not mention the previous burial locations (IRP FTD 49, 50, 51, 69, 70 & 71 LTM). Investigation of the area surrounding the former 1112 incinerator stack in 1999 identified a nearby ash disposal area in Area C (IRP FTD 54 LTM). Subsequently, Detrick removed all visible ash to the extent practicable and disposed of the material at the active Area B landfill and also implemented institutional controls to prevent contact with any remaining ash material buried on the site in Area C.

Detrick also had four vent gas incinerators in use during the WWII era,: 235, 294, 313 and 520. By 1946, only 313 and 520 remain on line with Incinerator 235 used sporadically (e.g. September 1949). In 1956, Detrick received permission to dispose of Incinerators T-235 and 294 as they were no longer needed. By 1975, Incinerators 313 and 520 are listed in "standby" status. Based on review of historical photos, it appears Building 313 was razed between 2005 and 2007 and Building 520 was razed for the construction of 576.

TCE and PCE Potential

Fort Detrick used Trichloroethylene (TCE) as an industrial solvent in the degreasing parts, as a refrigerant in the freeze-drying process to produce dry BW agents, and as a

brine or secondary refrigerant associated with test chambers where very low and a wide spectrum of temperatures (e.g., between -55 to 260o F) were required. While the volume consumed in solvent/parts cleaning applications are unknown, it appears the amounts required for refrigeration represent much higher volumes to be located in a single area (i.e., over 400 gallons in one storage tank location). These TCE based refrigeration systems were known to have been located in Buildings 376, 470, 568, and 1412 (see section 7.2.2).

Environmental investigation have identified TCE near Building 568 in Area A, the apparent result of leaks from drums of TCE that were stored outside in the courtyard between buildings 567, 568 and 571 (see section 7.2.2) (IRP FTD 66 LTM). Additionally, environmental investigations have identified two plumes of TCE contamination in Area B. One of the plumes is located in the northern portion of Area B and is believed to be associated with the active landfill. The second plume is located in the southwestern portion of Area B, which is the location of Pit 11. That disposal area received various chemical wastes between 1955 and 1970 (see section 6.7.2) (IRP FTD 49 LTM). In 1968, eight 55-gallon drums of TCE were reportedly disposed of by Fort Detrick, with Pit 11 assumed the most likely location.[6] Numerous environmental investigations of the Area B disposal areas (IRP FTD 49, 50, 51, 69, 70 & 71 LTM) have been made and the resulting reports document the findings. Remedial actions including removal actions, capping of the disposal areas and long term monitoring have been completed or are in place.

Detrick used limited amounts of perchloroethylene (PCE) as a solvent and degreaser. It has shown up in soil and water samples in Area B (see section 7.2.3). PCE can also be used as a dry cleaning fluid; however, there is no indication that dry cleaning facilities existed on Fort Detrick other than pick up and drop off services that sent items to facilities at other military installations in Maryland (see section 7.7.3).

Radioactive Material Potential

Like many laboratories and facilities involved in RDT&E, Fort Detrick utilized radioactive materials for a variety of scientific applications such as X-rays, calibrating equipment, or serving as tags to assist in dissemination trials. Detrick acquired this material in two forms: sealed sources and general radioactive isotopes. Sealed sources are just what they imply: the radioactive isotope is sealed in a container to prevent loss of the source material to the environment. General radioactive isotopes are intended to be used in the environment, which in the case of Fort Detrick was primarily in a laboratory environment, though isotopes were used in some field application such as a tracer in dissemination trials. The work at Detrick primarily involved the use of by-product material and as such operated under the guidance, licensing and other requirements of the AEC and later the NRC. In addition to the AEC/NRC procedures and regulations, the Army and Detrick produced a series of further supplementary guidance.

Typically when an organization at Detrick desired radioactive material for use in a specific project or activity, they submitted a request through the post Radioisotope Committee/Radiological Safety Section to ensure all regulatory requirements were met. Following completion of the paperwork, the material was ordered, received by Safety Division, and transferred to the user. The Detrick RPO made periodic inspections to account for the material and to ensure compliance with appropriate regulations. Waste materials generated during the operation of the project, were collected at the point of generation and periodically transferred to the safety section for ultimate disposal. For items with short half-lives, this meant storing it until it aged out and could safely be disposed of under procedures for non-radioactive material. Through 1957 the disposal method for other materials was on-site burial in designated locations in the southwest portion of Area B. After 1957, items were held for shipment to a licensed offsite facility for processing and disposal. The isotope committee/Safety Division was also responsible for insuring the using organization complied with all requirements when closing out the portion of a project requiring use of radioactive materials.

Initially Camp/Fort Detrick was the only agency and licensee using source material on the installation. As tenant activities became more active in the 1970s and later, the garrison's role was reduced to receiving and disposing of radioactive materials and waste from the tenant activities. Eventually the garrison was completely removed from the handling of radioactive materials, and the tenants became responsible for their own receipt and disposal activities.

This ASR developed a listing of the isotopes identified at Fort Detrick that may have resulted in the production of radioactive waste and sealed sources not used in a manner which would produce radioactive waste (see section 8.1)

Use of radioactive material at Detrick began in early 1948, following formation of a safety committee to control radiological activities. For the first few years radiological amounts, methods and location at Detrick are uncertain. Applicable Army guidance in 1950 called for aging-out waste containing short half-lives and disposing of it through non-radioactive waste channels.

In 1949, AEC's safe handling guidance on allowed burial of wastes on user-owned property; however it was not until 1951 that Detrick dug a trench in Area B to bury radioactive waste (identified as pit 3 on a 1951 map and later identified as pit 11). During the last half of 1951, Detrick disposed of approximately 148 gallons of solid waste and 190 gallons of liquid waste in that trench. Historic maps indicate use of the trench was limited to one year. In June 1952, Detrick dug a disposal shaft for in the same vicinity. This location differs from the two locations identified as pit "16 Radiological Material Sites" on a 1979 map.

In 1956, Detrick described that solid waste was collected and stored until a sufficient amount accumulated for burial in *"two separate holes 15x15x15 feet…in an area that is fenced"*, though it is uncertain if these locations conform to the ones noted on maps. The

end of radiological material burial on Detrick appears to coincide with activation in 1957 of the Army's east coast RMDF at Edgewood Arsenal, MD. As such, this facility received radioactive waste from Fort Detrick for ultimate disposal. It is undetermined when Detrick ceased shipping waste to the RMDF, but it continued storing and packaging the waste for shipment elsewhere at the "Radiological Waste Storage Facility" in Building 261. By the early 1990s, solid waste material was handled by a waste disposal contractor to the AMCCOM (see section 6.7.2 Area B Disposal Areas).

By 1952, Detrick used another method to dispose of liquid radiological waste. At that time, Detrick placed four 100 gallon tanks in Building T-270 and used them to store liquid waste until natural decay (i.e. half life aging-out) made it feasible to dispose of it in the sanitary sewer system, or allowed it to be diluted to the radiation level where AEC or CFR regulations allowed for the discharge of the waste at certain radiation levels into the sewer system, a practice that would continue through December 1999.

Sewage disposal plant sludge, which potentially contained aged-out radioisotopes from the wastewater treatment system, was allowed to be used as fertilizer on-post by the mid 1950s. This practice appears likely to have started circa 1948 and continued through the 1960s. From the mid-1970s until 1997, Detrick disposed of the dried sewage sludge at the post landfill in Area B. In May 1997, Fort Detrick ceased disposal of sludge at the landfill as a result of an NRC policy shift requiring disposal of sludge having radioactivity distinguishable from background as radioactive waste rather than solid waste. Between 1998 and 2004, Detrick sent the dried sludge to a low-level radioactive waste facility in Utah.

Based on reviewed documents radiological activities occurred in the following buildings over the course of licenses 19-01151-01 and 19-01151-02: 201, 236, 321, 427, 432, 433, 459, 467, 470, 524, 525, 538, 539, 550, 560, 567, 568, 600, 601, 605, 607, 1301 and 1412. However, only Buildings 201, 459, 568, and 1301 were indentified in the 2002 decommissioning plan.

POL Potential

Since the establishment of Detrick Air Field and throughout historical use of Detrick there have been both Above-ground Storage Tanks (AST) and Underground Storage Tanks (UST) that contained gasoline, diesel, and No. 6 Fuel Oil. The original "Gas" fuel tanks for aircraft and vehicles were located to the northwest of Building 201, the hangar, and based on site plans appear to exist from 1941 to approximately the mid-1950s, by which point they were used for Fuel Oil Storage and appear to be USTs. By 1964, site plans no longer delineate the USTs or 271, indicating removal. It is unclear if fuel storage facility 271, has been environmentally assessed.

The original airfield had fuel lines from the tanks northwest of the hangar (201) to a Quartermaster and Aircraft Dispensing Station and four Aircraft Fueling pits along what is now Hamilton Street. Once the post converted to an RDT&E establishment, those

facilities are no longer noted and the vehicle gas dispensing station is Building 705, north of Porter Street, as noted on site plans from 1944 and 1945. It is unclear if the facility has a specific storage tank associated with it or if the earlier quartermaster fuel lines were extended to it. It is unclear if these 1940s era gasoline dispensing facilities have been environmentally assessed. Building 705 was also in use only a short time and appears to have been replaced in 1951 by Building 940, Gasoline Dispensing, based on a site plan review. By 1970, Detrick added Building 950 as the Exchange Service Station. Both Buildings 940 and 950 had associated USTs that contained gasoline: two 12,000-gallon USTs at 940 and five 8,000-gallon USTs at 950. In 1991, after Detrick identified a gasoline leak from one of the USTs at 940 the USTs were excavated and removed from both buildings. Groundwater monitoring wells were installed and sampled from 1993 until 2005. Based on groundwater sample results it was determined that the contamination was effectively reduced by natural attenuation and is not migrating off Fort Detrick. Currently, the vehicle gasoline station on post is at Building 1405.

During WWII, Detrick used coal to fire the three boiler houses (100, 700 and 900), but by 1952, Building 700 was converted to a laboratory, and boiler houses 100 and 900 were converted to fuel oil as indicated by the planned disposal of the remaining coal handling equipment on base. By that same time, site plans delineate a larger Central Boiler Plant or Steam Plant, Building 190, along with an Oil Storage tank farm and Pump House, Building 191. Building 191 consisted of 10 50-thousand-gallon NO. 6 Fuel Oil USTs. Records indicate that by 1957 boiler house 900 was razed. In 1967, Detrick added a 650-thousand-gallon NO. 6 Fuel Oil AST (Building 194) west of the UST tank farm. In early 1995 Detrick removed the 10 USTs at 191 and several of them were leaking. Detrick initiated corrective actions, and by 2009 the fuel oil contamination in groundwater was considered stable and not migrating off post. Detrick replaced the 191 tank farm with AST 189. There has been extensive environmental investigation, monitoring, and remediation in this area (IRP FTD 73 LTM).

Site plans also indicate there was an oil drum storage (513) in the 1940s, that was apparently replaced by another oil storage building (365) by 1955. That building was apparently razed by 1967. It is unclear if any environmental assessment occurred for these facilities.

Munitions Potential

This includes the four areas in Area B identified by the Army as closed ranges for the MMRP: the Permanent Circular Test Grid, the Gun Emplacement, Building 1222, the Demolition Pit and the Ammunition Storage Area. The other exterior test grids and ranges identified in this ASR do not warrant inclusion into MMRP as they are included within the four areas already identified or do not have a munition or explosive hazard present.

Detrick also had training ranges for use with conventional munitions including two interior small-arms ranges and an exterior skeet range (see section 7.3). These also do

not warrant inclusion into the MMRP, as interior ranges are excluded and the Area B Skeet Range has no explosive hazard and was remediated under the main IRP.

1 INTRODUCTION

1.1 REPORT AUTHORIZATION

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, to respond to threats posed by historic releases of hazardous substances into the environment. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA), expanding the provisions of CERCLA by requiring departments and agencies of the federal government to comply with CERCLA. As a result the Defense Environmental Restoration Program (DERP) was established and the Department of Defense (DoD) became the response authority for releases or threatened releases from any facility or vessel under the jurisdiction, custody, or control of DoD.

CERCLA and its implementing procedures, the National Oil and Hazardous Pollution Contingency Plan (NCP), provide a structured process for investigation, remediating, and monitoring Superfund Sites. The first phase of the CERCLA process is a Preliminary Assessment (PA). Previous investigations at Fort Detrick that predated and followed implementation of CERCLA served an equivalent purpose to the PA. However, due to the highly complex and technical nature of the Army's use of Fort Detrick, the U.S. Army Environmental Command (USAEC) identified the need for a more comprehensive historical research report to supplement previous efforts to characterize operations at the site and determine if there was any potential for environmental releases not already investigated by the Fort Detrick restoration program. While not a standard obligation of CERCLA, the Army has supplemented PA efforts on selected installations, when initial research proved inadequate to identify all potential environmental hazards.

On 18 August 2010, USAEC tasked the Ordnance and Technical Services Branch of the St. Louis District of the U.S. Army Corps of Engineers (CEMVS-EC-P) to provide research and analysis assistance regarding potential environmental releases on Fort Detrick that would be documented in an Archive Search Report (ASR). CEMVS-EC-P has specialized in conducting archival research for environmental site characterization of military installations since 1992. The Fort Detrick assignment included an initial priority of completing a report regarding the field testing of 2, 4, 5-T and other herbicides at Fort Detrick, which was published on 4 April 2012 as: ASR Findings for Field Testing of 2,4,5-T and Other Herbicides.[7] This companion volume looks at the broader category of potential environmental releases without repeating the general findings of that volume.

1.2 SUBJECT

Fort Detrick consists of 1,153.13 acres in Frederick County located on the northwest side of Frederick, MD. The Army installation consists of four non-contiguous parcels. Area A, the largest parcel, is the built-up main post where most activities take place. It is situated between Rosemont Ave/Yellow Springs Road on the west and Opossumtown Pike on the

east. Area B is a relatively open area a half mile to the west of Area A. Area C consists of the separate water and wastewater treatment plants located about two miles to the east of Area A on the Monocacy River. The 68-plus acre National Institutes of Health's Frederick National Laboratory for Cancer lies within the Army's Fort Detrick boundaries on land formerly belonging to the military. For purposes of this ASR it is considered part of Fort Detrick (see following figure).

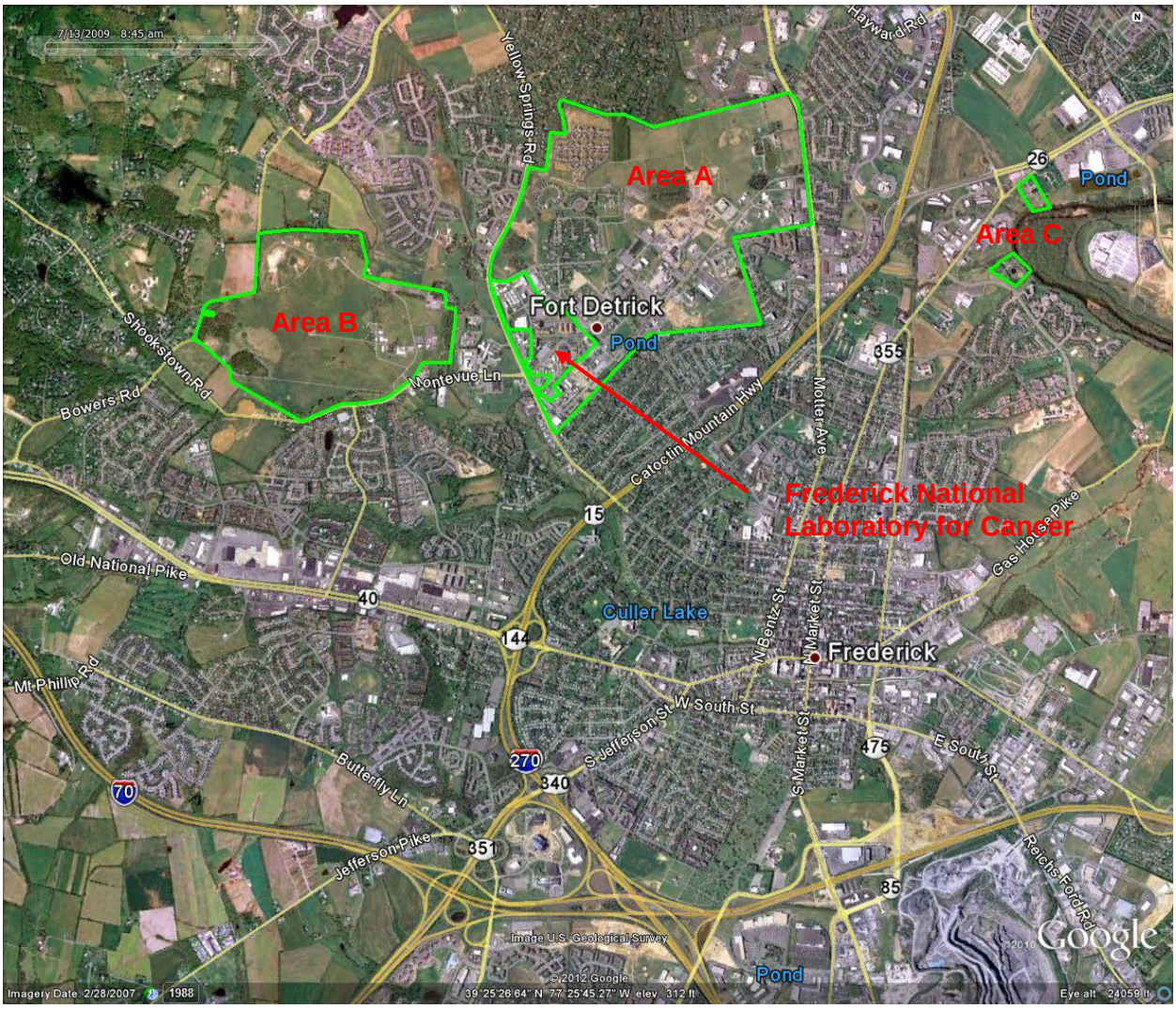


Figure 1 – *Fort Detrick – Areas "A", "B" and "C" - 2012*

During the 1930s and the first part of World War II, the Maryland National Guard and later the Army Air Corps used the city of Frederick's airfield, Detrick Field, as a pilot training center and landing field. In March 1943, the Army's Chemical Warfare Service (CWS) acquired the rights to the airfield in order to establish Camp Detrick as the center of the fledgling U.S. Biological Weapons (BW) Research Development Test and Evaluation (RDT&E) program for both offensive and defensive purposes. Camp Detrick housed the main laboratories and research facilities for investigating biological agents and developing the dispersal methods or weaponization means for those agents. Limited BW

agent production capabilities also were provided, mostly to support the RDT&E mission at Camp Detrick. Offensive BW agents principally relate to anti-personnel and anti-crop agents and to a lesser degree anti-animal ones. BW agents generally come in the form of pathogenic bacteria, rickettsia, viruses, fungi and toxins derived from living organisms (as opposed to synthetic chemicals or poisons). Detrick also focused on defensive BW measures to counter possible BW attack. These efforts included detecting BW agents, protecting against BW agents, and methods of decontamination after exposure to BW agents.

BW testing included small-scale laboratory tests and tests within enclosed chambers inside buildings. Small and medium scale testing typically occurred within the buildings and facilities on Detrick. At both of these scales, investigators could conduct the tests with the pathogens or toxins or with a simulant. BW simulants are substances or microorganisms that represent or mimic the physical and biological characteristics of a toxic agent Larger scale open-air field tests also occurred at Detrick, but these were limited to use of BW simulants or in a few cases a limited amount of anti-crops agents that were timed to avoid harm to local crops and vegetation (see section 5.4 for details). No pathogenic open-air anti-personnel tests are documented to have occurred at Detrick. Although Detrick led the BW efforts, Army installations located elsewhere provided large-scale production facilities or field locations for pathogen tests.

After WWII ended, Camp Detrick retained the BW mission, establishing permanent facilities and expanding the main post in 1946, 1947 and again in 1952. The BW mission at Detrick remained essentially the same but was known by several different, but similar names, including:

- CWS Special Projects Division
- Chemical Corps, Biological Department
- Chemical Corps Biological Laboratories
- Biological Warfare Laboratories
- U.S. Army Chemical Corps Biological Laboratories
- U.S. Army Biological Laboratories.

On 25 November 1969, Detrick's mission changed substantially with, President Richard Nixon renouncation of the use of lethal biological agents and weapons and all other BW, and directed the disposal of existing BW weapons. He further directed that the U.S. would confine its BW research to defensive measures, such as immunization and safety. This led to numerous changes at Detrick including establishing the U.S. Army Garrison, Fort Detrick in 1971, as separate from the tenant organizations and in 1972, the Army placed Fort Detrick under the Surgeon General. In October 1971, President Nixon announced conversion of a large portion of the Detrick to cancer research facilities under the National Cancer Institute (NCI).

In the following years, the Garrison at Detrick essentially acted as a landlord providing centralized base operational support services to an ever increasing number of tenants to carry out their missions. In those four decades, the primary missions on the installation became biomedical research and development, medical logistics and materiel management, and global telecommunications for the Department of Defense. Fort Detrick remained under the control of the Army Surgeon General and it serves as the headquarters for the U.S. Army Medical Research and Materiel Command (USAMRMC) since 1994 along with headquarters for a number of the subordinate elements. The most widely known of these is the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) and its research into naturally occurring infectious diseases. In 2010, approximately 9,000 military, federal, and contractor employees representing all branches of the U.S. military were assigned to Detrick. Other government entities served by Detrick include the Departments of Defense, Homeland Security, Agriculture, Health and Human Services, and Veterans Affairs. In 2011, the Army officially transferred Garrison to the Installation Management Command (IMCOM), which provides a uniform structure for managing U.S. Army installations.

1.3 PURPOSE

This ASR compiles information obtained through historical research at various archives and records holding facilities. The investigation was primarily a textual, cartographic and photographic research and analysis effort. It also makes use of interviews with individuals associated with the property and its operations. No sampling or quantitative field assessment techniques were conducted. The research directed efforts towards determining if there is a potential for the presence of hazardous contamination as a result of previous use, storage, and/or disposal of materials used at Fort Detrick. The research places emphasis on establishing the types, quantities, and locations of those activities. This information gained through this process will be used to develop recommendations for further environmental investigations and, if necessary, remedial actions at Fort Detrick.

1.4 SCOPE

1.4.1 General

For this report, the ASR investigation team focused on potential environmental releases on Fort Detrick. This report presents the following:

- Discussion of the archival documentation available relating to Fort Detrick including the types of reports generated while the BW program operated and highlights of the environmental investigations that have occurred subsequently (Section 2)
- A brief history of Fort Detrick (Section 3)

- A discussion of historic maps and a selected map analysis (Section 4 and Appendix B)
- Examination of the BW RDT&E operations including the role of safety, the various types of BW agents, decontamination and demilitarization of facilities in the early 1970s (Section 5)
- Assessment of the specific types of RDT&E facilities present including laboratories, test chambers, pilot plants, incinerators, sewage treatment, solid waste disposal and test grids and ranges (Section 6)
- Analysis of the non-BW specific operations and facilities that may have resulted in potential environmental releases including munition storage and ranges, pest control, fuel facilities and miscellaneous activities including operations with TCE and PCE (Section 7)
- Evaluation of operations at Fort Detrick that involved radioactive materials (Section 8)

1.4.2 Reference Material

The ASR summarizes the information gathered during the review of documents pertinent to the current environmental restoration program. The scope of all the records reviewed for this ASR is discussed in Section 2, Archival Documentation Relating to Fort Detrick and detailed in Appendix A Reference Sources and Records Reviewed. The material reviewed includes thousands of linear feet of documentation, thousands of maps and drawings, in addition to hundreds of still photographs and aerial imagery. From the material reviewed, the ASR team copied or gathered thousands of documents, maps and photos representing the most relevant material. Many of the documents gathered included hundreds of pages. This gathered material represents reference material or "backup" documentation for this ASR. All the gathered reference material was either gathered in a digital file format or scanned in and a digital file created (e.g. .PDF, .TIF, JPG, etc.). The exception to this relates to the classified material for which digital media was not gathered or created.

Given the volume of reference material collected, it is impractical and unwarranted to reprint this material as appendices to this report. Rather digital versions of the cited references as cited as end notes in Appendix B, as well as the un-cited gathered backup material (i.e. all gathered unclassified material); can be provided separately on a digital media for distribution within the Department of Defense. The reference documents will require some review before release outside the Department of Defense. Although the material is unclassified many documents have distribution limitations that prevent that specific document from being shared with the public, other government agencies or government contractors without further review or approval. Also included with the reference documents is a spreadsheet index of the ASR gathered material, both classified and unclassified, that can assist in identifying documents of interest. This cited material

can be consulted when seeking additional information or details about a subject that is only summarized or briefly discussed.

1.4.3 Classified Reference Material

Producing a classified addendum to this ASR to ensure inclusion of all areas where they might have been potential environmental impacts due to past practices was considered. However, after careful review of the material that remains classified, the ASR team determined all information pertinent to the U.S. Army Garrison Fort Detrick and USAEC environmental restoration program efforts was included within this unclassified report. Similarly, consideration was given to producing digital version of the classified back-up material for potential future use but is unwarranted at this time.

2 ARCHIVAL DOCUMENTATION RELATING TO FORT DETRICK

2.1 DOCUMENTATION GENERAL

Camp/Fort Detrick is an Army installation and as such has typical documents related to the operations of an Army post such as correspondence with higher headquarters and other installations, General Orders, post regulations, Standard Operating Procedures, budgeting, etc. However, because Detrick is primarily an RDT&E installation far more of its documents relate to specific activities. These include information on the test conducted by scientists and investigators and their findings recorded in a variety of formats, from handwritten laboratory notebooks to published reports. Initial notes and findings were recorded in "unevaluated" laboratory notebooks, logbooks and similar records. These were generally for personal use and not made available to other researchers, offices, laboratories or agencies (see Section 2.3). The standard practice at Detrick (as at other RDT&E installations) was to evaluate and convert the initial raw data from these records into documents that were published and distributed or reports made available for the use and knowledge of other researchers.

Most of the test results recorded within the laboratory notebooks were published in reports distributed by standard installation procedures. All of Detrick's published reports were numbered sequentially without regard to the division producing them or the subject matter. For example, a Crops Division report on plant growth regulators (i.e. herbicides), would be numbered as report 79 and the next report, which was from the Decontamination Branch on ethylene oxide as a gaseous disinfectant would be numbered as report 80. At the time, distribution of most of these reports was "limited to U.S. Army Biological Laboratories and supporting or cooperating agencies," and they were not cleared for release to the public. Although these reports were not distributed publically, various technical libraries on post or within the larger Chemical Corps and military community received a copy. These technical libraries have consolidated and were renamed over the years, but most of their holdings remain available to the military community with proper security clearances through the Chemical, Biological, Radiological, Nuclear Information Analysis Center (CBRNIAC) and its parent Defense Technical Information Center (DTIC). Due to the nature of the work completed at Detrick, many of these reports remain classified. While not available to the public, they were available to the ASR investigation team for review and analysis (see Section 2.2).

Many of the tests that occurred at Detrick involved multiple on post divisions or organizations, which required coordination of personnel, facilities and other resources. As such, prior to beginning a test, the lead investigators developed a proposal or test plan (typed but not widely distributed) to share with others. The test plan might contain component requirements from other divisions which resulted in multiple tests numbers assigned to a single test event. This was particularly the case with the M or Munition Division, charged with conducting munition related tests in the various test chambers and the test grid. These tests plans typically included the following information:

Test Number (s)
Project Number
Date Test is to Begin
Estimated Completion Date
Item or Munitions to be Tested
Purpose and Reason for Test
Method of Test
Location of Test

Following the test, Detrick most often produced a test report containing similar information to the test plan in addition to including the results and conclusions. These single test reports were not widely distributed by themselves but would lead to a more formal published report, as described above (see Section 2.4).

Additional documents resulting from Detrick's RDT&E mission included monthly, quarterly and annual reports created by various divisions. These additional documents were meant for distribution to other elements on post as well as inclusion in overall installation or program-wide reports for wider distribution (see Section 2.5). Among the various groups at Detrick, the Safety Division produced these types of regular reports in addition to the installation safety regulations and overviews of the Detrick safety program efforts which influenced all elements of the post (see Section 2.6).

Documentation of numerous environmental investigations the Army undertook to determine potential environmental issues following the passage of environmental legislation in the 1970s and 1980s, such as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), represents another significant type of documentation available regarding Detrick. The ASR did not seek a comprehensive review of all of these studies but did review the most relevant ones relating to past historical practices and sought to confirm or augment their findings (see Section 2.7).

Retention of documentation relating to Fort Detrick, like any other military or governmental installation, is covered by a set of standard guidance and policies that come under National Archives and Records Administration (NARA) at a national level. How records flow into the NARA system is discussed briefly in Section 2.8. Much of the documentation relating to the activities at Detrick prior to 1970 was housed in the onsite technical library. With the dismantling of the Biological Weapons program in 1970 and 1971, the former Detrick Technical Library also was disbanded and its contents dispersed. The bulk of the material went to Dugway Proving Ground (DPG) Technical Library. Remaining materials went to the Edgewood Chemical Biological Center (ECBC) Technical Library. Both libraries already were on distribution lists for most of Detrick's formal reports, so to avoid duplication, portions of the materials from the Detrick technical library were not retained. Because the U.S. Army Garrison Fort Detrick no longer maintained a comprehensive collection of Detrick-related material, the ASR

research team needed to locate relevant material in multiple records repositories. Appendix A includes a listing of the repositories searched and the specific records (boxes) reviewed for records relating to activities at Fort Detrick. At these repositories, the research team used finding aids and records managers to assist in locating documents relevant to the research topic. Most notable for the volume and quality of the holdings is the DTIC which incorporates both the DPG and ECBC technical library collections, archives and records centers under (NARA).

2.2 CAMP/FORT DETRICK PUBLISHED REPORTS

This ASR investigation included gathering technical reports published by the Biological Laboratories at Fort Detrick and under various other program/installation names. Between 1943 and 1958, the Biological Laboratories at Fort Detrick reported technical work in two types of official publications: Special Reports (Nos. 1-289) and Interim Reports (Nos. 1-168). In addition, from 1953 to 1955, the BW labs published a series of Status Reports (Nos. 1-29). A handful of reports were "withdrawn from publication," so the total number of reports produced is less than the total indicated by the report numbers in the series. The reasons for publications being withdrawn are unknown and no copies of withdrawn reports were located. At the end of WWII, in August 1945 Detrick directed the termination of much of the work and preparation of project reports, resulting in numerous reports being published in October 1945.[8]

In 1957, the Chemical Corps Research and Development Command directed a change to the previous report designations. The Fort Detrick Technical Information Division began summarizing the reports beginning with Abstracts of Technical Publications in September 1960, which included abstracts of reports from April 1957 through August 1960. In the foreword of that document, it defined the various categories of reports under the new system. The various report definitions were included in a similar form as a forward in subsequent quarterly updates of the abstracts through April 1971. The revised report categories included:

- **Technical Memorandum** – An internal operating document designed primarily for rapid dissemination of current Research and Development technical information; pertains to a small segment of the Research, Development, Test and Evaluation (RDT&E) effort, distribution limited.
- **Technical Report** – Fully evaluated RDT&E technical information; may include information previously issued in Technical Memorandums
- **Technical Study** – Computations, discussions, appraisals, evaluations, and extrapolations of previously published technical information
- **Technical Manual** – Experimental operating procedures, standard operating procedures, materials and design components or specifications

- **Technical Notes** – Brief information on techniques, findings, etc. of value to Research and Development community, appears to be replaced by Technical Manuscript
- **Technical Manuscripts** – Brief account of techniques, findings, etc.; primarily unclassified results of RDT&E effort of general interest to scientific community
- **Contract Publication** – Scientific and technical information prepared by organizations operating under contract[9]

2.3 CAMP/FORT DETRICK NOTEBOOKS

As with the sequential, rather than division- or subject-related numbering of Detrick's published reports, Fort Detrick also issued sequentially numbered laboratory notebooks to various departments as needed, not as they related to a specific project. These went to specific researchers who recorded their notes. The notebooks normally contained a brief test objective but did not necessarily record things of interest to this ASR investigation like a specific location of field tests. They did not include a lengthy description of the test purpose, background, analysis, or conclusions of the tests. Another limitation, in terms of this investigation, is that neither the lab notebooks nor the contemporary published reports stated the test parameters in a format that provided specific amounts, chemicals or location where they were used (i.e., x grams of y chemical were applied at z location).

The laboratory notebooks associated with Fort Detrick remain as a large group of boxes (Accession 338-80-0413) at the Washington National Records Center (WNRC) in Suitland, MD. The boxes are unclassified but are not available to the general public. This 192 box grouping includes laboratory notebooks from Camp and later Fort Detrick, with handwritten notes primarily on investigations and tests conducted from 1943 through December 1971. Based on an index for the accession, there were originally approximately 6,150 notebooks; however, only about three-fourths of the notebooks remain in this accession. In some cases, Fort Detrick destroyed the notebooks, as is typically done with all documents after the required retention period. In other cases, the investigators withdrew the notebooks and did not return them to the central Fort Detrick repository. While those notebooks were not in the collection sent to the records center the findings and results in the notebooks generally were documented in the published and distributed reports described above. However, not all the investigations conducted at Fort Detrick were published by Fort Detrick. In those cases, the laboratory notebooks are the only source of information regarding these tests. The ASR research team did review some of this material in depth, as required, such as the Crops Division notebooks and the herbicide and defoliation investigations, copying the portions dealing with outdoor field testing that occurred both on Fort Detrick and at other locations.

2.4 CAMP/FORT DETRICK TEST PLANS

In general, a test plan followed a standard format:

- Section 1 provides listed reference material such as the test number(s); project number the test falls under, the estimated cost, and estimated dates for the start and finish of the test.
- Section 2 contains a brief description of the item to be tested.
- Section 3 lists the proposed location of the test.
- Section 4 provides background information for the test.
- Section 5 lists the objective of the test.
- Section 6 gives the general method for the conduct of the test.
- Section 7 lists the data to be obtained.
- Section 8 gives the suggested method of data analysis[10]

A single test plan covers an overall test, which may also include multiple subtests. For example, the test may involve the testing of various concentrations of an agent with each concentration being a subtest under the overall test plan. It is worth noting that a single test may have multiple test numbers from differing divisions which combined overlapping needs into one test. This ASR investigation reviewed hundreds / thousands of test plans in the archival records but did not attempt to acquire a comprehensive catalogue of them based on their volume and the knowledge that the resulting information would be summarized in the published reports. The ASR investigation gathered only representative samples or ones of particular interest based on their distinctive nature.

2.5 CAMP/FORT DETRICK MONTHLY, QUARTERLY AND ANNUAL REPORTS

Based upon recovered documents, it appears that in the 1940s, Camp Detrick required each division to prepare periodic reports identifying the administrative and technical activities of the division. While beneficial in describing the Divisional activities in general, there is little specific site information as desired by this ASR investigation. In 1944, each division produced a monthly report, which was changed to a quarterly report about 1948. An insufficient number of reports were recovered to determine exactly when or why the reporting requirements changed. In general, the reports discussed the division manning situation and activities on each project assigned to the division. Additionally, the reports contained information of interest to the command, such as the Engineering Division identifying the amount of coal and oil consumed at power plants and incinerators for the period. The ASR investigation did not locate these regular reports after the early 1950s. It is unclear if the requirement went away, or if later reports simply could not be located.

2.6 SAFETY PROGRAM

The safety program efforts at Detrick touched all elements of the post from Camp Detrick's activation of the Safety or S Division on 27 September 1943. S Division immediately began developing safety regulations for all personnel and operations in the Restricted Area (area where work with agents occurred) including laboratories, pilot plants, animal rooms, shower and change facilities, etc. Safety Division personnel oversaw personnel inspection, first aid and immunization, as well as operational processes in laboratories and pilot plants. Safety Division also developed methods for detection, decontamination and treatment of biological agents. In addition to the published numbered reports and regular progress reports, the Safety Division produced regularly published Bulletins in the 1950s and early 1960s, and installation safety regulations and overviews of the Detrick safety program in the 1950s.[11]

The gathered safety regulations and policies at Detrick indicate safety was a high priority on the installation. Even though the material and work being done was extremely hazardous, the investigators were mindful of the risks and went to great length to assure the protection of personnel. The safety regulations and policies also show that the safety of the surrounding community of Frederick, where they and their families lived was of utmost importance to the investigators and was placed an even higher priority than self preservation.

2.7 ENVIRONMENTAL INVESTIGATIONS

As part of its Army-wide commitment to address contamination resulting from past practices, the Army has conducted numerous environmental, and hazardous and toxic waste studies at Fort Detrick in accordance with the IRP, DERP, CERCLA and the NCP. The primary focus of these previous studies was potential releases of Hazardous, Toxic and Radioactive Waste (HTRW) at Fort Detrick. This report concentrates on verifying and supplementing the findings of these previous studies. Particular emphasis was placed on filling in any "data gaps" in the established knowledge base. The following paragraphs discuss the relevancy of these investigations to this ASR though it is not meant as a comprehensive inventory of these past studies or review of their contents.

2.7.1 Installation Assessment of Fort Detrick, January 1977[12]

A research team from the U.S. Army Toxic and Hazardous Material Agency (USATHMA) conducted this initial assessment of Fort Detrick as part of a programmatic environmental look at Army installations in October and early November 1976. The investigation included a literature search at the installation, and interviews of key past and present employees, but did not include a search of the National Archives. The report identified four buildings in Area A associated with Bacillus anthracis spores (anthrax) that had not been certified free of biological agents due to the potential for spores to remain in building cracks and crevasses. Three of the four buildings were (and remain) in use (201, 263 and 375) and after further investigation in 1994, received a decision of No Further Action. The fourth was subsequently demolished (470). In the vicinity of

Building 538, a pre-1947 disposal site was also identified. It also indicated contamination might be present in the special (contaminated) sewer system. The report noted Area B, had been used for munitions testing and disposal of biological, radiological and chemical materials including two phosgene cylinders. The investigation identified 21 landfill or disposal pits in Area B, including pit 14 where herbicides were buried in 1970-71 (includes table of the amount and types of herbicides buried). Area B is the subject of many additional investigations and a number of remedial actions. Investigation results and the actions taken to date can be found on the Fort Detrick website.

2.7.2 U.S. Army Activities in the U.S. Biological Warfare Programs 1942-1977, February 1977[13]

In 1977, the U.S. Army prepared a two volume, comprehensive report reviewing the BW program to allow Congress and other governmental agencies to assess the issues related to BW following the renouncement of BW and direction to dispose of existing BW weapons. The first volume provides a general history of the BW program beginning during World War II and continuing through the Cold War era expansion to Disarmament and Phase Down (1969-72), as well as the continuation of the defensive biological research program up until the time of the report. Volume II includes various appendices, including one listing the open air BW field testing locations performed on public and non-public domain (military installations lands including Fort Detrick). This list includes simulant tests at a wide variety of locations including Fort Detrick. It also includes lists of field (outdoor) tests with anti-crop or anti-personnel pathogenic agents at locations other than Fort Detrick, such as Dugway Proving Ground (DPG).[14] No pathogenic open-air anti-personnel tests are documented to have occurred at Detrick.[iv]

2.7.3 Field Investigation of Uncontrolled Hazardous Wastes Sites on Fort Detrick, June 1981[15]

This is a report prepared for the EPA by Ecology and Environment, Inc. It focuses primarily on the waste disposal sites in Area B and recommends that the State and EPA monitor the Army's investigation of the site, which is occurring..

2.7.4 Evaluation of Fort Detrick Sanitary Landfill Area B Phase III Report. May 1989[16]

This is a Phase III report on the sanitary landfill used on Fort Detrick at the time of the report. It describes operating procedures, monitoring to be conducted, etc. The landfill subsequently was capped.

[iv] In the 1977 BW summary, Detrick is listed as hosting a pathogenic agent tests in March-May 1961 along with DPG, however, Detrick hosted only the simulant trials and the pathogen trials were held at DPG.

2.7.5 Geohydrologic Study No. 38-26-KI32-92 Phase 2 Area A UST Investigation, Fort Detrick, May 1992[17]

In November 1991, Fort Detrick discovered approximately 3,900 gallons of unleaded gasoline had leaked from a 12,000-gallon underground storage tank (UST) near Building 901 (Steam Plant) in Area A. This Phase 2 study from the U.S. Army Environmental Hygiene Agency was to determine the lateral extent of contamination.

2.7.6 Groundwater Consultation No. 38-26-K1KJ-93, 19-23 April 1993[18]

This is a U.S. Army Environmental Hygiene Agency report to analyze and interpret samples collected at Area B of Fort Detrick. The primary contaminant of concern in this report is trichloroethene (TCE).

2.7.7 TCE Contamination – Building 568 Site Investigation report, July 1993[19]

The report includes a detailed physical and historical characterization of the TCE contamination plume near Building 568, sampling procedures and results, as well as recommendations for further investigation.

2.7.8 Geohydrologic Study No. 38-EM-3925-95, 7 Area A UST Investigation August – 6 December 1995[20]

This is a U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) report to determine the concentration and extent of subsurface hydrocarbon contamination related to the former USTs in Area A located near Fort Detrick's Steam Plant.

2.7.9 Hazardous Waste Study No. 37-EF-5012-96, Area A Laboratory Complex, 5 June 1996[21]

This is a CHPPM report on potential for contamination in the immediate vicinity of the French Drain Overspray System sump at Building 1315.

2.7.10 Groundwater Consultation No. 38-EH-8004-98 Groundwater Quality at Buildings 940 and 950, 2-5 March 1998[22]

This is a CHPPM report to determine the groundwater quality at existing monitoring wells at Buildings 940 and 950. The contaminant of concern for this report is organic compounds from gasoline.

2.7.11 Sampling Protocol, Hazardous Waste Study No. 37-EF-3215-99, Building 1058 Environmental Health Chemical Sampling Plan, September 1999[23]

This is a CHPPM report identifying the chemical sampling plan for Building 1058. Building 1058 was used as a storage facility for various chemicals such as paint thinner and was being remodeled. The plan was to be used to determine potential health hazards to workers.

2.7.12 Aerial Photographic Analysis Fort Detrick Area B Site, January 2001[24]

The Environmental Sciences Division of the EPA prepared this analysis of Area B for EPA Region 3 to document observable past patterns of waste disposal activity and other conditions of environmental significance. The investigations located and acquired historical photographs from 1952, 1958, 1964, 1970, 1973, 1979, 1983, and 1988. The historic photographic analysis identified two major landfills, several debris burial sites, open burning areas, disposal trenches, munition storage facilities, and testing areas. The investigation was limited to only Area B and did not cover Area A or the Monocacy River treatment plants.

2.7.13 Groundwater Consultation No. 38-EH-6380-01 Groundwater Quality, Building 950, 31 July 2001[25]

This is a CHPPM report on groundwater samples taken from sampling wells at Building 950.

2.7.14 Landfill Sludge Disposal Radiological Assessment, U.S. Nuclear Regulatory Commission License No. 19-01151-02, March 2003[26]

This is an NRC radiological assessment for sewage plant sludge to be, or previously placed, in the Fort Detrick landfill and used as the technical and licensing justification for a NRC permit to resume disposal of sludge in its licensed landfill.

2.7.15 Area B-11 Burial Trenches Radiological Assessment, U.S. Nuclear Regulatory Commission License No. 19-01151-02, September 2003[27]

This report is in response to an NRC request for additional information as part of the decommissioning plan for NRC license 19-01151-02 which included the disposal of radioisotopes at the Area B-11 burial trench.

2.7.16 Closed, Transferring, and Transferred Site Inventory for Fort Detrick, December 2003[28]

In 2003, the Army completed a Phase 3 inventory of closed, transferring, and transferred (CTT) ranges at Fort Detrick to assess which ranges potentially qualify for the Military Munitions Response Program (MMRP). The report identified four closed ranges and no transferred or transferring ranges. The four identified closed ranges are all in Area B: the Permanent Circular Test Grid, the Gun Emplacement, Building 1222, the Demolition

Pit and the Ammunition Storage Area. This ASR contains further details about those four areas as well as identifying other potential MMRP areas in sections 6.8 and 7.4.

2.7.17 2010-03-18 Environmental Assessment Real Property Master Plan for Army Controlled Land at Areas A and C of Fort Detrick, March 2010[29]

This is a U.S. Army Garrison Fort Detrick report generated in compliance with NEPA and CEQ regulations in support of future construction, demolition and various infrastructure modifications at Detrick Areas A and C. As a result of the research and supporting documentation, the report provides detailed historical information and information on areas of environmental concern at Detrick Areas A and C.

2.7.18 Environmental Assessment for the Construction and Operation of Proposed Projects on Area B of Fort Detrick, December 2010[30]

This is a U.S. Army Garrison Fort Detrick report generated in compliance with NEPA and CEQ regulations in support of construction of proposed projects and various infrastructure modifications at Fort Detrick Area B. As a result of the research and supporting documentation, the report provides detailed historical information and information on areas of environmental concern at Detrick Area B.

2.8 GENERAL FEDERAL RECORDS MANAGEMENT

As with any military or government installation, retention of documentation relating to Fort Detrick is covered by NARA guidance and policies. Created in 1934, NARA is the Federal agency that preserves and maintains U.S. government records and makes them available for research. NARA administers the National Archives and the Federal Records Centers (FRC) system. The difference between the two entities is that the documents at the National Archives are those that are no longer under control of the agency that created them, while those at the FRC are still owned by the creating agency. Documents owned by NARA are available for public research. Documents at an FRC are only available to those to whom the owning agency officials allow access.

NARA regulations guide Federal agencies and their records management programs and each agency has promulgated additional guidance regarding which material is retained, and for how long. NARA keeps only those Federal records judged to have continuing intrinsic, evidential, or informational value, roughly two to five percent of those generated in any given year. Only a small percentage of the material sent to the FRCs in a given year are transferred to the archives side of NARA for permanent retention. In deciding which records to preserve for posterity, the value of records are weighed against the cost of maintaining them.

When Federal agencies move groups of boxes from one location to another, a Standard Form 135 (SF135s) “Records Transmittal and Receipt” form is filled out by a designated

Records Manager or Officer in the agency or at an installation. The completed SF-135 includes information regarding the "accession number" (unique NARA identifier for a series of boxes), the amount of material, disposition authority and disposal date. "Permanent records" is an acceptable response if applicable, but as previously stated, most of the material at the FRC is destroyed after being retained the prescribed amount of time. The first page is followed by additional sheets (SF135-A) which include descriptions of the material in each box of the accession. An accession can be as small as a single box or include over a thousand boxes.

As noted in Appendix A, Reference Sources and Records Reviewed, the research team worked with the Fort Detrick records Manager and reviewed the approximately four linear feet of Transfer Record forms for Fort Detrick (i.e. SF 135s) going back to 1953. Detrick sent all their files to WNRC in Suitland, MD. The team reviewed a large number of records there, as well as at the National Archives in College Park, for the material that had been transferred to the archives and was open to the public.

3 GENERAL HISTORICAL SUMMARY

3.1 Detrick Field, 1929-1942

On 1 August 1929, the U.S. government leased a tract of land from the city of Frederick, MD, for use as an emergency airplane landing field. This tract of land would become the nucleus for the future Fort Detrick. In 1931, the Maryland National Guard, 104th Aero Squadron, received permission to use the site as the permanent training ground for its annual encampment and the squadron named the site **Detrick Field**. In November 1940, following the outbreak of WWII and renewal of its lease of Detrick, the War Department approved construction of several buildings, including six frame buildings, a temporary barracks, a central heating plant, and airplane hangar.[31]

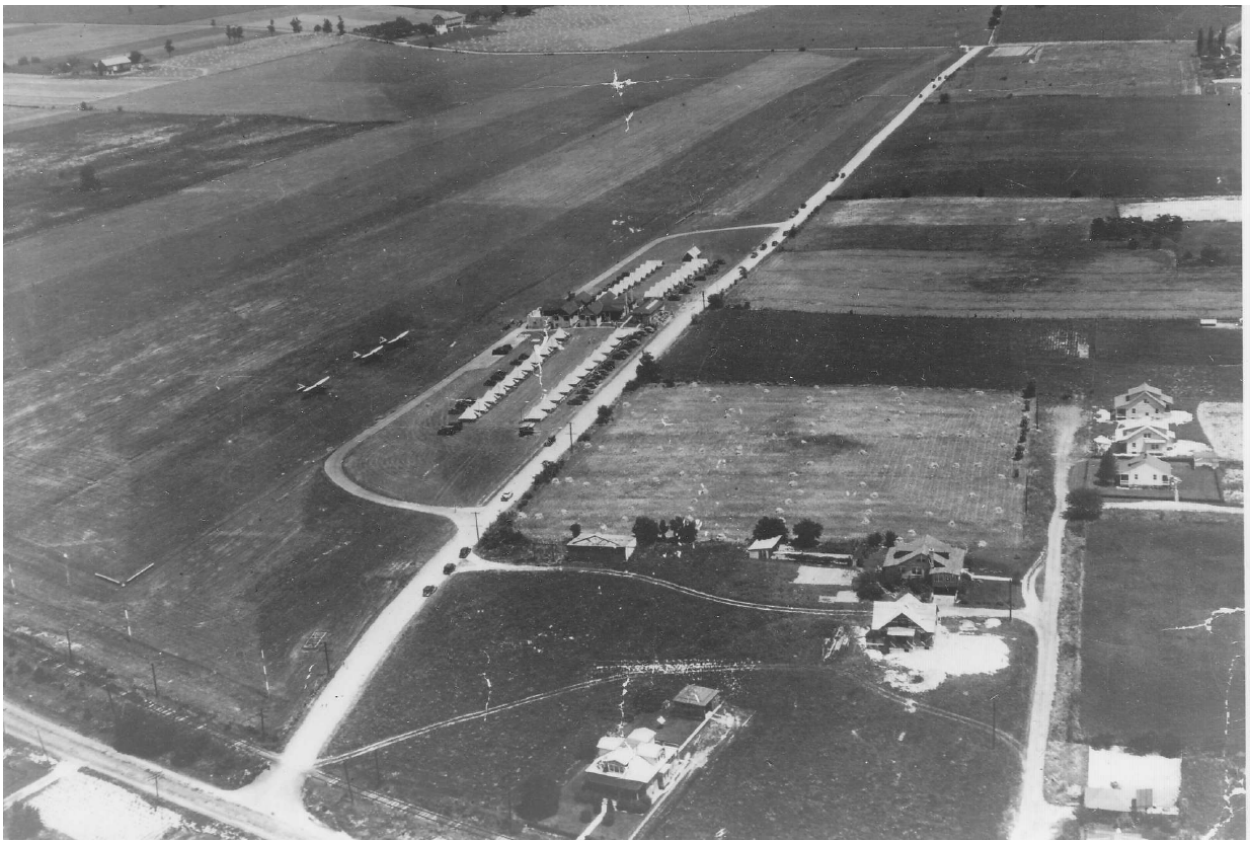


Figure 2 – *Aerial view North along Military Road of Frederick Municipal Airport – circa 1937*[32]

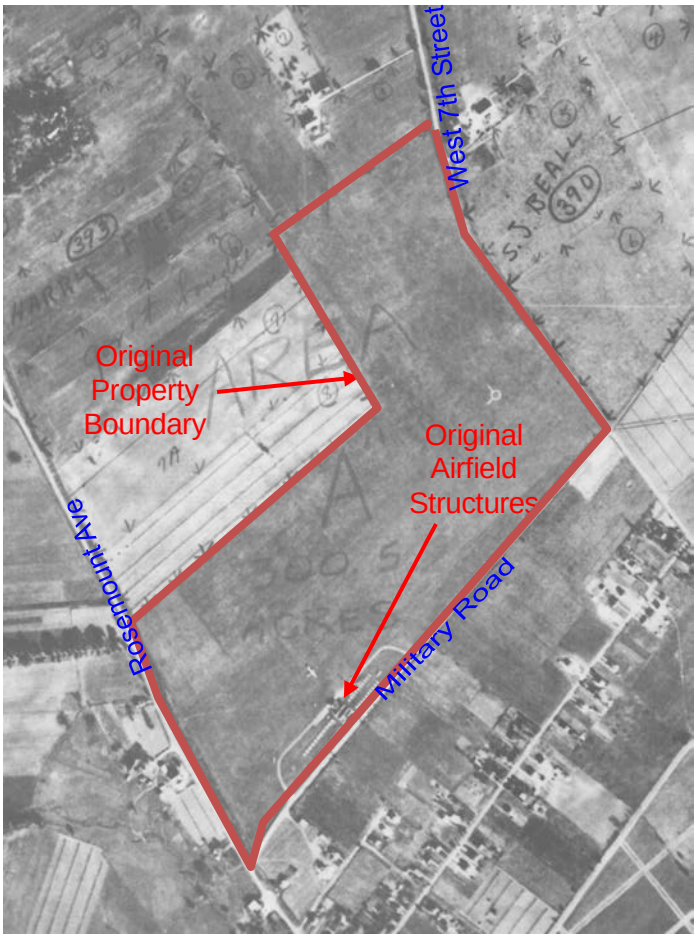


Figure 3 – *Aerial Photograph showing airfield and grass runways – circa 1937*[33]

The 104th Squadron continued to use Detrick as a summer training site until the fall of 1940. On 9 October 1940, the city of Frederick and the Maryland National Guard leased Detrick to the Army Air Corps' Cadet Pilot Training Program (CPTP), which used the site as a training center and landing field until December 1941, when the program was reassigned in response to the U.S. entering WWII. Although the last planes departed from Detrick in January 1942, the site continued to be an approved airfield for the Civil Aeronautics Administration-War Training Service (CAA-WTS) until early 1943. In March 1943, the Army Air Force's right to use Detrick Field was transferred to the Chemical Warfare Service (CWS), which recommended that the CAA-WTS Program at Detrick be discontinued.[34]

3.2 U.S. Biological Warfare Research Begins, 1941-1942

Following intelligence reports that both Germany and Japan were researching BW, the United States began BW research in the fall of 1941. In May 1942, based on the Secretary of War's recommendation, the president authorized formation of the War Research Service (WRS), a civilian agency that coordinated and directed BW research and development work.[35] The WRS determined the existing program was inadequate to perform the necessary research of biological warfare agents, their use as weapons, and

protection against such biological attacks.. In December 1942, the Secretary of War instructed the CWS to provide the supplemental BW research and development as WRS deemed necessary, [36] which lead to Detrick Field being chosen as the first facility in **Special Projects Division** created by CWS to handle the BW effort. Detrick's selection was in large part because of its proximity to both Washington, D.C., and Edgewood Arsenal, which was at the center of CW research.[37]

3.3 Camp Detrick, 1943-1945

The CWS formally acquired Detrick on 9 March 1943. With the mission change, Detrick Field became **Camp Detrick**. Following official activation construction of appropriate facilities to conduct RDT&E began in early April 1943. Laboratory studies produced information that allowed for proper pilot plant design and operation. By May 1943, Detrick established an Operations Division to oversee an immediate pilot-plant study of the problems related to BW agents. The experimental information obtained through pilot plant operation allowed for efficient large-scale production at other locations, such as the Vigo Plant in Terre Haute, IN. Detrick's pilot plant was also needed to produce sufficient quantities of agents for investigations at the CWS BW field test locations. The United States' BW research was part of a cooperative effort with the Canadians and British, and Detrick also worked in collaboration with numerous other installations, all of which performed various functions complementing Detrick's mission. For example, since Detrick did not have the capacity to conduct large-scale field tests, the CWS established satellite facilities for such work at Horn Island, MS, and the Granite Peak Installation portion of Dugway Proving Ground (DPG), UT.[38] During WWII, the Army increased the size of the main post, the former airfield, by annexing additional 53± acres of farm land in 1944 for more laboratory facilities and another 12± acres for water and sewage treatment plants on the Monocacy River.

In June 1944, the president approved transfer of all BW activities to the War Department. Later that same month the civilian WRS was discontinued with responsibility for their research projects transferred to the Special Project Division of the CWS.[39]

While responsibility for BW research shifted, personnel at Camp Detrick were preparing the installation for BW RDT&E. Much of the technology required for BW RDT&E needed to be invented and developed at Detrick. One initial task at Detrick was developing means to do BW RDT&E while containing the organism in its own environment so as not to affect researchers. Scientists at Detrick were able to develop means to protect against microorganisms as well as decontamination and sterilization methods. Detrick also established a hospital to provide treatment in case of any effects from the BW research. Research at Detrick was essential to developing the proper methods of protection and treatment to minimize the damage of enemy use of BW.[40] Detrick limited operations with agents to a separate fenced in "Restricted Area" within the boundaries of the installation (see following figure).

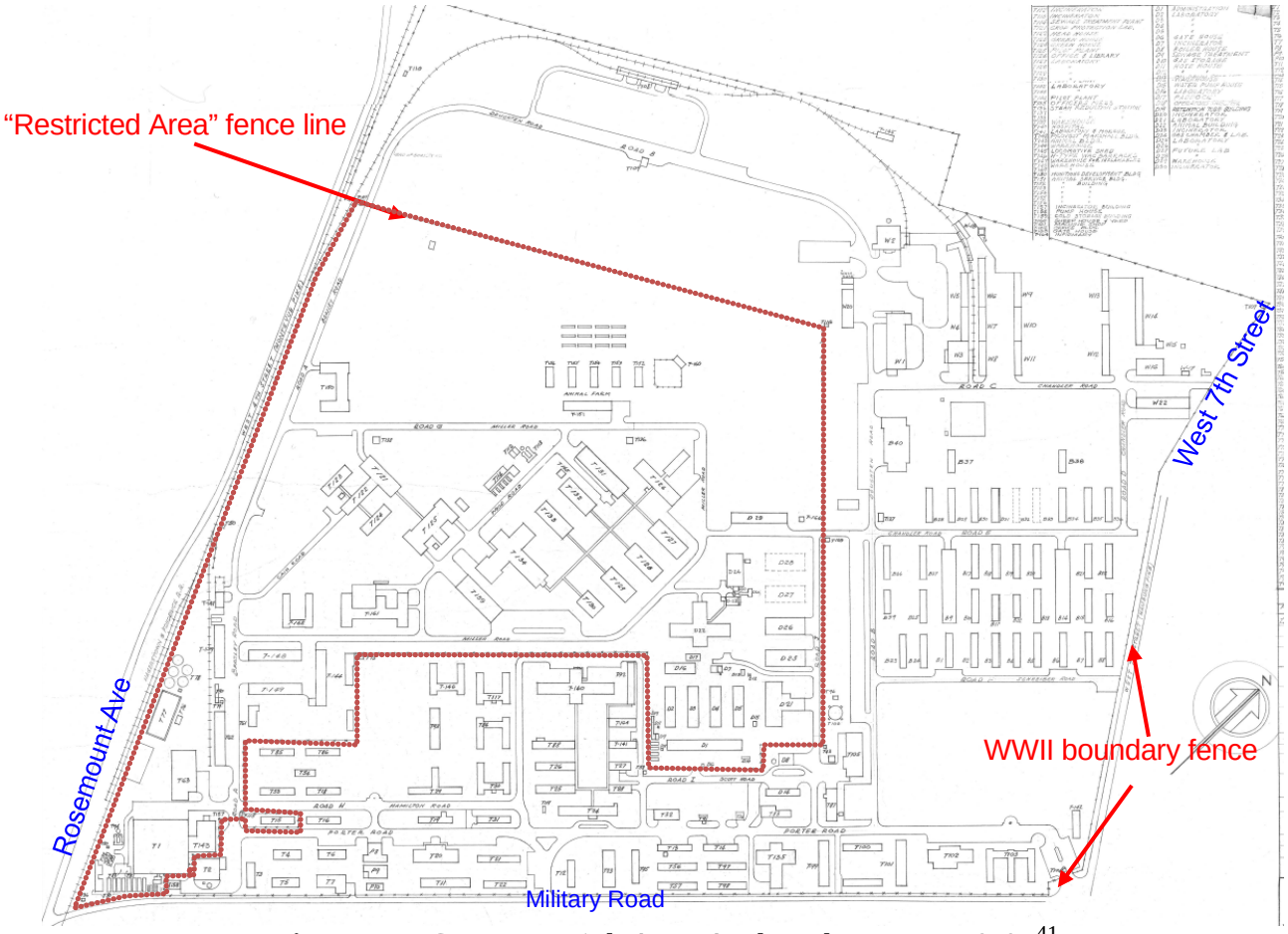


Figure 4 – *Camp Detrick Area A Plot Plan 1944-10-03*[41]

.

By October 1943, Camp Detrick organized into Offensive Development and Defensive Development Divisions. By fall 1944, the Divisions under the Technical Department including:

- Animal Research - investigated agents harmful to man and animals; conducting studies on a laboratory scale of methods and materials related to stability, efficiency, production and detection of these agents
- Crops Research - investigated chemical plant growth inhibitors (herbicides) and biological anti-crops pathogens
- Pilot Plant - conducted tests and developed equipment, materials, and methods in pilot plant production and storage with a view to application on a large scale
- Munitions Research - responsible for weaponization by adapting and testing of munitions and techniques for the dispersion of specific agents, developing filling methods, as well as conducting stability studies, persistence and efficacy of agents under field conditions.
- Biological Research – developing immunizations, treatments and agent detection methods

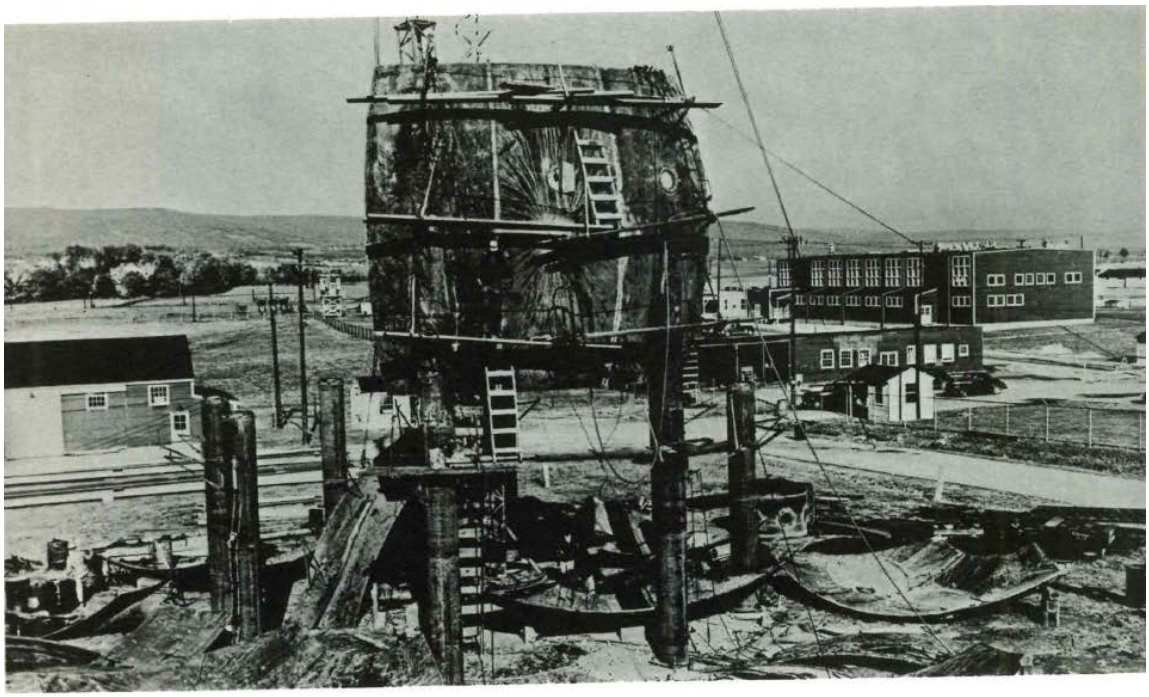
- Physical and Chemical Research - developing physical and chemical protection, including masks, clothing, ointments and decontamination methods[42]

3.4 Post-War Years, 1945-1950

After World War II ended, it appeared that the BW program would be terminated. However, in the fall of 1945, the Secretary of War directed that the BW RDT&E program continue with Camp Detrick, staffed down to approximately half of its wartime level, remaining as the center for that effort..[43] In the post-war period, the Army re-designated the CWS as the U.S. Army Chemical Corps, and the BW efforts at Camp Detrick formally became the **Biological Department, Chemical Corps**.[44] The post-war years (1946-1947) did see an expansion of the main-post (Area A) by 158 acres to the north from the WWII area of approximately 143 acres.[45]

3.5 Growth of Camp Detrick, 1950-1955

Initially, the majority of the structures built at Camp Detrick had been temporary. Starting in 1949, construction of modern, permanent facilities began. The first major structure constructed was a large "cloud chamber" or test sphere for use in the study of microbiological aerosols released during a munition detonation. The sealed test chamber, Building 527, became colloquially known as Million Liter Test Sphere or the 8-Ball (see following figure).[46]



A test sphere that enabled the investigation of effect of agent was constructed during the early 50's and greatly improved existing sampling and dissemination techniques.

Figure 5 – *One Million Liter Test Sphere under Construction – c. 1948*[47]

In the 1950s, U.S. susceptibility to a BW attack, the outbreak of the Korean War, and the threat of possible covert uses of BW, led to increased budgets, better planning, and increased personnel requirements in BW RDT&E. In response to these concerns, construction efforts at Detrick were expedited to have permanent facilities required for BW RDT&E in place. BW work at Detrick became the **Chemical Corps Biological Laboratories** in 1951. RDT&E was placed under control of the post commander,[48] and, by 1951 the divisions included the Biological Sciences Division charged with conducting with research in aerobiology, bacterial nutrition, pathobiology, and pathology. The Field Test and Meteorology Division planned and performed field tests, evaluated the results, and prepared final reports.[49] In 1952, Detrick added more than 500 acres to the east from the existing 300 acres the main-post (Area A). [50] Detrick referred to this expansion as "Area C" to differentiate it from the previously built up "Area A" and the "Area B" test grid (see following figure). However, as the land east of the pre-1952 boundary became developed and the distinction between developed and undeveloped sides blurred the entire 800 acres became "Area A." "Area C" now refers to the sewerage and water treatment facilities along the Monocacy River. By 1958, Area A contained 12 permanent and sophisticated facilities designed for a variety of biologically and medically oriented research programs.[51]

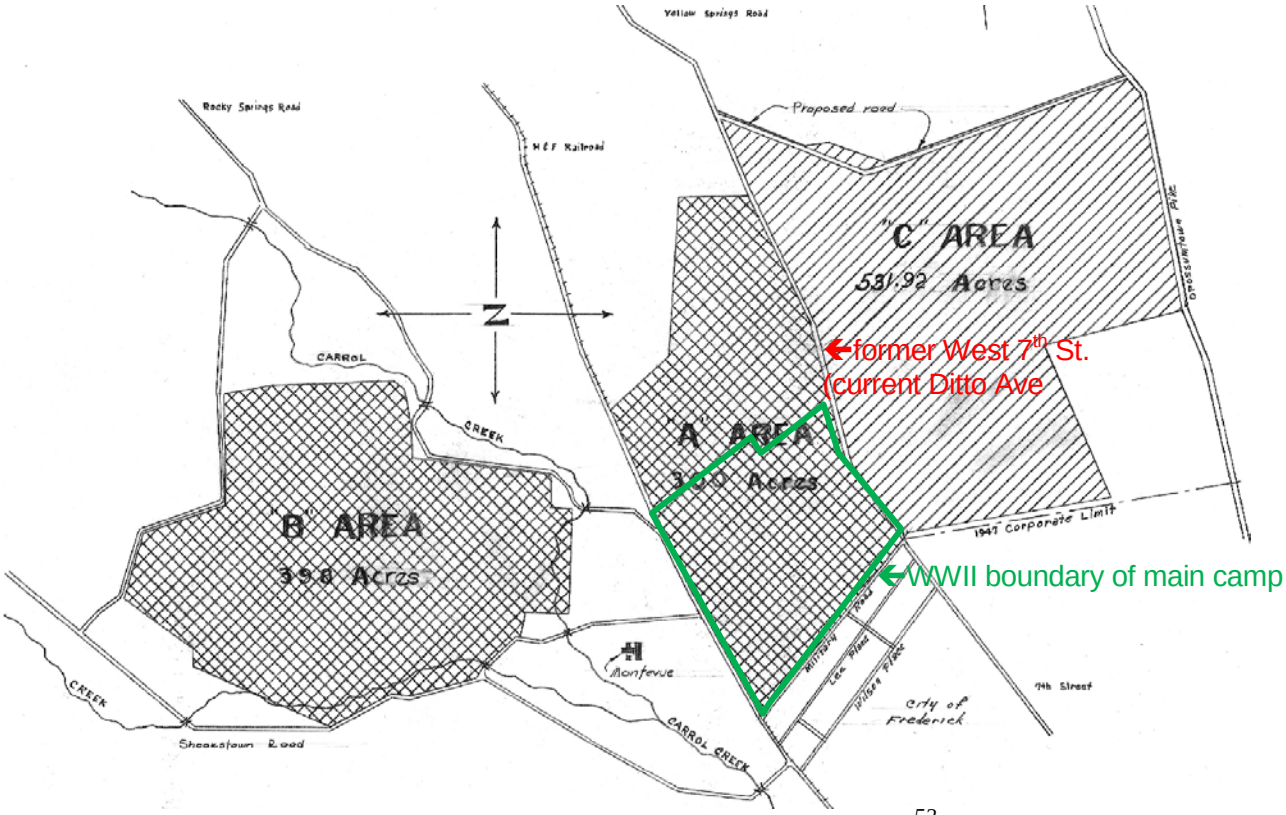


Figure 6 – *Camp Detrick Addition – 1951* [52]

3.6 Fort Detrick, 1956-1969

Between 1955 and 1956, the Chemical Corps studied human susceptibility to aerosols as an infectious agent. This was the first such study that used the BW volunteer program. Volunteers at Detrick were exposed to aerosols in the test sphere and field tests occurred at DPG. The studies were so successful that the Corps developed a more comprehensive study. This also led to the Chemical Corps and Medical Corps agreeing to define the aspects of the program for which each would be responsible.[53] As a result of a Medical Service-Chemical Corps agreement, the Surgeon General established the Medical Unit, Walter Reed Army Medical Center (WRAMC) at Fort Detrick as a separate activity of the WRAMC in June 1956. The missions of the unit were to develop appropriate medical defensive measures and to operate the hospital facility.[54]

In February 1956, the Army re-designated Camp Detrick as **Fort Detrick**. The BW operations became the **Biological Warfare Laboratories (BWL)**[55] which would undergo a series of slightly altered name changes in the late 1950s – early 1960s though Detrick's role essentially remained unchanged. In January 1957, the BWL became the **U.S. Army Biological Warfare Laboratories**[56] to be renamed again in July 1960, the **U.S. Army Chemical Corps Biological Laboratories** and renamed again in August 1962, the **U.S. Army Biological Laboratories**.[57]

Additionally, in 1956, the first non-BW related tenant activity on base came to Detrick when the Army provided 5.8 acres of land in the northeast corner of Area "B" to the Maryland Military District for use as an Army Reserve Training Center armory. The Army Reserves unit used this and other portions of Area "B" for field training, such as driver training, signal construction, panel bridge construction and field fortifications.

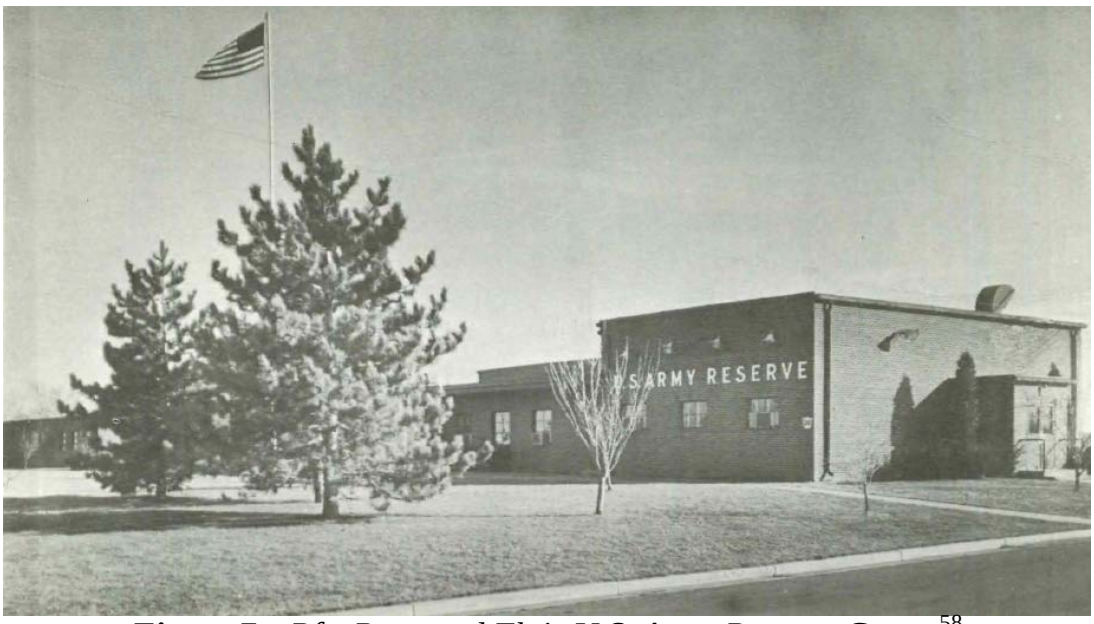


***Figure 7** – Pfc. Raymond Flair U.S. Army Reserve Center*[58]

In October 1959, the **East Coast Relay Station** of the U.S. Army Communications Agency, which served as a receiving and relaying switching center for messages throughout the world, Detrick's second tenant, occupying about 20 acres on the eastern edge of the base.[59]

3.7 Decline of Offensive BW Research at Detrick, 1969-1973

In the mid-1960s, as international opinion began to turn against BW and funding for RDT&E decreased.[60] A July 1969 report urged a halt to production, development, and stockpiling of BW and CW agents. The Army was directed to stop production of all BW agents in August 1969 and guidelines were soon issued for the BW demilitarization, including disposal of all anti-crop agents at Fort Detrick. The BW demilitarization plan also emphasized absolute verification of the destruction of BW materials by independent observers. On 25 November 1969, President Richard Nixon visited Fort Detrick to issue new U.S. policy renouncing the use of lethal bacteriological (biological) agents and weapons and all other methods of BW. The DoD was directed to dispose of existing BW weapons and he further directed that U.S. BW RDT&E would be confined to defensive initiatives, such as immunization and safety measures.[61]

This policy change led to a transformation of the unique facilities at Detrick. Early in 1971, personnel, facilities, and equipment used in plant pathology research were transferred to the U.S. Department of Agriculture (USDA). The vegetation control (herbicides) group moved under the USDA in 1974.[62] On 1 September 1971, the Army divided the U.S. Army Biological Defense Research Center into two separate entities: the U.S. Army Garrison, Fort Detrick and the U.S. Army Biological Defense Research Laboratory (USABDRL). Thus, USABDRL simply became a Fort Detrick tenant. On 18 October 1971, President Nixon returned to Detrick to announce conversion of a large number of the BW facilities into cancer research facilities as part of the National Cancer Institute (NCI), under the National Institutes of Health (NIH). By 1972, facilities formerly used for BW research were decontaminated and certified for future use by tenants, primarily the NCI.[63]

With the shift to defensive aspects of BW research, the Army transferred Fort Detrick from the U.S. Army Materiel Command to the Office of the Surgeon General on 1 April 1972. The Surgeon General placed Detrick under its U.S. Army Medical Research and Development Command (USAMRDC), which transferred additional activities to Fort Detrick including: Army Health Services Data Systems Agency and the Historical Unit. The Army Biomedical Research Laboratory and, the Army Medical Equipment Research and Development Laboratory moved to Detrick in early 1972 before merging in September to create the U.S. Army Medical Bioengineering Research and Development Laboratory (USABRDL). On 30 June 1972, the Army deactivated USABDRL, the last remnant of the BW RDT&E program.[64]

By 1973, the U.S. Army Garrison Fort Detrick become the landlord for the post's numerous tenant activities providing centralized Base Operations Support Services. Overall, the number of tenants at Detrick increased significantly, as the installation was providing centralized base operational support for services for 19 tenants by 1973.[65]

3.8 Army Garrison Fort Detrick, 1973-present

After the end of offensive BW RDT&E, the primary missions at Detrick became biomedical research and development, medical logistics and materiel management, and global telecommunications for the DoD.[66] In 1994, the Army Surgeon General established the headquarters at Fort Detrick for one of its major Medical Command (MEDCOM) subordinate commands, the U.S. Army Medical Research and Materiel Command (USAMRMC), successor to the USAMRDC. Detrick is also headquarters for a number of the subordinate elements of USAMRMC including U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). USAMRIID is probably the most famous as it is the Army's BW defensive research and research into naturally occurring infectious diseases conducted at the Biosafety Level 4 facility on base.[67]

***Figure 8** – USAMRIID Laboratories Building 1425 Under Construction - 1968*[68]

The NCI opened the **Frederick Cancer Research and Development Center** (FCRDC) in 1973 on 68.61 acres and in approximately 70 converted building within Fort Detrick. The FCRDC became the **National Cancer Institute-Frederick** and is now called the **Frederick National Laboratory for Cancer Research**, with more than 2,400 employees occupying more than 100 structures used for administration and cancer research and development.[69]

By the 1980s, Detrick's WWII cantonment facilities began to be replaced by modern facilities, though as of 1986, 98 of the original 245 structures, such as pilot plants and research and production facilities remained, but their original equipment had been removed. The Army also constructed numerous Quality of Life facilities, such as a fitness center, recreational areas, a youth center, counseling center, and other off-duty services facilities. By the early 1990s, more than 155 sets of family quarters had been added to Detrick as well.[70]

Over the years, the U.S. Army Garrison Fort Detrick essentially acted as its landlord, offering critical base operations support to DoD that allows tenants to carry out their missions.[71] In 2010, approximately 9,000 military, federal, and contractor employees representing each branch of the U.S. military were assigned to Detrick. Detrick also serves the DoD, Homeland Security, Agriculture, Health and Human Services, and Veterans Affairs.[72] On 30 September 2011, U.S. Army Garrison Fort Detrick officially transferred from U.S. Army Medical Command to the U.S. Army Installation Management Command.[73]

4 GENERAL HISTORIC MAP ANALYSIS

4.1 Introduction

The investigation team reviewed thousands of maps and drawings within the installation's flat files or map drawers, and collected hundreds of site-specific layout plans for Fort Detrick. Given the volume of material collected, it is impractical and unwarranted to discuss and reprint all of the historical maps and site plans in this report though copies remain in the ASR reference material. Sections of this ASR include specific and detailed map extracts and discussion as warranted illustrating the topic.

4.2 Building Numbering

In mid-1945, Detrick renumbered the buildings on post to correspond to new "area" designations. Buildings located in Area 4 buildings became the 400 series of buildings, Area 5 became the 500 series, etc. This created three-digit building numbers. The first digit represented the Area location and the last two digits, in general, were the last two digits previously assigned. For example, Building T-134 in Area 4 became Building T-434 or simply 434. While this system retained continuity with the previous numbering system, the numbering was never sequential (e.g. there is no 401) and there are gaps between numbers that can lead to confusion. An August 1945 listing of building numbers with both original and the revised maps numbers provides a good cross-walk between the original and "new" numbering schemes and was used in preparing this report. Exceptions to numbering shown on the 1945 listing are noted as they appear with figures and maps.

After WWII, when Detrick constructed additional clusters of buildings or areas, they became the 1000s, 1100s, 1200s etc. series of buildings. Many of the published WWII era documents reference only the original number. To add clarity and avoid lengthy descriptions, this ASR will use the historical reference number for the structure and then follow it with a "/" followed by the current number. For example, the airfield Hangar, T-1, which was renumbered 201, will be shown as T-1/201. If only the current number is referenced, then the previous one will not be mentioned.

5 BW OPERATIONS, AGENTS AND DECONTAMINATION

5.1 GENERAL BW RDT&E

Beginning during WWII, Fort Detrick served as the RDT&E for BW for both offensive and defensive purposes. The ultimate purpose of offensive BW efforts is related to agents and dispersal methods or weaponization. This involved investigating potential agents and the development of means to disburse the agents. Offensive BW agents principally relate to anti-personnel and anti-crop[v] agents and to a lesser degree anti-animal ones. BW agents generally come in the form of pathogenic bacteria, rickettsia, viruses, fungi and toxins derived from living organisms (as opposed to synthetic chemicals or poisons). Factors considered in the investigation and development of BW agents include: can the agent have a desired military effect, can it be mass produced, can it be stored without losing its effectiveness, and can it withstand the military means of application (i.e. spray tanks, bombs, etc.). The development of a means to disburse the agent is evaluated based on how much agent per unit of land is required, can a proposed weapon disperse enough agent to meet the dosage requirements, can it withstand the handling from the time of manufacturing until use, and do all the components function as designed and produce the desired effect. These are just a few of the concerns of the RDT&E effort for offensive BW.[74]

The defensive side of BW RDT&E focused on countermeasures to possible BW attack but many of the research paths also supported and overlapped with the needs of the offensive efforts including basic research into potential BW agents, detecting BW agents, protecting against BW agents and methods of decontaminating after exposure to BW agents. For example the development of detection methods supports the sampling methods used for offensive tests as well as determining if an attack occurred. The means of protection supports the program to ensure the control of agents in laboratories, test chambers and the field. Despite the overlap, when organizing Camp Detrick the Army split the work into separate organizational elements, between offensive and defensive divisions.[75] This resulted in the somewhat arbitrary assignment of a function to one division even though it was used equally by both divisions. For example, Detrick initially assigned administrative, technical, laboratory services and engineering functions to Defensive Division even though they provided support to all of the activities on Camp Detrick. Other defensive elements of RDT&E included development of biological protective materials and methods to ascertain degrees and duration of such protection and developing mechanical methods of protection through use of masks, clothing, etc. Another task was determining the criteria for killing BW agents for application to the contaminated sewer system and decontamination in general.

[v] Fort Detrick also investigated chemical anti-crop agents (i.e. herbicides) investigations as part of the BW program and these efforts are detailed separate companion ASR volume on Detrick.

BW testing included laboratory tests (small scale), closed chambers tests (medium scale) and open-air field tests (large scale). In each of these scales, investigators could conduct the tests with the pathogens or toxins or with a simulant. BW simulants are substances or microorganisms that represent or mimic the physical and biological characteristics of an agent that were considered medically safe to operating personnel and surrounding communities.

The two most commonly used BW agent simulants were *Serratia marcescens* (SM), a simulant for pathogenic bacteria and *Bacillus subtilis* var. *niger*, more commonly referred to as *Bacillus globigii* (BG), a simulant for pathogenic spores. Other commonly used simulant were fluorescent particles, zinc cadmium sulfide (ZnCdS) and *Aspergillus fumigatus* (AF), a fungus simulant used in the early 1950s before Detrick abandoned anti-fungal agent studies. The small and medium scale testing typically occurred within the buildings and facilities on Fort Detrick and included both simulants and pathogens. Open air testing at Fort Detrick was limited due to size of the base and the proximity of civilian populations. However, small scale open air tests with non-pathogenic simulants occurred on the circular Test Grid portion of the post, currently referred to as Area B. Tests in Area B were generally restricted to unfilled munitions or those filled with simulants. Fort Detrick did not have the area or facilities for large scale tests with agents. Those were conducted at other installations, most typically at DPG in Utah.

The 1977 U.S. Army comprehensive report to Congress reviewing the BW program lists the open air BW field testing locations performed on public and non-public domain including Fort Detrick. This list includes simulant tests at a wide variety of locations including Fort Detrick.[76] Detrick Safety Regulations decreed that "Infectious or toxic substances will not be used in field testing at Camp/Fort Detrick"[77] and no pathogenic open air anti-personnel tests are documented to have occurred at Detrick.[vi] The pathogenic open air anti-personnel tests primarily occurred at DPG, which includes the Granite Peak Installation. The pathogenic open air anti-crop tests occurred at a variety of other military installations, state agricultural research stations and DPG. Although no pathogenic crop agent tests have been identified on the Area B test grid, tests such as the 20 mm tests with agent TX (Wheat Stem Rust) filler have occurred at outside locations on Fort Detrick.[78]

Additionally during development of a field harvester for collecting uredospores of cereal rust plants "several moderate size field collections of rust spores were made at Camp Detrick in 1949".[79]

[vi] In the 1977 BW summary, Detrick is listed as hosting a pathogenic agent tests in March-May 1961 along with DPG, however, Detrick hosted only the simulant trials and the pathogen trials were held at DPG.

5.2 SAFETY PROGRAM

Because of the pathogenic nature of the agents and materials being handled at Camp/Fort Detrick, this ASR looked not only at the test activities that occurred at the installation, but also at the methods in place to control to prevent release of, exposure to and contamination by both the agents used in the tests and the materials used for decontamination and maintenance of the test facilities. Camp Detrick activated Safety or S Division on 27 September 1943[80], and they began developing safety regulations for all personnel and in particular those conducting all operations in the Restricted Area (potentially contaminated area where work with agents occurred) including laboratories, pilot plants, animal rooms, shower and change rooms, etc. The importance placed on safety is illustrated by the fact that in August 1944, one of every 25 people at Detrick was in the Safety Division. It had a staff of 86 personnel and was one of three divisions commanded by a full colonel. To further put that into perspective, on a normal Army installation the director of safety is generally a special staff position with a handful of staff assistants. The size and prominence of the safety program at Detrick was a function of the unique and ground-breaking nature of the work for the military. As work began at Detrick there was little in the way of military guidance available for working with BW agents and material, requiring the Detrick safety office to develop, test, and implement safety requirements for all aspects of BW operations at Camp Detrick, as well as at subordinate or field installations (i.e. Horn Island, MS; Granite Peak Installation, DPG, UT and Vigo Plant, Terre Haute, IN). For example, Detrick's safety division prepared Special Report 66 on procedures for the removal of *Bacillus anthracis* from contaminated buildings and equipment as part of the closeout procedures following the end of WWII. Over the course of the war, the number of people in Safety Division dropped to reflect the post-war drawdown. As the post workload evened out from the late 1940s to mid-1950s staffing again increased. Even at its post-war low, the Safety Division was staffed at much higher levels than found at a typical Army base.[81]

The Safety Division's general function with respect to BW was that it ensure *"safety of research and development operations for personnel involved and for surrounding communities; inspects, plans for operation of all research laboratories, plants, and field testing stations; designates safety practices and precautions to be taken therein; develops and applies tests to determine and control safety of operational practices; cooperates with Surgeon General's representatives in application of biological methods for protection of personnel, to develop methods of evaluating efficiency of such methods, and to maintain required level of resistance in individuals; formulates or approves safety regulations."*

Detrick divided the Safety Division into two branches: the Biological Protection Branch and the Operations Protection Branch. The Biological Protection Branch "*Conducts, evaluates and maintains biological protection of individuals designated by Chief, Safety Division; develops methods for determination of safety of operational procedures; in cooperation with other divisions, devises methods for prophylaxis and treatment for*

designated agents." The Operations Protection Branch "*Performs safety inspections: conducts safety control of all research, development, pilot plant and field testing activities and surrounding communities."* [82]

Although the other groups and divisions at Detrick had specific RDT&E missions, prior to the use of *"...new agents or the execution of unusual operations or the handling of equipment involving hazards* [they] *must have prior approval from the Safety Division*." Prior to their approval, Safety Division also had the authority to require additional information, request a demonstration of the procedures proposed for use, and might require safety tests of procedures and equipment.[83]

The Safety Division, like the other divisions on Detrick, produced at various times either monthly or quarterly reports on the activities of the division. Between 1949 and 1956 the Safety Division produced 13 issues of a regular Safety Bulletin to inform the population of the post regarding various safety topics.[84] The Safety Division also either authored or sponsored a number of various reports dealing with safety, such as Special Report 99, The Removal of *Bacillus globigii* Spores from Various Surfaces[85]

Additionally, Safety Division prepared a series of summary reports covering the period from 1943 through 1959. These Safety Program reports provided an overview of the safety program during the period of the report; the hazards faced; examination of accidents and occupational infections; decontamination and detection methods; training provided, specific safety equipment and prophylactic measures developed and used and specific safety issues relating to certain buildings (e.g. pilot plants, decontamination plants and laboratories). These reports represent a good summary of problems and solutions faced by the Safety Division and Detrick as a whole and the practices used to operate safely.[86]

The Safety Division conducted formal safety training and orientation classes beginning in February 1944. The classes were tailored for a variety of personnel based on their knowledge and experience levels. In August 1948, the Safety Division collected and organized the safety regulations developed to that point and distributed them as an 11 page pamphlet. These regulations were revised and modified over time with the later versions expanding to include additional guidance. Supplementing these were the Biological and Radiological Safety Regulations for the Limited Areas, and by 1952 the pamphlet was over 60 pages long.[87]

Among the activities under the control of the Safety Division were the removal of all equipment and material from potentially contaminated areas. The first regulations for removal were established in October 1944. The regulations varied over time but entailed procedures to ensure that the items were properly sterilized prior to removal.[88]

In short, the Safety Division had responsibility and oversight authority for ascertaining that the activities at Detrick were conducted in a manner that protected the military and

civilian personnel on post and the population outside the gate. In their words, "*The principal objective of all safety efforts is to prevent injury, illness, and death in employees and in the surrounding community. All other interests are subsidiary*."[89]

5.3 BW ANTI-PERSONNEL AND ANTI-ANIMAL AGENTS

5.3.1 General

In fall 1941, the War Research Service (WRS), a civilian agency that worked in conjunction with the War Department was established and assigned the mission to provide supplemental research and development of BW to the CWS. Following a literature review of diseases and pathogens to identify candidate BW agents, candidate agents were studied in the laboratory to determine if they met or could be made to meet military requirements for a BW agent (i.e. readily produced, storable for an extended period, and dose rates that could be achieved by military dispersal methods). Normally if a disease agent passed the first and second examination it was studied for application as a BW agent and an agent code was assigned. BW agents included live pathogens and toxins produced by a live organism but not a live agent. The WRS selected *Bacillus anthracis* (anthrax) as the first BW agent. During WWII, the CWS focused on the following anti-personnel and anti-animal agents:[90][vii]

Anti-personnel Agents

- Agent N - Anthrax *(Bacillus anthracis)*
- Agent X - Botulism or Botulinum toxin from the botulism organism)
- Agent US - Brucellosis
- Agent LA - Glanders
- Agent HI - Melioidosis
- Agent UL - Tularemia
- Agent SI - Psittacosis
- Agent OC Coccidioidal Granuloma
- Agent NT - Neuro-Tropic Encephalitides
- Agent SS - Shellfish (Mussel) Poison
- Agent LE - Plague
- Agent R - Rinderpest
- Agent OE - Newcastle Disease or Fowl Plague

During WWII, Detrick focused on the etiologic agents for Anthrax, Botulism, Brucellosis (starting in May 1944), Glanders and Melioidosis (April 1944), Tularemia, Psittacosis (September 1944), Coccidioidal Granuloma (January 1945) and Neuro-Tropic Encephalitides (June 1945). Detrick also worked with the two main simulants *Bacillus globigii* (*Bacillus subtilis* var *niger*) (BG) and Serratia marcescens (SM). Universities,

[vii] Anti-Crops pathogens agents are discussed separately in section 5.4.

the Navy Bureau of Medicine and Surgery or our allies lead investigations of the other agents.[91] After the war, Detrick continued studying the most promising BW agents as well as investigating other candidate agents for their BW potential.

5.3.2 BW Agent Codes

A comprehensive listing of BW agents and the specific strains studied at Detrick over time is not available. The following table covers the BW agents assigned BW Agent Symbols by the Chemical Corps Technical Committee in the 1950s (i.e. the most significant ones)[92] or were identified in this ASR investigation as occurring at Detrick (note this list also includes anti-crops pathogens and chemicals).

Table 5.3.2 - BW Agent Codes

Agent Code	Common Name	Scientific Name	Note
AA		*Brucella abortus*	
AB AB1		*Brucella suis* (Liquid)	See US
AF		*Aspergillus fumigatus*	Fungal Simulant
AM	Brucellosis	*Brucella melitensis*	
AN	Japanese Type B Encephalitis		
AU			Mass cultures of spores
AV_1		*Rickettsia typhi*	
BG		*Bacillus globigii* (*Bacillus subtilis* var *niger*)	Spore forming simulant
BM		*Bacillus megaterium*	
BV	Bovine Diarrhea		
C	Southern Blight	*Sclerotium rolfsii*	
CI	Coccidioides Immitis		
DE_1	Influenza		
DX_1		*Corynebacterium diphtheriae*	
E	Brown Spot Of Rice	*Helminthosporium oryzae*	
EA			See SM
EC		*Escherichia coli*	
EEE			See ZX
EK	Vescular Exanthema		
ET	Vescular Stomatitis		
EV_1	Western Equine Encephalitis		
FA	Rift Valley Fever		

Table 5.3.2 - BW Agent Codes			
Agent Code	**Common Name**	**Scientific Name**	**Note**
FP	Florescent Particle	Zinc Cadmium Sulfide	Used to provide a visual count of aerosol particles
FW	African Swine Fever		
FX		Venezuelan Equine Encephalitis (Liquid)	
GIR-1			See R
H1		*Pseudomonas pseudomallei*	
HI	Melioidosis	*Malleomyces pseudomellei* *Pfeifferella whitmori*	
HL		*Shigella alkalescens*	
HO	Cholera	*Vibrio comma*	
KG	Chikungunya Virus		
IA			See IE
IE	Wheat Blight	*Gibberella zeae*	
II			Rice Diseases
IR			See LX
JT		*Pasteurella tularensis* (Strain 425)	
KF_1		4-Fluorophenoxyacetic Acid	
KS_1	Rabies		
LA	Glanders	*Malleomyces mallei* *Pfeufferekka mallei*	
LB_1		*Blastomyces brasiliensis*	
LE	Plague	*Pasteurella pestis*	
LL_1		*Blastomyces dermatitidis*	
LN	Plant Growth Inhibitors		
LO	Late Blight Of Potatoes	Phytophthora infestans	
LP		Lycopdium Spores	
LS		Venezuelan Equine Encephalitis	
LT			Blood studies
LU			See OI
LX	Rice Blast	*Piricularia oryzae*	
M			Immunization, general
MB	Monkey Virus		
MH_1		*Rickettsia tsutsugamushi*	

Table 5.3.2 - BW Agent Codes			
Agent Code	**Common Name**	**Scientific Name**	**Note**
MN		*Coxiella burnetii (Liquid)*	Immunization For N
N N1	Anthrax	*Bacillus anthracis*	
NC			See NI
NI	Newcastle Disease		
NT		Neuro-Tropic Encephalitides	
NU		Venezuelan Equine Encephalitis	See VEE
OC	Coccidioidal Granuloma	*Coccidioides immitis*	
OE	Fowl Plague		
OH	Hog Cholera		
OI	Yellow Fever		With the mosquito vector
OJ	Yellow Fever		Without the mosquito vector
OL_1		*Histoplasma capsulatum*	
ON	O'nong-Nyong Virus		
OO	Foot-And-Mouth Disease		
OU OU1	Q Fever	*Coxiella burnetii*	
OY_1		*Sporotrichum schneckii*	
PG	Staphylococcal Enterotoxin B	*Staphylococcus aureus* Enterotoxin Type B	
PG-2		*Staphylococcus aureus* Enterotoxin Type B (Dry)	
PY_1		*Cryptococcus neoformans*	
R	Rinderpest		
RI			Preservation Of Rickettsia
RO_1	Poliomyelitis		
RR			Plant Growth Regulators
RT	Ricin Toxin		Chemical Agent W
SI	Psittacosis Virus		Several strains of related viruses
SK_1		*Actinomyces bovis*	

Table 5.3.2 - BW Agent Codes			
Agent Code	**Common Name**	**Scientific Name**	**Note**
SM		*Serratia marcescens*	Bacteria Simulant
SS	Shellfish Poison		
SX SX1	Rye Rust	*Puccinia graminis secalis*	
T1		T1 Bacteriophage	
T2	T2 Mycotoxin		
T3		Bacteriophage Found On E Coli	Virus Simulant
TD		Venezuelan Equine Encephalitis (Dry)	
TT		*Pasteurella tularensis*	
TX TX1	Wheat Stem Rust	*Puccinia graminis tritici*	
TZ	Shell Fish Poison		
U			British And Canadian Code For BG
UA	Colorado Tick Fever		
UC		*Staphylococcus aureus* Enterotoxin Type B	See PG
UL UL1 UL2	Tularemia	*Pasteurella tularensis* *Pasteurella tularensis* (Liquid) *Pasteurella tularensis* (Dry)	
ULP			British And Canadian Code For BG Mixed With Peat
US	Brucellosis	*Brucella suis*	
UY_1		*Rickettsia rickettsii*	
VEE		Venezuelan Equine Encephalomyelitis	
VKA		Herbicide 2,4-D (2,4-dichlorophenoxyacetic acid) dissolved in tributyl phosphate and fuel oil	Vegetable Killer Acid
VKL		Herbicide 2,4-D dissolved in tributyl phosphate	Vegetable Killer Liquid
VKS		Herbicide 2,4-D Ammonium Salt of dissolved in water	Vegetable Killer Salt
W	Ricin Toxin		
WEE			See EV

Table 5.3.2 - BW Agent Codes			
Agent Code	**Common Name**	**Scientific Name**	**Note**
X OR XR	Botulism, Botulinum Toxin	*Clostridium botulinum* Botulinum Toxin Type A	
Y	Dysentery	*Shigella dysenteriae*	
YE	Typhus Fever	*Rickettsia prowazeki*	
ZE_1		*Salmonella paratyphi*	
ZL_1	Smallpox		
ZO_1		*Salmonella typhosa*	
ZP_1		*Mycobacterium tuberculosis*	
ZX_1		Eastern Equine Encephalitis	
ZZ		*Pasteurella tularensis* (dry)	

5.4 ANTI-CROP AGENTS (BIOLOGICAL PATHOGENS) TESTING

In October 1943, the CWS established what would become the Crops or C Division to conduct anti-crop agent research. The Crops Division work was divided into Biological and Chemical branches to work on anti-crop agents. The Biological Branch focused on investigating plant pathogens, which did not involve the use of toxic chemicals, and the Chemical Branch investigated plant growth inhibitors or regulators, essentially herbicides. A more thorough description of the activities of the Crops Division Chemical Branch is contained in the companion ASR volume published separately: *Archives Search Report Findings for Field Testing of 2,4,5-T and Other Herbicides, Fort Detrick, 4 April 2012*[93], and will not be reiterated here.

Preliminary work, consisting of planning and literature searches on anti-crop agents began at Detrick and various agricultural research facilities around the country in fall 1943. Initial work was conducted in a 12 by 25 foot laboratory facility in Building 201 and was moved into Building 321 with a pilot plant housed in Building 325, where sufficient quantities of anti-crop pathogens were developed for laboratory and field testing use.[94]

Fort Detrick conducted an anti-crop program involving the development of both anti-crop pathogens and chemical growth inhibitors. As part of this program, crop laboratories, greenhouses, and small plot crop areas were established.

The Biological Branch investigated various plant pathogens, beginning with funguses Brown Spot of Rice (*Helminthosporium oryzae,* Agent E), Southern Blight (*Sclerotium rolfsii,* Agent C), and Rice Blast (*Piricularia oryzae,* Agent IR) and the fungus like oomycete Late Blight of Potatoes (*Phytophthora infestans,* Agent LO), during WWII. In July 1946 work began with Wheat Stem Rust (*Puccinia graminis tritici,* Agent TX) as well.[95] Plant pathogens work begins with selecting spore strains from infected plants in

nature and continuing with preliminary studies in the laboratory and plants in the greenhouse. Detrick produced spores for testing in the laboratory and in large quantities in Pilot Plants (see section 6.4). Detrick's efforts might include modifications to the growth media to optimize growth of agent, variations in drying and concentrating methods to improve results, investigating storage methods and means to optimize the length of storage, or using chilled sterile water for washing grain substrates.[96] Unlike anti-personnel and anti-animal pathogens, anti-crop pathogens could be developed and tested in the field when taking protections to prevent infection of local crops, such as growing an infected crop in area where that crop is not typically grown or planting infected crops later in the season after plants in the community had passed the point of infection (i.e. growing a spring-type cereal crop in areas where winter-type versions of those crops are grown). The vast majority of open air BW field testing with anti-crop pathogenic agents occurred at locations other than Fort Detrick as noted in the 1977 U.S. Army two volume comprehensive report reviewing the BW program.[97] However, Detrick did conduct some very limited outdoor tests with anti-crop pathogenic agents, including cereal rusts TX (Wheat Stem Rust) and Southern Blight (see section 6.8.3 and 6.8.5).[98]

5.5 CHEMICAL WARFARE AGENTS

Detrick conducted a limited number of experiments with Chemical Warfare (CW) agents using laboratory quantities in non-weaponized applications. None of the data from test information recovered as part of the ASR indicated that large amounts of CW agents and or CW weapons were ever used on Fort Detrick.

In 1945, Fort Detrick conducted a series of experiments on the use of CW as co-agents in a BW cloud to facilitate the invasion of a BW agent, specifically *Bacillus anthracis* (anthrax), and also to reduce the required dose. The CW agents investigated included: Phosgene (CG), Mustard (HD), Nitrogen Mustard (HN3) and Lewisite (L). The CW agent tests were part of a larger series of co-agent tests which also involved using metallic compounds such as chromium, cadmium and mercury. The tests were conducted in an autoclave type cloud chamber (24 by 24 by 36 inches, likely the ones in D-24/524). Mice, guinea pigs, and rats were exposed to the combined agents to determine the effects of the combined agents.[99]

Chlorine or phosgene clouds were tested in another experiment to determine if they had any defensive or anti-BW effect on clouds of BW agents. The test series investigated if common CW munitions such as smoke pots could help counter a BW attack. Clouds of chlorine and phosgene gas showed some promise in this record but the specific test data was not located.[100]

Another test series determined whether standard chemical decontaminates were effective on decontaminating combined BW-CW contamination. In a specific case, Detrick personnel conducted a test on contamination of ship compartments with BW (simulant

BG) and CW (Agent HD) contamination at the Bush River Dock, Army Chemical Center, MD, and not Fort Detrick.[101]

When Detrick expanded the munitions storage in the early 1950s, they also added a Toxic Gas Storage structure (Building 1217) in the ammunition storage area for storage of CW agents; however, none of the documents reviewed during the ASR indicated large amounts of CW agents or weapons were stored at Fort Detrick.

5.6 DECONTAMINATION

5.6.1 General

Anytime a BW agent or simulant was used at Camp/Fort Detrick, whether the work involves highly infectious biological agents or BW stimulants, having a method of decontaminating or sterilizing personnel, the area, the facility and equipment was central to the safe operations of the infrastructure. It is required for the safety of employees and community, to prevent cross-contamination between uses, and to prevent destruction of equipment and material. It also ensures no contaminated equipment or material is allowed to leave a contaminated area.

Heat was the primary and most basic method of decontamination used at Fort Detrick. This was accomplished by using steam, applied directly to the surface, or enclosed within the piping or chambers of equipment for periods of time, or enclosing the item within a chamber where steam was applied under pressure (i.e. autoclaving). If the material was no longer required, incineration was an option. However, applying heat was not an acceptable method of decontamination for all applications and surfaces. The temperatures required could destroy delicate and valuable equipment and was not suitable for human exposure. Therefore, decontamination activities were directed toward the type of material contaminated, such as air, liquid, equipment or personnel. Contaminated liquids were primarily processed through a special sewer system that used high heat for periods of time to decontaminate the effluent (see section 6.6.3). Gases or air contaminated with aerosolized bacterial agents could be sterilized by using incinerators (see section 6.5) or by using filters outfitted with heaters and ultraviolet (UV) lights. Where equipment and facilities with different kinds of surfaces required sterilization, Detrick developed various decontamination approaches that primarily used chemicals in liquid and gaseous states as bactericides, which are the focus of this section. The primary chemicals used in decontamination activities at Detrick were the following (in alphabetic order):

- Beta (β)-propiolactone (BPL)
- Calcium hypochlorite (as HTH (high-test hypochlorite) and bleaching powder)
- Ethylene imine

- Ethylene oxide as Carboxide gas (10% ethylene oxide and 90% co_2) and as 19% ethylene oxide and 81% Freon 12)
- Formaldehyde (formalin, a 37% solution of formaldehyde in water and paraformaldehyde)
- Sodium hypochlorite (aka. Liquid bleach or "Clorox")

The following chemicals were also used or suggested for use in decontamination activities at Detrick (in alphabetic order):

- Asboloxane
- CC2 (impregnate)
- Chlorine
- CWS screening smokes: oil smoke, white phosphorus, HC (hexachoroethane) and FS (liquid smoke consisting of a mixture of sulfur trioxide and chlorosulfonic acid) smoke
- DANC (decontaminating mixture of CC no. 1 (a chlorine mixture) and acetylene tetrachloride)
- Detrochlorite (calcium hypochlorite ant thickening agents, surfactants and water)
- Detroxide (12% ethylene oxide and 88% dichlorodifluoromethane)
- Formaldehyde - methanol
- Halazone (chlorine based water purifier)
- Lysol
- Mercuric chloride (1 to 1000 and 70% alcohol)
- Methyl bromide
- Peracetic acid (PAA)
- Phenol
- Propylene glycol
- Quaternary compounds (Rocca1, Purasan, Hyamine)
- Sodium hydroxide (aka lye or caustic soda)
- Sodium or potassium hydroxide (e.g. Drano)
- Super tropical bleach (STB, chlorinated lime [calcium hypochlorite] and calcium oxide with 30 percent available chlorine))
- Triethylene glycol

Most Detrick reports discuss decontamination at least briefly. Many go into great detail specifically covering decontamination. For some perspective, this investigation located nearly 100 Detrick reference documents with decontamination in the title and over that mention it in the text (over a fifth of the total gathered). Many of the decontamination documents are detailed reports specifically on the topic, such as the 29-volume set "Principles and Practice of BW Decontamination" on specific items.

5.6.2 Decontamination 1943 - 1970

Beginning in November 1943, Detrick began investigating decontamination as it applied to BW under Project CD - DM - 3. At the time, conventional bactericidal methods used in civilian applications, used steam under pressure (autoclaving), intense dry heat, or chemicals including, formaldehyde, mercuric chloride, other solutions of heavy metals, ethyl alcohol, phenol, propylene glycol, hexylresorcinol, and solutions of chlorine. The Physics and Chemistry (PC) Division of Camp Detrick had responsibility for developing and improving decontamination procedures. The PC Division undertook investigations to develop methods using available materials and to determine the minimum effective concentrations required. The PC Division reported the progress of this work monthly throughout the war, with Safety Division responsible for ascertaining the effectiveness of the methods.[102]

Among the chemical decontamination methods Detrick initially experimented with were hypochlorite mists (i.e. bleach), chlorine gas, propylene glycol, triethylene glycol, and ethylene oxide for decontaminating bacterial aerosols. CWS screening smokes such as: oil smoke, white phosphorus, HC (Hexachloroethane) and FS (liquid smoke consisting of a mixture of Sulfur Trioxide and Chlorosulfonic Acid) smoke, were also tried. though the screening smokes use appears extremely limited as they were not highly effective. For surfaces and clothing, Detrick used formaldehyde (Formalin, a 37% solution of formaldehyde in water), hypochlorite (sodium hypochlorite and or calcium hypochlorite), ethylene imine, methyl bromide, other organics tested on a small scale and ethylene oxide. Use of ethylene oxide was in the form of Carboxide gas, which is a mixture of 10% ethylene oxide and 90% CO_2 to reduce the flammability of pure ethylene oxide. Formaldehyde proved the most effective surface decontaminating agent of several tested in commercially available amounts. Decontamination of soil proved difficult though Detrick found that calcium hypochlorite in the form of HTH (high-test hypochlorite) and bleaching powder were the most promising, along with NaOH (sodium hydroxide). Water decontamination included the use of HTH, halazone (chlorine based water purifier) and chlorine.[103]

Bacillus anthracis (anthrax) contaminated items proved to be among the most challenging to decontaminate. One of the first methods used during WWII was to spray equipment with a solution containing mercuric chloride and 70% alcohol. Safety Division quickly insisted on abandoning this method based on concerns over the toxicity of mercury, and the amount of decontamination that would be required. Detrick switched to a method using a 5-% calcium hypochlorite or sodium hypochlorite to sterilize the exterior surface of equipment and cloud chambers. They also showed that Formalin proved more stable and less corrosive than hypochlorite in other tests. At the end of the war, in order to decontaminate the buildings and equipment contaminated with *Bacillus anthracis*, Detrick used steam sterilization and chemical sterilization with: a. Calcium hypochlorite, b. Formaldehyde, c. Carboxide, and d. Sodium hydroxide. This decontamination effort represented the state of the art at the time. The internal surfaces of the pilot plants were treated with steam under pressure for 612 hours and then flushed with sodium hydroxide. External surfaces were sprayed with a calcium hypochlorite

solution. Equipment was autoclaved unless it was too delicate, in which case it was exposed to ethylene oxide in the form of Carboxide under pressure for six hours. Office equipment was decontaminated by a cloud of formaldehyde **(**Formalin). In cleaning the vent and duct work with calcium hypochlorite, grease was removed with carbon tetrachloride to avoid the fire hazards with other solvents.[104] In other instances, Detrick used other solvents or cleaning agents to remove the accumulations of dirt, grease, or oil while decontaminating (see section 7.2 on TCE and PCE).

Exhaustive sampling and testing was conducted to ensure complete decontamination of the *Bacillus anthracis* (anthrax) contaminated buildings and equipment after WWII. The decontamination process was repeated until post decontamination samples came back clean. Frequently, Detrick established control locations with simulant BG to assist in the confirmation process.[105]

While hypochlorite was the most effective decontaminant for *Bacillus anthracis* (anthrax), its use caused corrosive damage to the plumbing in T-201. By 1946, Detrick published its findings on the virtues of ethylene oxide, as a non-flammable mixture Carboxide, as a non-corrosive decontaminating agent. Although previously known and used as an insecticide, Detrick determined its advantages as a gaseous disinfectant over sulfur dioxide and formaldehyde, the only gases commonly used for that purpose at the time. It was less toxic and did not require high humidity to be effective. In gaseous form, ethylene oxide has little or no deleterious action on fabrics, metals, or various types of laboratory equipment and had good penetrating powers for clothing.[106]

In the years following the war, the Decontamination Branch of PC Division continued routine screening of chemicals for their potential use in decontamination. They worked to consolidate their knowledge and recognize data gaps for further study, such as identifying effective decontamination agents less damaging to material equipment. [107]

In the early 1950s, Detrick continued to use formaldehyde vapors, sometimes generated from a Chemical Corps smoke generator, to decontaminate exhaust ducts or test chambers. Detrick continued evaluating ethylene imine along with Beta (β)-Propiolactone (BPL) and screened fluorine and carbonyl-containing compounds. At this time Detrick also studied mixing 19% ethylene oxide with Freon 12, which allowed for nearly twice the concentration of ethylene oxide as Carboxide while remaining non-flammable.[108] Subsequently this use became an accepted practice at Detrick.

The November 1952 Detrick Safety Regulation included a section on Disinfection and Sterilization which covered various procedures for removing hazards including autoclaving methods, use of ethylene oxide as a decontaminant, sewage disposal, treatment of contaminated air, use of UV lamps, plus the removal of refuse and salvage of materials. This regulation did not discuss specific decontamination agents or detailed procedures except to address the hazards associated with ethylene oxide and UV lamps.[109]

Most decontamination documentation is on the findings of various tests of potential new agents or procedures with little on the day-to-day use of decontaminants being uncovered. BW safety regulations of the time only cover decontaminating agents that have a specific safety requirement such as ethylene oxide or provide safe use practices for devices such as autoclaves and UV lights. The summarized safety program activities from 1944 to 1953 at Detrick briefly describes decontamination procedures used after accidents or during other operations and included references to the following decontaminates:[110]

- Sodium Hypochlorite solution
- Calcium hypochlorite.
- Phenol used with UV lamps
- Roccal (a commercial disinfectant)
- Formaldehyde in vapors or in conjunction with steam (the method used for Test Sphere)
- Sodium Hydroxide solution
- "Clorox"
- Peracetic acid (PAA) with Sodium Hypochlorite solution
- Ethylene oxide (in the form of Carboxide 10% Ethylene Oxide and 90% Carbon Dioxide)

The success of using ethylene oxide in sterilization led Detrick to specify autoclaves for use with Carboxide in all new buildings housing infectious agents and converting autoclaves in existing buildings to use Carboxide as well, dubbing them Carboxoclaves.[111]

The Army identified the following standard and miscellaneous materials for decontaminating BW in TM 3-220, October 1953, though it is uncertain if Detrick used all these materials in that manner:[112]

- Super Tropical Bleach (STB)
- DANC Solution
- Soap and Water
- Methyl bromide
- Commercial Disinfectants
- Germicidal soaps
- Phenol solutions
- Cresol solutions
- Rubbing alcohol
- Formalin (37% formaldehyde in water)
- Sodium ch1orite
- Hydrogen peroxide
- Potassium permanganate
- Mercuric chloride

In 1955, Detrick recommended using heat, exposure to UV rays and decontaminate chemicals ethylene oxide (Carboxide), sodium hypochlorite, chlorine and formaldehyde to sterilize BG spores.[113]

By the mid-1950s, less emphasis appears to be placed on identifying and developing new chemical decontaminates, though investigations continue at a lesser pace. In 1953-54, Detrick converted autoclaves for use with an 18.75 % ethylene oxide and 81.25% Freon 12 mix in low pressure cans. Detrick also investigated using a formaldehyde-methanol mixture for decontaminating aerosol chambers.[114]

In 1959, Detrick published findings on using a thickened bleach slurry, Detrochlorite (calcium hypochlorite and thickening agents, surfactants and water) for use in decontaminating vertical surfaces, particularly in cold weather climates. Detrochlorite proved less corrosive than STB.[115]

In 1962, the Safety Division published an unclassified "Practical Procedures for Microbial Decontamination" written and cleared for release to the general public. The report provides general decontamination methods regarding using heat, vapors and gases, liquid decontaminates, and radiation as well as including more detailed procedures for dealing with specific surfaces or materials (e.g. rooms, table tops, paper, people, etc.).[116]

That same year, Detrick also provided guidance for handing BW material aimed at governmental personnel in general. Detrick identified five types of chemicals as effective against all forms of microorganisms and suitable for sterilizing surfaces: hypochlorites (Clorox, HTH or STB), sodium or potassium hydroxide (e.g. Drano), aqueous beta-propiolactone, peracetic acid, and formaldehyde.[117]

In 1964, the Physical Defense Division continued to develop decontamination procedures for the protection of personnel against biological agents as well as developing methods of sterilizing interplanetary space vehicles in support of NASA's moon missions. Although firmly established, Detrick continued to investigate ethylene oxide and beta-propiolactone in sterilization including how moisture affected their bactericidal properties. In 1966 with beta-propiolactone, Detrick recommended reducing the previously suggested concentration. Detrick also investigated effectiveness of beta-propiolactone, peracetic acid, sodium hypochlorite (mixed with ethylene glycol) at very low temperatures. [118]

Use of peracetic acid as a decontaminant had limited application at Detrick as it is corrosive, toxic, and decomposes to acetic acid and molecular oxygen readily. It remained as a special-purpose decontaminant to sterilize the plastic protective suits for laboratory personnel. In 1966, Detrick did have one Peracetic acid shower in operation at the exit of a highly infectious area of Building 467.[119]

In July 1964, Detrick reassessed the use of beta propiolactone as a large-volume decontaminant and concluded that under properly controlled conditions it works but some of those conditions could not be readily met at Detrick because of the lack of an adequate disseminator and adequate environmental control within buildings requiring decontamination at the time.[120]

In 1968, Detrick conducted a series of tests to determine the effectiveness of using fine powdered paraformaldehyde, a powder that decomposes into formaldehyde when heated. Heating the powdered paraformaldehyde on an electric hot plate operating at 450^{o} F, produces formaldehyde gas that was as effective in sterilizing laboratory surfaces and equipment as the vaporized formalin method Detrick had used as a sterilizing agent since WWII.[121] The acceptance of paraformaldehyde use on Detrick occurred quickly as the revised installation Safety Regulations in 1969 noted precautions when using paraformaldehyde, along with the standards of steam and formaldehyde, with or without methanol, to decontaminate a ventilated cabinet. The regulations also noted the use of dry formaldehyde gas, in addition to the standard ethylene oxide, as being an acceptable decontaminant for use with tools removed from contaminated area.[122] Detrick also used heated paraformaldehyde when developing a mobile medical research laboratory.[123] Paraformaldehyde is one of the specific types decontaminates cited for use in the decontamination of all buildings at Detrick that had housed work on infectious microorganisms at any time during the period from 1943 through 1970.[124]

5.6.3 Decontamination Certification 1971-1973

After President Nixon's November 1969 announcement renouncing offensive and retaliatory use of BW and limiting the country's biological program to defensive research, the Army formulated BW demilitarization plans. Those demilitarization plans included decontaminating all of the buildings and equipment in the contaminated area and certifying them as clean for reuse or release to non-Army agencies to reuse the facilities or for standby closure of the structure.

The plans identified 79 structures and the Grid Area to be decontaminated

201	323	428	470	539 (lab.)
243	324	429	472	539
261	325	430	504	(incin.)
263	326	431	505	550
312	327	431A	520	560
313	374	432	522	567
318	375	433	523	606
319	376	434	524	621
320	384	459	525	660
321	389	467	527	1040
322	427	468	538	1301

1302	1412	1026	1031	1036
1303	141	1027	1032	1037
1304	1023	1028	1033	1038
1305	1024	1029	1034	1039
1306	1025	1030	1035	1656

In 1971, the Army transferred the Plant Pathology Division at Detrick to the USDA, including facilities, buildings and personnel. As such, the Army issued permit DACA-31-4-71-413 to the USDA effective 1 March 1971 for ±48 acres of fields and 9 buildings: S-319, S-324, 374, 378, 390, 1301, 1302, 1305, and 1306.[125] The Army transferred the Vegetation Control Division, the rest of personnel from what had been Crops Division, to the USDA in July 1974 and permitted the land and facilities including buildings: S-318, S-323, 326, T-391, S-1234, 1303, 1304, 1307, T-1312, T-1313, 1315 and T-1316.[126] The USDA Agricultural Research Service (ARS) as part of the Foreign Disease - Weed Science Research Unit retains a permit for the following buildings: 326, 374, 379, 383, 390, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1312, 1313, 1315 and 1316.[127]

Building 434 had been built as the Virus Pilot Plant, (see section 6.4.7) and later housed the Anti-crop Stockpile that was demilitarized (see section 5.7.2) and was one of the last of the 79 buildings associated with biological activities that underwent decontamination to be certified free of all infectious material. The Biological Safety Cabinet (BSC) systems were subjected to specific decontamination procedures prior to the general building decontamination. The three BSCs used in demilitarization operations were equipped with steam ejectors permitting direct injection of a methanol-formalin solution while concurrently raising both temperature and humidity. Decontamination of Building 434 was by formaldehyde vapor generated through depolymerization of paraformaldehyde in electric fry pans. Decontamination began on 5 January 1973 and the building was certified as being free of viable spores on 25 January 1973. Other buildings were decontaminated in a similar fashion.[128]

Four buildings (201, 263, 375 and 470) were not certified free of biological agent based on concerns that while *Bacillus anthracis* spores (anthrax) did not remain on building surfaces, allowing use, spores could possibly remain encased in the building foundation, cracks and pores. Building 201, formerly the location of WWII Pilot Plants Nos. I & II (see section 6.4.3), currently houses the Directorate of Public Works (DPW) for the installation with offices and equipment shops and storage. During WWII Building 263, housed equipment for the separation, concentration and drying of agents produced in Pilot Plant No. II. (see section 6.4.3) and then after the war was converted for use as the Munition Test Chamber/ Test Tank No. 1 (see section 6.3.4). Subsequently it was converted for use equipment shops and storage. Detrick built Building 375 as the "new" contaminated sewage treatment plant in 1953 and it remains in use (see section 6.6.3.5). Building 470, was the Bacteria Pilot Plant, colloquially referred to as the "Anthrax Tower" and it was razed in 2003 (see section 6.4.8).[129]

5.7 DEMILITARIZATION OPERATIONS

5.7.1 General

Operations involving the demilitarization of biological munitions come in two forms. First, as part of the development process, tests were required for the development of field disposal procedures in situations outside of the testing environment. Second, excess and unserviceable munitions and munitions components accumulate and require demilitarization as part of the disposal process.

Camp Detrick had the mission of developing both the biological agent and the delivery system (or munition). In this process, a certain number of munitions and components would not be used and require disposal. Additionally, small quantities of non-weaponized agent would result from the testing process. Camp Detrick conducted numerous test programs on methods of decontamination of various equipment and surfaces. Additionally, they had extensive experience in decontaminating contaminated sewage. It is assumed that the primary method of destruction of live BW cultures was with heat and that once the BW agent is destroyed the remaining munitions components can be treated as conventional munitions for disposal.

As discussed above in section 5.6.3, all buildings at Detrick that housed work on BW agents during the period from 1943 through 1970, including all fixed and moveable equipment required decontamination before release to a non-Army agency. The decontamination process entailed initial sampling, decontamination with hypochlorite solution and formaldehyde gas and resampling. Sterilization was repeated if resampling indicated there was remaining live BW agent.[130]

Part of the demilitarization process included the conversion of a large portion of the post formerly used for BW RDT&E into cancer research facilities under the NCI of the NIH. Although announced in October 1971 by President Nixon that official transfer of 68.61 acres to the NIH was not effective until 30 August 1977. This along with other property Detrick disposed of over the years totals 89.89 acres including 85.07 acres in fee, 2.72 in easement and 2.10 acres in license. This area is Formerly Used Defense Site (FUDS) eligible under DERP. FUDS is real property that was formerly owned by, leased by, possessed by, or otherwise under the operational control of the Secretary of Defense, that was transferred from DoD control prior to 17 October 1986. The Corps of Engineers manages the FUDS program under DERP for the DoD.[131] However, the U.S. Army Garrison Fort Detrick has handled all DERP issues under the IRP.

5.7.2 Anti-Crop Stockpile and Demilitarization

In July 1966, Fort Detrick began storing anti-crop agent *Pircularia oryzae* (Agent LX), the causal agent of Rice Blast. The Army stored the material in 4 mil polyethylene bags

containing approximately 20.7 pounds of material, the material was double bagged and placed in a standard 16 gallon drums and held in cold storage in Building 434.[132]

In August 1969 the Department of the Army directed immediate cessation of all production of toxins and biological agents and the filling of dissemination devices. When the use of BW by the U.S. was limited to defensive research in November 1969, the Army formulated guidelines for BW demilitarization plans and initiated plans for disposal of all anti-crop material at Fort Detrick. The demilitarization plan incorporated:

> *"(a) the principles of absolute safety and maximum protection to operating personnel and the environment rather than the consideration of time and cost;*
> *(b) the acquisition of data to assure incontrovertible evidence of complete inactivation of stocks; and*
> *(c) the provision of independent observers to witness the inactivation."* [133]

In December 1970, the Army provided the Draft Environmental Statement covering the anti-crop agent demilitarization (i.e. anti-crop biological agent inactivation and disposal) at Fort Detrick for comment to federal, state, and local agencies. Comments regarding the destruction and disposal resulted in the Army adopting a two phase program, with Phase I consisting of deactivation of the agent, which had been agreed to, and Phase II, consisting of the destruction and disposal of the inactivated material. In September 1971 the Army adopted the recommend alternate destruction and disposal method of incineration and on-site land disposal of resultant ash. The Army submitted the final Environmental [Impact] Statement for "Destruction and Disposal of Anti-Crop Biological Material at Fort Detrick" in July 1972.[134]

The procedures used ensured no aerosolized material escaped to the surrounding area during the inactivation and disposal processes, with all handling confined to equipment located in Building 434, which filtered all the air in and out of the building. The disposal operation involved a six step process with the first five being conducted in Building 434 on Fort Detrick:

1. Each lot of agent was sampled and assayed to establish viability.
2. Containers of spores were inactivated with Carboxide gas (10% ethylene oxide and 90% carbon dioxide).
3. Inactivation was certified by sampling and assay.
4. Dry inactivated spores were incinerated in a dual chamber, gas fired furnace.
5. Resulting ash was crushed, sampled, and analyzed microscopically and chemical to verify the absence of spores.
6. The certified ash was disced into the soil and seeded with a cover crop.[135]

On 13 September 1971 the Army activated a demilitarization operation team under the Vegetation Control Division to dispose of anti-crop agent at Fort Detrick. The Vegetation Control Division initiated Phase I, agent inactivation on 17 January 1972

completing it on 15 May 1972 with certification on the 18th. Phase II began upon the completion of the testing of the incinerator installed for this operation.[136]

The storage drums used to hold the agent were incinerated in the furnace, removed (see previous Figure) and sterilized, then crushed and buried in the landfill. All combustible material was incinerated. The inert ash residue resulting from the incineration of the inactivated anti-crop spores consisted primarily of silicon dioxide (sand), potassium phosphate (a common fertilizer ingredient) and small amounts of oxides of magnesium, calcium and iron. Detrick completed the ash disposal on 16 March 1973 in Disposal Pit 13 on Area B (see following figure). The demilitarization effort vacated Building 434 on 31 March 1973.[137]

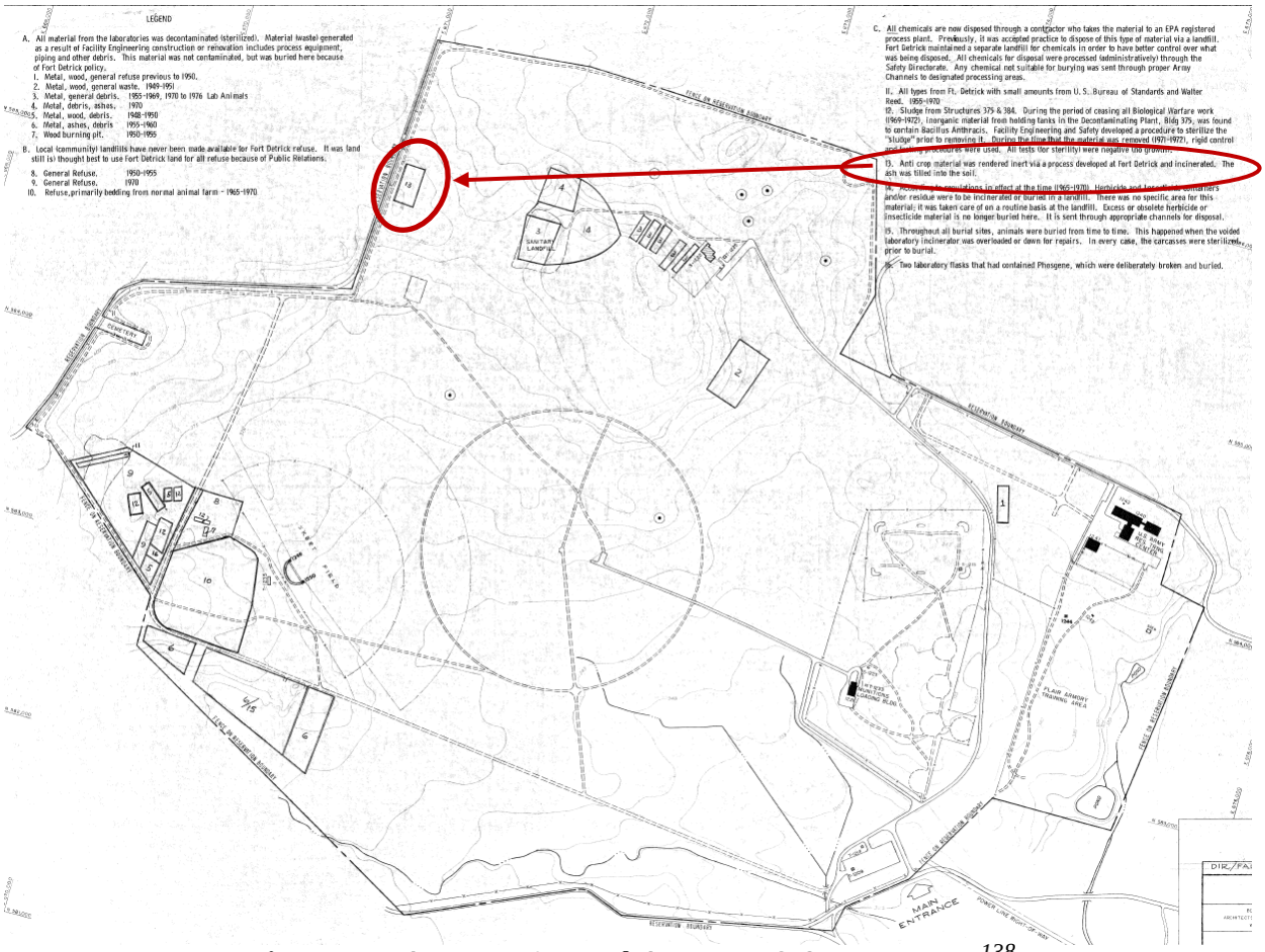


Figure 9 – *Area B Disposal Areas – 18 August 1977* [138]

6 **BW RDT&E FACILITIES**

6.1 GENERAL

Detrick originally was designed to be a small, self contained city with all its own facilities. However, because its laboratories, pilot plants, animal rooms, shower and change facilities, etc. were all in support of the RDT&E mission that involved working with highly infectious agents, Detrick spent a great deal of effort on developing and implementing methods to ensure no live agent escaped the research and testing area. Protective features of these facilities included decontaminating equipment, structures for sterilizing potentially contaminated gaseous and liquid waste using vented air incinerators, and a separate contaminated sanitary sewer system to sterilize air and water leaving areas where live agent was being tested or produced.

To provide the maximum level of protection possible for handling agents, the Army physically separated the facilities where work with live agents occurred behind a second fence on the installation in an area known as the Limited Area or Restricted Area or more colloquially the “hot” area. Detrick limited access to the Restricted Area to those with an established need, who had been given the appropriate immunizations, tests, and examinations, undergone special training, and had the proper clothing. There were strict guidance and procedures for disinfection and sterilization of personnel and equipment in order to remove hazards. Because any leak in the process equipment or laboratory operations presented a danger to Detrick personnel and the surrounding community, Detrick instituted a vigilant program of monitoring and sampling to detect potential escapes and methods to decontaminate the contaminated areas and facilities, if necessary.[139]

The Restricted area was used for small and medium scale testing. Laboratory testing were small scale tests conducted within a laboratory environment. For medium scale testing, Detrick developed secure, enclosed test chambers for testing exposure means, dose rates, and for testing the dispensing of agent from small munitions and components. These enclosed test chambers at Detrick, sometimes called cloud chambers were gas tight structures that varied in size from under 10 cubic feet, up to one million liters at their largest. Results of the chamber testing determined the need for or parameters for large scale or field testing.

Detrick facilities for outdoor testing were limited to single or small munitions using non-pathogenic simulants or crop agents which had no potential for infecting local agriculture or harming the Detrick or local inhabitants. The most significant field test location at Detrick was the circular Test Grid that dominated Area B and was the reason that the Army acquired the non-contiguous land. Other open air test locations also existed in Area A and Area B.

As Fort Detrick developed facilities to safely handle, analyze and test pathogens and their toxins, investigators also developed facilities both to produce selected organisms to provide a source of agent for testing and also to test production methods for creation of mass production, called pilot plants. In association with this, Detrick had a limited ability to manufacture and load small munitions for testing purposes that were generally part of the pilot plant facilities. With limitation of space, Detrick efforts in this regard remained modest with full scale production facilities being constructed elsewhere (e.g. Pine Bluff Arsenal, Arkansas).

The following sections provide additional details about the BW facilities on Detrick.

- Section 6.2 Laboratories
- Section 6.3 Enclosed Test Chambers
- Section 6.4 Pilot Plants
- Section 6.5 Incinerators
- Section 6.6 Sanitary and Contaminated Sewage Treatments
- Section 6.7 Solid Waste Disposal and Landfills
- Section 6.8 Exterior Test Grids / Ranges

For the purpose of this ASR, the primary concerns were the method and chemicals used that could potentially have resulted in a release of contamination into the environment and where any potential contamination may remain. While the ASR team reviewed extensive documentation regarding the activities in each of these facilities, the report highlights those activities that show either how releases to the environment were protected against, or method and chemicals used that might have resulted in potential releases and the location of such activities so they can be cross-checked with past remedial investigations and activities.

6.2 LABORATORIES

6.2.1 General

Much of the basic science research and experiments conducted at Detrick to study infectious microorganisms for both offensive and defensive purposes occurred in separate laboratories set up in designated laboratory buildings.

Initially, the program used industry standards for operation of laboratories involved in the study of pathogenic organisms. At the start of operations, Detrick planned on containing operations with highly infectious agents in one room divided into three sections, one for preparation, one containing a cloud chamber, and the last for animal maintenance and handling.[140] As requirements expanded, facilities needs expanded beyond the one room concept. During this development process, safety procedures were devised as required to prevent the release of the organisms. By the end of WWII, there were fourteen research

laboratory buildings in three sections of the Restricted Area: Buildings 321, 427, 428, 429, 430, 432, 433, 502, 503, 504, 505, 516, 525 and 526.[141]

Because commonly used laboratory methods for the study of microorganisms were not effective in preventing contamination of workers or the laboratories when *Bacillus anthracis* was being studied, routine daily decontamination of the laboratories including the use of disinfectant soaked mats in all the doorways to prevent the tracking of agent spores out of a potentially contaminated lab. All personnel were checked prior to entering a potentially contaminated area and were required to pass through a decontaminating shower upon leaving. Special clothing and shoes which could be sterilized were used in these areas. Another layer of protection involved the continuous monitoring of all clothing and workers for contamination. The preferred method for preventing *Bacillus anthracis* spores from escaping the ventilating system was to evacuate the air from potentially contaminated areas through incinerators. However, some attempts were made using filters to remove the contaminants from the air in areas where only small amounts of aerial contamination was expected. All liquid waste was handled by the contaminated sewer system and contaminated solids were decontaminated using autoclaves or in the incinerators.[142]

Inside the laboratories, Detrick researchers used enclosed chambers for housing hazardous equipment and procedures. Early designs for containing hazardous biological operations in the laboratory were similar to a chemical fume hood, with air venting through a stack to be incinerated by a gas burner with the natural draft created by the burner, though these were modified with an exhaust fan to increase the flow rate. This non-airtight cabinet provided protection by physically separating the researcher from the material and having a continuous flow of air through the cabinet and away from the operator and was suitable for working with materials with a slight or moderate risk. Detrick installed the first stainless steel biosafety cabinet versions in 1948. Air was exhausted from the cabinet with a 300-cubic-feet-per-minute blower that passed through a filter. Originally the filter consisted of asbestos filter paper and activated charcoal that provided nearly 100% filtration. However, this proved too restrictive and was replaced with a filter box using two layers of fiberglass. Ultraviolet light provided partial disinfection of the cabinet.[143]

To protect laboratory personnel from exposure to more infectious materials, Detrick enclosed the operation in gas tight cabinets (classified as a Class III type in 1959). Detrick also standardized these cabinets in a modular system to allow flexibility for the needs of the various groups that needed these cabinets for: housing infected animals, plating, pipetting, aerosolizing, autopsy, etc. The modular system also allowed the ability to have accessory equipment such as autoclaves, incubators, or refrigerators become incorporated into the system. Material would enter the modular biosafety cabinets through a dunk tank filled with decontaminant solution. Negative air pressure was maintained in these cabinets by exhaust air from the cabinet being drawn by a fan through gas tight ductwork to a bacterial filter and then through an electric incinerator, so

that only sterile air was exhausted. The air flow through the system was adjusted to four-cubic-feet-per-minute per module. The modular system also had a 20-gallon waste collection tank designed for the collection and sterilization of infectious waste. The contents were sterilized with steam under pressure, and were then cooled by a water jacket before being discharged to the common waste line.[144]

6.2.2 Plant Pathogen Laboratory, Building 374

In the early 1950s, Detrick constructed a new brick Plant Pathogen laboratory (41 by 176 feet) with five attached glass greenhouses (25 by 60 feet each) to act as a containment facility for RDT&E of plant pathogens. Although most plant pathogens do not offer a direct health hazard to personnel, Detrick designed the layout of the building similar to the other contaminated facilities on the installation to ascertain that aerosolized material did not escape. The area where plant pathogens were present was separated with air locks and shower rooms from the offices, changing rooms and ancillary equipment (heating and cooling etc). The exhaust air was filtered a number of times before discharging to outside air and the liquid waste sewage was treated through the Detrick contaminated sewer system. Material leaving the containment facility passed through large double ended autoclaves with discarded plant material, soil and pots being steam sterilized and the sensitive equipment (microscopes, cameras, etc.) being treated with a 10% ethylene oxide carbon dioxide cold gas mixture.[145]

In March 1971, the Army transferred this facility along with the rest of the Plant Pathology Division (i.e. biological anti-crop group) to the USDA, including facilities, buildings and personnel. The USDA Agricultural Research Service (ARS) Northeastern Region operated this facility under the Plant Disease Research Laboratory. The USDA Agricultural Research Service (ARS) continues to operate this facility currently as part of the Foreign Disease - Weed Science Research Unit.[146]

6.3 ENCLOSED TEST CHAMBERS

6.3.1 General

Enclosed chamber testing is the stage where assumptions based upon laboratory results are tested in a controlled, enclosed environment designed to model a specific field environment. The enclosed chambers, initially known as cloud study chambers or later aerobiology chambers, were gas tight. The results of chamber testing determined the criteria required for field testing, if field testing was deemed to be required.[147] Cloud chambers were primarily used for controlled exposure of various animals or organisms to BW agents.

Detrick received the assignment to develop an enclosed test chamber for the quantitative study of highly infective agents in air in December 1943. Although initially developed for research for defense against BW, the chamber proved equally essential to study of

offensive BW. Detrick received the first enclosed test chamber in August 1944. Detrick modified the accessory devices (e.g. atomizer, mixing chambers, samplers, animal boxes, etc.) and the overall methods used. Typical of test chambers, the chamber had an associated laboratory and a holding area for test animals.[148] Later Detrick developed additional test chambers and tanks at other locations on post (e.g. Buildings 263, 527, 567, 568, and 1412) including the largest one ever built, the One-Million-Liter Test Sphere. The Enclosed Test Chambers associated with live pathogen testing were located near or adjacent to air incinerators to sterilize the exhaust leaving the test chambers (see sections 6.5 for further details on incinerators). Details about the enclosed test chambers are described in more detail in the sub-paragraphs below.

6.3.2 Building T-129 (aka Building 429), Temporary "Cloud Chamber"

Building T-129 housed the "US" (brucellosis or *Brucella suis*) project during WWII. Testing of the chamber involved the use of simulant agents in a series of tests to ensure the chamber was safe to use with live pathological agents. With the arrival of the first equipment in late August 1944, Detrick temporarily installed it in one of the small gas rooms in Building T-129/429 adjacent to the laboratory and animal rooms. Studies were conducted at this temporary location between September 1944 and January 1945 on dyes, simulants, "US" agent and meningo pneumonitis virus. The experience gained from these efforts carried over as Detrick reinstalled the equipment in Building D-24/524.[149]

6.3.3 Building D-24 (aka Building 524), Permanent "Cloud Chambers"

Detrick completed construction of the cloud chamber building (D-24/524) in January 1945 and began installation of the cloud chamber equipment used in T-129/429 along with a second unit. Work with agents began on 21 March 1945.[150].

The abbreviations used for the various rooms of the Cloud Chamber are:[151]

E	Explosive Chamber (originally built for M Division
IN	Incinerator, refuse (shares chimney D-30/530 with air incinerator D-20/520)
D	Decontamination
C	Chamber room
OF	Offices
L	Latrine
OC	Outside Change Room
IC	Inside Change Room
CP	Cage Processing (animal)
IS	Inside Service
ST	Large autoclave
U	Utility room
AL	Air Lock
K	Kitchen

Detrick designed the building to hold two test chambers one on each side of the main hallway. The chamber itself was a cylinder 28 inches in diameter and 48 inches long. As with all test chambers, Detrick used simulant agents to ensure the safety of the chamber prior to using for research with pathogens. Vacuum pumps pulled exhaust air from the experimental chambers to the adjacent air Incinerator Building D-20/T-520. Basic and detailed operating procedures of the Cloud Chamber are available for this WWII era test chamber.[152] As Detrick developed other test chambers, in particular the replacement Aerobiology Building 376 in 1953, use of these chambers appears to taper off and cease.

6.3.4 Building 263, Munition Test Chamber/ Test Tank No. 1

Detrick personnel constructed a munitions test chamber in Building T-63/263 in 1947, to provide a more robust test chamber for testing explosive disseminated BW munitions. In 1944, the Army constructed building 263 with a reinforced concrete frame and glazed tile curtain wall as the munitions building. Detrick modified a 5,000 gallon tank, apparently one used by the contaminated sewage disposal plant, by welding ports for observation, insertion, sampling, circulation, sterilization and animal exposure to the tank. Detrick renovated and equipped adjacent rooms in 263 for laboratory purposes to support the test chamber.[153] Agents identified as having been used in this tank include the simulants BG and SM, along with the live agent, X (Botulism). During the period when this test chamber was in use, Detrick was designing a larger 40-foot diameter spherical chamber or One-Million Liter Test Sphere. Information gained from use of the munitions test chamber resulted in modifications to the construction of that larger facility. Despite bringing that larger facility on line, Test Tank No. 1 in Building 263 remained in use through 1955.[154]

In 1950, Detrick designed alterations to Building 263 including adding a new wall to form two "Firing Chambers" approximately 15 by 24 foot rooms at the northwest end of the structure (see following figure). There was no refrigeration system identified with the test tank/firing chambers in Building 263.[155]

6.3.5 Building 527, One-Million Liter Test Sphere

The largest aerobiology chamber at Fort Detrick, and the world, was the Cloud Study Chamber in Building 527. Designed to contain the test detonation of pathogen-filled munitions, the 40-foot diameter test chamber is better known as the One-Million-Liter Test Sphere or more colloquially "Eight Ball" or "8-ball". Design drawings for the facility date back to November 1946. Construction began in 1947 and was completed 4 June 1948. Between June 1948 and April 1951, investigators used only simulants in the sphere as it underwent a series of operational shakedown tests and modifications. The first test on infectious agents occurred on 10 April 1951. The spherical test chamber was made of 1 ½ inch thick steel armor plate and rests on eight tubular columns that were housed within a 60-foot high and wide cube, which also housed the ancillary facilities

used to study the effects of pathogen-filled munitions A metal platform or cat walk encircled the sphere's equator to provide access to the various support features such as work cabinets, entrance chambers, dip tank, dressing rooms, decontamination showers, observation ports, etc. There were additional catwalks, stairs and ports at other locations around the sphere as well. These access ports allowed for the connection of biological safety cabinets to expose animals to the resulting aerosol during the tests. Other ports along the perimeter allowed for vented exposure for human volunteers under Operation Whitecoat.[viii] The sphere also had systems for controlling the humidity and temperature of the air before the start of a test with a Freon based refrigerant system.[156] Multiple tests of live pathogen agents and BW munitions have been identified as being conducted in this test sphere. Based upon the test numbering systems, this facility was in use as a test camber through at least 1966, though it may have been as late at 1969. Fire destroyed the cube structure surrounding the test sphere in 1974 but the sphere itself remains standing as Building 527 and it was placed on the National Register of Historic Places in November 1977.

6.3.6 Buildings 567 and 568, Test Tank Nos. 95, 96 and 97

Construction of Building 567 began in March 1951 to provide laboratory facilities for the adjacent Test Sphere, Building 527. As part of its construction, there was to be three test tanks: two (Test Tank Nos. 96 and 97) with a volume of approximately 1,790 cubic feet (about 50,000 liters) and the third (Test Tank No. 95) with a volume of approximately 4,060 cubic feet (about 100,000 liters). The three tanks were housed in two interconnected rooms with hallways to both Buildings 567 and 568, although the tanks were primarily located in 568 at the point it conjoined with 567. All three tanks were 14 feet in diameter inside with Tank No. 95 being approximately 30 feet high and Tanks Nos. 96 and 97 being half that. Building 567 first used infectious agents on 2 December 1953.[157]

Test reports reviewed indicate live pathogen agents were used in all three Test Tanks involved, and Tank No. 95 had some test fixtures associated with munitions development. Detrick outfitted all three test tanks with various assembly, sampling and exposure cabinets in order to conduct the tests, though Tank No. 95 had two levels of them.[158]

Use of these facilities also included some low temperature secondary refrigeration units that used TCE as a refrigerant (see section 7.2 for further discussion).

6.3.7 Building 376, Reynier Aerosol Chambers

[viii] Operation Whitecoat refers to project between 1954 and 1973 where Detrick used enlisted personnel volunteers, typically trained medics / conscientious objector members of the Seventh-Day Adventist Church, for biomedical research relating to the effectiveness of antibiotics and vaccines.

Detrick completed construction of a 2 ½ story brick Aerobiology Building in 1953 to replace the old Aerobiology Building 524. Detrick designed and built Building 376 primarily to facilitate aerobiological studies in small test chambers. The new facilities offered better control of relative humidity and temperature in aerosol chambers, and improvements to regulating animal exposure dosage. Following a period of safety testing, operations with infectious agents began on 28 September 1953. The four aerosol chambers installed in two rooms were on the first floor. The chambers were built of 1/8-inch stainless steel and consisted of four sections: balloon sphere, spray section, animal exposure section and cloud sampling section. Refrigerated brine solution flowed in the jacket surrounding the chambers allowing for temperature control between 35° F and 150° F in three of the chambers and between -60° F and 120° F in the fourth chamber (the specific type of low temperature secondary refrigeration unit is uncertain but appears to have used TCE, see section 7.2 for further discussion). The aerobiological tests conducted in the four chambers between 9 March and 30 June 1954 included 148 infectious trials and 430 tests on the etiologic agents for anthrax, tularemia, plague, Brucellosis, Venezuelan Equine Encephalitis and influenza. Three electric Trent air incinerators were originally installed in 376 to sterilize contaminated air.[159]

6.3.8 Building 1412, Cloud Chambers A and B (Test Tanks X and Y)

In 1955, the Army produced specifications and began construction of Building 1412, a new Biological Laboratory for Special Operations Division, which was completed in 1959. A focus of the building was two 3/16 inch thick stainless steel Cloud Chambers, A and B, located across two floors of the building. Chamber A was approximately 33 by 38 feet in plan view and 30,000 cubic feet in volume. Chamber B was approximately 40 by 21 feet in plan view and 18,000 cubic feet in volume. The design for Building 1412 included a formaldehyde vaporizer system for decontamination of the Cloud Chambers and included a 200 gallon storage tank.[160] Test reports indicate the Cloud Chambers were later referenced as Test Tanks X and Y and testing included pathogen agent and simulant agent use. In addition to the two cloud chambers, Building 1412 had two aerosol exposure tanks, 1,500 cubic feet in volume. These facilities included some low temperature secondary refrigeration units that used TCE as a refrigerant (see section 7.2 for further discussion).

6.4 PILOT PLANTS

6.4.1 General/Introduction

In general, the process for the production of biological agents proceeded from laboratory to pilot plant, to production plant. The laboratory and pilot plant phases were conducted at Fort Detrick with production plants established at other locations. Laboratory production was used for making limited quantities of agent for small scale testing. When testing moved beyond the laboratory's production capability or the process progressed far enough that full scale production may be required, a pilot plant was established to

develop methods for larger production of the agent. If the agent was determined to be effective enough to require mass stockpiles the process would move to the production plant phase.[161]

A major mission of Camp Detrick during WWII, was to produce BW agents on a pilot plant scale in order to develop larger scale production plants as required elsewhere (e.g. the WWII era production plant was in Vigo, IN). Laboratory studies were conducted to properly design and operate the large scale pilot plants. In addition to the plant design mission, the pilot plans were meant to produce sufficient quantities of agents to meet the investigation needs at Detrick and other locations (i.e. Horn Island, MS and Granite Peak Installation at DPG, UT). In other words, if live agent munitions were required for an investigation-scale test either on Camp Detrick or on another base, the munitions would have been prepared and filled at Camp Detrick.[162] This basic process would continue after WWII as well.

Associated with the construction of all the pilot plants were buildings for laboratories and control facilities. Two major problems were associated with pilot plants. The first was control of the agent being produced to ensure contamination was not released outside of the production areas. The second was to ensure that no outside organisms were allowed to contaminate cultures of agents being produced at the plants.

The specific procedures for the production of biological pathogens are not included in this report for security reasons. This process can be likened to the craft brewing of beer. Once it is determined which culture is best suited for the growth of the agent, a large container(s) of the agent is grown and the amount of agent needed is removed from the vat. The following pictures are from the crop pathogen pilot plant but can be considered representative of the general processes.

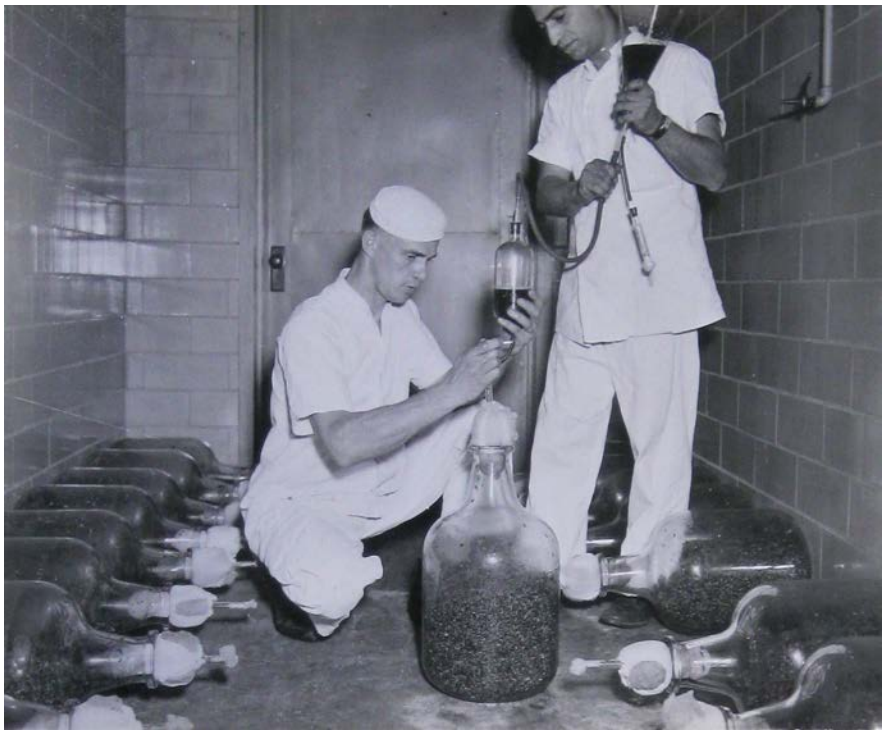


Figure 10 – *Inoculating the Growth Media with the Desired Agent – example from Crops Pathogen Pilot Plant*[163]
"Inoculating carboys of sterile grain substrate with spore suspension"

Figure 11 – *Placing the inoculated media in a growth chamber– example from Crops Pathogen Pilot Plant* [164]
"Dumping the infested substrata from carboys into sterile trays within the cabinet"

Figure 12 – *View of the growth chamber– example from Crops Pathogen Pilot Plant* [165]
"View inside constant temperature cabinet arranged for shallow trays"

6.4.2 "Black Maria"

Detrick constructed the original pilot plant, known as "Black Maria", in early 1943 in a temporary two story wooden structure approximately 30 feet square. The purpose of this plant was to obtain sufficient information and experimental data for the design of future pilot plants. In this plant, the liquid was decontaminated in the plant and then discharged to a French drain system and vent gases were released to the atmosphere.[166] Although documentation does not indicate what simulants were used in the testing of the plant or if actual agents were used, given the experimental nature of its use and construction, the use of live agents is considered very unlikely.

The specific location and building number are uncertain, as there are no structures labeled as pilot plant or "Black Maria" on installation site plans from the period. There is an unnumbered, unlabeled structure of the right size with a fence surrounding it, depicted apart from all the other buildings on an August 1943 site plan. The facility is visible on aerial imagery at the end of October 1943 (see following figures) but does not appear on site plans in 1944, having been replaced by other construction.[167] This is the suspected location of "Black Maria", which is currently under a parking lot to the north of Building 364.

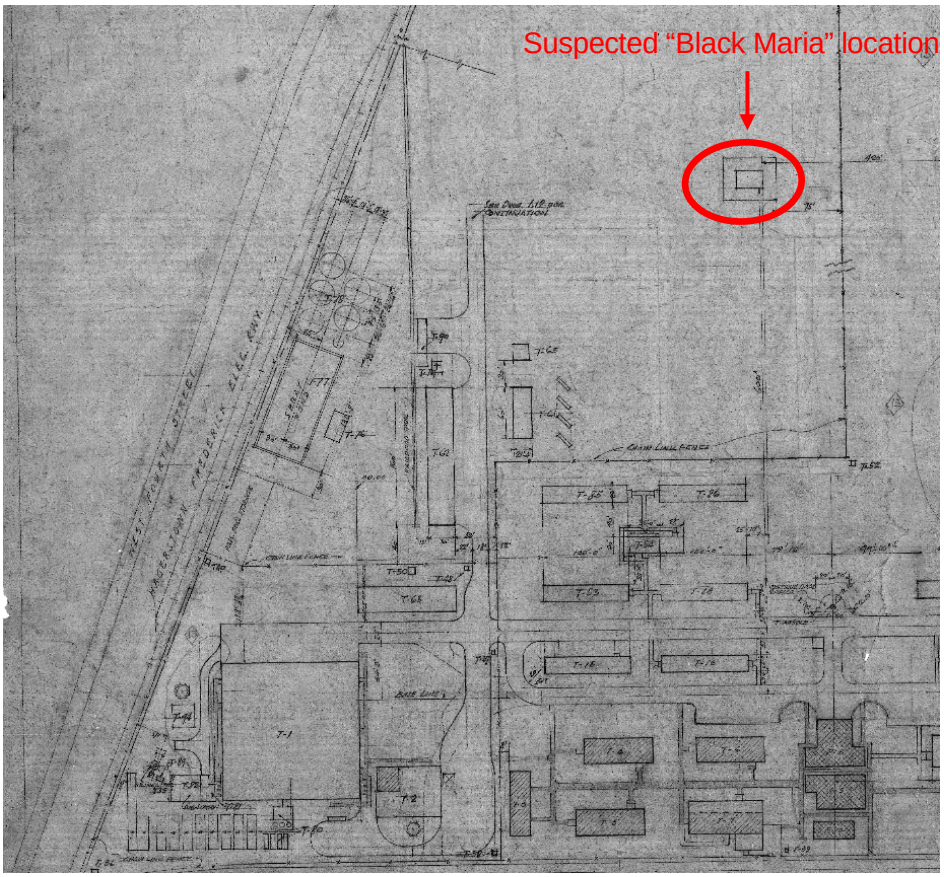


Figure 13 – *Suspected location of "Black Maria" – Map August 1943*[168]

6.4.3 Pilot Plant Nos. I and II, Buildings 201 and 263

Pilot Plant No. I was constructed inside of the old Detrick Field airplane hangar (Building T-1/T-201) in the south part of Area A and was completed in October 1943. The plant was used for the production of Agent X (Botulinum toxin). In January 1944, the plant was revised for production of agent N (*Bacillus anthracis*, anthrax). Drains led to a center sump which emptied into a 460 gallon waste disposal tank. Initially the vent gases were passed through a disinfectant solution but later were fed directly into an air incinerator. Liquid waste material was piped to the waste disposal tank also called a blowcase along with liquid collected in the sump. In addition to the original tank, a second 230-gallon tank was installed. The waste liquids were pumped to holding tanks outside of the building and then to the contaminated waste disposal system associated with the contaminated sewer system.[169]

Pilot Plant No. II, completed in March 1944, was also located in the old airplane hangar and was identical to Pilot Plant No. I in basic construction, although Plant No. II had a considerably larger production capacity. Plant No. II was used primarily for the production of Agent N (*Bacillus anthracis*, anthrax) spores and simulant Agent BG. Two separate systems were used in this plant to ensure no cross contamination between the live agent and the simulant agent. Associated with Plant No. II is Building 263

Munitions Building, completed in March 1944, which housed equipment for the separation, concentration and drying of agents produced in Plant No. II. Wastes from Building 263 were treated with the same facilities used to treat wastes from Plant No. II.[170]

After the end of the WWII, Detrick undertook an effort to decontaminate the building and equipment contaminated with *Bacillus anthracis* including Pilot Plants Nos. I and II prior to placing them in standby status. The decontamination included steam sterilization, calcium hypochlorite, formaldehyde, Carboxide and sodium hydroxide.[171] By 1950, the two pilot plants in the Operations Building 201 were considered obsolete.[172] Eventually, Detrick removed the equipment for Pilot Plants Nos. I and II from Building 201 and remodeled it for other uses. Although it's been in use for decades, Building 201 was one of the four structures that did not pass the 1971 certification process for being free of biological agents based on concerns of *Bacillus anthracis* spores possibly remaining the building foundation, cracks and pores in the building material.[173] Building 201 currently remains in use as offices for a variety of facility engineering services. However, after further environmental investigations, Building 201 received a No Further Action letter from the MDE in 1994. Currently the building houses the installation Directorate of Public Works (DPW) including offices and equipment shops and storage.

6.4.4 Blowcases

The blowcases were small batch decontamination units used to sterilize effluent from a building or a section of a building by subjecting the effluent to temperatures of approximately 250 degrees for 30 minutes to an hour. They were installed to reduce the number of viable organisms at pilot plants prior to their entering the contaminated sewer lines a. In 1953 the Detrick blowcases included the following: [174]

Building Number	Number of Blowcases	Capacity (gallons)
T-201	1	1,000
T-263	1	750
T-431	3	750, 400 & 2,500
T-431-A	2	500 each
T-434	1	2500
T-459	1	500
PP-1	2	5000 each
PP-2	18	30

6.4.5 Crops Pathogen Pilot Plant, No. III, Building 325

Detrick designed Pilot Plant No. III for the production of crop pathogens, constructing it in Building T-125/325 just to the east of the Crops Division laboratories and greenhouses (see following figure). Construction was completed on 10 February 1945. During WWII, this plant produced both liquid and dried versions of four agents:

- C Southern Blight (*Sclerotium rolfsii*)
- E Brown Spot of Rice (*Helminthosporium oryzae*)
- IR Rice Blast (*Pircularia oryzae*)
- LO Late Blight of Potatoes (*Phytopthors infestans*)

As with all pilot plants, the safety division conducted extensive tests and modifications to ensure the containment of all pathogens produced in the plant and that any effluent from the plant was thoroughly sanitized before leaving the pilot plant building.[175]

Although it continued to be listed as a Pilot Plant through 1956 on installation building schedules,[176] use of the building as a crops pilot plant is unclear. During the first quarter of 1950, Pilot Plant Division used it to produced 16tanks of SM simulant (*Serratia marcescens*).[177] Building 263 is not discussed among the other pilot plants in the safety program oversight in the 1950s indicating it is no longer part of the program.

6.4.6 Bacteria Pilot Plant, No. IV Building 431 and 431A

On 13 January 1945, Detrick completed construction of Building 131/431, an improved Bacteria Pilot Plant, designed for the production of bacterial agent, specifically Agent US (Brucellosis or *Brucella suis*). Its design was based upon previous experience obtained in Pilot Plants Nos. I and II in Building 201. Building 131/431 was part of the "Area 4" complex in the WWII Restricted Area of Camp Detrick that consisted of laboratories (the headquarters offices and library and the virus pilot plant (T-134/434). Construction of these structures began in July 1944. In 1945, documentation refers to both of the two "Area 4" pilot plants (Buildings 131/431 and 134/434) as Pilot Plant No. IV.[178]

Initial test run production during the testing phase of construction was of simulant agent SM. Waste liquids were collected by a blowcase system similar to that used in other pilot plants. In 1945, following months of testing with SM and approval of Safety Division, Detrick introduced agent US into the pilot plant for additional shake out of the facility operations. Safety issues led to the redesign and rebuilding of the plant in 1948 and approval of the production of highly infectious bacterial agent occurred on 20 October 1948. The pilot plant also produced *Bacillus anthracis* (anthrax, Agent N) from December 1951 to April 1952 following earlier work with N in a laboratory in Building 431, though contamination of the building outside the enclosed system proved problematic. Following samplings, operations ceased and a general cleanup of the building occurred using primarily hypochlorite and autoclaving or carboxoclaving

everything that could fit. Work with *Bacillus anthracis* resumed in November 1952 though contamination elsewhere in the building continued to be an issue.[179]

The pilot plant also produced simulants on the same equipment until early 1953, when a section ("B-Plant") was isolated to only produce simulants, while pathogenic work continued on "A-Plant". Building 431 also had facilities for filling munitions with the agents produced for field trials being conducted elsewhere. Although the pilot plant in 431 was considered obsolete by early 1953, particularly with the larger replacement plant coming online later in the year, it remained in use. By 1955, the pilot plant produced UL (tularemia) in small quantities (i.e. 32-35 liters). In addition to UL and N, by the end of 1957 HI (Melioidosis) and BCG (Bacillus Calmette-Guérin**,** a vaccine against tuberculosis) were also produced in 431.[180]

6.4.7 Virus Pilot Plant, Building 434

Detrick designed Building T-134/434 for production of BW agents that require embryonated eggs as the culture medium (i.e. viral agents) with the agent SI (Psittacosis virus) being selected as the agent to produce. Investigators selected the Cal-10 strain of mouse meningo pneumonitis virus as the simulant for SI. Construction began in July 1944 and was completed in March-June 1945. Refrigeration Building T-159/459 just to the south supported operations in 434 by refrigerating the eggs required in the process. In the summer of 1945, process testing began but in fall of 1945 after WWII ended, activities were suspended and neither psittacosis virus nor its simulant were brought into the plant. The plant reopened in 1950 and safety studies continued in the following months using *Escherichia coli*.[181]

Between 1 July 1953 and 30 June 1954, the agents in use at the pilot plant were psittacosis (various strains) and NU (Venezuelan Equine Encephalitis) virus. By the next year it appears to be limited to only NU. From mid-1956 to the end of 1957, Detrick used Building 434 to produce NU or VEE, SI and OU Q Fever (*Coxiella burnetii*).[182]

With the termination of the BW program, the equipment and facilities of Building 434 were decontaminated following standard methods of the time (see section 5.6.3). Specific decontamination procedures of the biological safety cabinets involved use of steam ejectors of a methanol-formalin solution. General decontamination of the demilitarization facility was by means of formaldehyde vapor generated through depolymerization of paraformaldehyde in electric fry pans in January 1973 and was certified as being free of viable spores on the 25th.[183]

6.4.8 Bacteria Pilot Plant, Building 470

In the early 1950s Detrick identified a need for an improved and larger pilot plant for production of biological agents, in particular agent N (*Bacillus anthracis*, anthrax), resulting in the construction of the seven story Building 470 in 1952 and 1953,

colloquially referred to as the "Anthrax Tower" or "Anthrax Hotel". It was the tallest structure on Fort Detrick and its size was due in part to needing to house large fermenter tanks that crossed three floors with access provided by catwalks. Due to the nature of the work, the building was sealed and pressurized. Following a series of trial operations with simulants to assure its safety (e.g. SM, BG and T-3 [Bacteriophage found on *E. coli*]), investigators initiated a program with infectious agents on 29 December 1953. By 1955, Detrick used Building 470 for the production, assay and packaging of N, including filling munitions for use in testing off-post. Production lasted until 1956, when it was placed on standby with only laboratory work with N and UL (Tularemia) being conducted until the end of 1957. In 1959, the agents in use in Building 470 consisted of only UL and OU (Q Fever, *Coxiella burnetii*).[184]

With the construction of office and laboratory buildings associated with the Pilot Plants 467,468, 469 and 470 in 1952-54, the active bacterial and viral pilot plants became interconnected, although parts, such as the office Building 469, were considered clean.[185]

Production of agents in building 470 ceased in 1965, and the facility underwent sterilization and decontamination. Demilitarization included decontaminating the building three times. Final decontamination was completed in June 1971. Although declared safe for occupancy based on over 1,300 samples coming back negative for the presence of N, the building was not certified 100% clean. Building 470 was locked up and remained idol until 2003 when it was demolished by current owner NCI-Frederick after additional sampling, confirming no presence of N. Its location was turned into a parking lot.[186]

6.4.9 Simulant Pilot Plant, Building 472 and 433

Detrick completed a Simulant Pilot Plant in Building 472 about June 1953, placing it in operation that fall. The building featured the latest equipment and incorporated safety improvements learned from other facilities that eliminated most excessive exposure to SM (Serratia marcescens). The plant also produced simulant BG (*Bacillus globigii*), *Escherichia coli*, *Bacillus cereus*, and *Staphylococcus citreus*. Following its use with the infectious unit in early 1957, Building 433 was treated with steam formaldehyde and became part of the Simulant Pilot Plant with the adjacent Building 472. Besides producing the simulant, the buildings housed facilities used to fill agent containers and package the material for shipment off Detrick.[187]

6.5 INCINERATORS

Fort Detrick used incinerators for several purposes such as the disposal of burnable waste (contaminated and uncontaminated) and as a means to decontaminate air from contaminated facilities. The following figure shows the locations of the incinerators as of October 1944.

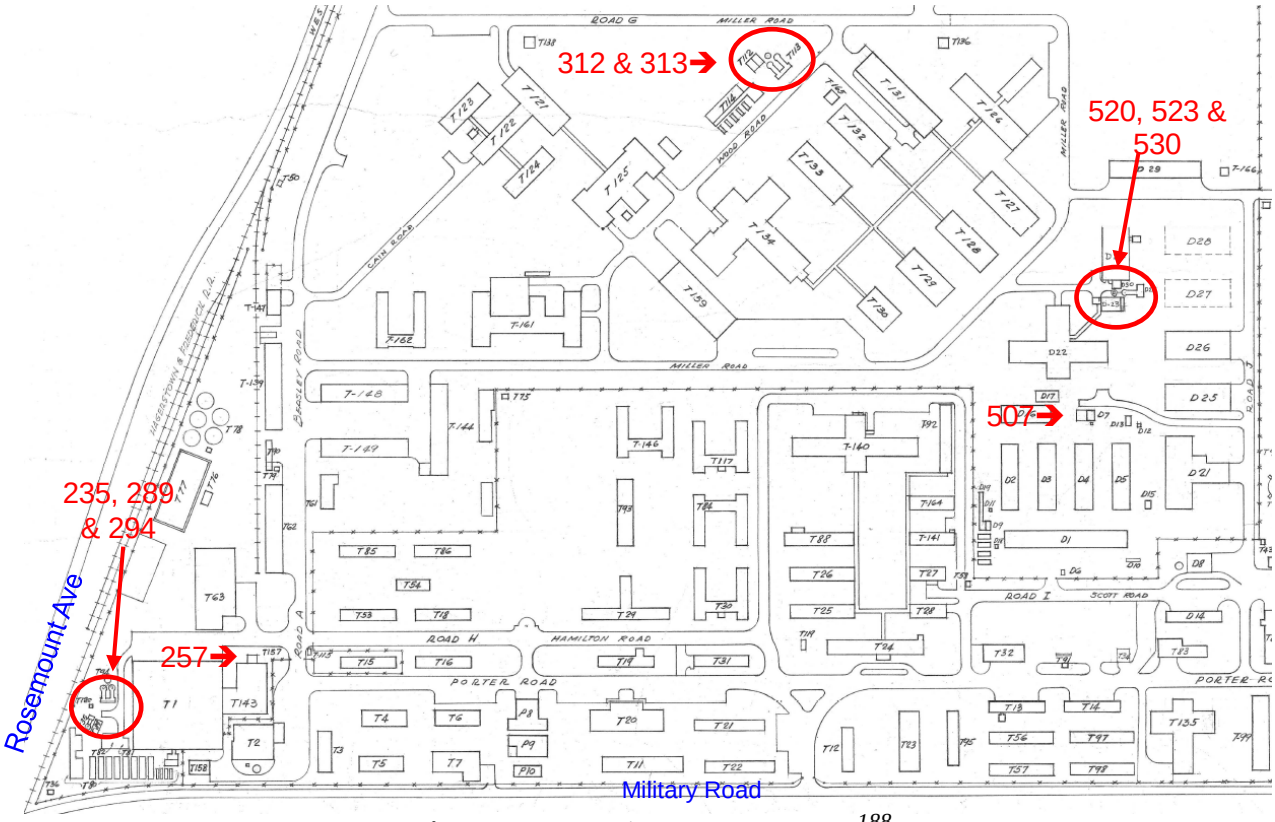


***Figure 14** – Incinerators– 1944* [188]

Buildings in the 200 area, including Pilot Plant I in T-1/201, the Decontamination Plant at T-80/280 and the gas chambers in T-1/201 were served by Vent Gas Incinerator T-35/235. Vent Gas Incinerator T-94/294 served Pilot Plant II in T-1/201 and Building T-63/263.[189] Incinerator T-89/289 disposed of solid wastes and the use of the incinerator at T-157/T-257 is associated with Building T-143/243 and also appears to be a solid waste incinerator. In December 1946 it was used for incineration of rubbish and animals while plant T-523 was shut down for maintenance.[190]

Vent Gas Incinerator T-113, served buildings in the 300 Area including Pilot Plants III (T-125/325) and IV (T-131/431) and all the surrounding laboratories. T-112/312 was a solid waste incinerator.[191]

At the time of construction these incinerators were fuel oil fired and each incinerator had 500- to 5,000-gallons underground tank(s).[192]

Laboratories in D-22/520, D-24/524, D-25/525, and D-26/526 used Vent Gas Incinerator D-20/520.[193] Detrick used Incinerator D-23 /T-523 for burnable solids during WWII. In January 1947, Detrick returned Incinerator Plant 523 to operating condition and all refuse within the Restricted Area, except that from the animal farm, was burned there. At that time the incinerator operated six hours a day, five days a week.[194] The specific uses for Incinerators D-7/507 and D-30/530 are unclear.

The four incinerators (T-220, T-235, T-289 and T-294) in the vicinity of T-201 (i.e. hangar building) were out of service from late 1945 through July 1946 when the CWS Engineering and Research Division began extensive efforts to recondition them.[195]

To provide an idea of the amount of waste generated from the Restricted Area, a three month study in early 1947, determined that Detrick generated about 3,000 pounds of refuse a day from within the Restricted Area. Detrick incinerated about 2,000 pounds daily in the post Incinerator 523, which had an estimated additional capacity to handle another 1,000 pounds a day. However, Detrick sent these additional approximately 1,000 pounds from within the Restricted Area along with the 1,500 pounds daily from the rest of the post (total of about 2,500 pounds a day) to the City of Frederick incinerator.[196] Records show that over a 35 day period in May-June 1947, Detrick sent 29,420 pounds of trash (24 loads) to the Frederick City incinerators in addition to the use of solid waste Incinerator 523.[197]

On 27 January 1948 the incinerator, Building RS-12/1112, at the Monocacy disposal plant was put into operation. Approximately 3.5 tons of coal was used at this incinerator during the first quarter of operation. [198] By the next quarter this incinerator was fuel oil fired, consuming 1,270 gallons of fuel oil in the quarter ending June 1948.[199] However, coal was still occasionally used as shown by the December 1948 report showing four tons of coal burned in conjunction with the operation of the Monocacy Disposal Plant.[200] In 1948, Detrick continued to use Incinerator 523 to burn rubbish from within the Restricted Area and used the Monocacy incinerator for all the noncontaminated rubbish.[201] The T-235 incinerator was listed as in use during the quarter ending September 1949.[202] On occasion Detrick continued to send noncontaminated refuse to the Frederick City Incinerator for burning in August 1949, when the RS-12 Monocacy Incinerator was undergoing repairs.[203] On 28 March 1950 the Monocacy incinerator burned to the ground requiring a complete rebuild.[204]

In December 1955 the installation requested permission to dismantle the smoke stack at Building T-257 with the justification that the building was no longer being used for its original purpose and the smoke stack was no longer required.[205]

In November 1956, Detrick received permission from higher headquarters to dispose of the Incinerators T-235, 289, and 294, which were no longer needed given similar permanent structures were provided elsewhere.[206] Solid waste Incinerator 523 is no longer delineated on site plans after 1971 and by 1975, Incinerators 312, 313 and 520 were listed in "standby" status.[207] Based on review of historical photos, it appears Building 312 remains, Building 313 was razed between 2005 and 2007 and Building 520 was razed for the construction of Building 576. In 1971, Detrick certified that Incinerator 1112 was decontaminated and demolished the facility in 1975. In 1999 investigation of the area surrounding and downwind of the former Incinerator 1112 indicated that there were no elevated human or ecological risks, however, investigation did identify a nearby

ash disposal area in Area C. In 2002, Detrick performed a removal action entailing the removal of all visible ash to the extent practicable with conventional excavation equipment. Detrick disposed of the excavated ash material from Area C to the active Area B landfill. After ash removal, soil in the area had a hazard index that exceeded the target limit considered protective of human health and in 2005 Detrick implemented institutional controls that prevent contact with ash material buried on the in Area C site.[208]

Ash disposal locations for the 1940s-era Area A incinerators are unclear. Descriptions of the fill in burial pits identified in Area B indicate receiving ashes from 1955-60 and 1970 but do not mention the 1940s. In 1947, Detrick hauled non-combustible material to the city of Frederick dump daily but by the end of 1948 Detrick had developed a non-burnable trash pit in Area B for use (see section 6.7.2 Solid Waste Disposal).[209]

In 1975, Detrick constructed a new Incinerator Plant, Building 393, consisting of two Municipal Solid Waste (MSW) incinerators on western side of Area A near the sewage decontamination plant 375 and holding tank 384. In 1995, the facility was expanded by 5,000 square feet to accommodate the addition of two medical waste incinerators.[210] In 1988, an audit reported that the incinerator ash was transported to the landfill located in the northwest corner of Area B.[211]

6.6 SANITARY AND CONTAMINATED SEWAGE SYSTEMS

6.6.1 General

From its beginning as an RDT&E facility working with infectious biological agents, Detrick had a separate "contaminated" sewer system to handle liquid effluent from within the Restricted Area where work with infectious agents occurred. The remainder of the installation sewer system was handled initially through the City of Frederick municipal system and subsequently through a Detrick specific sewage treatment facility at the Monocacy River, about two miles east of Area A and a couple thousand feet downstream from the post water treatment intake. The following two sections briefly discuss both sewage systems. Detrick's gravity flow storm water sewers that drain to Carroll Creek are not discussed.

6.6.2 Sanitary Sewer System

When it was an airfield, the sewer lines for buildings at Detrick connected to the existing 8-inch sewer main located near Carroll Creek southwest of the hangar building.
In 1943-1944, Detrick upgraded the sewer line from the post from an 8-inch line to a 12-inch line tying into the 12-inch Montevue sewer at Shookstown Road along with the applicable new right of way.[212]

As the installation increased in size, the sanitary sewer system expanded with it. It remained a gravity flow system to the southwest, tying into the municipal system. In 1944, Camp Detrick acquired property on the Monocacy River for the construction of a water treatment plant[ix] and a sewage treatment plant. The property acquired included the land for the plant facilities and the right-of-ways for the water and sewer lines. This allowed the installation the ability to process its own sewage at the treatment plant at the river and no longer have to process it through the City of Frederick sewer system. It did however require the construction of a pump facility at the southwest end of the post to pump the sewage to the plant at the river. The Army pre-chlorinated the sewage before it was pumped to the standard trickling filter treatment plant on the Monocacy River. Although the treatment plant was constructed during WWII, Detrick continued to use the municipal system for a few years until the city terminated the arrangement requiring the use of Detrick's treatment plant, which had remained idle. On 1 November 1948, the Post Engineer activated the Monocacy Sewage Treatment Plant.[213]

In August 1956, the Crops Division agreed to dispose of sludge from the sewage disposal plant. Detrick regulations in the 1960s continued to allow "*Sludge from the Fort Detrick Monocacy River sewage disposal plant may be used on-post or off-post as fertilizer*."[214] In 1973-1974, sludge from the drying beds continued to be used by local citizens for gardening purposes.[215] The local farms used the sludge for fertilizer, a common practice by the late 1980s.[216] Documentation does not confirm the use of sewage sludge as fertilizer from the Monocacy plant between 1948 and 1956 or what the disposition of the sludge was during that period. However, standard Army guidance from 1945 regarding sludge disposal prescribed using sludge as fertilizer or fill unless it was "raw" in which case it was treated with lime and buried or placed in a sanitary landfill.[217] The ASR did not investigate the disposition of sludge from the City of Frederick municipal system before Detrick activated the Monocacy plant.

During WWII, the buildings in Area B did not have sanitary service with the exception of Building G-7/T-1207 at the main entrance to the Test Grid, which was serviced by a septic tank and dry well.[218]

6.6.3 Contaminated Sewer System

6.6.3.1 General and Initial Systems

Sewage originating from within the Restricted Area where infectious agents were in use (e.g. laboratories, pilot plants and test chambers) was required to be sterilized before leaving the installation. For this reason, the Engineering Division at Detrick developed a separate sewage system, generally referred to as the "contaminated" sewer system to

[ix] Prior to this, Detrick acquired its water from the city municipal system and a spring at Montevue to the west. The spring water was twice as hard as the river water and a source of boiler scale and heavy incrustation eventually leading to using water from the Monocacy River.

differentiate it from the sanitary sewer system handling conventional sewage. Detrick sterilized the sewage by heat and discharged it into the regular sanitary system afterwards for further treatment. In general, each system consisted of piping and collection tanks, sumps or holding tanks that stored material and regulated the flow rate to run the treatment plant in batch mode. A heating coil, heat exchangers and steam were used to raise the temperature to kill any live biological agents. After treatment, the effluent was tested for organisms and when cleared was released into the non-contaminated sanitary sewer system.[219]

For decontaminating the liquid effluent during WWII, the Army initially established three sterilization plants: facility D-19/519 was developed to treat the effluent from the M/D/500 Series buildings; facility T-80/280 was set up to support the pilot plants in T-1/201; and facility T-114/314 was set up for the second generation of laboratories and pilot plants developed in 1944.[220]

The amount of effluent treated in the contaminated system varied over time but from the end of 1946 through the beginning of 1953 it varied from two to eight million gallons per month. Detrick was vigilant about the effective operation of the sewage plants, taking samples several times daily, typically at the most likely sources of leakage (e.g. valves, flanges, pumps shafts) to check for sterility of the effluent and the tightness of the equipment. If the plant tested positive for agent, decontamination of the plant with steam, a hypochlorite solution, formaldehyde or sodium hydroxide would be undertaken.[221]

6.6.3.2 Decontamination Plant D-19/519 ((M-9/D-9/509))

The smallest of the three plants was developed to treat the effluent from the initial laboratory buildings in 1943 (i.e. the M or D Series buildings). Piping from the initial Restricted Area of the post with five laboratories (M-2 through M-5 and M-16) and Administration building (M-1) flowed through pipes into a sump connected to four 10,000 gallons sewage tanks (M-9/D-9/509). Additions to the system included the adjacent structure of D-19/519 retention tube building, which subsequently became used as the facility number for the plant in much of the documentation, although some references continued to use the original numbering (M-9/D-9/509). Of the three WWII era plants, this was the only one not directly tied to a pilot plant nor was it clearly tied to a vent gas incinerator. D-19/519 had a maximum capacity of 100 gallons per minute (gpm), though only a working capacity of 40-70 gpm (it increased over time). D-19 operated in a similar manner to the other plants described in more detail in the section on plant T-80/280.[222]

Following completion of a connecting sewer line with the T-114/314 plant, on 29 August 1945, Detrick rerouted the flow from D-19/519 to that plant, steamed out the D-19/519 system and placed it in stand-by condition.[223] The plant returned to operation in August 1946 due to the breakdown of plant 314 but idled the following months as the capacity of

the plant was too small to warrant operation.[224] In June 1952, the tanks were removed and the facility was abandoned.[225] On 18 November 1958, Buildings T-509 and T-519 were removed by demolition.[226]

6.6.3.3 Decontamination Plant T-80/280

The Army set up facility T-80/280, initially to treat liquid wastes from the pilot plants and laboratories in Building T-1/201 and later T-63/263. Eventually, sanitary sewage from showers, toilets and lavatories (from T-1/201) were also tied into the system. The treatment process was a batch type system where waste liquids were collected in four 25,000 gallon tanks. The batch tanks are equipped with 100 psi steam lines, and a vent line where air or vent gases that came in contact with the sewage passed through an incinerator (T-35/235 or T-94/294). To process a batch, the tank was allowed to fill until it was approximately three quarters full and then steam was used to raise the temperature to 212º F. The gases in the tank were vented through the incinerator. Then steam was used to raise the temperature to 270º F for 30 minutes. After the waste cooled, it was sampled and if the material in it was sanitized, it was allowed to drain into the sanitary sewer system. When Pilot Plant 2 in T-1/201 came on line, it was necessary to start operation of the continuous decontamination system in order to care for the flow. Two storage tanks were added to bring the total to six. In this system the waste liquid was pumped through a continuous steam heater and heat exchangers to eliminate the biological materials. However this system suffered many problems due to calcium carbonate scale. As part of the system some additional tanks were added to hold clean water used in the steam jackets on parts of the system. The goal of the system was still to hold the liquid waste at 270º-280º for at least 30 minutes. Not only was the waste tested before being released to the sewer but the recirculation water was also periodically tested in case of leaks. The normal method of operation was to collect approximately 30,000 gallons of waste then start up the system and run it until all the tanks were empty. Tanks one through six held raw sewage, tank seven held processed sewage awaiting laboratory results and tank eight held steam jacket water. At the request of the Safety Division, a concrete basin was constructed to contain any leaks in the system. This system was set up so that it could be operated continuously or in a batch mode if repairs were needed.[227]

The June 1945 monthly progress report stated that this plant required extensive repairs before it could be operated, and it was closed by 13 September 1945, because the pilot plants it serviced were idled and it was no longer required to treat effluent. Subsequently, equipment from 280 was used to replace worn out equipment at 314, leaving 280 unavailable for use until the equipment was replaced in 1948 and it was returned to a standby basis. Test runs occurred in June 1949, and sporadically as required, but generally 280 remained in standby status through 1953 Building T-280 was disposed of on 18 Nov 1958. [228]

6.6.3.4 Decontamination Plant T-114/314

The third WWII era contaminated sewage plant, T-114/314 was similar to the system in Building T-80/280. It used five storage tanks of 17,000 gallons each and was built to be contained in one building, with lines built in a manner to prevent freezing.[229] Plant 314 serviced buildings T-125/425, T- 127/427, T-128/428, T-129/429, T-130/430, T-131/431, T-132/432, T-133/433, T- 134/434, T-159/459, D-22/522, D-23/523, D-24/524, D-25/525, and D-26/526. It also had a tie-in system that allowed the buildings serviced by D-19/519 to be serviced by this system when required.[230]

As plant shut downs for maintenance or breakdown occurred, it became clear that a cross connection piping between the decontamination plants was needed to avoid shutting down the laboratories and pilot plants that fed into it. When a treatment plant was shut down, the contaminated sewage could be held for a short period until maintenance was completed or piped to another plant with a connector. Following completion of a connecting sewer line from the D-19/519 plant to the T-114/314 plant, Detrick rerouted the flow and idled D-19/519 on 29 August 1945, placing it in standby condition. Within a few weeks the 280 plant closed as well, leaving plant 314 as the primary sewage decontaminating plant for the post-war period)[231]

In 1946, plant 314 was the main one in operation with plant 519 in reserve and plant 280 requiring extensive repairs.[232] On occasion plant 314 went down and required maintenance. A 1947 Detrick Special Report on sewage decontamination focused on problems with the plant 314. The recommendations from the report included standardizing heat exchangers, keeping sufficient repair parts on hand, interconnecting the decontamination plants so sewage could be diverted from one plant to another, interconnecting to the installation steam boiler plants to ensure a continuous supply of steam, and adding redundancy in electrical power to ensure that continued decontamination will occur even with a failure of one of the parts of the system. In July 1947 system plant 314 broke down completely and practically all research activities at the installation were halted until 7 September. This occurred again in July –September 1948 along with shorter down time episodes, resulting in requests for emergency funding to construct an improved and adequate facility due to the criticality of the plant to the overall functioning of the installation. It took approximately five years before the replacement facility was operational in 1953.[233]

6.6.3.5 Decontamination Plant 375

In 1952, as part of the installation construction program, Detrick added a new contaminated sewage treatment plant Building 375, (aka U1A/U2A [375/385]) which connected to the previous contaminated sewers and to a new contaminated sewer main from the newer construction as well. As part of this construction it was recommended the plant near Building T-201 (the hangar) remain but the one on Wood Road (T-314) be abandoned.[234]

Plant 375 began operations in 1953 and was capable of both continuous and batch decontamination processes.[235] Building 375 remains in operation today.

6.7 SOLID WASTE DISPOSAL AND LANDFILLS

6.7.1 General

In the 1940s, standard Army practice dictated establishing a garbage collection system that allowed the segregation of salvageable materials (i.e., grease, paper, cardboard, glass, tin cans, wood, metal, ash) with the remaining materials further segregated into burnable and non-burnable waste. The burnable waste was sent to an incinerator and the remainder was sent to a landfill.[236] Detrick followed these procedures with the additional burden of dividing solid waste into potentially contaminated from the Restricted Areas and uncontaminated solid waste from the administrative and housing areas.

During WWII, there were few specific details of solid waste disposal and incineration. Detrick did have several incinerators on post for burning of combustible solid material, in addition to incinerators for burning contaminated gases (see section 6.5). Detrick's disposal of non-combustible waste during this period is unconfirmed but in early 1947, Detrick was hauling two loads of non-combustible material to the city dump daily.[237] In May 1946, collection and incineration of pathogenic refuse was a two person job.[238]

In the 1948, Detrick continued to use Incinerator 523 to burn waste from within the Restricted Area but use of Frederick's incinerator appears to have ended generally with the opening of Incinerator 1112 at the Monocacy disposal plant place in operation in January 1948, which Detrick then used to incinerate all non-contaminated rubbish. Use of the Frederick dump also appears to have ended with the development of a non-burnable trash pit in Area B by the Post Engineer, which was in use by the end of 1948.[239] Subsequently, Detrick used the Frederick Incinerator on occasion for the burning of non-contaminated refuse such as in August 1949, when the Monocacy facility was closed for repairs.[240] In early 1950, Detrick had 90,285 pounds of non-contaminated trash burned at the Frederick City Incinerator following a fire in March that burned the Monocacy incinerator to the ground, requiring it to be rebuilt.[241]

Detrick used paint to differentiate the refuse cans with potentially contaminated material from the Restricted Area from those on the rest of the post. In 1947, refuse cans within the Restricted Area had a yellow band to distinguish them. In the 1960s, this marking had switched with the cans for use in the clean areas and buildings identified by a white painted stripe on cans and lids, while cans from the areas dealing with infectious material were unmarked. Marked and unmarked cans were not to be interchanged.[242]

By 1952, Detrick Safety Regulations provided guidelines for the handling and disposal of refuse and trash, focusing on the specifics for potentially contaminated items. Detrick directed that size permitting, all potentially contaminated refuse, whether it was

combustible or not, was to be autoclaved prior to being placed outside for removal. Items too large to be autoclaved, had to be cleared by the Safety Division.[243] It is unclear how early this directive occurred but was certainly in place by 1949 and 1950 as the Safety Division made periodic checks during that period to confirm the refuse from the Restricted Area was sterilized.[244] By 1952, Detrick was also directing that large quantities of acid, used cleaning solution or contaminated flammable liquids were not to be poured down building drains but rather stored in carboys for removal and disposal by the Decontamination Branch.[245]

In the 1950s, the refuse disposal unit of the Sanitation Branch collected both contaminated and non-contaminated refuse as well as operating the incinerator for non contaminated refuse. Non-contaminated material consisted of the normal post trash, garbage, etc. with the combustible items burned at the incinerator adjacent to the Monocacy River Sewage Plant. The noncombustible items were picked and hauled to a sanitary landfill in Area "B" (see following section 6.7.2). The potentially contaminated refuse generated in the Restricted Area of Detrick, was placed in designated cans, then picked up and hauled to the special waste incinerator operated by the Facilities Division, Decontamination Plants unit.[246]

Refuse disposal records are not generally retained however there exists one for January 1956 that indicates about 630 cubic yards of normal post trash and garbage was transferred to the incinerator; 766 cubic yards of contaminated combustible waste was incinerated and 837 cubic yards of non-combustible potentially contaminated material was buried.[247]

In 1963, the updated Detrick Safety Regulations provided additional guidelines for disposal of solid waste and stipulated that "*As a general policy, as much as possible of potentially contaminated materials will be retained within the confines of Fort Detrick*." Detrick policy directed that combustible potentially contaminated materials that had not been sterilized, were burned in the burning pit (see section 6.7.3.1) as opposed to being buried in the Area B burial pit. Based on later Detrick regulations, use of the burning pit ceased by 1969. The revised refuse disposal guidelines indicate that burning of combustible potentially contaminated materials in the incinerator was allowed but specifically stated: "*No open pit burning is permitted*." The 1963 regulations also added a paragraph stipulating that pressurized aerosol containers, were to be punctured underwater to avoid them exploding when heated either in the autoclave or incinerator. Detrick policies allowed the use of the sludge from the Monocacy River sewage disposal plant and cleanings from animal cages at the animal farm (unless autoclaved cleanings from infectious units) to be used on-post or off-post as fertilizer.[248]

The following sub-section provides additional details concerning the location of the Disposal Areas in Area B and the open burning pit and other disposal areas in Area A.

6.7.2 Area B Disposal Areas

A three month study in 1947, determined that Detrick hauled two loads of non-combustible material to the city dump daily.[249] This practice stopped the following year and by the end of 1948, Detrick buried all scrap, glass and other non-burnable trash in a pit in Area B developed by the Post Engineer.[250] Over time, Detrick developed multiple pits in Area B for use with various types of materials. The location and use of these pits in Area B were denoted on various site plans as follows.[251]

Area B 1951 site plan indicates that these plots were located near the wood lot on Area B (see following figure).

- Pits 1, 2, and 6 were used for scrap metal
- Pits 4, 5, and 7 were for refuse (location for pit 7 is not discernible on these maps.)
- Pit 3 for radioactive waste (see section 8.3 additional discussions on disposal of radioactive waste material).[252]

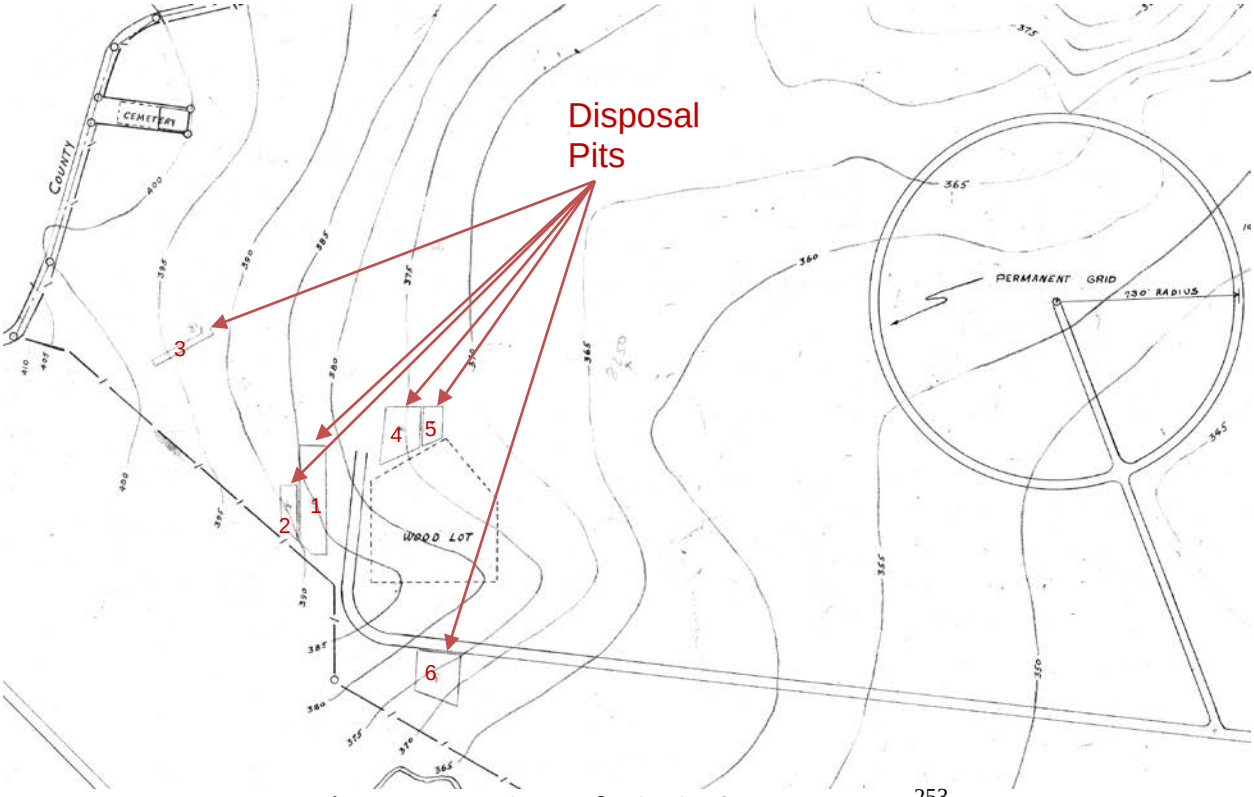


Figure 15 – *Disposal Pits in Area B – 1951*[253]

By 1963, the "Wood Lot" is denoted as the "Wooded Disposal Lot" but the location and extent of the disposal pits surrounding it appear the same. A separate "Dump Area" is noted to the northeast of the test grid.[254] It is uncertain if this is the Pit 7 not discernible on the 1950s drawings or represents a different one.

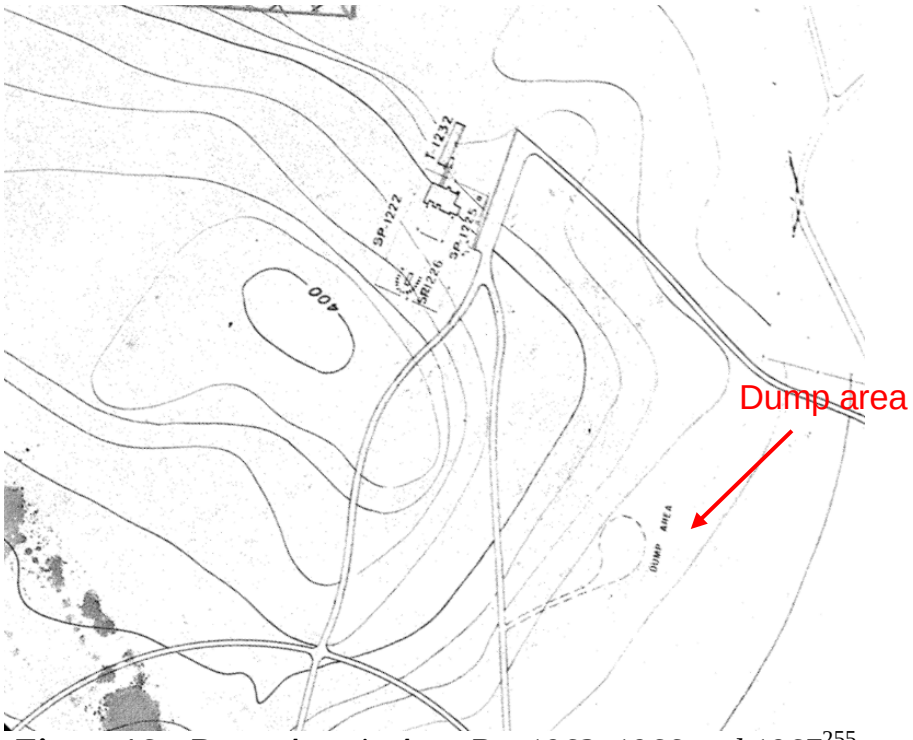


Figure 16 – *Dump Area in Area B – 1963, 1966 and 1967*[255]

The December 1964 Post Memorandum regulating the safe use of use of Area B includes a Zone II, which includes "*the old disposal area"* depicted on the attached map to the memorandum but not included on other recovered installation site plans (see following figure).[256]

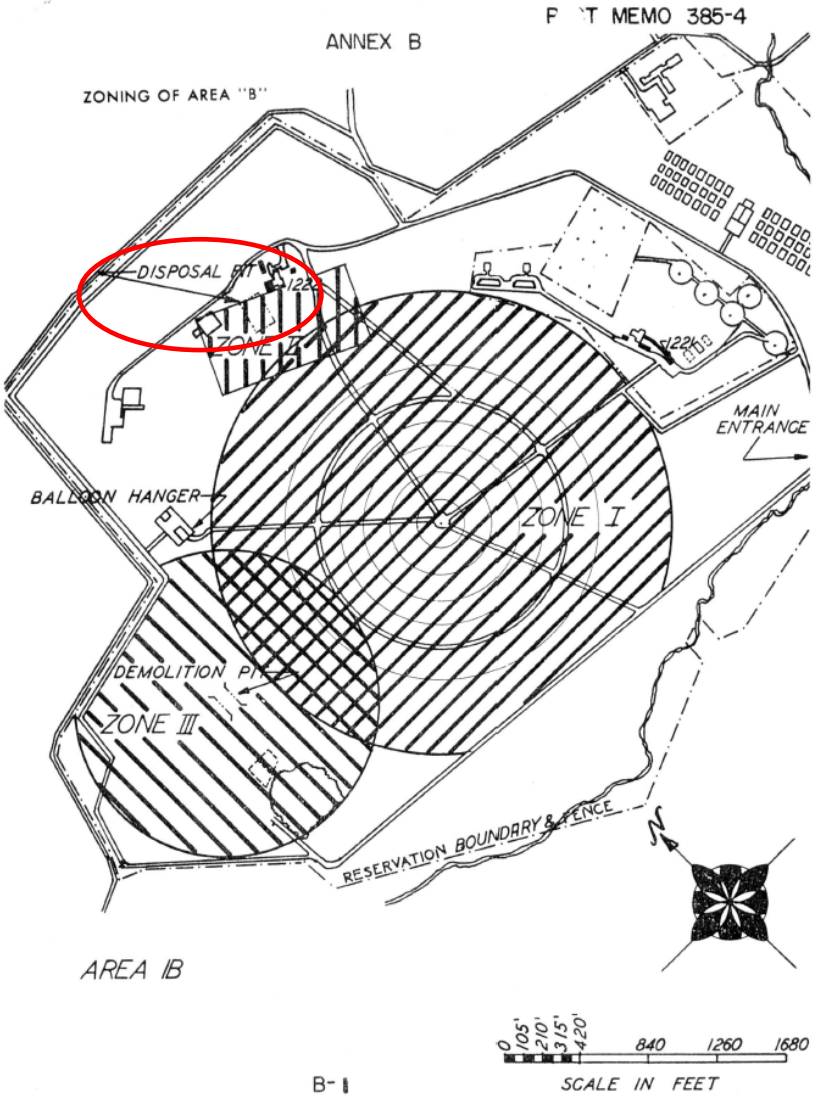


Figure 17 – *"Disposal Pit" west of Building 1222*[257]

Another 1967 map delineates a rectangle around the "Dump Area" but does not denote its purposes, although later site plans indicate it is a disposal area. The delineation of disposal pits around the wooded area remains the same but is enclosed within larger polygons. Immediately south of the Wooded Area, there are smaller polygons that later maps indicate as disposal areas but they are not labeled as such.[258]

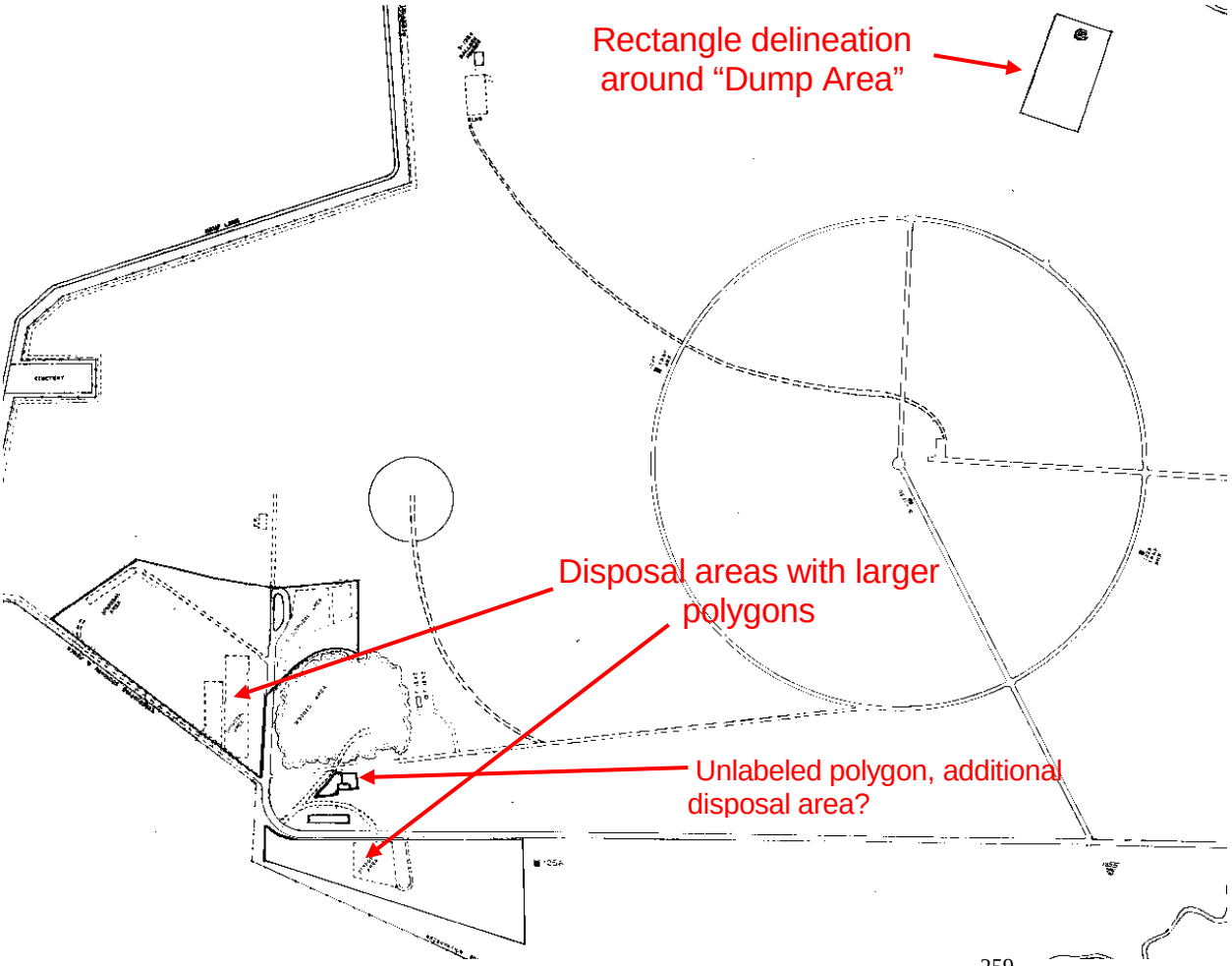


Figure 18 – *Disposal and Dump Area in Area B – 1967*[259]

Between 1968 and early 1970, site plans for Area B no longer delineate the disposal pits or the dump area but include two other "Disposal Areas": one at the far west side of Area B south of the cemetery and the another one north of the test grid, in the northwest corner adjacent to an area leased to a local farmer.[260]

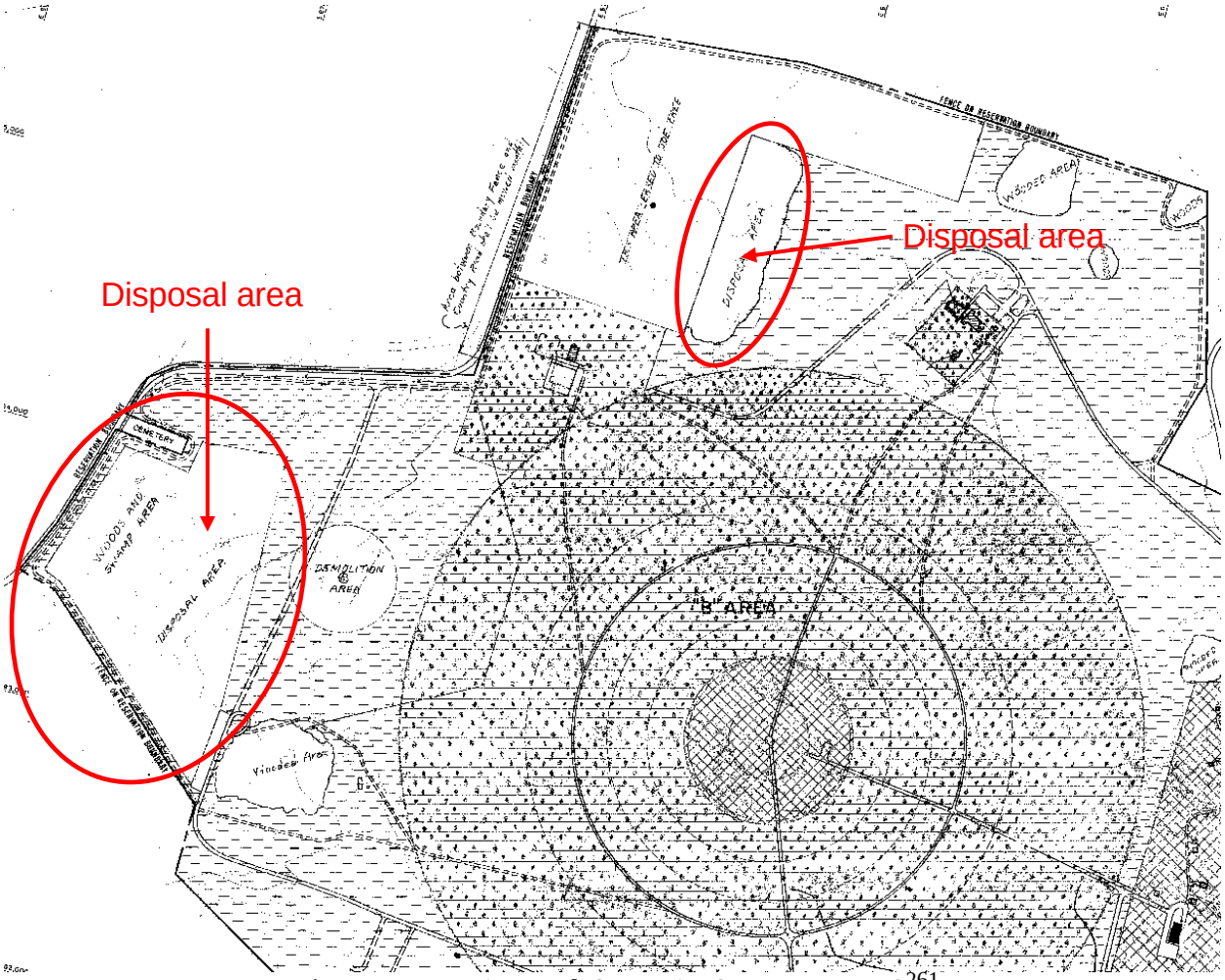


Figure 19 – *Disposal Areas in Area B – 1968*[261]

By September 1970, Detrick prepared a detailed site map of the Area B disposal areas showing previous locations and including a more specific description of the material disposed of in each area. Disposal Area 1 (see following figure), located to the northeast of the munition storage area near the Army Reserve Training Center on the northeast side of Area B and was not depicted on previously available site plans and reportedly contained "Decontaminated material from laboratory operation, modification and demolition, 1. Metal, wood, general refuse previous to 1950".

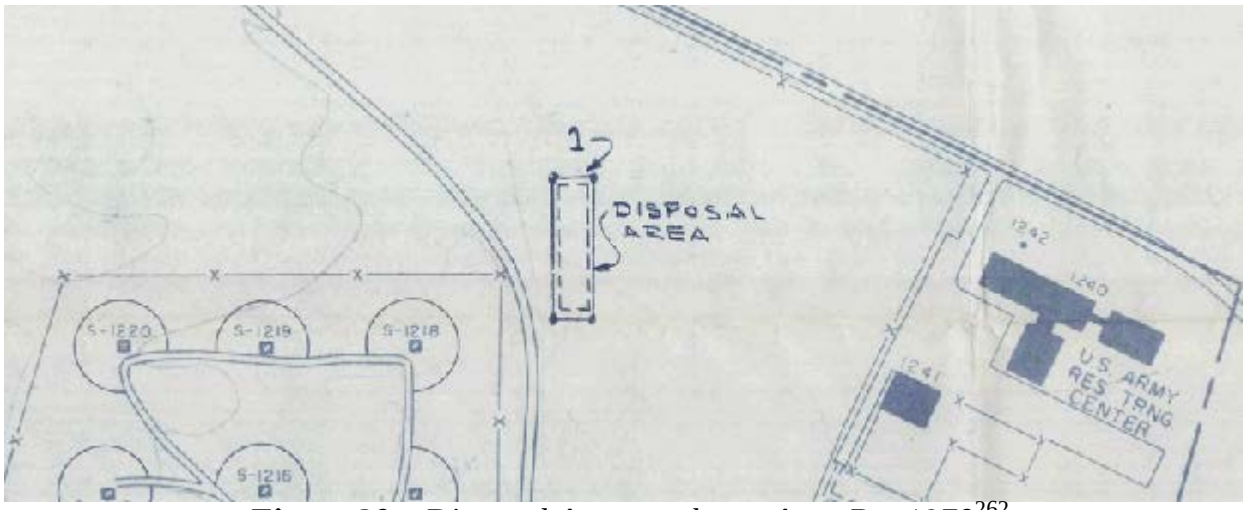


Figure 20 – *Disposal Area northeast Area B – 1970*[262]

Areas 2-4, north of the test grid, had been depicted on previous site plans and according to the legend included:

"*Decontaminated material from laboratory operation, modification and demolition,*

2. Metal, wood, general waste. 1949-1951
3. Metal, general debris. 1955-1969,
4. Metal, debris, ashes. 1970"

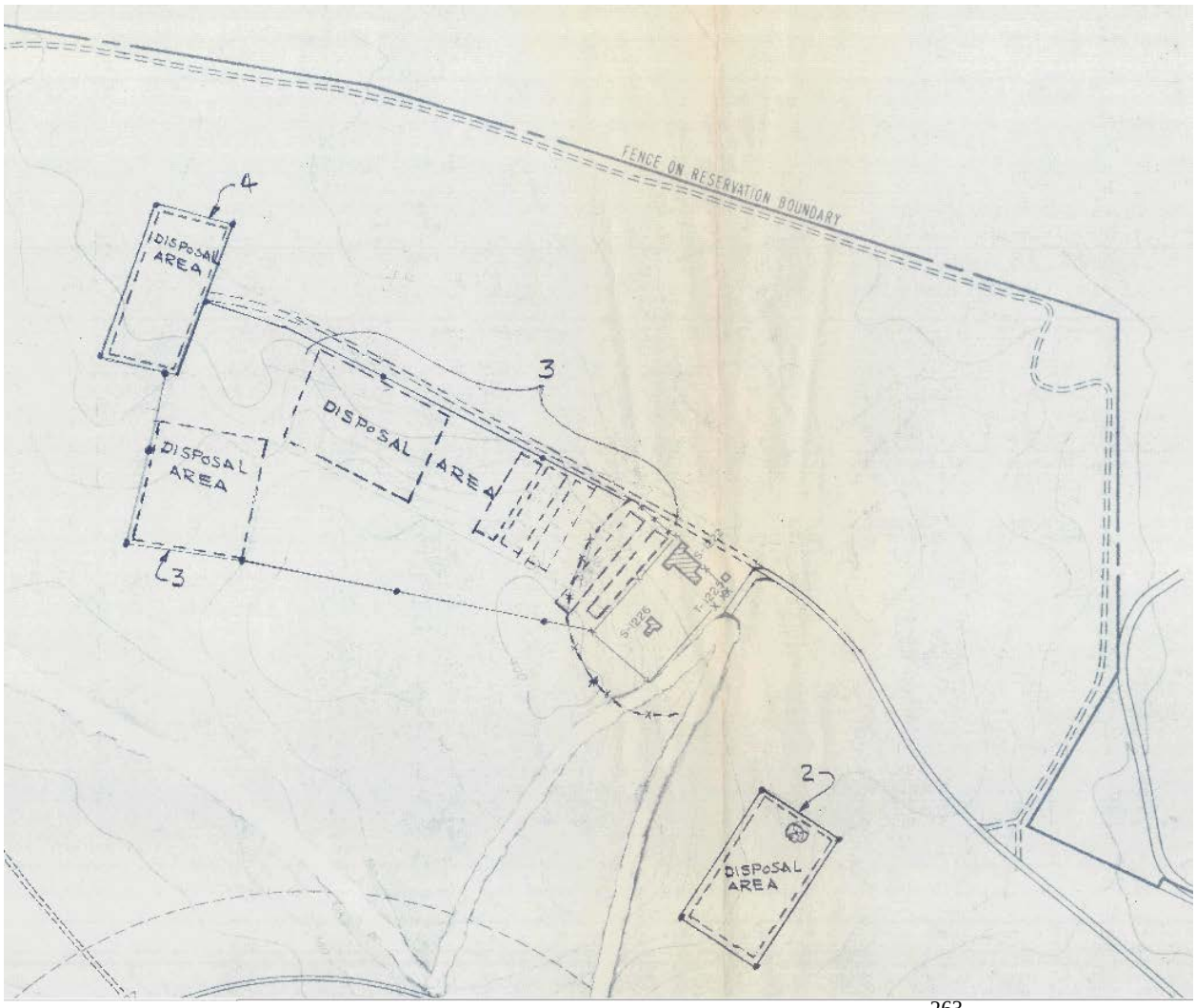


Figure 21 – *Disposal Areas northern Area B – 1970*[263]

Areas 5-11, south west end of Area B, had been depicted on previous site plans, including site 10 in 1967 though it had not been specifically labeled as a disposal area previously. The details provided about the contents of the disposal area are more detailed than in previous depictions:

"*Decontaminated material from laboratory operation, modification and demolition,*

5. Metal, wood, debris. 1948-1950
6. Metal, ashes, debris. 1955-1960
7. Wood burning pit.1950-1955

Material from Housing and Other Clean Areas

8. General Refuse. 1950-1955
9. General Refuse. 1970
10. Refuse, primarily bedding from normal animal farm 1965-1970

Acid and Chemicals

11. All types from Ft. Detrick with small amounts from U.S. Bureau of Standards and Walter Reed. 1955-1970"

It is worth noting that Disposal Area 11 corresponds to Pit 3 on maps from the 1950s for radioactive waste.

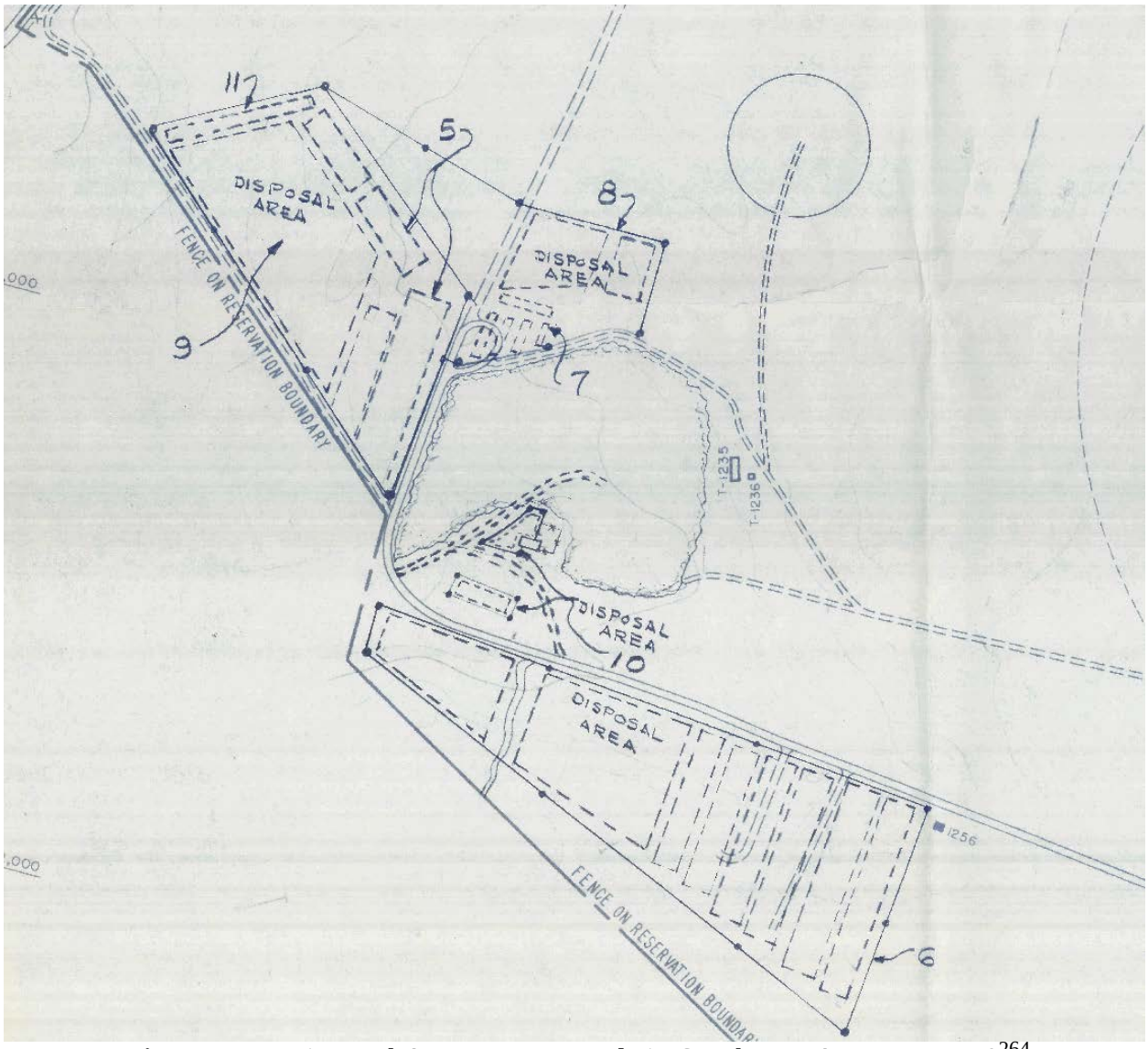


Figure 22 – *Disposal Areas near Woods in Southwest Area B – 1970*[264]

A 1972 site map for out leasing indicates only two disposal areas: Dump #1 and Dump #2, apparently indicating only the two active ones at the time (see following Figure).

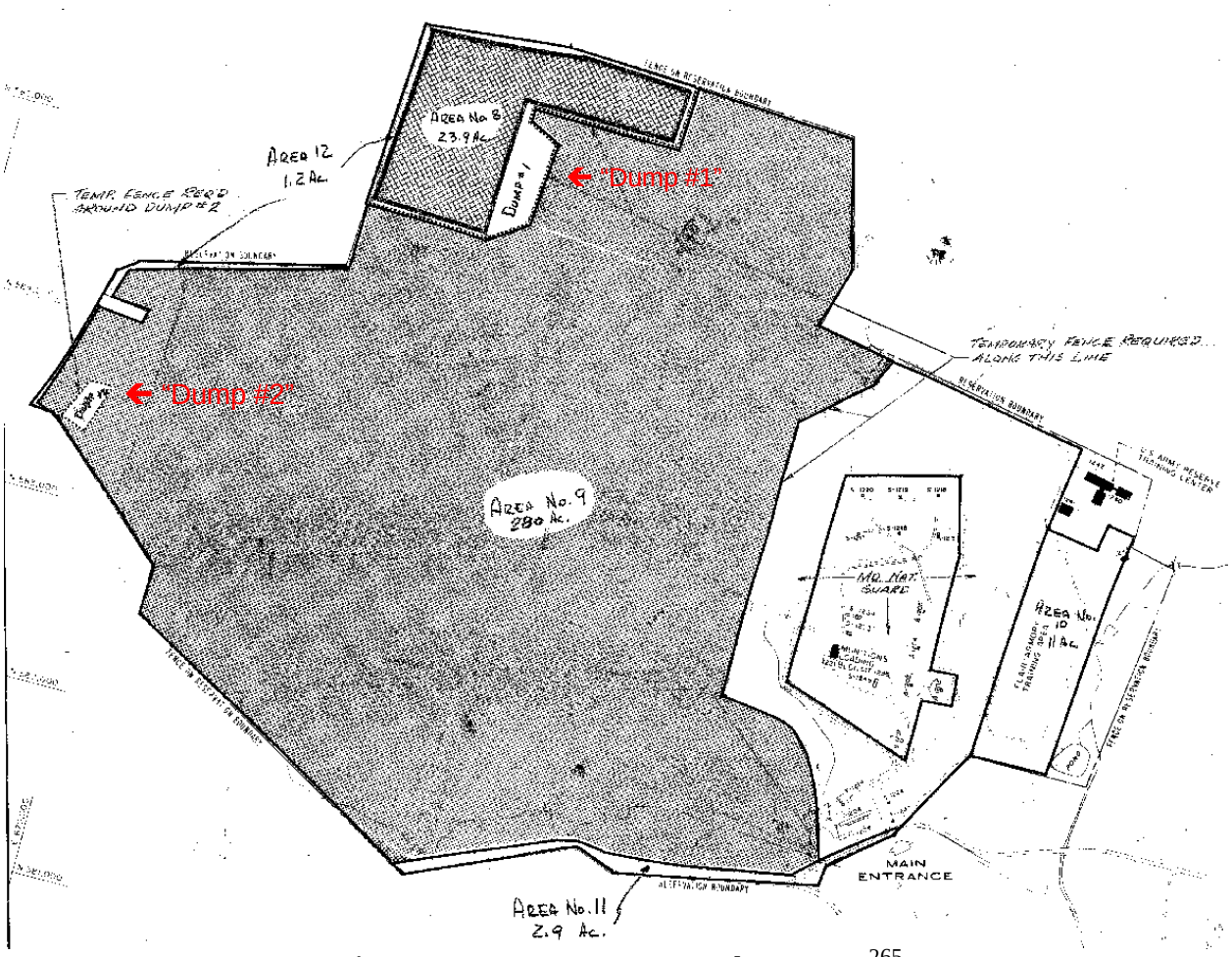


Figure 23 – *Dump Nos. 1 and 2 – 1972*[265]

In 1973 and 1974 land use maps delineate the landfills as on the 1970 detail site plan except for Disposal Area No. 1 in the northeast position of the installation (see following figure). It also includes all the Wooded Area within the southwest disposal areas within the Landfill designation.[266]

Figure 24 – *Disposal Areas in Area B – 1973 and 1974* [267]

A later 1974 map (see following figure) includes four "lab waste disposal" areas on the west side of Area B; three generally cover the areas previously noted in the southwest. The fourth "lab waste disposal" area is the smallest one and covers a smaller polygon near the northeast boundary not shown on earlier maps on land that had been previously out leased. It coincides with the incinerated anti-crop disposal area where Detrick tilled the ash material into the soil in 1973[268] (See section 5.7.2 for additional details) and no other disposal activities have been identified with that location. In addition, this map shows a kidney bean shaped "Sanitary Landfill" located north of the test grid in the vicinity of the rectangular disposal area cells noted previously. The smallest area, located west of the sanitary landfill was also not shown on earlier maps of this area.

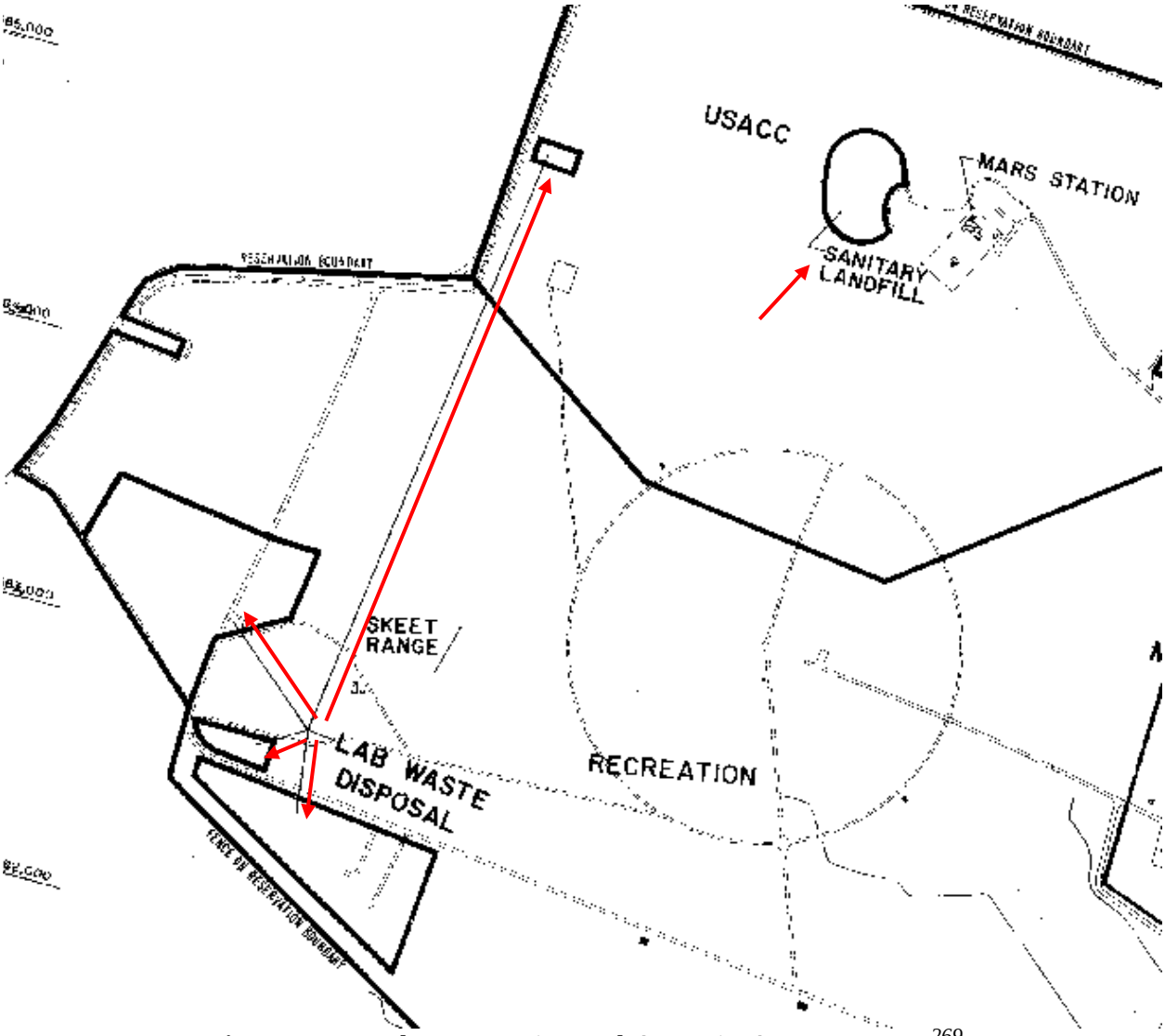


Figure 25 – *Lab Waste Disposal Areas in Area B - 1974*[269]

In 1977, Detrick created another detail map of the Area B Disposal Areas that is very similar to the 1970 version but it includes one additional area, Disposal Area 13 (the small "lab waste disposal" noted in 1974) and modifies and refines the delineation of many areas (see following Figure).[270] Some of the significant changes are Areas 3 and 4 are in the same general location but the boundaries have changed, Area 10 includes all the Wooded Area and Areas 12, 14, 15 and 16 are further refined designations within the southwest disposal area. As in 1970, the radioactive waste burial area correlating to Area 11 is not noted.

Figure 26 – *Disposal Area within Area B – 1977*[271]

The legend includes many details and is as follows:[272]

A. All material from the laboratories was decontaminated (sterilized). Material (waste) generated as a result of Facility Engineering construction or renovation includes process equipment, piping and other debris. This material was not contaminated, but was buried here because of Fort Detrick policy.

1. Metal, wood, general refuse previous to 1950
2. Metal, wood, general waste. 1949-1951
3. Metal, general debris. 1955-1969, 1970 to 1976 Lab Animals
4. Metal, debris, ashes. 1970
5. Metal, wood, debris. 1948-1950
6. Metal, ashes, debris. 1955-1960
7. Wood burning pit. 1950-1955

B. Local (community) landfills have never been made available for Fort Detrick refuse. It was (and still is) thought best to use Fort Detrick land for all refuse because of Public Relations.

8. General Refuse. 1950-1955
9. General Refuse. 1970
10. Refuse, primarily bedding from normal animal farm 1965-1970

C. All chemicals are now disposed through a contractor who takes the material to the EPA registered process plant. Previously, it was accepted practice to dispose of this type of material via a landfill. Fort Detrick maintained a separate landfill for chemicals in order to have better control over what was being disposed. All chemicals for disposal were processed (administratively) through the Safety Directorate. Any chemical not suitable for burying was sent through proper Army Channels to designated processing areas.

11. All types from Ft. Detrick with small amounts from U.S. Bureau of Standards and Walter Reed. 1955-1970
12. Sludge from Structures 375 & 384. During the period of ceasing all Biological Warfare work (1969-1972), inorganic material from holding tanks in the Decontaminating Plant, Bldg 375, was found to contain Bacillus Anthracis. Facility Engineering and Safety developed a procedure to sterilize the "sludge" prior to removing it. During the time that the material was removed (1971-1972), rigid control and testing procedures were used. All tests (for sterility) were negative (no growth).
13. Anti crop material rendered inert via a process developed at Fort Detrick and incinerated. The ash was tilled into the soil.
14. According to regulations in effect at the time (1965-1970), Herbicide and Insecticide containers and/or residue were to be incinerated or buried in a landfill. There was no specific area for this material; it was taken care of on a routine basis at the landfill. Excess or obsolete herbicide or insecticide material is no longer buried here. It is sent through appropriate channels for disposal.
15. Throughout all burial sites, animals were buried from time to time. This happened when the voided laboratory incinerator was overloaded or down for repairs. In every case, the carcasses were sterilized prior to burial.
16. Two laboratory flasks that had contained Phosgene, which were deliberately broken and buried.

SOURCES OF INFORMATION:

1. DWG. NO. MAD 59 REVISED NOVEMBER 1957.
2. DWG. NO. F-93-I-5620 DATED NOVEMBER 1958.
3. AERIAL PHOTOGRAPHY BY ALSTER & ASSOCIATES, WASHINGTON, D.C., APRIL 1960.
4. FIELD CHECK BY GROLL BEACH & ASSOCIATES, WASHINGTON D.C., MAY 1960.
5. COMPILATIONS BY ALSTER & ASSOCIATES, JUNE 1960.
6. AERIAL PHOTGRAPHY BY AIR PHOTOGRAPHICS, PURCELLVILLE, VA., NOV. 1972.
7. FIELD CHECK BY BEACH ASSOCIATES, WASHINGTON, D.C., MAY 1973.

A 1979 Disposal Area map is similar to the 1977 version but it is actually a revision to the 1970 Disposal Area map that was revised in July 1973, December 1976 and again in March 1979 to change the drawing number (see following figures).[273]

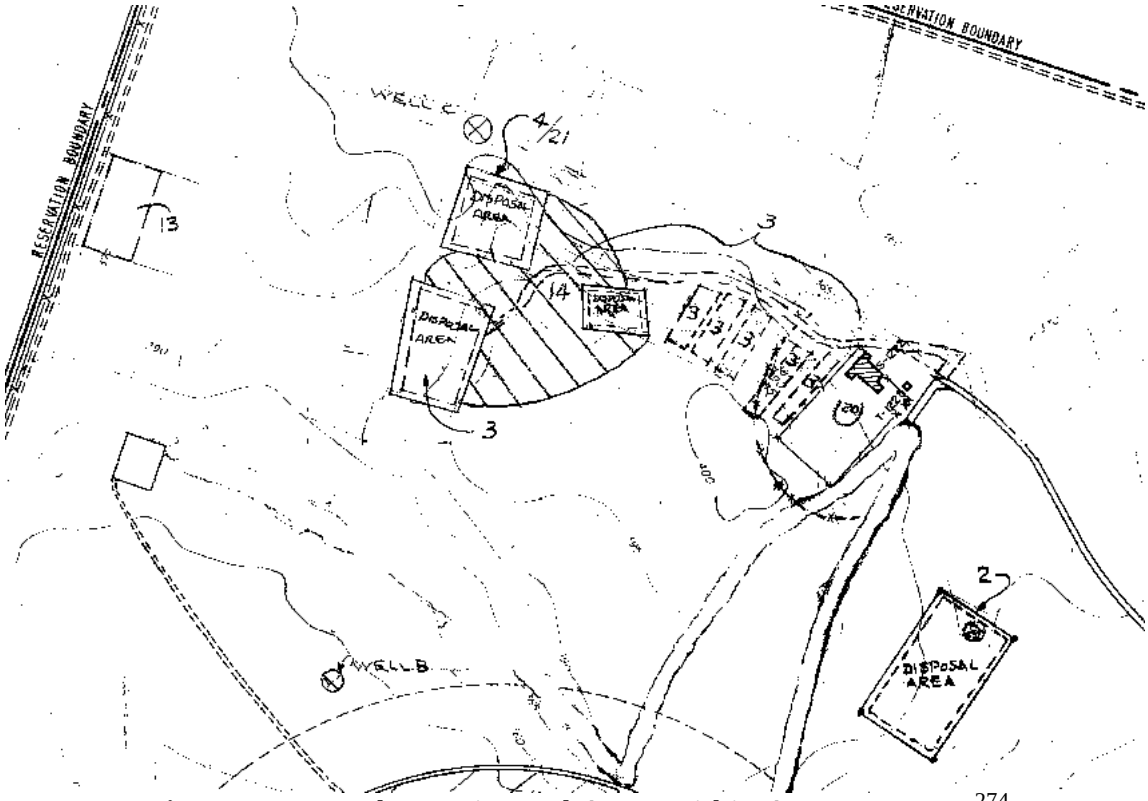


Figure 27 - *Northern Disposal Areas within Area B – 1979* [274]

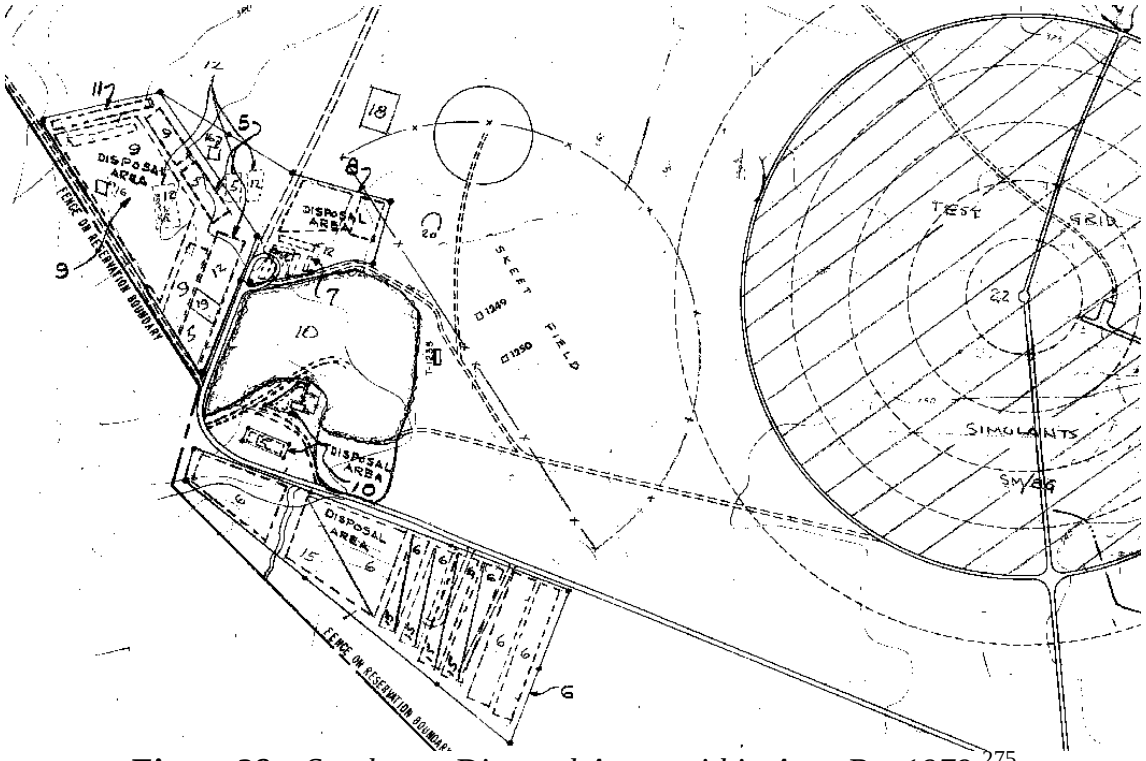


Figure 28 – *Southwest Disposal Areas within Area B – 1979* [275]

The 1979 map delineations differ from the 1977 version. The legend notations from areas 12 through 22 did not exist on the 1970 version and 17 through 22 did not exist on the 1977 version. The legend notes from areas 3 and 12 through 16 differ from the 1977 version:

3 Metal, general debris. 1955-1969, 1970 to present, Lab Animals from DC Walter Reed
…
12 Sludge from 375 and 384
13 Demil 434
14 Herbicide/insecticide waste (1965-70)
15 Large animal burial & Special Operations Material
16 Radiological Material Sites
17 See Area "A" (possible First Burial Site @ Fort Detrick in mid-1940s)
18 First Burial Site in Area "B" All Types of Material (pre-1950)
19 2 Phosgene tank buried
20 Firing Ranges
21 Anti-crops disposal operations (1973)
22 Test Grid (simulants wet/dry; AF Munitions; spheres; fletners, etc.)

Note the radiological areas (16) do not correlate with 1950s site maps. Area 17 is on Area A and is not depicted (see section 6.7.3.2). It is unclear from the legend notes why Area 20, Firing Range, and Area 22, Test Grid, are included as disposal areas.

Interpretation of the map is assisted in that the December 1976 version of the map is used in the 1977 Installation Assessment of Fort Detrick as Figure II-8[276] with Figure II-7 being of Area A (see section 6.7.3.2). The Installation Assessment calls the disposal areas pits and provides details about them beyond what is included in the legend as noted below:

"Pit 11 – was used from 1955 to 1970 to dispose of acids and chemicals. Following the disestablishment of the biological research center in 1969, chemical disposal pits were dug approximately 15 feet deep, 12 feet wide, and 20 feet long in the same general area for the disposal of surplus, unopened and partly used chemicals from the mission elements of Fort Detrick. During operations no more than three 32-gallon garbage cans of chemical were disposed of in any one week. Following the completion of this task, five 15-pound drums of fluorescein dye were placed in the pit, three in October 1970 and two in April 1971. As of the date of this report no dye has been found in adjacent streams. In the case of cyanides, strychnine, and other poisonous compounds, reacting chemicals were used to neutralize compounds, diluted with water and processed through the contaminated sewerage system."

"Pit 12 – contains 150 tons of liquid waste including approximately 25 tons of sludge which was buried in 1972 from holding tanks at decontamination plants (Bldgs 384 and 375) located in area A. Hypochlorite was put on top of the sludge as it was removed from the holding tanks. Additional hypochlorite was put on top of the sludge prior to burial. Burial of…contaminated sludge has caused the area to be considered permanently contaminated with anthrax spores" as the sludge might not have been completely treated.

Pit 13 – was used as a burial site for incinerated LX waste after demilling operations. This material was buried in 1973. Note that according to a 1971 Disposal Plan, Detrick disced this material into the ground rather than put into a formal pit with the containers decontaminated, crushed and then buried.[277]

Pit 14 – was used from 1965 to 1971 to dispose of herbicide and insecticide waste. In 1970 and 1971 following the closing of the Biological Research Center, amounts of herbicides from the Plant Sciences Laboratory and Vegetation Control Division were also buried in this pit (see section 7.4 of the companion ASR Findings for Field Testing of 2,4,5-T and Other Herbicides in 4 April 2012 for further discussion)[278].

Pits 15a and b – buried test animals. Carcasses were sterilized and then buried. Carcasses were covered with hypochlorite upon disposal.

Pits 20 and 22 – included on disposal areas based on the presumption that there it may contain some UXO's as these areas were firing ranges

"Pit number 21 contains quantities of decontaminated drums which at one time contained TX material. Drums were buried in 1973."

Conclusions also stated that radiological tracer materials (radioactive Carbon, sulfur and phosphorus) were reportedly buried at three locations in Area B. Information about quantities buried was not uncovered.

By 1981, Detrick installed monitoring wells and began some cleanup of the Area B Disposal Areas under a Preliminary Assessment that included recommendations that the state and EPA monitor the Army's investigation and this investigation should address the potential of off-site migration of toxic materials and delineate the potential hazards related to the presence of *Bacillus anthracis* (anthrax) cysts in the soil. [279]

In 1983, the Area B utilization maps no longer depict the previous disposal areas but do show a single Sanitary Landfill and a number of monitoring wells throughout Area B.

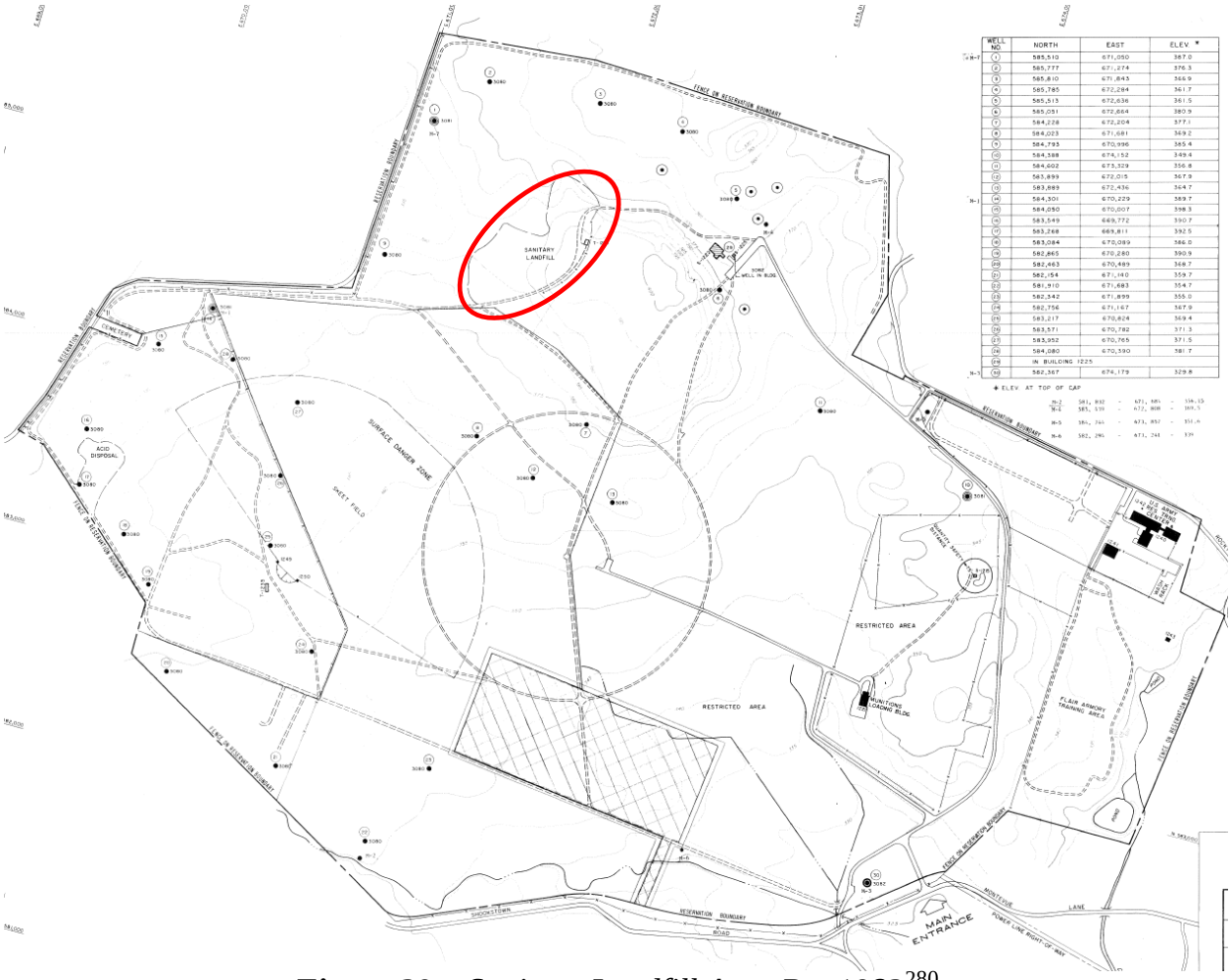


Figure 29 – *Sanitary Landfill Area B – 1983*[280]

A May 1988 environmental audit by the U.S. Army Environmental Hygiene Agency (Audit No. 38-26-7001-89)[281] found Fort Detrick generated 78,600 cubic yards of solid waste during 1987. Approximately 28% was disposed of in the landfill located in the northwest corner of Area B with 68% disposed of by incineration and 4% through land application (such as bedding material for sterile bred animals). Incinerator ash and non-burnable waste were transported to the landfill two to three times per week and the audit recommended Detrick consider offsite disposal at a municipal landfill if cost effective. The audit noted that Fort Detrick applied to the State for a permit to operate the Sanitary Landfill and was currently operating it under an interim authorization that required groundwater monitoring. The report identified an active recycling program for waste oil, used solvents and scrap metal. Groundwater monitoring wells were established to monitor both the current and historic landfill areas.

Although the audit recommended no environmental monitoring for BW agents since it was thought it unlikely they would survive in the subsurface environment, Detrick was monitoring groundwater for five herbicide compounds (Cacodylic Acid, dalapon, silvex, 2,4-D and 2,4,5-T). Silvex and 2,4,5-T were not detected and very low concentrations of

the other three compounds were detected in various samples. Over all, Detrick analyzed samples for metals, cyanide, total nitrogen, sulfide, pesticides/herbicides, PCBs, purgeable organics, and base neutral and acid extractable organics.

In 1989, Fort Detrick published an evaluation report on the operations of active Sanitary Landfill in Area B that included operation procedures. *"Contaminated wastes generated on Fort Detrick will be autoclaved and incinerated before disposal in the landfill.... When necessary, dried water treatment plant and sewage treatment plant sludge may be disposed of in the landfill if appropriate permits have been obtained. This sludge may also be applied to the surface to encourage vegetative growth in place of fertilizer.*" "*Ash residue from any waste-to-energy facility which is deemed nonhazardous by EP [Extraction Procedure] Toxicity testing will be incorporated into the fill area and treated as general waste materials."* The EP toxicity testing of the incinerator residue was to be performed annually to verify that it was non-hazardous.[282]

In March 1991 samples from the leachate collection system were analyzed for volatile organic compounds (VOC), semi-volatile organic compounds (SVOCs), metals, pesticides, PCBs and cyanide. Several contaminants were detected above the limit of detection standards including cyanide; the SVOCs, methylene chloride, ethyl benzene, trichloroethane (TCE) and 1,1,1 trichloroethane and the metals arsenic, silver, zinc and nickel. Although routine monitoring of the landfill leachate was not required, testing was also conducted in the spring of 1993 and no VOCs, dioxin, pesticides, metals, PCBs, or cyanide were detected.[283]

An analysis of water taken from groundwater monitoring wells in September and October 1992 detected TCE above the primary drinking water standard. Detrick also detected chloroform, Trichlorofluoromethan, tetrachloroethene, and pentachlorophenol but at levels below primary drinking water standards. Radionuclides were not detected. The source of the Chloroform, TCE, and Trichlorofluoromethane appears to be in the area of trench 11. The report recommended monitoring a series of six wells semiannually.[284]

In April 1993 the monitoring wells were again sampled. Benzene, Chloroform, 2-Chlorotoluene Methylene, Chloride, and Naphthalene were detected in one or more monitoring wells below the quantitative detection limit. Toluene was detected in 11 wells with one detection above the quantitative detection limit but below the National Contaminant Level. TCE was detected above the Maximum Contaminant Level (MCL) in three wells, above the quantitative detection limit in six wells and below the quantitative detection limit in one well. Trichlorofluoromethane was detected below the quantitative detection limit in four wells and above the quantitative detection limit in one well. There are no drinking water standards for this chemical. No target SVOCs, cyanide, herbicides or insecticides were detected. Total Metals were all non-detects except lead, which exceeded the NPDWR no-action level; Beryllium and Nickel, which exceeded the promulgated MPDWR MCL; Zinc, which exceeded the National Secondary

Drinking Water Regulation, and Barium which was slightly above the MCL. Radionuclides were found in one well.[285]

In 1994, the General Accounting Office (GAO) reported to Congress about the potential for radioactive contamination at sewage treatment plants overall. Until 1998 sludge, containing radioisotopes from the Detrick wastewater treatment plant (WWTP) was disposed of at the sanitary landfill. In 2000, Detrick ceased discharge of radioactive liquid waste into the sanitary sewer system and the WWTP no longer received or treated any radioactive waste. In 2003, as part of the NRC license closeout procedure, Detrick completed reports recommending resumption of sludge disposal from the WWTP and recommending the NRC delete the past Area B-11 burial sites as an assessment showed they met the required NRC criteria..[286]

As a result of the chemical detections above MCLs Detrick initiated an investigation of contamination in Area B that included installation and sampling of monitoring wells and Phase I and II Remedial Investigations. Subsequent to these environmental investigations removal actions were initiated at several of the Area B disposal areas (IRP FTD 49). Disposal Pit 11 (B-11) is of particular interest due to historical chemical disposal. Wastes buried in Area B-11, which includes eight 55-gallon drums of TCE buried in 1968, are believed to represent a primary source of TCE and PCE contamination in Area B groundwater. In 2001 during an interim removal action PCE, TCE and PCBs were detected in soil samples from the floor of the excavation. During this removal action vials containing live pathogens in medical wastes at Area B-11 were found and all intrusive work was temporarily suspended at the disposal area until additional safety measures and testing procedures were in place. The interim removal action was completed in 2004.[287]

In 2001, the EPA completed an aerial photo analysis of Area B focusing on past landfill and waste disposal at Detrick. The investigation located and used the following aerial imagery for their analysis: 1952, 1958, 1964, 1970, 1973, 1979, 1983 and 1988. This investigation did not revisit the findings of that investigation but it should be noted that additional imagery has been located that was not available for that investigation.[x] The analysis only looked at Area B and not at Area A.[288]

[x] The ASR located the following additional imagery :

- 1937-10-30 ~ 1:20,000
- 1943-09-18 at 1:20,000
- 1947-09/10 on 1948 photo mosaic map
- 1972-11-16 at 1:12,800
- 1976-08-05 (incomplete coverage)
- 1982-07-21 at 1:13,750
- 1998-04-06 at ~1:40,000
- 1999-03-20 at ~1:40,000

Relatively current site maps of Area B designated a number of the former Disposal Areas or Sanitary Landfills as "Land Use Control Area" (see following figure).

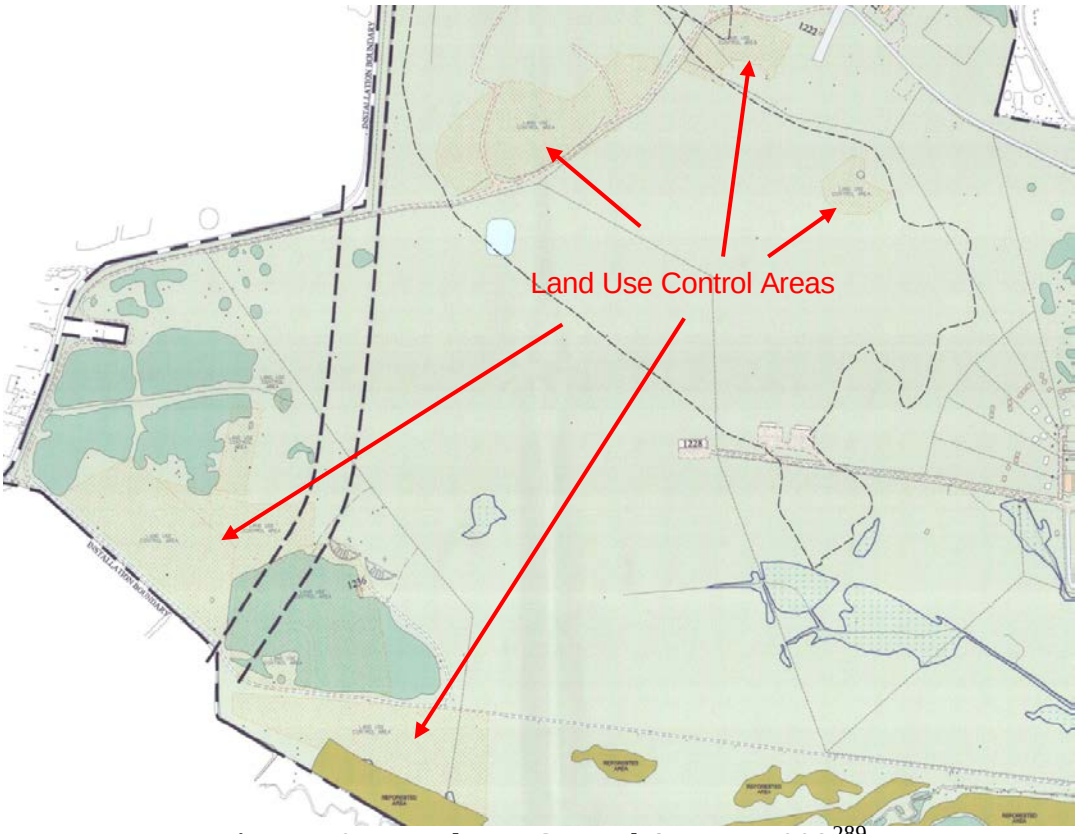


Figure 30 – *Land Use Control Areas* – 2009[289]

6.7.3 Area A Disposal Areas

6.7.3.1 Rubble Dump and Burn Pit for Contaminated Combustible Materials

In 1957[290], Detrick proposed establishing a burn pit for the disposal of contaminated combustible materials. It was about 10 feet wide, 50 feet long and five feet deep and just east of a rock and dirt spoil disposal area on the eastern side of the post at approximately the same location as a 1955 Fire Department Training Site[291].

Both of these areas, along with the scrap lumber pile, are clearly visible on imagery of the area from August 1958. This figure also shows a large open storage area of material (boxes, pallets, crates etc.). The devegetated area around the burn pit is larger than on that map at approximately 150 by 200 feet (see following figure).

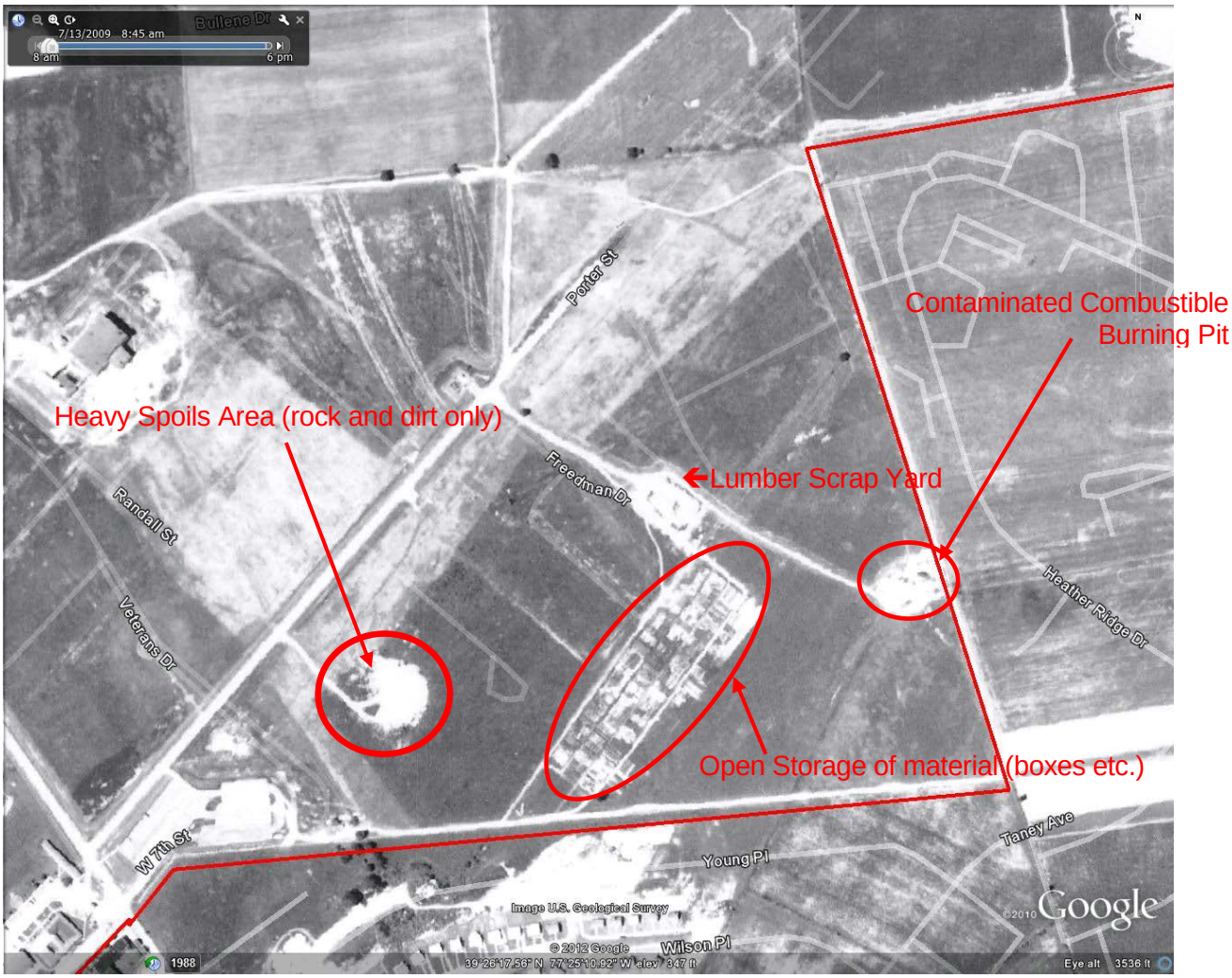


Figure 31 – *Rubble Pile and Contaminated Burn Pit – Area A – Aerial Image August 1958*[292]

In 1963, the Detrick Safety Regulations provided guidelines for the use of this "Area C Burning Pit" (currently called Area A). The policy directed that potentially contaminated combustible materials from repair, remodeling, or demolition that had not been sterilized (i.e. too big to be autoclaved), were burned in the burning pit rather than being buried in the Area B burial pit. Burning in the incinerator is not noted. Fire Department personnel controlled the burning pit including keeping the key to the burning pit gate. Burning occurred, under Fire Department direction, whenever sufficient materials accumulated. Based on later Detrick regulations, the use of the burning pit ceased by 1969. The revised refuse disposal guidelines indicate burning of combustible potentially contaminated materials in the incinerator was allowed but specifically stated: "*No open pit burning is permitted*."[293]

Reference to the "contaminated burn pit" is not longer on site maps starting in 1970. The spoils area, is still depicted, but is labeled as "rubble dump".[294] Aerial imagery of the

area from July 1970 confirm a much larger devegetated area for the Rubble Dump than in 1958 and shows the contaminated burn pit has been revegetated as a grassy, pasture. (see following figure).

Aerial imagery of the area from July 1970[295] confirm a much larger devegetated area for the Rubble Dump than in 1958 and shows that the contaminated burn pit has been revegetated as a grassy, pasture like the surrounding area. The area outside the installation to the east remains in agricultural use and undeveloped. By 1974, site plans show the establishment of a helipad on top of the former Rubble Dump[296]

The 1977 Installation Assessment of Fort Detrick indentified the area as a "Sanitary Landfill" on Figure II-7 of that report (see Figure following the next one); however, it did not provide evidence that it was used for more than rubble disposal.[297] The 1979 aerial imagery confirms the leveling and revegetation of the former rubble dump and establishment of the helicopter landing pad at that site. The area on the other side of the fence from the former burn pit is being developed for residential housing. More recent imagery from 2011, shows the former burn pit area is covered by a new storm water pond and the Rubble Pile has been redeveloped with the helipad in approximately the center the approximate extent of both features is delineated in green on the following Figure). Detrick finalized Phase I and II soil investigations of the former burn pit site in 2000. Analysis of soil borings detected both organic chemicals and metals in the soil samples, at low levels. None of the organics detected exceeded USEPA Region III residential RBCs. The investigation, which involved looking at depths of five to six feet below ground surface, did not find any evidence, such as debris or disturbed soil, to indicate past burning activities had contaminated soils at this depth. Due to the low risk estimate, no further action was taken (IRP FTD 11 NFA). No further action is also the conclusion for the Rubble Pile (IRP FTD 09 NFA).[298]

6.7.3.2 Disposal Area 17

Disposal Area 17 is among the Disposal Areas identified by Detrick in 1976-1977. It, is, the only disposal area in Area A other than the Rubble Dump. Apparently it was a landfill until 1947 based on material unearthed during road grading operations in the area in 1952. The area depicted on site plans is an area of approximately 100- by 175-feet located between Buildings 538 and 560 crossing Wood Street near Chandler Street.[299]

Review of site plans from the early-to mid-1940s, show the reported location of Disposal Area 17 in an open, undeveloped area within the Restricted Area just west of the Sheep House, T-360 and north of the Rabbit Hutches, T-357 .

There is no clear evidence of a disposal or landfill operation in this location discernible on aerial imagery from September-October 1947 or September 1952 (see following figures). The October 1943 imagery shows the location as an agricultural field, as it was

not acquired for Fort Detrick until early 1944. No further action is the conclusion for this area (IRP FTD 08 NFA).[300]

6.8 EXTERIOR TEST GRIDS / RANGES

6.8.1 General

Outside test areas were generally used to test how a munition and/or agent would react in the uncontrolled outdoor environment. Tests may have involved what happens to the munition fuse when the munition item is dropped from various altitudes on various target materials (i.e. soils, rocks, buildings, etc); whether the munition produced an aerosol of the correct particle size and dose strength; if an acceptable percentage of the agent in the munition is converted to an aerosol; did clustered munitions produce the required impact patterns, etc. For testing related to various agents, the goal may have been to analyze how different wind speeds, humidity, and even sunlight, affected their movement and efficiency. Field testing of pathogenic agents required an isolated area large enough to control the potential spread of the pathogen. Fort Detrick tests areas did not have sufficient size or remoteness to allow outdoor testing of pathogenic agents with the exception of anti-crop agents that had negligible potential to affect local crops. The only test identified by the ASR as having occurred on outdoor grid areas at Fort Detrick are those using stimulants and some crop agents.

Starting in 1943, the Munitions Branch was required to devise methods for determining the military values of contemplated BW munitions. In the interest of safety for operating personnel and for the surrounding community no toxic BW agents could be used at Camp Detrick for field munitions testing. Therefore it was necessary to select and manufacture appropriate non-toxic or non-pathogenic simulants for these tests. *B. globigii* (BG) was selected as one such simulant, but was not available in needed quantities for several months. During this intervening period experiments were performed with yeast.[301]

Simulants were considered a safe substitute that were used in place of the anticipated agent and mimicked that agent to the extent necessary for the test. Examples of simulants that were commonly used are water, water with a dye, talc, yeast slurry, and organisms that had characteristics similar to the anticipated agent. The two most commonly used BW agent simulants, *S. marcescens* (SM), a simulant for pathogenic bacteria and BG, a simulant for pathogenic spores.

Fort Detrick was also involved in the development of biological warfare ammunition which would have included development of the explosive components of this ammunition, however "*The nature of the project at Camp Detrick is such that security requirements prevent the disclosure of detailed information concerning the use of explosives stored at this post.*"[302] These exterior test grids and ranges on Fort Detrick were unique, non-standard ranges designed to accomplish a specific test objective (the conventional small arms ranges are discussed in section 7.3 and munition storage in

section 7.4). The following sections provide additional details about the exterior test grids and ranges used on Detrick, four on Area A and six on Area B and an evaluation of the munition items associated with them. There is also a discussion of testing that occurred outside the installation but within Frederick County, MD.

- Area A – Temporary Test Grid
- Area A – 20 mm Test Area
- Area A – Assessment Division Grid
- Area A & B – Crop Pathogen Field Testing
- Area B – Temporary Circular Test Grid
- Area B – Permanent Circular Test Grid
- Area B – Test Chamber
- Area B – Permanent Circular Test Grid - Test Firing Towers and Dugouts
- Area B – Gun Emplacement, Building 1222
- Area B – Demolition Pit
- Monocacy Valley Simulant Tests
-

6.8.2 Area A – Temporary Test Grid

The first identified test area was not located in Area B, but was a temporary test grid established in September 1943 in Area A on land earmarked for later building construction. The first series of tests at Detrick involved examination of existing chemical munitions to determine if they were suitable for dispensing biological agents. These were static tests and one of the first munitions tested was the M67 bomblet where the incendiary filler was replaced with a yeast slurry as a simulant for a biological agent. Initially Detrick used Baker's yeast as it was immediately available in sufficient quantities. Detrick also tested other adapted chemical bombs: M47A2 Bomb, M69 Bomblet, M70 Bomb, and the M77 Bomblet but these proved unsuitable for BW use. Originally this temporary grid was rectangular with sampling stations at 2.5 and 5 yard intervals along rows 50, 60, 70, 80, 90, 100, 110, 120, and 150 yards from the munition. This was found to be unsatisfactory and was replaced by a small circular grid on the same site. The field tests at this temporary test grid did not include any biological material considered pathogenic. During WWII, pathogenic agent field tests were conducted at Horn Island, MS (FUDS) and DPG (an active military installation).[303]

6.8.3 Area A – 20 mm Test Area

Following WWII, Detrick conducted additional RDT&E efforts on BW weapons systems based on small arms. These included projects aimed at adapting of Army and Navy 20 mm shells to dispense anti-personnel agents and a similar weaponization effort using 20 mm shells to dispense a cereal rust anti-crop agent. No additional information on the location and types and amounts of agents has been uncovered but as stated earlier, Fort Detrick was not allowed to test toxic or pathogenic agents outside of test chambers.

(Note: it is possible that this type of test was conducted in a test chamber if a live agent was used.).[304] The first identified tests involved four firings of 12 gauge shotgun shells containing TX (i.e. anti-crop agent for Wheat Stem Rust) fired between 9 and 11 March 1948. Although not specifically stated it is believed that these initial tests were used to calibrate the new grid in preparation for the actual test activities. These tests were followed by a series of tests involving the static firing of a 20 mm shell filled with TX. The field tests were conducted in a vacant area near the northeast side of Building T-350 (see following figure for approximate location of tests) where a semi-circular grid of samplers was established with sampling arcs out to 96 yards. Tests 1 through 5 were conducted in August and September 1948. This was followed by a series of inside tests (location not identified) which provided a tighter control of temperature and relative humidity variables. The indoor tests also involved the firing of some 10 gauge shotgun shells as part of the test series.[305]

Additionally, a 1950 test at Detrick involved testing different dose rates (ranging from ¼ gram to 25 grams per acre of rust spores) on field plots of cereal grains to determine the minimum dose rate needed to achieve the military requirements for infection.[306] Based upon the timing of this test and the 20 mm tests it is assumed that the purpose of this test was to determine the number of 20 mm rounds required per acre to achieve the desired results. With increased building construction and the acquisition and development of Area A, the testing of munitions outside of controlled test chambers was generally limited to Area B.

6.8.4 Area A – Assessment Division Grid

Some weapons development tests involved investigating dispersal patterns over areas larger than Area B allowed, such as testing of simulated-agent travel. Although many were done off of Detrick, at least one test series occurred on Area A, specifically on land east of Ditto Ave. referenced as Area C on the test figures, between 14 and 24 February 1953, as part of the land trials of Operation Seltzer. The munitions test, MD-1223, involved the release of eight liters of a mixture of simulants SM, BG, and FP from a XB-14B Test Fixture.[307] There were six tests in this series. This was a test of long distance cloud movement with sampler's set-up along an Assessment Division Grid Line at 350, 700 and 1,400 yards from the release point (see following figures). The tested slurry included: SM consisting of about 550 grams per trial of liquid slurry with 20×10^9 organisms per ml of slurry; BG consisting of about 550 grams per trial of liquid slurry with 2×10^9 organisms per ml of slurry and 8 grams per trial of zinc cadmium sulfide, as the fluorescent tracer powder.[308] This test was carefully controlled and executed only when the wind and temperature gradient was within the standards designated for the test. To ensure optimum flexibility, Detrick established a series of 14 dissemination points and corresponding downwind sampling points. When the wind and temperature gradient requirements were met, the test controller would announce the dissemination point and sampling points that were being used for the test. The test fixture was mounted on a trailer to allow rapid changing of dissemination point when the wind direction changes

and not for use as a line source (see dissemination point 1-8 and 9-14 along "Assessment Grid Lines" on following Figures). The test involved the test fixture spraying the mixture of simulants for a period of eight minutes and ended when the agent cloud reached the final sampling line.[309]

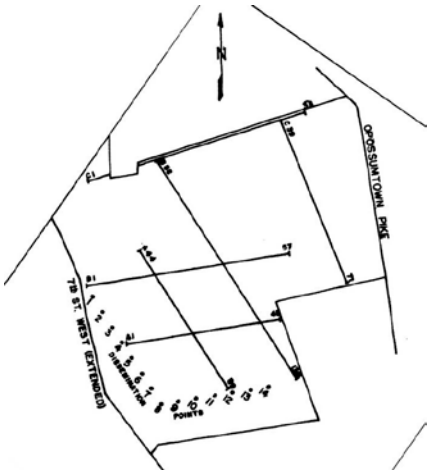


Figure 32 – *"Operation Seltzer Test Site, Area C, Camp Detrick" – February 1953* [310]

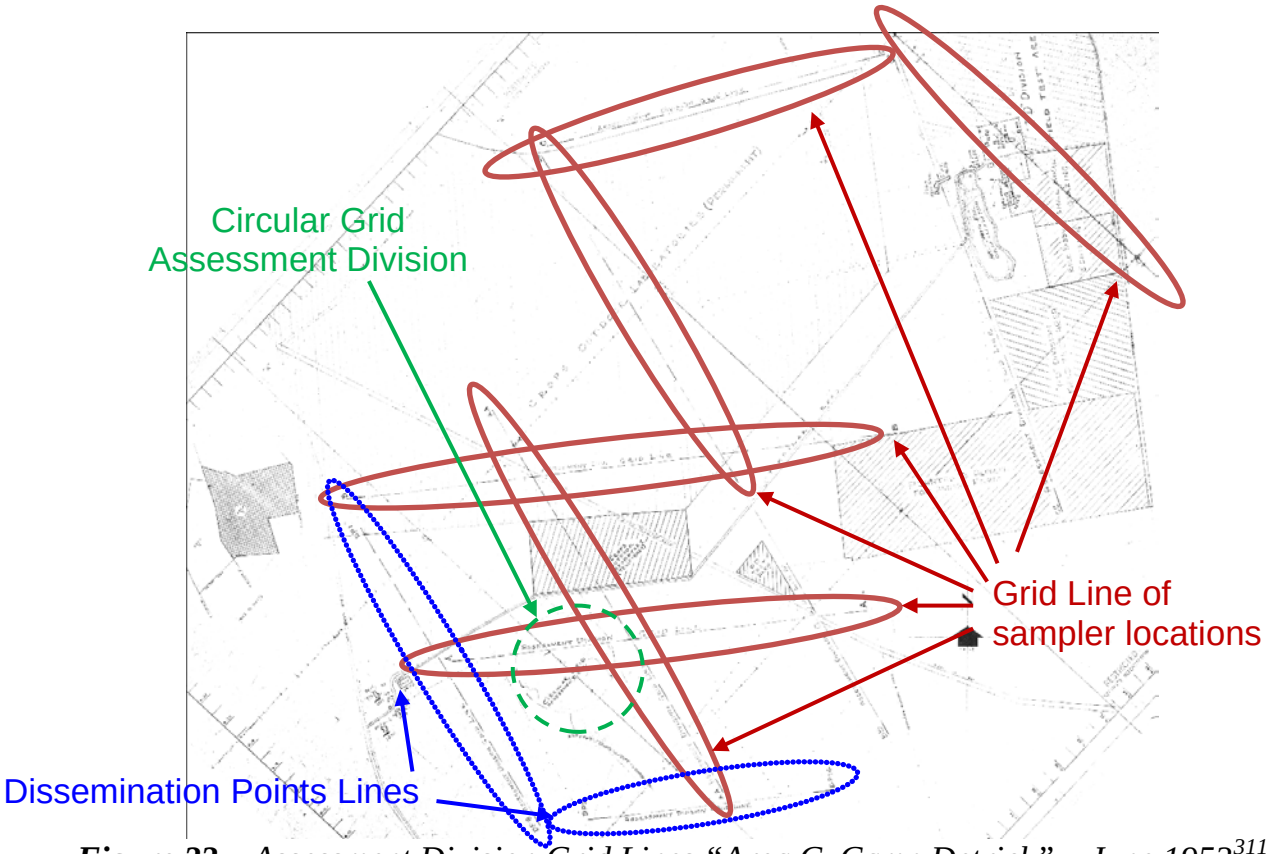


Figure 33 – *Assessment Division Grid Lines "Area C, Camp Detrick" – June 1953*[311]

This is the only confirmed test series that occurred on this grid. There was also a "Circular Grid Assessment Division" depicted on a plot plan of "Area C", though no tests have been confirmed at that location.

6.8.5 Areas A & B - Crops Pathogen Field Testing

Initial screening efforts of anti-crops agents consisted of a series of tests in controlled interior environments within laboratories and greenhouses. These tests involved seeds and plants to determine the compounds best suited for military purposes. The second investigative phase consisted of small field plots or "garden plots" (e.g., 6- by 18-foot field of a single crop) for experiments with the most promising compounds. These test plots on Fort Detrick included small plots of many of the farm food crops commonly found in smaller acreage plots in most temperate climate areas (e.g. corn, beets, tomatoes, etc..

Detrick located these field plots on both Areas A and B, moving them over time as construction of new facilities required land previously occupied by the field plots. The eastern portion of Area A between Ditto Ave. and Opossumtown Pike (historic Area C), is associated with small crop plots used in the development and testing of chemical anticrop agents or herbicides. Detrick also used these garden plots for a limited amount of pathogenic anticrop agents such as the field studies on agent C (Southern Blight, *Sclerotium rolfsii*) conducted in 1944 and 1945 on sugar beets and potatoes.[312] A more thorough analysis of the small crop plot locations is contained in the companion ASR volume published separately: Archives Search Report Findings for Field Testing of 2, 4, 5-T and Other Herbicides, Fort Detrick, 4 April 2012.[313]

Large scale anti-crop pathogen testing occurred at other locations outside of Detrick, typically at various state agricultural experimental or test stations, such as the ones in Beaumont, TX, or Crookston, MN, or on portions of military reservations (e.g. Avon Park, FL).[xi]

Starting in 1947, the focus of research on plant pathogens appears to have moved in the direction of determining the best methods for culturing or harvesting plant agents.[314] Detrick developed a field harvester for collecting uredospores from plots of intentionally rust infected cereal plants as a source of anti-crop pathogenic agents. "Several moderate size field collections of rust spores were made at Camp Detrick in 1949".[315] Although the specific locations were not identified, given the time frame before the 1952 expansion east of West 7th Street (Ditto Avenue), it would appear to coincide with the areas of cereal grain productions discernible on 1952 aerial imagery. One such investigation in 1955 involved the study of crown rust on different varieties of oats conducted on the former Nallin farm.[316]

[xi] It is outside the scope of this report to provide a comprehensive list of U.S. BW Field Testing that occurred outside of Fort Detrick. The February 1977 report: U.S. Army Activities in the U.S. Biological Warfare Programs, 1942-1977 includes such listings for testing that occurred on Fort Detrick as well as other locations.

6.8.6 Area B – Temporary Circular Test Grid

In January 1944, the War Department leased additional land near Camp Detrick for use as a proofing ground (i.e. Grid Area or Area B) for the testing of new munitions.[317] In this addition, Camp Detrick established a munitions development area. A temporary circular grid with a radius of 600 feet was initially installed (see following figure) during the construction of a larger permanent circular grid.[318] By 1950, the temporary grid no longer appears on site plans.

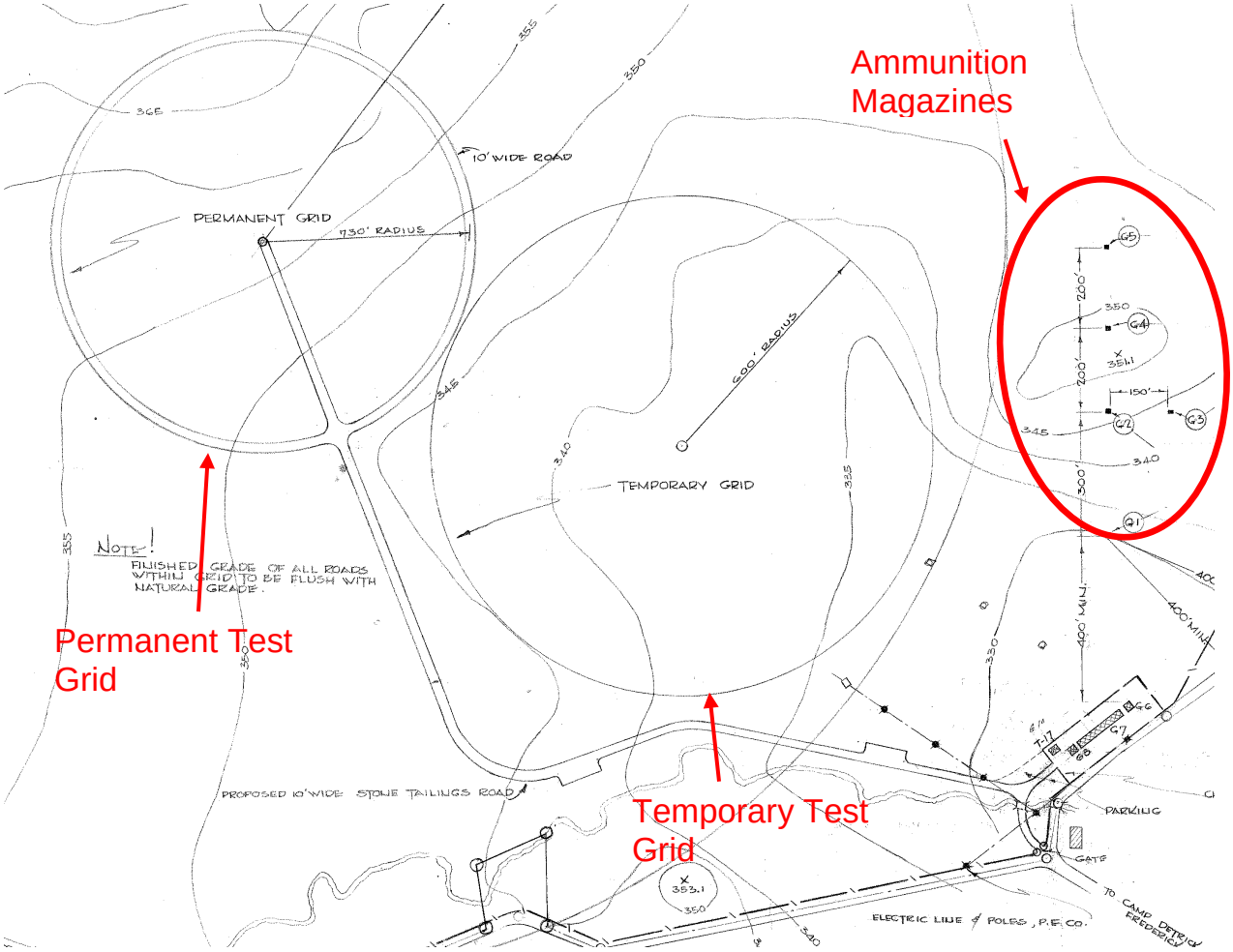


Figure 34 – *Temporary and Permanent Test Grids in Area B 1944* [319]

Because tests conducted on this grid are normally referenced in test documents as "Area B Grid" or "Circular Grid Area B" and do not differentiate between the temporary and permanent grid no specific information related to the tests conducted on the temporary grid were uncovered.

6.8.7 Area B – Permanent Circular Test Grid

The permanent Circular Test Grid, referred to on designs as the "Munition Development Area," was a circular grid with a radius of 1,800 feet, composed of rings with 60 sensor nodes evenly placed along concentric circles radiating 150, 300, 450, 600, 900, 1,350 and 1,800 feet out from the center of the grid. The center of site had a 20 foot diameter concrete slab two inches thick with armor plate in the center. A circular road was located at a radius of about 750 feet. There are 30 electrical conduit arms evenly spaced 12 degrees apart radiating from the center of the grid(see following figures).[320]

Figure 35 – *Permanent Circular Grid*[321]

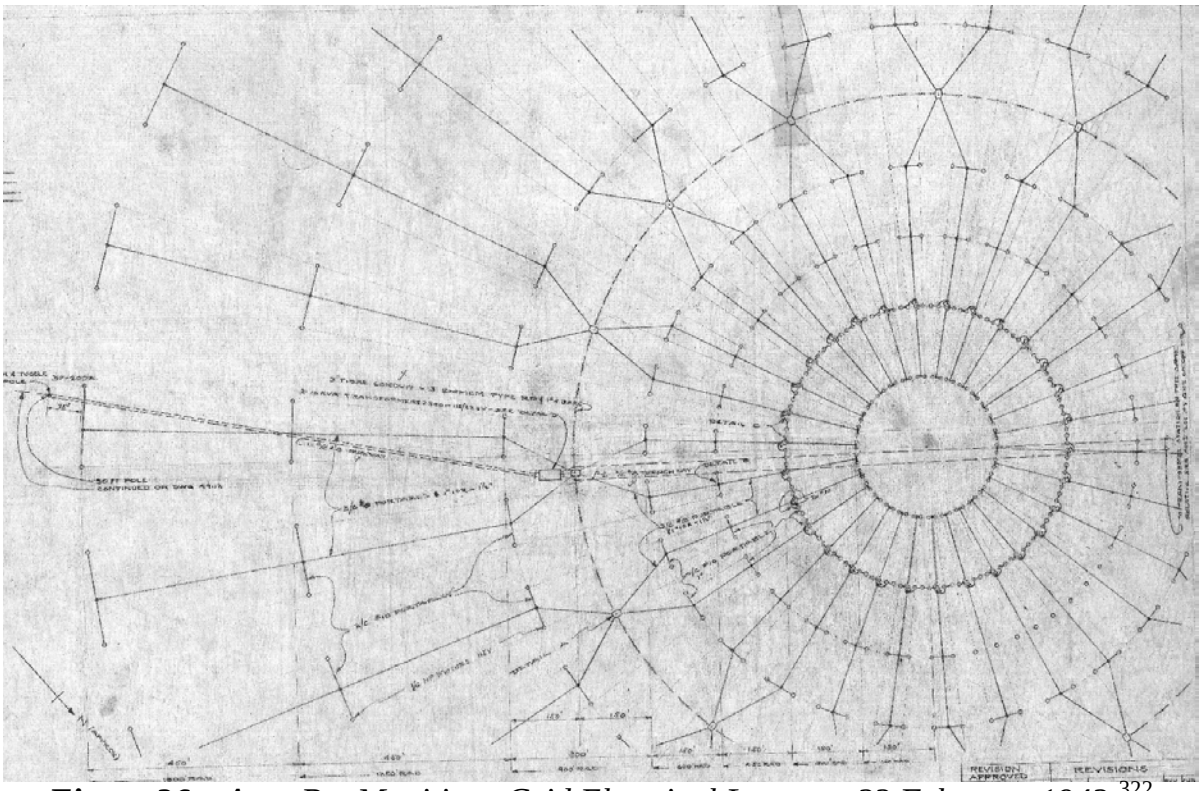


Figure 36 – *Area B – Munitions Grid Electrical Layout – 23 February 1943* [322]

The U.S. MK 1 bomblet, which was similar in size to the four-pound incendiary bomb allowing for use of existing clusters for delivery, was the first BW specific bomb in the U.S. inventory. Tests on this bomb included developmental testing of the fuze, tests on how the agent was dispersed (and how it could be improved) plus tests on dispersion patterns with full clusters. The majority of dispersion-efficiency and cloud-characteristics tests were static tests with a filler of the simulant BG. These tests occurred from May 1944 to June 1945, apparently on the test grid in Area B at Fort Detrick. The tests using complete clusters (simulant and live agent) were conducted on DPG with some simulant filled tests also being conducted on Edgewood Arsenal.[323] Experiments were also conducted to develop a bomb (MK2) to dispense the chemical anti-crop agent (i.e. herbicide) VKA (Vegetable Killer Acid or specifically 2, 4-D (2,4-dichlorophenoxyacetic acid) dissolved in tributyl phosphate and fuel oil). This bomb was basically a M10A1 Cluster Adapter filled with paper containers of dry agent VKA. Tests of this cluster bomb occurred at the Granite Peak Installation on DPG.[324]

In 1950, the munition projects for disseminating BW Agents were:[325]

Project 4-04-14-002 - development of a droppable munition for Crop Agents
Project 4-04-14-004 - use of feathers to dispense agent
Project 4-04-14-005 - 4 lb Biological Bomb in E96 Cluster
Project 4-04-15-006 - ½ lb Biological Bomb in E108 Cluster
Project 4-04-14-007 - 20 mm Particulate Projectile

Project 4-04-14-008 - fletnor rotor / self-disbursing bomblet (did not proceed far enough to be given a model number)
Project 4-04-14-009 - development of a family aerosol generators
Projects 4-04-14-002/003/013 - E48 bomblet for use in various guided missiles
Spray Tanks (no evidence of testing of spray tanks on Camp Detrick)

Specific test data for these and other projects were not reviewed in detail; however, the general BW development process included field testing on the Area B Grid with a single munition or bomblet filled with a simulant. At Detrick, munition development tests using live agents occurred within enclosed test chambers, particularly the ones in Building 263 and 527 (see section 6.3). As previously stated, field tests of live agent with a single munition or bomblet occurred elsewhere, typically DPG. Tests of munition clusters also occurred at DPG. In some cases bomblet cluster dispersion patterns were determined by dropping clusters of bomblets filled with florescent dye. A typical type of BW bomblet used in clusters was the softball sized E120.

Two aircraft spray trials using agent simulants SM and BG were conducted on the Area B Grid in 1951. The trials involved using a C-47 aircraft flying at 75 to 100 feet above the terrain with one flight cross wind and one parallel to the wind to determine the feasibility of employing low-flying aircraft to disseminate a liquid suspension of a BW agent for the purpose of aerosol production and ground contamination. A third trial was conducted in the Monocacy Valley using the simulant SM (see section 6.8.12 for discussion of that trial).[326]

Dispersion tests for potential self-dispersing bomb shapes also were conducted on the Area B Test Grid, but no fill agent was used in these. The test grid on Fort Detrick was used for some of the testing but was typically restricted to drops from 900 feet or less due to safety considerations. The drops on the grid were typically made from either a moored balloon (thus the need for Building 1234, the balloon hanger completed by 1958[327]) or from a helicopter. Drops from above 900 feet were conducted at other installations, including Fort A. P. Hill, Edgewood Arsenal, and DPG.[328] However, drops of water-filled munition clusters as high as 2,500 feet from aircraft (L-20) traveling at 125 mph or helicopters from 1,500 feet traveling at 80 mph are known to have occurred at the Area B Grid in 1962[329]

As described in ASR Section 2 Archival Documentation Relating to Fort Detrick, a comprehensive list of all the Munitions Division test plans and reports was not collected; however, all tests on the B Grid, where the agent was identified, either used simulants or no agent. The following is a list of test data recovered where Area B Grid was identified as the test location. Simulant abbreviations:

SM - *Serratia marcescens*, a bacteria simulant
BG - *Bacillus globigii*, a spore forming simulant
EA – alternate code for SM

EC - *Escherichia coli*, a simulant
FP – Fluorescent Particles

Table 6.8.7 - Identified Tests Occurring in the Area B Grid in 1950s

Date	Applied Aerobiology Test Number	Munitions Division Test Number	Technical Evaluation Test Number	Agent	Munition
15 May 51 FT - unnumbered				AF	None (training exercise)
1951 FT 6/51				BG/SM	Aircraft Spray test
1951				WP	Atmospheric diffusion test
		MD-1003		SM	M114
		MD-1011		SM	M114
		MD-1012		SM	M114
		MD-1013		SM	M114
		MD-1015			
		MD-1016		SM	M114
		MD-1018		SM	M114
		MD-1019		SM	M114
		MD-1021		SM	E88
		MD-1022			
		MD-1041		SM	M114
		MD-1057			
		MD-1059		SM	Test Nozzle
		MD-1069		SM	Test Nozzle
		MD-1082		SM/EC	E88
1-Apr-52		MD-1115		SM	E61
2-Jun-52		MD-1151		SM	M114/E61
		MD-1156		SM	C Generator
24-Mar-54		MD-1159		Water	E133R2
28-Jul-52		MD-1168		SM	M114/E61
		MD-1175		SM	Generator
		MD-1191		SM	M114/E61
15-Dec-52		MD-1209		SM	E61
		MD-1246		SM	E99
		MD-1269		SM	E4 Fixture
		MD-1292		SM/BG	Test Nozzle
		MD-1299		SM	E4 Fixture
	A-130	MD-1300		SM	C Generator

Table 6.8.7 - Identified Tests Occurring in the Area B Grid in 1950s

Date	Applied Aerobiology Test Number	Munitions Division Test Number	Technical Evaluation Test Number	Agent	Munition
1-Aug-53		MD-1309			
		MD-1321		BG; SM	C Generator
22-May-53		MD-1328			
		MD-1331			
20-Aug-53		MD-1396			
20-Oct-53		MD-1397		BG	M114
20-Oct-53		MD-1402		BG	E61
		MD-1404		SM	Generator
20-Jan-54		MD-1406			
		MD-1423		BG	
16-Sep-53		MD-1431		None	E86R1
		MD-1507		SM	E93
		MD-1537		BG	E61
		MD-1577		SM	M114
		MD-1616		SM	XBFG-1 Disseminator
		MD-1617		SM	E93/E61
2-May-55	A-332	MD-1676		BG	4 inch Sphere
1-Aug-55	A-355	MD-1678		BG	E4 Generator
13-Jun-55	A-365	MD-1683		SM	4 inch Sphere
26-Sep-55	A-456	MD-1688		BG	4 inch Sphere
		MD-1689		BG	4 inch Sphere
12-Dec-55	A-503	MD-1696		BG	E61/Test Fixture 1b
5-Mar-56	A-544	MD-1710		SM; BG; EA	Fletnor Rotor
		MD-1712		None	
	56-A-696	MD-1735		BG	Fletnor Rotor
		MD-1745		EA	E120
		MD-1747		EA	
20-May-57	57-A-749	MD-1752		SM	E133
	57-A-911	MD-1754		BG	3.4 in Explosive Sphere
	57-A-854	MD-1770		BG	E22
1-Sep-57		MD-1779		none	4.5 inch Sphere
		MD-1807		BG; SM	
		MD-1840		BG	
8-May-59		MD-1846		BG	

Table 6.8.7 - Identified Tests Occurring in the Area B Grid in 1950s

Date	Applied Aerobiology Test Number	Munitions Division Test Number	Technical Evaluation Test Number	Agent	Munition
1-Jun-59		MD-1857	59-TE-1204	BG	E134
28-Apr-59	A-749	MD-1852		SM	
21-Aug-59		MD-1857		BG	
3-Sep-59		MD-1860		none	5" HVAR
		MD-1920	61-TE-1534	BG	E134
		MD-1937		None	
		MD-1962	63-TE-1759	Corvus Oil	E138
		MD-1963	63-TE-1778	BG	
		MD-1963	63-TE-1778	BG	E41
		MD-1967	63-TE-1787	BG	
		MD-1968		None	E41 spray tank
		MD-1979		None	
		MD-1981		SM; BG	
		MD-1987		BG; SM; Water	Rotating Nozzle Disseminator
		MD-1999			
		MD-2053		Talc	
	A-340			BG; SM	E61R4; M114
			58-TE-1116	BG	E120
			58-TE-1145	SM	E120
25-Jun-59			58-TE-1204	BG	E134
			61-TE-1534	BG; SM	E134
			63-TE-1777	BG	
			63-TE-1850	BG	E-35
			64-TE-1912		
11-Apr-55	A-313			FP	E61R4

Table 6.8.7 - Identified Tests Occurring in the Area B Grid in 1950s

Date	Applied Aerobiology Test Number	Munitions Division Test Number	Technical Evaluation Test Number	Agent	Munition
24-Oct-55	A-475			SM	E61R4; M114
	A-382			BG; SM	Test Nozzle
9-Nov-55	A-490			BG; SM	E61R4; M114
1-Dec-55	A-501			BG	R61R4
	57-A-883			SM	E61
	59-A-1247			CORNSTARCH	
	59-A-1150			BG	
	61-A-1506			BG	HVAR RKT
	61-A-1513			BG	
	64-A-1787			BG	

NOTE: Applied Aerobiology, Munitions, and Technical Evaluation sections had test numbers and occasionally a test served more than one section and therefore had test numbering from the various sections participating in the test. Additionally, data provided in the above table is based upon unclassified notes of test plans reviewed and summaries of tests found in other documents. Most of the test plans were classified. Blanks in the above table represent data not acquired from unclassified sources during research.

Based on Post Memorandum 385-4, 16 December 1964, use of the test grid continued through the mid-1960s.[330]

6.8.8 Area B – Permanent Circular Test Grid - Test Firing Towers and Dugouts

In 1951 it appears that Detrick had two 60-foot towers separated by 75-foot offset about 30 feet west of the grid center (see following figure).

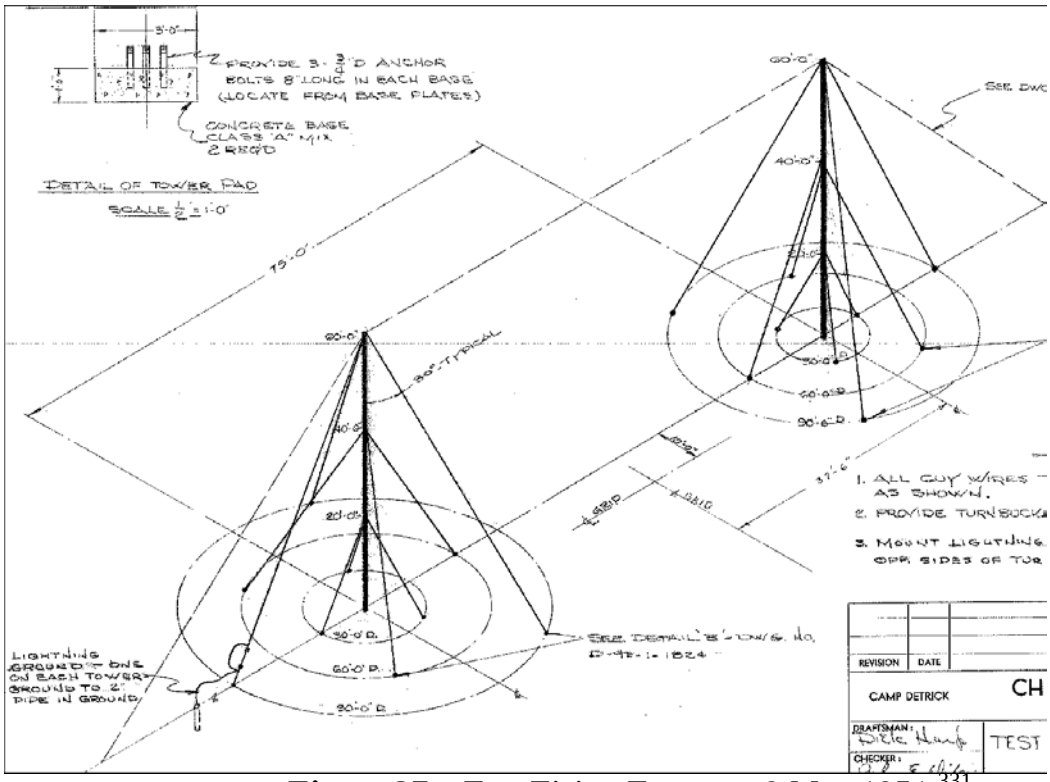


Figure 37 – *Test Firing Towers – 9 May 1951* [331]

The tower locations appear on an Area B Plot Plan in April 1952 (see following figure), so evidently they were constructed and were in use for a period of time, but are not indicated on site plans in 1952 and 1953. No data on the tests associated with these towers has been uncovered. Test information appears likely to be intermingled with the other tests specifying only "Grid Area B" as the test location. The specific purpose of these towers is unconfirmed but they would provide a reliable method for controlling the height of a test item above the ground surface (BW munitions typically function by air burst). A few years later, it appears that Detrick constructed the balloon hanger on Area B (Building 1234, completed by 1958[332]), which provided a method for controlling the burst height to much higher levels.

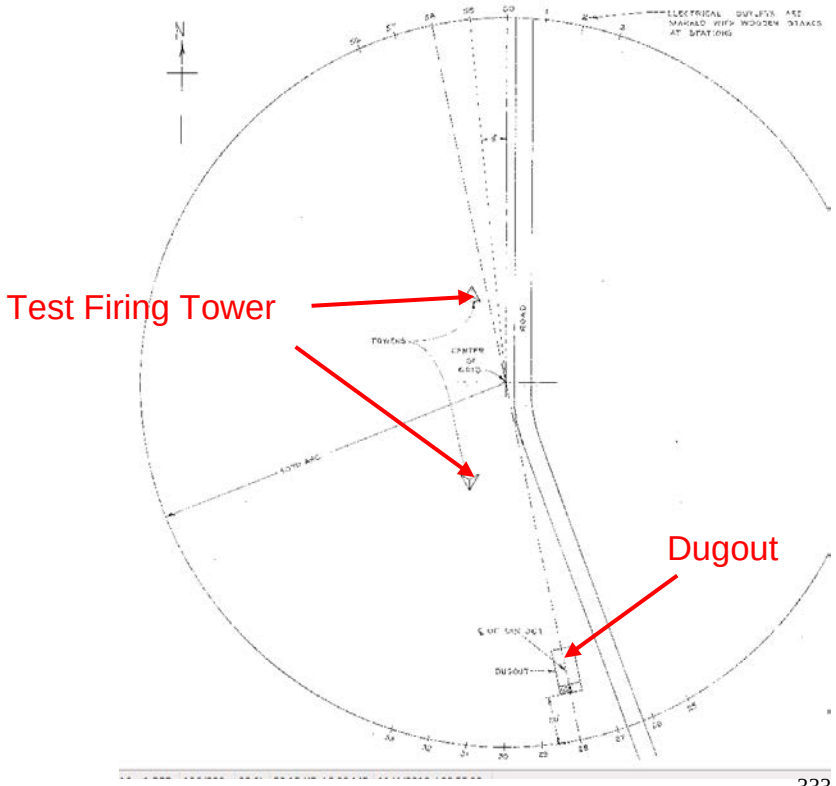


Figure 38 – *Test Firing Towers – 16 April 1952* [333]

The 1952 image also shows a "dugout" about 130 feet out from the center of grid just off the access road to the center (see previous Figure). This dugout is not shown on a later 1952 plot plans (see following figure) and is not readily discernible on aerial imagery, so it is unclear if it was constructed or was only temporary in nature.

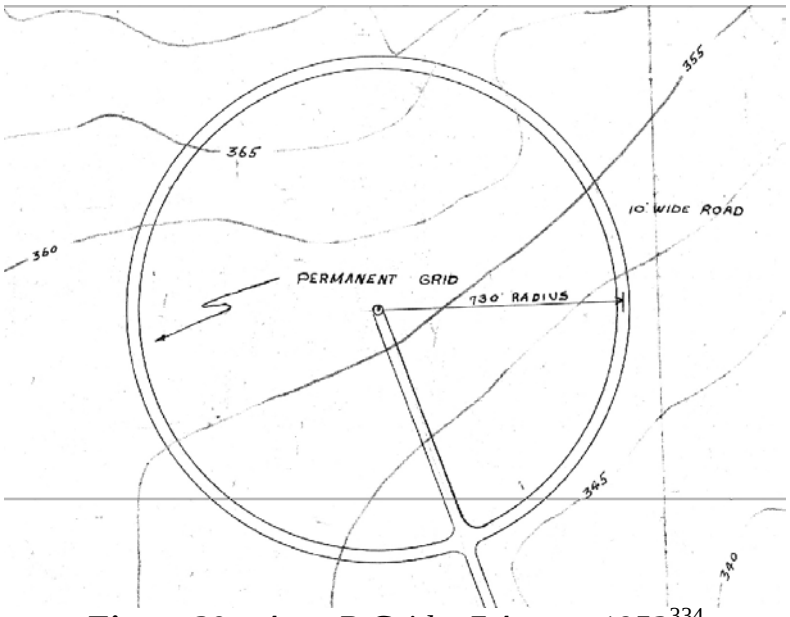


Figure 39 – *Area B Grid – 7 August 1952*[334]

A year later Building 1230, Dugout is depicted on the Area B plot plans as existing approximately 700 feet from the center along the same radial line as the 1952 one (see following figure).[335] It appears that the dugout provided personnel shelter during tests that occurred on the Area B Grid.

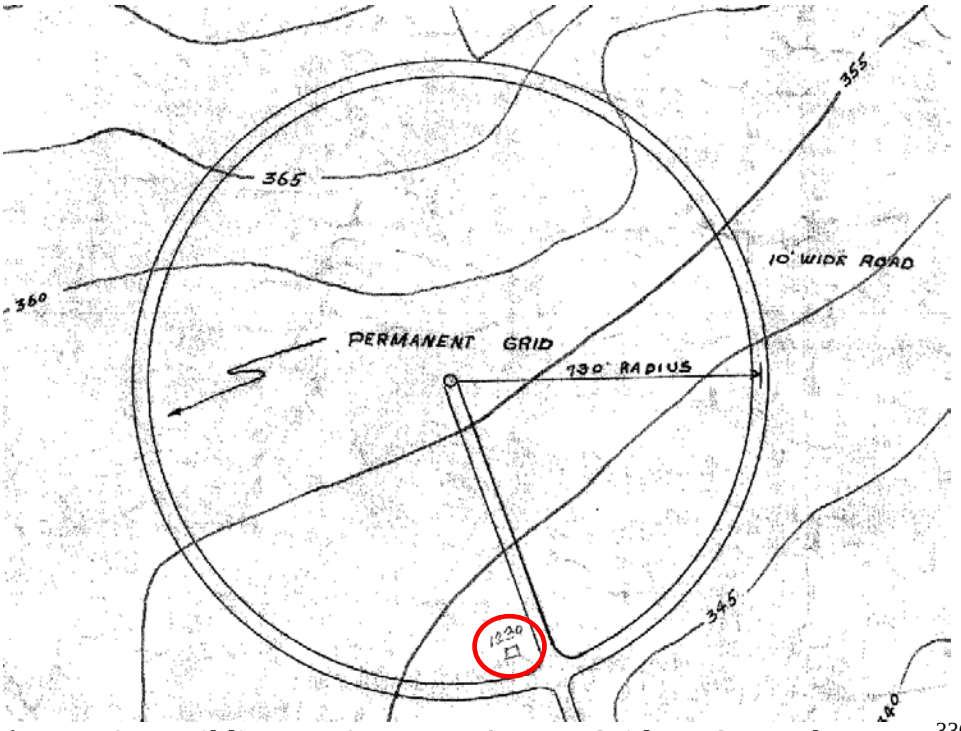


Figure 40 – *Building 1230 Dugout Area B Grid – 1 September 1953*[336]

6.8.9 Area B – Gun Emplacement, Building 1222

In 1951, Detrick designed two cylindrical test pits four-feet deep and 30 and 48 inches in diameter for an "Area B - 20 mm Range".[337] It appears these were for the gun emplacement established in a fenced in area including Building T-1222 by 1952 [338] and refers to electrical service at the 'Artillery Firing Range' implying the gun emplacement (see following figure) was used to fire munitions.

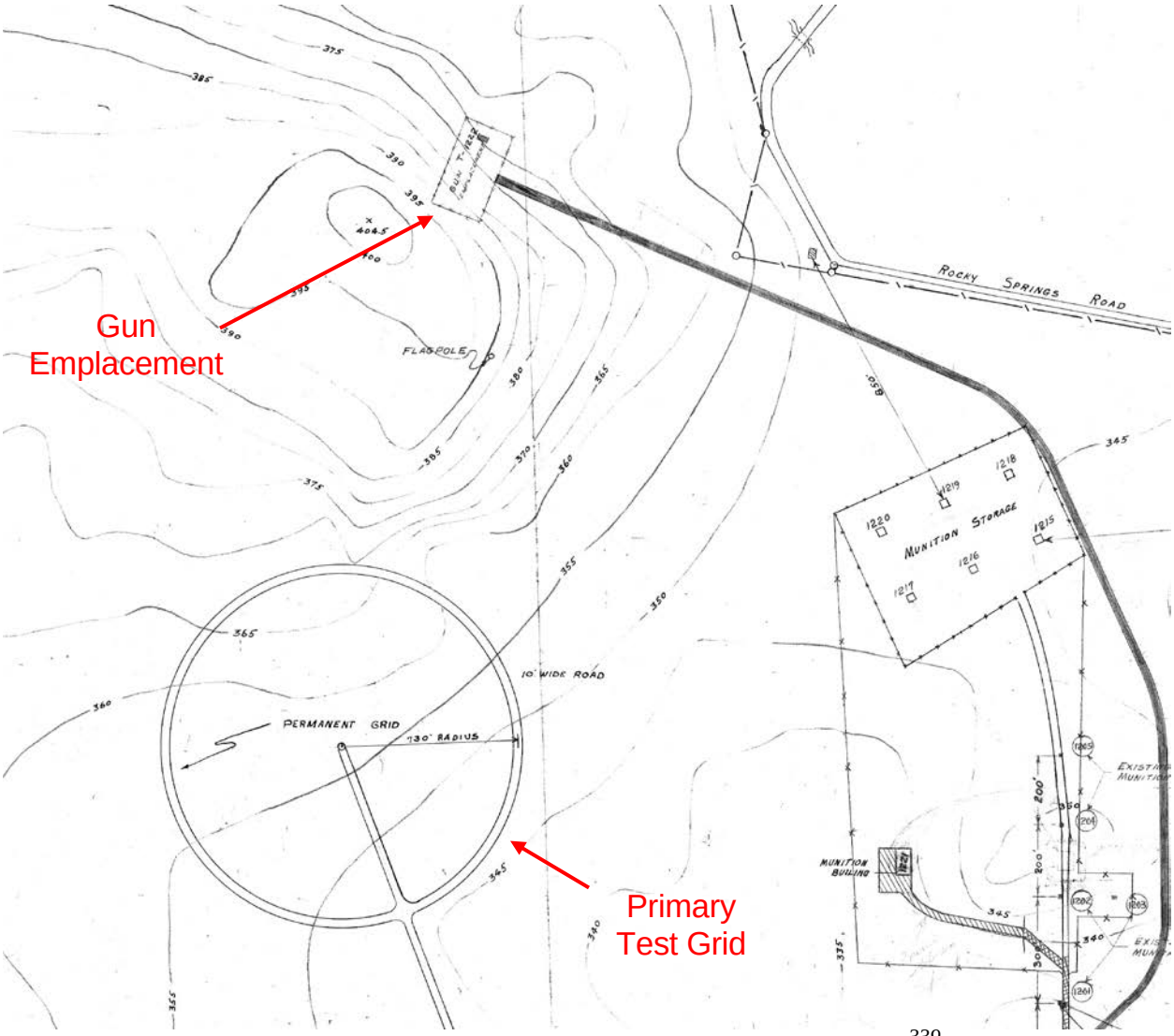


Figure 41 – *Gun Emplacement Test Facility – 1952*[339]

This is not a standard artillery firing range but rather a test facility set-up to achieve a specific result. Based upon map locations, the "interior ballistics" building is in the same location as the "gun emplacement", indicating multiple names for the same facility (see following figures).

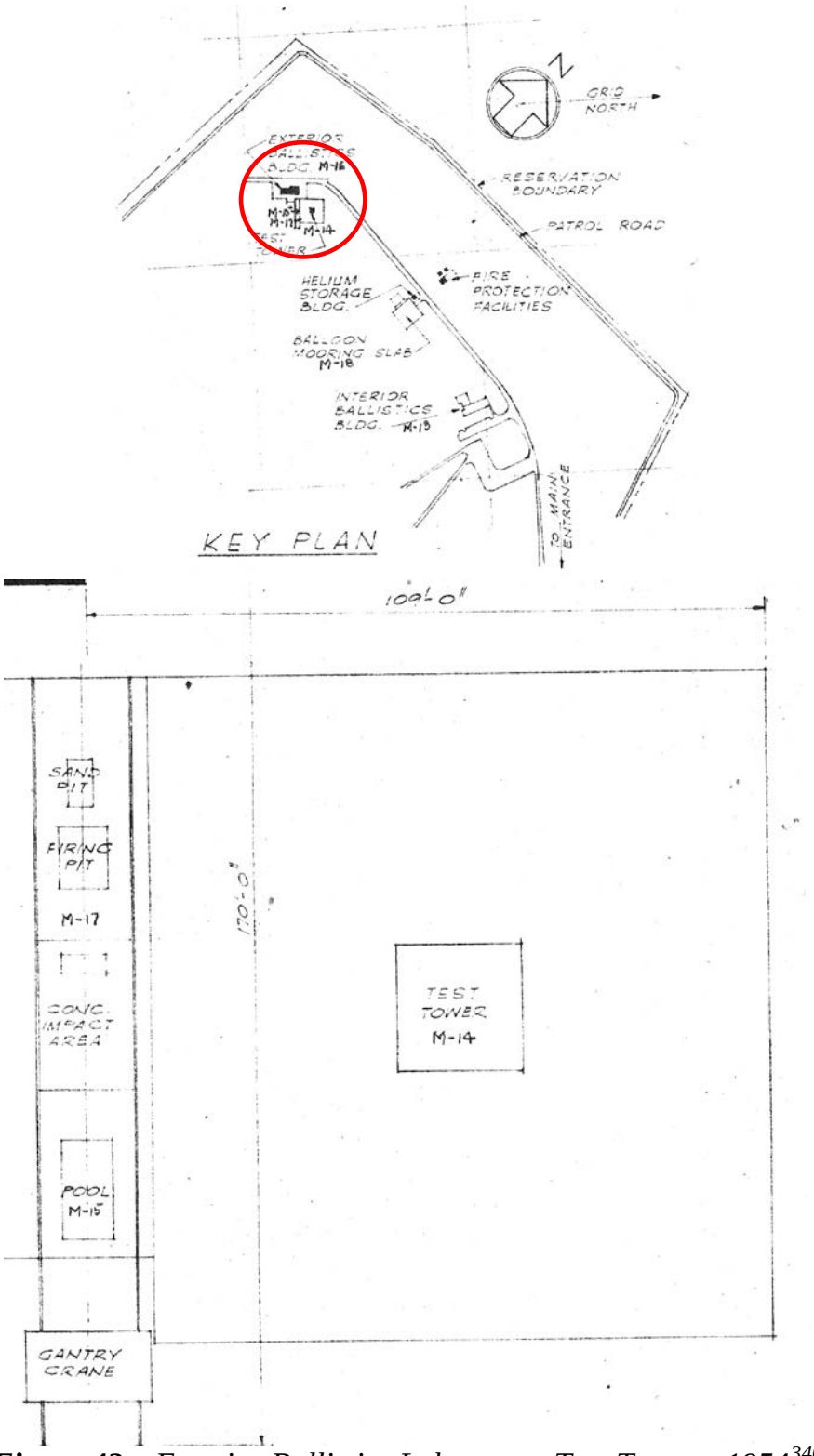


Figure 42 – *Exterior Ballistics Laboratory Test Tower - 1954*[340]

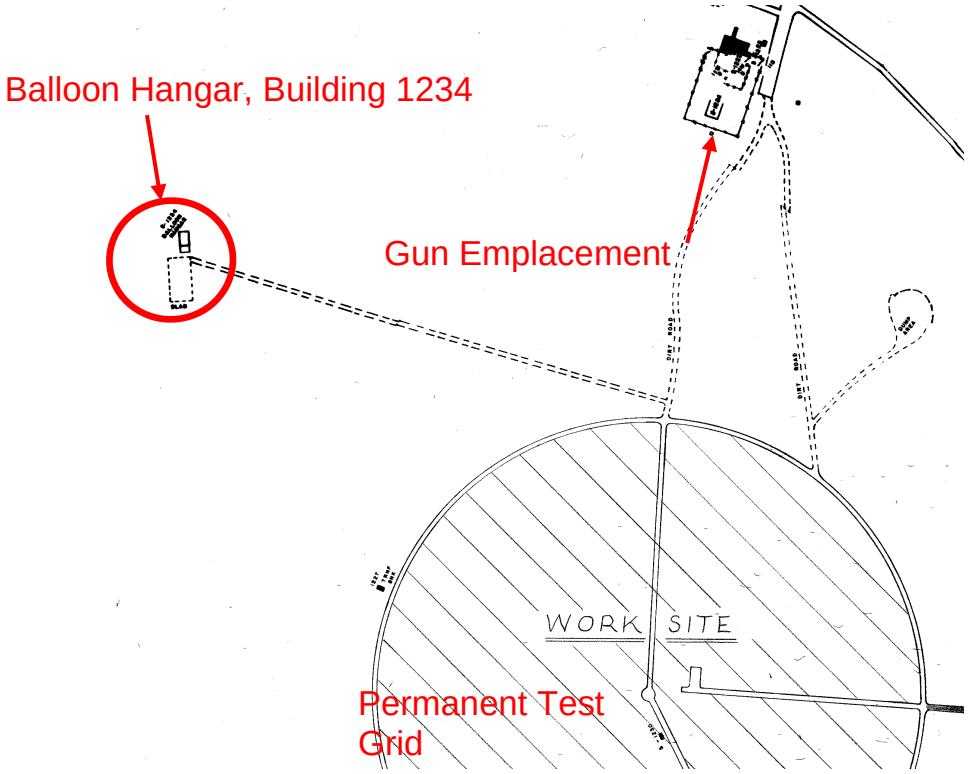


Figure 43 – *Gun Emplacement Area B – 1966* [341]

A comprehensive list of all the testing that occurred at this location is not possible but some of the tests are known. For example, test MD-1779 involved firing 4.5 inch bomblets from an air gun at various types of surfaces to determine the best construction material for the bomblet. The test involved firing the bomblets from the tower using an air gun, into several types of surfaces. There was a sand pit, a concrete impact area, a pool and a firing pit approximately 50 feet southwest of the tower.[342]

Test MD-1857[343] involved testing field disposal means for the E134 bomblet. This was part of the development of procedures for EOD personnel to follow in case the munition was encountered in other than a test environment.

In 1960, a series of tests involving the static firing of variously modified 5-inch HVAR rocket motors was conducted at the George Washington University facility (Building 1222) in the test grid area. George Washington University operated facilities at Fort Detrick (primarily in the B Area) as part of the contract they had with Fort Detrick. Specifics of their contract have not been uncovered but they are known to have conducted some ballistics tests as part of the weapons development program. These tested of motor modifications as part of the development of a vehicle for generating high speed line sources for planned tests. The ballistic flight tests were conducted on M field at Edgewood Arsenal.[344]

Use of the gun emplacement facilities appears to continue through the mid-1960s, as Post Memorandum 385-4, 16 December 1964 safety guidance defines Zone II, as a rectangle, extending "*…from the road to the east of Building 1222 to a point 150 yards west, and 150 yards south of the firing bays*" (see following figure).[345]

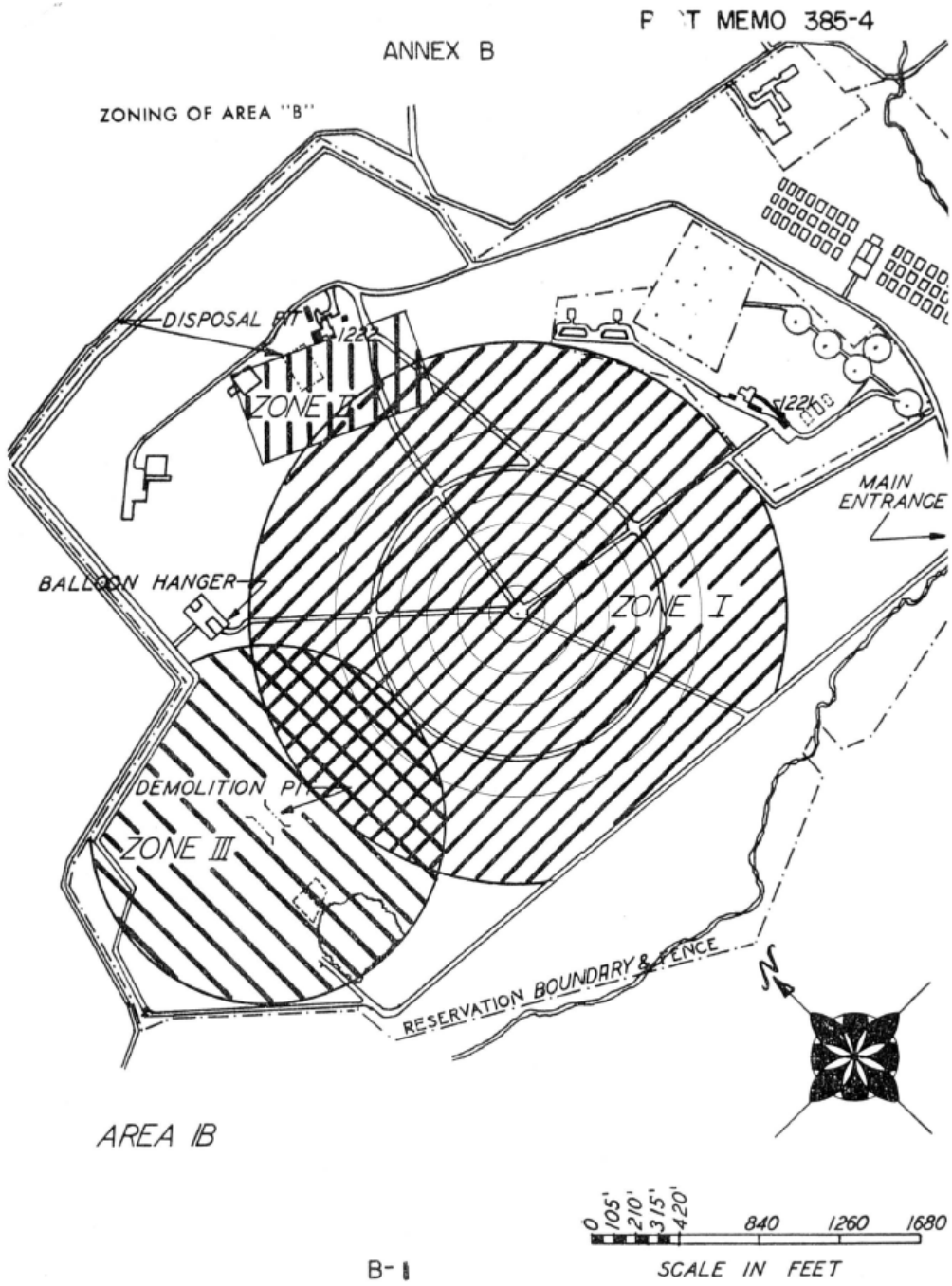


Figure 44 – *Area B Zones (Test Grid, Building 1222 and Demolition Pit) – 16 December 1964* [346]

6.8.10 Area B – Demolition Pit

In 1954 a demolition pit was constructed northeast of the original landfills in Area B.[347]. By 1955, Detrick used the demolition pit to destroy unserviceable items including M50A2 incendiary bombs, M4A2 smoke pots, and M5 smoke pots.[348] In 1957, explosive use in the area was reduced to less than three pounds of RDX or the equivalent and it also advised that consideration be given to abandoning any explosive over a few ounces and moving such trials to a location where it could be tolerated.[349]

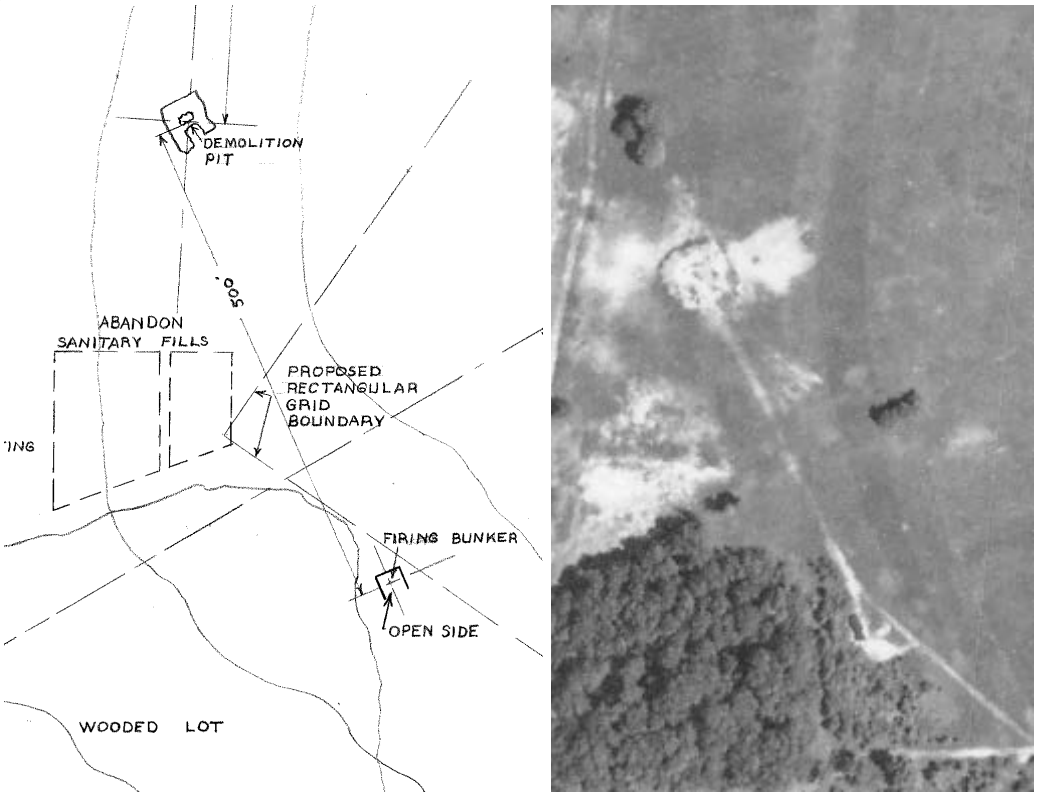


Figure 45 – *Demolition pit and firing point, 1954 map, 1958 Aerial Photograph* [350]

In 1958 the Chief Chemical Officer directed the on post disposal of M114 bombs left from previous testing.[351] The M114 (E48R2) BW Bomblet is a four-pound bomblet, 1 designed to contain 320 ml of liquid BW agent. The specific disposal procedures are not noted but the purpose of a demolition pit is to provide a location for the safe destruction of unserviceable or unneeded munition items.

Post Memorandum 385-4, 16 December 1964 indicates use of the demolition pit continued through the mid-1960s, as it regulates the use of Area B, including Zone III, the demolition pit, a 300 yard radius circle with its center at the pit.[352]

By 1966, site plans delineate and label two buildings, 1235 and 1236 at the firing bunker for the demolition pit. A 1975 building schedule identifies both T-1235 – Inclined Testing Shed and T-1236 – Test Chamber, as temporary buildings.[353]

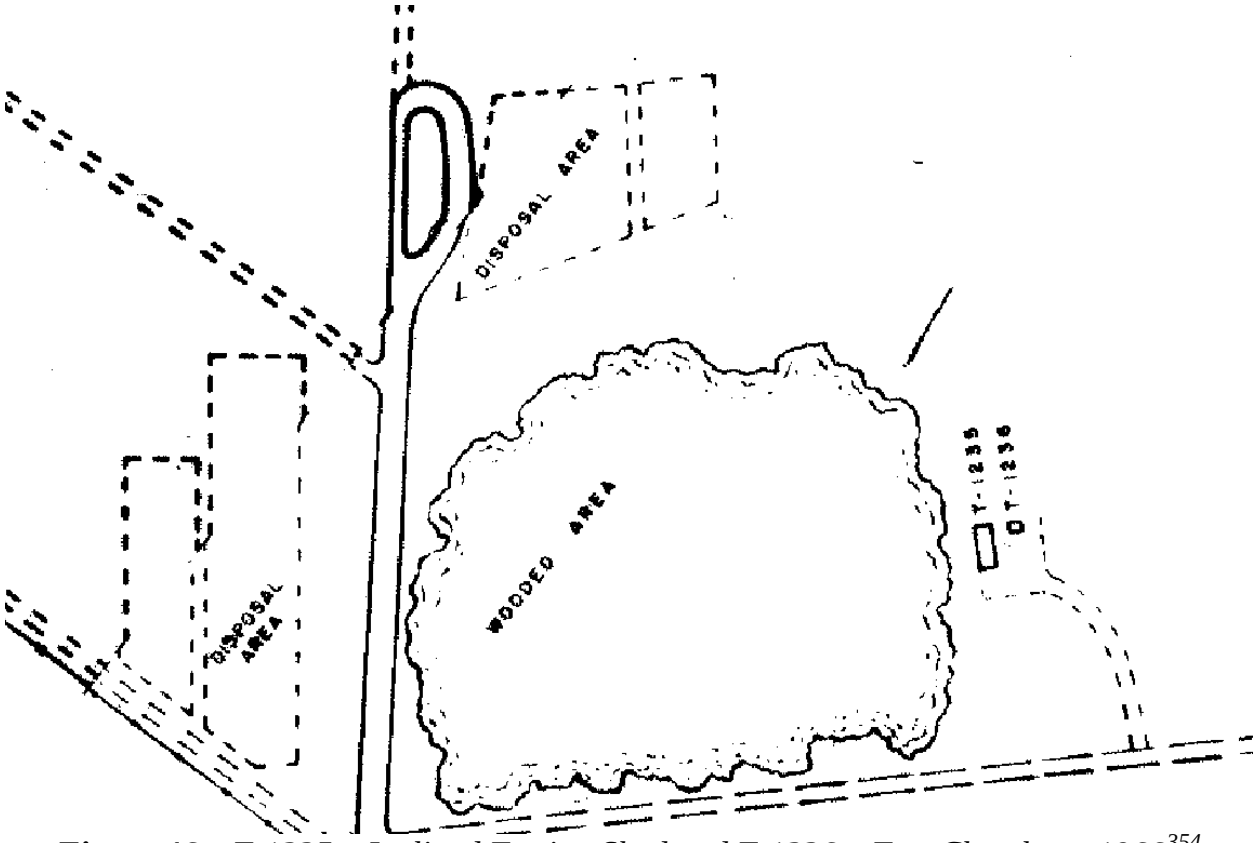


Figure 46 – *T-1235 – Inclined Testing Shed and T-1236 – Test Chamber - 1966*[354]

By 1968, site mowing plans designate the Demolition Area as a 200-foot radius that does not get mowed. The outlines for the structures at the firing bunker (T-1235 and T-1236) remain delineated but are no longer labeled with a building number. Based on aerial imagery the devegetated area is maintained through 1970 but by 1979 no longer appears to be actively maintained (see following figures).[355]

Figure 47 – *Demolition pit, 1970 and 1979 Aerial Photographs*[356]

6.8.11 Monocacy Valley Simulant Tests

In 1951 and 1953, Detrick conducted tests with simulants in Frederick County outside the immediate installation borders. It is included here due to the proximity to the post.[xii] Three field trials using aircraft to spray the simulant SM were conducted in June 1951, to determine if aerial spraying of a liquid BW agent from low altitudes could produce ground contamination.[357] The first two small-scale trials were conducted on Detrick's Area B – Permanent Circular Test Grid. The third test was conducted on a non-specified location in the Monocacy Valley, Frederick County, MD, to allow for a longer flight line and larger sampling grid. That trial involved a C-47 aircraft flying at an altitude of approximately 100 feet along a 2.5 mile long release line spraying SM. Sampling stations were established in between 0.5 miles and 15.75 miles downwind of the release line. Meteorological observations of wind speed and direction were taken from Area B, indicating the test occurred within proximity of Detrick.[358]

On 29 July 1953, another set of dissemination tests were conducted along a dissemination line about 13 miles south of Detrick along the levee road on the north side of the Potomac River. The test used zinc cadmium sulfide (florescent particles or FP), mixed with lycopodium spores (a flash powder) to reduce the bulk density, in a 38 pounds of lycopodium to 50 pounds of FP proportion, as a simulant for dry biological agent. The amount used is unclear but appears to be less than 50 pounds for this single test. The material was disseminated from a Navy Airborne Dry Dissemination unit attached below the wing of a plane flying between the town of Frederick and the Potomac River extending about eight miles along what is now Ballenger Creek Pike/Doubs Road/Pleasant View Road (highway 351) – Line A; New Design Road – Line B; Buckeystowne Pike (highway 85) – Line C(see following figure).[359]

[xii] It is outside the scope of this report to provide a comprehensive list of U.S. BW Field Testing that occurred outside of Fort Detrick. The February 1977 report: U.S. Army Activities in the U.S. Biological Warfare Programs, 1942-1977 includes such listings for testing that occurred on Fort Detrick as well as other locations such as the Army's Dugway Proving Ground. However, the 1951 and 1953 Monocacy Valley tests were not included in the 1977 report.

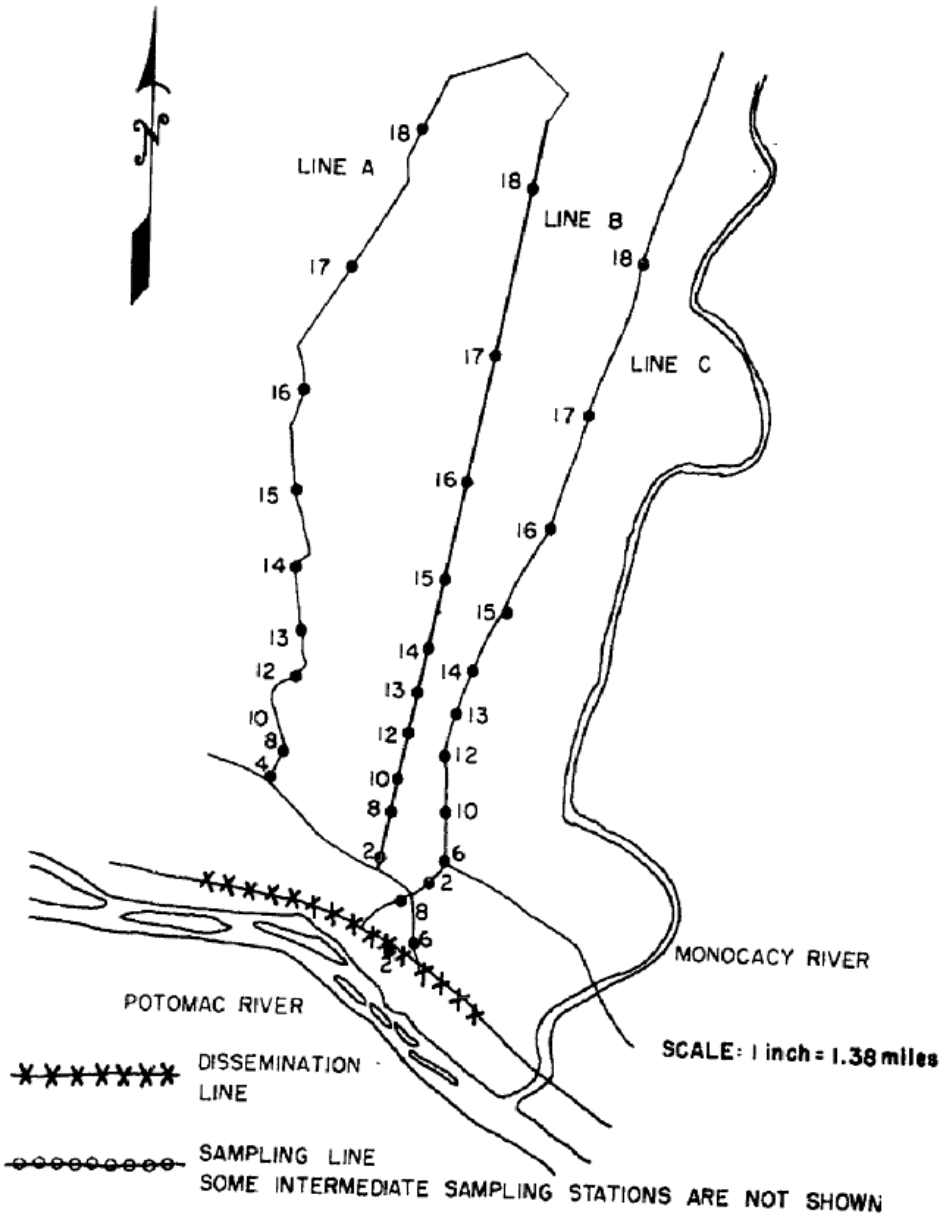


Figure 48 – *Frederick County Florescent Particles Dissemination Trial – 29 July 1953*[360]

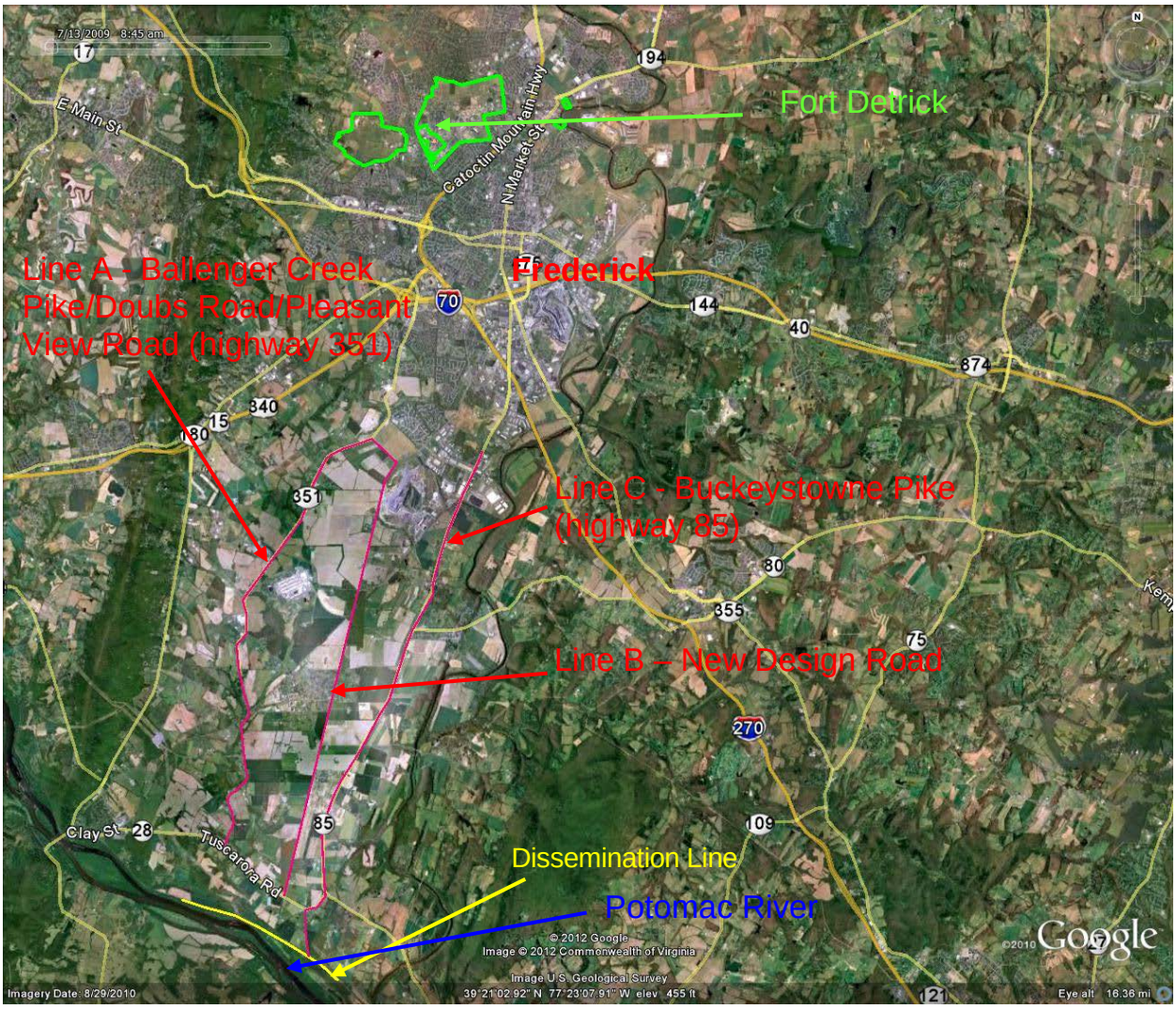


Figure 49 – *July 1953 Florescent Particles Dissemination and Sampling Lines – Aerial Imagery 2010*

6.8.12 Conventional and BW Munitions Technical Data

Based on maps and archival documentation, the ASR investigation identified the following conventional ordnance items associated with Fort Detrick. In addition to small arms used on the small arms ranges, some conventional ammunition was used in conjunction with the development and testing of the BW munitions.[361] These items used included:

Cartridge, Caliber .22, Ball

- Shell, Shotgun, 12 Gauge
- Bomb, Incendiary, 4-LB, AN-M50 Series, AN-M50X Series, AN-M50T Series, and AN-M50TX Series
- Pot, Smoke, HC, M1
- Pot, Smoke, HC, M4A2

- Pot, Smoke, HC, M5
- Cord, Detonating and Fuse, Blasting, Time M700
- Grenade, Hand, Smoke (HC), AN-M8
- Grenade, Hand, Colored Smoke, M18

In addition, unspecified pyrotechnics, signals and smoke grenades; Prima Cord; Squibs; detonators and various types of explosives may have been used on tests or destroyed at the demolition pit.[362]

Fort Detrick also tested BW specific munitions including the E61R4, E120R1, E120R2, E134 and 4-Pound, M 114 BW Agent bomblets. Testing of munitions filled with pathogenic agents was restricted to enclosed test chambers where both the effects of the disease and agent dispersal from small munitions could be tested. The engineering and safety sections made extensive decontamination efforts to ensure no hazardous biological agents escaped into the environment. Decontamination methods included the use of chemical decontaminants, steam sterilizers and incinerators with reoccurring tests to ensure the processes were effective. Outdoor testing at Detrick was limited to simulants and crop agents. Depending on the goals of a test it could be as simple as water or as complicated as a non-pathogenic biological agent specifically developed to mimic the characteristics of a particular pathogenic agent (e.g. SM and BG). Munitions tested for use with biological agents were generally test items manufactured in limited numbers for a specific test.

7 OTHER FACILITY OPERATIONS WITH POTENTIAL ENVIRONMENTAL RELEASES

7.1 GENERAL

In addition to the facilities and buildings associated with the BW RDT&E activities discussed in Section 6, other operations and facilities on post are typical of military installations and, as with other industrial operations, it is possible hazardous materials were used and potentially released to the environment.

There is limited site-specific information to determine the materials potentially used. Common operations of typical military installations, and information contained in standard Army Technical Manuals (TMs), Technical Orders (TOs), and Field Manuals (FMs) can be used to supplement the Detrick-specific information. In support of the DERP, USACE conducted studies of historic operations performed at military installations to support decisions regarding the potential releases to the environment as a result of those past operations. USACE's Common Installation and Common Support Service Operation studies provide subject matter expert advice associating common specific operations with the potential for releases to the environment. Using lessons learned from sites with similar operations, DERP remediation managers use these reports to help determine where to look for potential releases on their installations. Fort Detrick's IRP has used information from these reports to help identify and conduct investigations into potential areas of concern. When necessary, response actions have been conducted in those identified areas where actual releases were found.

7.2 OPERATIONS WITH TCE AND PCE

7.2.1 Background

Sampling and monitoring operations associated with the Fort Detrick IRP Phase II Remedial Investigation, along with subsequent geophysical and soil-gas surveys, identified the chemicals Trichloroethylene (TCE) and perchloroethylene (PCE) in groundwater beneath Area B. Detrick also discovered TCE in the groundwater well near Building 568 in Area A.[363] Based on these finds, identifying the sources and uses of the chemicals PCE and TCE on Camp and Fort Detrick are of particular interest.

TCE is a chlorinated hydrocarbon with the formula C_2HCl_3. TCE is most commonly used as an industrial solvent in the degreasing of metal parts, to extract greases, oils, fats, waxes, and tars. However, it also has been used as a refrigerant in very low temperature applications, R-1120. TCE also is used in consumer products such as paint removers/strippers, adhesives, spot removers, and rug-cleaning fluids. In the past, TCE was used as a general anesthetic;[364] however no evidence was found of TCE being used for this purpose on Detrick (see section 7.7.4 Medical Activities). At Detrick, TCE was used primarily as a refrigerant and parts cleaner.

PCE is tetrachloroethylene, tetrachloroethene, or perchloroethylene. It is a chlorocarbon with the formula $Cl_2C_2Cl_2$. PCE is typically used as a dry cleaning fluid; however, it is also used for degreasing and metal cleaning operations; in aerosol formulations; as a carrier for rubber coatings, solvent soaps, adhesives, sealants, and in various consumer products.[365] Use of PCE at Detrick as a degreaser was not positively confirmed by historical documentation.

The ASR investigation did not locate any records regarding amounts of either TCE or PCE acquired, shipped or stored for use on Detrick, as installation supply and ordering records are not required to be archived or retained for long periods of time.

7.2.2 TCE

One of the main uses of TCE on Fort Detrick was in refrigeration systems. Refrigeration systems on Fort Detrick served a wide variety of purposes associated with analysis and manufacturing of BW agents. The main two activities were the freeze-drying process for producing dry BW agents, and as a brine or secondary refrigerant associated with test chambers where extremely low or a wide spectrum of temperatures were required over a period of time. These TCE-based refrigeration systems were known to have been located in Buildings 376, 470, 568, and 1412. This investigation did not confirm the use of TCE refrigeration systems at other building on Detrick.

Initially during the WWII period, refrigeration units at Detrick used ammonia as a refrigerant and later moved to Freon refrigerant.[366] While Freon-based refrigeration systems remained the norm, by 1953, Detrick began using TCE as a brine or secondary refrigerant in very low temperature brine (i.e. below -40^{o} F) systems associated with aerosol or test tanks. The term "brine" when applied to refrigerants indicates its use as a secondary refrigerant. TCE brine transfers heat from the test chamber in 'hot' areas through a closed system to a separate "clean" room housing the mechanical refrigeration systems like the heat exchanger, compressor, condenser and cooler, which is located elsewhere. The first confirmed use of the a TCE brine system at Detrick was for Test Tanks Nos. 95, 96 and 97, the three test chambers in Building 568 (see section 6.3.6). The volume of TCE in the piping, condenser, cooler or storage tank is undetermined but the BT (Brine TCE) pipe lines are readily depicted on available refrigeration flow diagrams. Although a "Refrig. Unit" is shown in the Utility Room in the basement at the southeast end of Building 568 next to the Test Chamber room which housed the three test tanks, the detailed layout of the system shows that it was located in the Test Chamber Service Room to the southwest. An ethylene glycol brine system was also in use.[367]

In 1955, Detrick reported on a recommended design of BW RDT&E facilities and included notations regarding three types of refrigerant: ethylene glycol, Freon and TCE.[368]

In 1959, Detrick completed construction of the Special Operations Biological Laboratory, Building 1412 (see section 6.3.8), which included another TCE brine cooling system. The TCE brine system cooled two aerosol exposure tanks with a 1,500 cubic feet capacity. The TCE brine circulated in a jacket surrounding the tanks to keep the interior temperatures constant within 1^{o} F. The TCE pumping temperatures were designed to vary between -55 to 260^{o} F at up to 90 gallons per minute. The total volume contained within the TCE brine system is undetermined but the storage tank was not to have less than a 57-cubic-foot capacity (i.e. 426 gallons), so it would be at least that. Mechanical equipment rooms were located in the basement of Building 1412, which also included a nine by nine foot Solvent Storage Closet. Other elements in Building 1412 appear to have used Freon 12 as a refrigerant and propylene glycol in some of the heating systems.[369]

The Aerobiology Building 376 completed in 1953 included four Reynier-type aerosol chambers with refrigerated brine solution flowing in the jacket surrounding the chambers allowing for temperature control between 35° F and 150° F in three of the chambers and between -60° F and 120° F in the fourth chamber. Although the specific type of brines in Building 376 was not stated, it appears based on 1969 safety regulations citing Building 376 for its TCE use, that at least the fourth chamber used a TCE brine to reach the required temperatures.[370]

There is no clear evidence of TCE brine use in other test tanks or chambers at Detrick. The One Million Liter Test Sphere used a Freon based refrigerant system according to a review of the systems and utilities associated with Building 527.[371] There was no refrigeration system identified with the test tank/firing chambers in Building 263.[372] The Plant Pathogen Laboratory, Building 374, had a small compressor system supplying chilled brine to remote dew chambers but the type of brine was not determined nor was Building 374 specifically cited in the 1969 safety regulations related to TCE.[373]

In addition to secondary refrigeration use, TCE also was used at Detrick in freeze drying applications. In 1952, Detrick needed a freeze drying system capable of drying large batches of pathogenic organisms for use in conjunction with the pilot plant and designing still larger systems. In 1953, Detrick compared four types of freeze drying equipment: the commercial Stokes drier, a University of Wisconsin spray drier (conducted at Wisconsin), the National Research Corporation (NRC) freeze drier, and the Fort Detrick freeze drier. The Stokes drier used a TCE tank and heat exchanger as part of a two stage refrigeration process. The NRC system used a Varsol (a commercial solvent) tank at -60^{o} F as the freeze unit. It is undetermined what refrigerant was used in the Detrick system for the comparison test. Between April 1958 and January 1960, Detrick developed operating procedures and techniques for freeze drying pathogenic agents using a modified NRC system using TCE brine. The Pilot Plants Division installed three refrigeration units in Building 470 (see section 6.4.8) with TCE brine cooled at -40° to -45°C in one unit and TCE brine cooled to -64°C in the other two. There were also TCE heaters (both steam and electric) to warm TCE flowing through the drying chamber to

provide the heat necessary to sublime the water from the frozen product. The volume of TCE in these freeze drying systems and associated pumps, heaters, surge tanks and a separate supply tank for charging the system in Building 470 is undetermined.[374]

In 1963, a Detrick safety bulletin noted TCE was being used in refrigeration systems and as a degreasing solvent and reported an incident where:

> " *A Fort Detrick engineer investigating a leak in a refrigeration system was exposed to large quantities of trichloroethylene causing him to become ill. Considerable attention is currently being given to the use of substitutes for trichloroethylene on the post.*"[375]

The specific location of the accident was not noted but the bulletin implies there was more than one active TCE refrigeration system on Fort Detrick at the time. Concerns about TCE leaks is not noted in the 1963 or available earlier safety regulations at Detrick,[376] however it appears this accident lead to later revisions.

By 1969, Detrick safety regulations required canister gas masks for emergency protection in atmospheres immediately dangerous to life with the masks being stored and maintained in an approved manner, specifically citing:

> "*Masks with canisters suitable for use in a trichloroethylene atmosphere will be kept in suitable areas of Buildings 1412, 568, 376, and any other area using large amounts of trichloroethylene*."[377]

Mention of these three specific buildings appears related to the TCE brine refrigeration use associated with the test chambers housed in them.

Detrick also used TCE as a degreaser to clean and prepare surfaces prior to bonding the surfaces together with adhesives. One particular application was in preparing biological safety cabinets. Any foreign matter between the sealant and a bonding surface would cause poor adhesion; requiring removal of cured sealant from previously applied joints. TCE was the chlorinated hydrocarbon cited as being used successfully in cleaning those surfaces before sealant application. Use of TCE o remove grease and dust prior to being sealing continued through at least the late 1960s in cleaning surfaces t.[378] Documentation citing other specific cleaning or degreasing uses on post was not located.

TCE also was used in one test series as the medium to de-aggregate biological aerosol particles into individual cells for improved sensitivity of detection instruments. The results were "*discouraging*" making likely this TCE use was limited.[379]

In September 1987, TCE above the EPA Maximum Contaminant Level (MCL) for drinking water was discovered in a Detrick groundwater well in Area A near Building 568. The well water was used for supplying a laboratory with water for aquatic

organisms.[380] Investigations conducted at Detrick from 1988 through 1993 (IRP FTD 66) identified the courtyard between Buildings 567, 568 and 571 where TCE was used for refrigerant in the laboratory, was reportedly stored in drums that possibly leaked as the source of the detections.[381] A 1995 investigation also found TCE in wells around the Building 190 boiler plant. This TCE detection appears to be related to the Building 568 source area as the natural flow of groundwater in this area is from east to west between the buildings.[382] Hydraulic containment of the Building 568 TCE groundwater plume was the remedy selected to address this contamination according to decision documents signed in 2001. [383] The Building 568 TCE plume is no longer migrating off post at concentrations above MCLs. Restoration sites being addressed under the Army's CERCLA IRP in both Area A and Area C are all at "Remedy in Place" or "Response Complete" and Long Term Monitoring is in place for the Building 568 plum.[384]

In 1992, TCE contamination above MCLs was detected in off-post residential wells. Wastes buried in Area B-11, which reportedly includes eight 55-gallon drums of TCE were reportedly buried there in 1968, are believed to be a primary source of TCE contamination in Area B groundwater and surface water. Phase I and Phase II Remedial Investigations conducted between 1994 and 2004 in Areas B and C identified a TCE plume in the vicinity of Area B-11 (former disposal pits). An interim removal action was begun in 2001 at Area B-11 to address the TCE groundwater plume. During the removal viable biological material was discovered comingled with hazardous waste. Due to cost and safety concerns subsequent intrusive activities were limited. Capping the area to prevent further leaching to groundwater along with Land Use Controls at the area to avoid future exposure (IRP FTD 49 LTM) were selected as the remedial actions to address this area in decision documents signed in 2007 and 2009.[385]

7.2.3 PCE

Records show PCE was first used at Detrick during WWII when investigators tested it as a solvent for decontaminating clothing exposed to *Bacillus anthracis* (anthrax). PCE was used with CC-2 (impregnite) at a 1:15 by weight ratio. The test showed wool and cotton clothing could be effectively decontaminated of Bacillus anthracis with CC2 in tetrachloroethane (PCE).[386]

In a post war test involving the recoverability of known numbers of organisms from stopcock greases, PCE along with acetone was found to kill all the organisms of the BW simulant SM.[387] It is not known how common Detrick's use of PCE as a decontaminant degreaser was but it is not cited heavily in available documentation.

The CWS recognized PCE as one of the chlorinated solvents useful as a solvent for DDT in sprays and aerosols and "*is preferred because of its low toxicity and noninflammability*."[388] While Detrick's BW mission did not include the testing and development of DDT, they did use DDT as part of the ongoing pest control activities on base (see section 7.5).

In 1992 PCE above MCLs was detected during environmental investigations of the groundwater from wells surrounding Area B. The highest PCE concentrations found in subsequent investigation were in a well located just east of the B-11 Trench indicating B-11 represents the primary source of PCE contamination.[389] In 2001 an interim removal action detected PCE in soil samples from the excavation floor; however, discovery of live pathogens in medical wastes at Area B-11 caused a temporary suspension of all intrusive work until additional safety measures and testing procedures were in place. The interim removal action was completed in 2004 and subsequent IRP action shifted to long term monitoring (IRP FTD 49 LTM).[390]

7.3 TRAINING RANGES (CONVENTIONAL MUNITIONS)

Three small arms ranges, historically used for the primary function of providing training facilities for assigned military personnel have been identified on Fort Detrick. Two are indoor small arms ranges limited to .22 caliber ammunition (i.e. Building T-812 and Flair Armory). The third is a skeet range located in Area B. This range would have been restricted to the firing of shotgun ammunition bird shot (no. 7 ½ shot or smaller).

The first identified rifle range on Camp Detrick was an indoor range in Building T-812. This type of indoor range was normally restricted to .22 caliber weapons. The size restriction for ammunition at indoor ranges is due to the difficulty in constructing a backstop for high power military ammunition. It is unclear if the T-812 range was ever established and there are no details about its use. The key to building numbers in August 1945 indicates T-812 served as an Enlisted Men's Mess Hall and in 1953 as the Camp Detrick Field Office of the Washington District Engineer.[391]

The Flair Armory range is first seen on 1958 drawings which include construction of a bullet stop for an indoor small arms range inside the armory.[392] The range had five firing points and was restricted to .22 caliber rim fire ammunition.[393] The Competitive Marksmanship Program would have used one of these indoor ranges and would have also been restricted to .22 caliber weapons (rifle and pistol).[394]

By the 1975, a skeet range appears in Area B[395]. Common military practice is to use skeet ranges for training personnel in use of shotguns, as well as for recreational use by installation personnel. Ammunition on this range would be limited to shotgun ammunition firing No. 7 ½ shot and smaller.

Detrick deactivated the Skeet Range in 1999 and subsequently conducted environmental investigations of the area. Analytical results for surface and subsurface soil samples collected at the range showed elevated concentrations of lead. In 2001, the ground surface of the skeet range was scraped to remove the majority of the lead shot and clay pigeon contamination. Soils exceeding action levels for lead were removed as hazardous waste and the remaining soils were used as daily cover material at the Fort Detrick

Municipal Landfill. In 2005, surface soil confirmation samples indicated that an area close to the shooting stations contained significant quantities of clay pigeon debris and elevated polycyclic aromatic hydrocarbons (PAHs). Additional clean-up of that debris was completed in August 2005 (IRP FTD 29, NFA).[396]

7.4 AMMUNITION STORAGE

Initially, in 1943, ammunition related storage on Camp Detrick consisted of one munitions storage building (T-17) and three black powder storage buildings: T-45, 46, and 47.[397] By October 1944, other buildings occupied this area creating a need for a more remote storage area. These original structures were removed, and so not given "new" numbers when other buildings were renumbered in 1945.

Additional space for munition storage, away from the main research area, became available in January 1944, with the acquisition of the non-contiguous Area B/Test Grid Area.[398] In 1944, Camp Detrick constructed five ammunition magazines in the newly acquired Area B and established the magazine contents as:[399]

Orig. #	New #	Storage
G1	1201	HE loaded fuzes up to 250 lbs
G2	1202	Tetryl, up to 300 lbs
G3	1203	Smokeless Powder, up to 100 lbs
G4	1204	Pentolite, up to 700 lbs
G5	1205	Pentolite, up to 700 lbs

In 1950 the post requested and received permission to move the five ammunition magazines and one toxic gas storage building to a new location in Area B to make room for new construction,[400] Including an ammunition loading Building 1221.[401] This building was used for preparing small test munitions and the mixing and melting of explosives for casting in specific shapes as required.[402] In 1955, as part of the mission to develop small BW munitions, Detrick requested permission to build a mix-melt laboratory in Building 1221 to design small custom explosive charges for testing in proposed BW weapons with an estimated need for 3,000 items for the next year.[403]

On a 1950 map, the new Storage Magazine 1217 was described as "toxic gas storage." This building was used to store non-weaponized chemical warfare agents (see Section 5.5 for further discussion on CW agent usage on Fort Detrick). Only laboratory quantities were ever used on Fort Detrick and this building would have held the small quantities of agents in support of those operations. By 1956 this magazine was used to store fuzes and other munition components.[404]

A 1956 inspection of the Explosive Storage Area[405] indicated that the following munitions items were stored as indicated:

Building 1201	Pyrotechnics and Signals
Building 1202	Detonators
Building 1203	Smoke Grenades
Building 1204	Squibs, quick match
Building 1205	Small Arms ammunition, blank powder
Building 1211	Black Powder
Building 1212	Black Powder
Building 1213	Black Powder (not listed on inspection)
Building 1215	Smokeless Powder
Building 1216	RDX, HMX, PETN
Building 1217	Fuzes and Components
Building 1218	Prima Cord, Bursters, Tetryl
Building 1219	Tetryl, Pentalite
Building 1220	Comp C3, Tetryl, PETN

Three tents are used to store inert munitions hardware.

Site plans from the 1960s show security fencing around the ammunition storage area in the mid-1960s implying continued use. [406] However, the magazines buildings were all removed in 1971, except for Building 1215, which was repurposed.[407]

7.5 PEST CONTROL ACTIVITIES

Maintaining Detrick in a condition to support the mission was the responsibility of the Post Engineer. This included pest control activities (e.g. insecticides and rodenticides). Because of its mission, Detrick had a pest control situation that was more crucial than normal installations:

> "*Insect and rodent control in the restricted technical areas at Camp Detrick is a particularly sensitive problem because of the presence and hazard of BW agents there, because of proximity of surrounding installation support facilities and housing and because of Camp Detrick's location immediately between the northwest limits of the City of Frederick and the neighboring rural residential area and farms. The usual consideration of property damage and loss, while important, are secondary to the BW hazard which is two- fold. Vermin gaining entrance to laboratories, animal buildings, and such facilities can destroy laboratory control by bringing in contamination. Conversely, if permitted to go out again alive, in their natural migrations they could carry whatever BW agent they had been in contact with to non-immunized post personnel and to the public*."[408]

During WWII, there was also the security concern that even if a few cases of diseases transmitted by rodents escaped out into the community it would be damaging to the secrecy under which the work was conducted. For these reasons, Detrick maintained

rigid control over both insect and rodent pests and attempted to enlist the help of the U.S. Public Health Service in eliminating off-reservation sources of infestation.[409]

Although Detrick's need for pest control was more imperative than other military installations, there is no indication they used or developed exotic pesticides, but rather depended on the use of those pesticides developed by other groups elsewhere.[410]

Although specific details concerning the pest control at Detrick are sporadic in the available records there are examples that provide the scope of the pest management activities. The earliest confirmed insecticides used at Detrick involved a May 1944 request for expedited delivery of 100 pounds of pure concentrate DDT powder larvicide that had to be deducted from limited war quantities. An August 1944 emergency request for 100 pounds of DDT to avoid a fly infestation may represent an additional request or be further correspondence on the May request.[411] The specific locations of use of the DDT are undetermined.

From 1 July to 31 Dec 1946, Camp Detrick spent $2,750 on Insect and Rodent Control for 447,442 sq feet of buildings and streets and 513 acres of grounds. In May 1946, Detrick had a "Sanitary Operator" who was responsible for vermin control within restricted buildings. A decade later, from July 1955- January 1956, Detrick used 133 man days to place residual sprays on 263,000 square feet; two man days to spray 5,000 cubic feet of space; 14 man days on applying hydraulic sprays to 35 acres; 110 man days on rodent control and less than a day on mosquito control on two acres.[412]

Detrick's rodent control needs were acute at the animal farm area where animal feed attracted rodents. In November 1946, the Safety Division identified a rodent control problem in the vicinity of Building T-516 and 517 (laboratory and adjacent animal paddock). In cooperation with the Post Engineers, a rodent control program was instituted which resulted in 31 rats being trapped during the month of November.[413] Controlling rodents would be an ongoing effort and in 1948, Detrick initiated the use of Sodium monofluoroacetate, brand name "1080", for use in the Restricted Area, a practice that would continue through at least 1956:

> *Sodium monofluoroacetate (1080) is used as a water bait which the rodents accept readily, because of this, and because 1080 acts so rapidly that the animal cannot go far after having taken the bait, 1080 has proven the most satisfactory rodenticide used to date in the restricted area*."[414]

Although the Army recognized sodium monofluoroacetate as standard rodenticide, its use required special approval and was to be handled only by trained personnel due to its toxicity. Detrick tried using another less toxic rodenticide warfarin (an anticoagulant) but it proved less effective for the needs of the Restricted Area and animal farm but acceptable for buildings on the remainder of the post. The Post also used cyanide dust in

rodent burrows on occasion. All these materials and methods followed standard practices of the period.[415]

A comprehensive list of pesticides used on Fort Detrick has not been found however a couple monthly reports of Insect and Rodent Control Activities (DA Form 5-123) from 1955 and 1956 lists the Federal Stock Numbers (FSN) of pesticides and amounts used per month and cumulatively for the fiscal year which started in July 1955 (see following table).[416] Not all the FSNs could be cross referenced to a specific material, but given there is a FSN clearly indicates the material was a standard item in use at the time. Later this report form was replaced by the Pest Management Report, DD 1532, which has been revised over the years and remains the current form.[417]

Federal Stock Number	**Amount Used July 1955 – January 1956**	**Material**[418]
6840-242-4210	14 gallons	
6840-240-2539	61 pounds	
6840-242-4213	55 pounds	Lindane in 5 gallon Can
6840-227-1840	193 pounds	Lindane Powder, 20 lb Drum
6840-240-2538	297 gallons	
6840-281-2773	0.5 pounds	Calcium cyanide powder
6840-246-6439	9 pounds	
6840-246-6437	21 ounces	sodium monofluoroacetate (8 oz carton)
6840-254-8770	11 oz	DDT-Allethrin Aerosol Spray
VKL & motor oil	11 gallons	2,4-dichlorophenoxyacetic acid (2,4-D), liquid, a herbicide
Not applicable	2 pounds	salt
6840-252-3002	1 pound	DDT Powder 25 lb Drum

By 1969, Fort Detrick Regulations[xiii] specify that "*No pesticides, herbicides or rodenticides will be disposed of through the Fort Detrick drainage system. 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).[419]

The post wide Fort Detrick Pest Control Program inventoried all the buildings designating selected buildings for pest control services (i.e. roach or rodent control and indoor residual spraying of insecticide), the frequency (i.e. daily, weekly, monthly, quarterly and yearly) and the area in square feet to be applied. The specific types of pesticides used are not listed.[420]

[xiii] The 1963 Fort Detrick Safety Regulations do not mention pesticides.

Detrick's 1979 pest control program included approximately 210 sanitary sewer manholes and 136 steam manholes receiving a single spray treatment of 1.1% "Baygon" annually and approximately 50 sanitary sewers manholes receiving a bait block of 0.005% Diaphacin paraffin for rodent control.[421]

The June 1982 Pest Control Report for Detrick reported use of Dursban, Baygon Pyrethrins, Drione for control of roaches, resmethrin for control of sapsuckers and Kelthane, Malathion, Plictran, Pentac, Endosulfan, Captan and Methoxychlor for control of mites.[422] More recent pest control reports were not gathered for this investigation.

In 1977, the USATHMA Installation Assessment of Fort Detrick reported that use of the following pesticides on post in accordance with the Department of the Army and EPA regulations: organic phosphates (Diazinon, Malathion & Dursban), chlorinated hydrocarbon (Chlordane), botanicals (Drione/Silica gel & Pyrethrum), rodenticide Anticoagulants (Warfarin) and carbamates (Sevin & Baygon). That investigation also reported the burial of insecticides and herbicides in Disposal Pit 14 at Area B from 1965 to 1971[423]. Historical aerial photos do not necessarily confirm the extent of Disposal Pit 14 as depicted on available site plans (). The site map notes that there was no specific area for the insecticide material in Disposal Pit 14 and "it was taken care of on a routine basis at the landfill." In 1990, installation of the bottom liner of the Fort Detrick municipal landfill partially capped Disposal Pit 14. The remaining portions of that pit were capped with an impermeable liner emplaced in 2010.[424]

7.6 PETROLEUM, OIL AND LUBRICANTS (POL) AND COAL FACILITIES

As part of the construction for Detrick Air Field in 1941, fuel tanks were constructed near the hangar. This area included pumps for moving fuel from rail cars to holding tanks to dispersing points and contained storage capacity for 60,000 gallons (see following figure).[425]

This fuel tank area had connections for the downloading of Aircraft Gasoline and Quartermaster Gasoline from rail cars to separate holding tanks and fuel lines for dispersing the fuel on the airfield.[426]

When the Army established Camp Detrick, the aircraft fueling system was no longer needed, though it is unclear when it was dismantled. On WWII era site plans, the area is denoted as "*Present Fuel Storage*" if it is noted at all. Site plans from 1944 to 1952 delineate only a blank box at the location without building numbers, potentially implying they were no longer present or part of the plan following the conversion of the post from airfield to RDT&E installation.[427] This does not appear to be the case, as by 1955 site plans depict the area as Building 271, noted in 1956 building as a 50,000 gallon Fuel Oil Storage. The semi-permanent Building 271 is depicted on site plans through 1960 but is not depicted from 1964 and later indicating its removal.[428]

During WWII, site plans for Camp Detrick delineated the following facilities associated with coal, oil, and gas activities:[429]

- T-2/T-100, Boiler House
- T-91/T-705, Gas Dispensing Station
- T-108/T-926, Coal Trestle
- D-8/T-700, Boiler House
- D-13/T-513, Oil Drum Storage
- W-2/T-900, Boiler House

The Gas Dispensing Station T-91/705 was apparently a motor vehicle gasoline station but the fuel storage location is unclear as no tanks are noted. Potentially the quartermaster fuel lines from the airfields were extended. D-13/513 was identified as an Oil Drum Storage area. D-10/510 was labeled as "Gas Storage" but based on the small size and location this apparently was a storage area for compressed gas cylinders used in various activities. Between 1951 and 1952, Detrick converted the central heating plant, Building T-2/T-100 from coal fired to oil fuel as the post requested to dispose of the remaining coal handling equipment.[430] This implies that during this time period the post converted from coal to oil use for its boiler plants.

During the quarter ending in June 1950, 76,620 gallons of fuel oil was delivered to Buildings 1000, 1012, 1013, 1014, 1015 (Housing Units), the Grid Area, R15, and the Restricted or Limited Area[431]. Detrick converted boiler plant (steam plant) D-8/700 to use as a laboratory and constructed a new steam plant. By 1952, site plans delineate the new larger Central Boiler Plant or Steam Plant, Building 190 along with an Oil Storage tank farm and Pump House, Building 191.[432] Building 191 consisted of ten 50,000-gallon No. 6 Fuel Oil Underground Storage Tanks (UST)s.

The WWII era the motor vehicle gasoline station 705 is no longer depicted on site plans by 1951, apparently replaced by Building 940, Gasoline Dispensing Station.[433] A 1956 building listing identified the following buildings on Detrick associated with coal, gas, and oil.[434]

Building Number	Use
100*	Steam Plant
190	Steam Plant
191	Oil Storage and Pump House
271*	Fuel Oil Storage
365	Oil Storage
900*	Steam Plant
926*	Coal Trestle
940	Gasoline Dispensing Station
946	Oil Storage Building

* Structures denoted or delineated on WWII era maps

Although the boiler plants had converted from coal to oil by this time the coal trestle remains. In December 1955, the post requested permission to dismantle the Coal Trestle (or Tipple) with a justification that since the heating plants had all been converted to oil it was no longer needed.[435] In September 1956, Detrick determined the central boiler in Building T-900 was no longer economical to repair and recommended disposal and it appears to have been razed by 1957.[436]

Detrick installed a 650,000-gallon No. 6 Fuel Oil AST (Building 194) west of the UST tank farm in 1967.[437] By 1971, Detrick converted Building T-100 to being a steam reducing plant and had constructed a pump house (195) next to oil storage area (Building 191) in the vicinity of the main Steam Plant Building 190. Two diesel "day tanks" and one diesel tank labeled as a 20,000-gallon underground diesel tank were added later as depicted in the vicinity of Building 191 in a 1995 Geohydrologic Study Report. [438] Building 365 is no longer listed and had apparently been razed by that point.[439]

Building 950 the Exchange Service Station appears on a site map by 1970,[*440*], though Building 940 also remains.[441] Both buildings were historically used as vehicle fueling stations and had associated USTs that containing gasoline: two 12,000-gallon USTs at 940 and five 8,000-gallon USTs at 950. After Detrick identified a gasoline leak in 1991 at one of the Building 940 USTs, the USTs were excavated and removed. Groundwater monitoring wells were installed and sampled from 1993 until 2005. Based on groundwater sample results it was determined that the contamination was effectively reduced by natural attenuation and is not migrating off Fort Detrick. [442] Currently, the vehicle gasoline station on post is at Building 1405.

Between 1985 and 1991, a 100-gallon diesel spill occurred between the tank farm (191) and the steam plant (190). In early 1995 the 10 USTs at 191 were removed and several of them were leaking. Petroleum product was floating on the water surface in the excavation.[443] Following these observations an estimated 15,000 gallons of water and No. 6 Fuel Oil were pumped out of the excavation. Detrick initiated groundwater monitoring to assess the extent of free-phase No. 6 fuel oil in the aquifer, and a

Corrective Action Plan (CAP) was established. Two fuel oil recovery skimmers were installed near Building 190 to meet state cleanup requirements. A diesel "day tank" between the steam plant and the former UST farm was also removed in the fall of 1995. The tank appeared to be in good condition, but extensive No. 6 Fuel Oil contamination in the soil and groundwater were present. Detrick detected diesel in samples from a monitoring well near building 190 in 1995. More recent information regarding diesel contamination was not found. However, the location of the detected diesel contamination is within area of groundwater monitoring for No. 6 Fuel Oil contamination. By 2009 the fuel oil contamination in groundwater was considered stable and not migrating off post.[444] Detrick replaced the 191 tank farm with an above ground tank 189.[445]

7.7 OTHER SUPPORT OPERATIONS

7.7.1 General

All military facilities support a number of common activities such as vehicle maintenance, medical care, etc. Little specific information has been uncovered regarding operations of these types at Fort Detrick . The following sections address practices common at most military facilities and includes buildings identified which may have been used for these purposes. These observations are based on a series of Common Operations Reports prepared by the Corps of Engineers outlining common practices over various time periods.

7.7.2 Vehicle, Locomotive and Aviation Maintenance

Under the Army maintenance system there are five echelons (first through fifth) of maintenance broken into three categories (Organizational, Field, and Depot). On Fort Detrick, no Field or Depot maintenance operations have been identified. Only First Echelon (Operator) and Second Echelon (Organizational) Maintenance operations are suspected to have occurred on Fort Detrick. First Echelon maintenance is the routine maintenance carried out by the operator of the vehicle (the driver) consisting primarily of before, during, and after operation inspections. These may also include adding fluids to the vehicle. Second Echelon Maintenance is that maintenance carried out by the organization (by an authorized mechanic) owning the vehicle. It commonly includes oil changes and lubrication, plus replacement of some parts (batteries, hoses, etc).[446]

Though few details are know about the aircraft maintenance activities that occurred during Detrick's initial military use as an aviation field, it is anticipated this included First and Second Echelon Maintenance operations to include fluid changes, lubrication and minor repairs. It may have included more substantive overhauls as well given the period of operation. The location for the maintenance activities would have been the hangar Building T-1/201.

Detrick had two areas previously associated with First and Second Echelon vehicle maintenance: the 700 area and the 900 area. In the 700 area, First Echelon maintenance activities were at Building T-34/704, Wash Rack involving the removal of dirt and grease from vehicles.[447] Although the building description is somewhat ambiguous, Second Echelon maintenance occurred at Building T-32/706 – Motor Repair Shop – Gasoline, Oils, Lubricants, and solvents/degreasers.[448]

By 1952, the wash rack 704 no longer appears on site plans and apparently was razed. Building 706 remained but by 1956 it was used for Vehicle Storage. Based on a review of aerial imagery, between 1958 and 1964, Building 706 was razed.

In the 900 area, First and Second Echelon maintenance activities were at Building T-922, Wash Rack and involved the removal of dirt and grease from vehicles.[449] Building W-20/T-921, Motor Repair Shop would have used gasoline, oils, lubricants, and solvents/degreasers.[450] Building 921 may have also been associated with repair of small engines used in various operations on post and not necessarily with vehicles.

It appears that Building 921 expanded to include the wash rack based on review of site plans and aerial imagery. It remained a Motor Repair Shop through 1975 but aerial imagery shows it was razed between 2005 and 2006.[451]

Fort Detrick was known to operate an on-base rail system. Based upon the layout of the rail system it appears that it was used primarily for the transportation of bulk products. The only building identified as relating to this activity is Building T-145/T-924, Locomotive Shed.[452] It is uncertain what level of maintenance was performed on locomotives on Fort Detrick but no facilities were identified that would support other than the use of oils, lubricants, and degreasers as part of the First Echelon (Operator) types of maintenance.[453]

The building remained throughout post facilities expansion in the early 1950s and was denoted as at the locomotive building through at least 1956. Later it appears Detrick redeveloped the building, as Building 924 and by 1975 the Post Chapel occupies the same location.[454]

7.7.3 Laundry Facilities

In the buildings containing infectious or toxic agents, the change rooms had receptacles to hold discarded laboratory clothing (i.e. laundry bags or carts). Employees of the Custodial Branch counted and collected the soiled clothing and shoes at the end the day and sterilized them by autoclave at 240^{o} F for approximately 45 minutes to an hour, with wet clothes taking longer. Following this, the Post Quartermaster Laundry followed standard Army procedures for laundering work clothes (with Formula F). Personnel collecting soiled clothing received applicable immunizations as did the employees

handling soiled clothing in the laundry.[455] Building W-1/T-901 housed the Laundry or what was later called the Technical Laundry from WWII through the 1960s.[456]

The protective clothing belonged to the U.S. Government and any clothing that had been potentially contaminated was not worn outside or taken from the building without prior sterilization. Even if it was clean, laboratory clothing was not to be worn in "*…the Technical Library, in 'clean' conference rooms, or on visits to Maintenance Division shops nor to property warehouses or other clean areas. Supervisors of such areas hereby are specifically directed to request violators of this regulation to leave the prohibited area. Violators should be reported to Safety Division*".[457]

Detrick excluded laundry from the post restaurant, families, persons, or facilities outside the Restricted Area from the Post Laundry.[458]

In the early 1950s, Detrick began equipping the discarded clothing laundry receptacles in the change rooms of infectious disease laboratories with a Ultraviolet light to provide a protective barrier of UV radiation to isolate discarded articles.[459]

Detrick did some testing and development for the Quartermaster Corps field laundering procedures with a Semi-mobile Laundry Washing Tumbler and modifying the procedures for the BW decontamination of standard troop clothing. It was determined that by adding 2000 parts per million chlorine to the first suds, laundering seemed to be a satisfactory decontamination procedure for all clothing.[460]

By 1975, Detrick had placed the Laundry, T-901 on stand-by status and it remained standing until 2011 when it was razed.[461]

By the early 1960s, Detrick offered a separate Dry Cleaners and Laundry housed in Building 713, which also housed the Post Exchange, barber shop, post office, and cafeteria. That laundry was available to all personnel holding PX privileges and offered three-day service on laundry, cleaning and garment repair. No self-service laundromats were located on post though ones were available in the community of Frederick. In regard to a regular Quartermaster Laundry for officers and enlisted personnel, Detrick had laundry picked up twice weekly and taken to Fort Meade, MD, for those services by the 1970s. Fort Meade had an active 5,000 man dry cleaners by 1953.[462] The specific details about the dry cleaning facilities available within Building 713 or what dry cleaning solvents may have been is use there was not determined but appears to have been only a drop-off and pick-up location. Building 713 remained on post through at least 2005 but has been subsequently razed with Building 1405 currently providing dry cleaners and laundry among other services.[463]

Additonal details regarding potential constituents resulting from the laundry operations can be found in the Common Operation Report for Laundry and Dry Cleaning (CO-13), which discusses common features of laundry and dry cleaning operations performed at

U.S. military facilities within the continental United States between World War II and 1986 based primarily on technical guidance documents published between 1947 and 1967.[464]

7.7.4 Medical Activities

In addition to the medical facilities supporting the BW mission of Fort Detrick, like all military installations Detrick had facilities for providing basic medical and dental care for the assigned personnel. Common Operations Report No. 15 (CO-15), Medical Operations[465] provides generalized information on the operation of a medical facility supporting an installation. In general, medical facilities supporting an installation dispense drugs, take X-rays, etc. Waste streams include medical waste, and deteriorated or otherwise unusable drugs, which may include medical radioisotopes consumed during medical treatments.

One atypical medical activity of Detrick from other Army installations is the need to anesthetize animals during various experiments. Although not always documented as to what anesthesia was used, it appears that ether is the anesthesia of choice[466] Other anesthesia used in the 1940s and 1960s included chloroform, pentobarbital or its name brand version Nembutal.[467] In the late 1950s and early 1960s, Detrick was also using Combuthal, a trademarked mixture of Pentobarbital Sodium and Thiopental Sodium.[468] There is also evidence that Detrick used sodium pentothal, Fluothane and thiamylal sodium (Surital) for anesthesia.[469] No evidence was found of TCE's use as an anesthetic at Detrick, though that is one of the common uses for TCE.[470]

7.7.5 Photographic Laboratory

Details concerning the specific chemicals involved in the development and printing of photographic film and prints at Detrick are undetermined. However, it's known that during WWII Building P-9/11 served as the Photographic Laboratory, where photographic chemicals were apparently used. By 1953, Building 11 was repurposed as the Signal or telephone exchange building and a previous mess hall, B-9/817 was converted to the Photographic Laboratory. By 1975, Building 817 was a Production Facility.[471] Building 11 remains on post as does 817.

7.7.6 Paint Shops

Details concerning the specific use of the paints and solvents for spraying at Detrick are undetermined but the locations where this appears to have occurred can be determined from the site plans and building lists. During the early 1940s, Building W-15/T-918 was the Paint Shop. It became the Sign Shop by 1943 and aerial imagery indicates the building was razed between 1958 and 1964. Between the late 1940s and early 1950s, the paint operations were moved to Building T-941, Paint Spray Building. By 1975,

Building 941 was serving as the Post Engineer Facility and Special Services.[472] It remains on base.

7.7.7 Material Storage

Review of Detrick site plans and building lists provides buildings that stored chemicals potentially hazardous to the environment. During WWII, Building W-17/T-919 was used for Paint Storage (paints and solvents). By the mid-1950s it was noted as being for Flammable Storage. Review of aerial imagery indicates the building was razed between 1958 and 1964. The mid-1950s Paint Storage Building was 939 which by 1975 was used as an Ammo Storage Building, evidently for storage of small arms for the guard force following the removal of the magazines in Area B in 1971.[473] Aerial imagery indicates Building 939 was razed between 2005 and 2006.

Building SP-1223 in Area B was listed as being used for Paint Storage by 1956, after having been used for flammable storage in 1953. In 1975, the schedule of facilities lists it as a paint storage laboratory but based on aerial imagery, it was razed by 1979.[474]

The Solvents Storage Building T-147/347 remained in use for that purpose from the 1940s through 1970s and remains standing.[475]

During WWII, Detrick built Building T-365 for Inflammable Storage but by 1956 was using it for Oil Storage. It appears to have been razed by 1964 based on aerial imagery.[476]

Detrick used Building T-532 for Inflammable Storage in the 1940s but razed it for the extension of Miller Drive in the early 1950s.[477]

There are numerous other storage buildings and locations on Detrick but no obvious indication that hazardous chemicals were potentially stored there.

8 OPERATIONS INVOLVING RADIOACTIVE MATERIALS

8.1 BACKGROUND / OVERVIEW

Like many laboratories and facilities involved in RDT&E, Fort Detrick utilized radioactive materials for a variety of scientific applications such as X-rays, calibrating equipment, or serving as tags to assist in dissemination trials. Detrick acquired this material in two forms: sealed sources and general radioactive isotopes. Sealed sources are just what they imply: the radioactive isotope is sealed in a container to prevent loss of the source material to the environment. General radioactive isotopes are intended to be used in the environment, which in the case of Fort Detrick was primarily in a laboratory environment, though isotopes were used in some field application such as a tracer in dissemination trials.

An example of a sealed source is Cobalt 60 which is often used as a source of X-rays. The only radioactive waste that is typically generated from a sealed source is wipes, gloves, etc. that would be used to test the source to ensure the seal is intact. When these items become unserviceable or are no longer needed they are normally disposed of by returning them to the appropriate agency. An example is Detrick's use of Carbon 14 in the form of carbon dioxide (CO_2) and to determine how plants process CO_2. This type of isotope generates radioactive waste requiring collection and processing.

The Atomic Energy Act of 1946 identified three categories of radioactive materials:

> 1) Fissionable materials – those materials that could be used to sustain a nuclear reaction
> 2) Source materials – those materials from which fissionable materials can be extracted
> 3) By-Product materials – those materials made radioactive by radioactive processes. [478]

The work at Detrick primarily involved the use of by-product material.

Under the 1946 act, guidance on licensing and requirements for possession of by-product material was limited. Generally, if Detrick requested a certain amount of by-product material from Oak Ridge Laboratories, the request would state what was required and, why it was required, along with identifying the personnel and procedures for the handling of the material. Oak Ridge would issue the material with instructions on its use, handling, and disposition. Together, these documents would constitute the 'license'.

The Atomic Energy Act of 1954 superseded the 1946 act and became the legal source for the regulations generated by the Atomic Energy Commission (AEC) and later the Nuclear Regulatory Commission (NRC) regarding licensing. The 1954 act also added the previously omitted naturally occurring radioactive materials (e.g. radium and thorium) to

the items under the purview of the AEC/NRC. In general the procedures for acquiring, storing, using, and disposing of radioactive materials remained fundamentally the same but were codified following implementing regulations based upon the 1954 Atomic Energy Act. This resulted in the initial AEC license for Fort Detrick being issued in 1956, even though radioactive material had already been used on the installation for eight years.

Even before the licensing regulations, Detrick had developed guidelines for requesting and needed radioactive materials for a specific project or activity through the post radioisotope committee/radiological safety section. This section ensured the request met all regulatory requirements (such as identifying the specific needs for material for the project, a facility that met the requirement for the use and storage of the material, and qualifications of personnel involved in using/handling the material, etc.). Only when all the required paperwork was approved was the material ordered. Normally the Safety Division received the material and transferred it to the using organization. The Radiation Protection Officer (RPO) or other Safety Division personnel made periodic inspections to account for the material and to ensure compliance with appropriate regulations.

Waste materials generated during the operation of the project were collected at the point of generation and periodically transferred to the safety section for ultimate disposal. For items with short half-lives, this meant storing it long enough for it to age out to the point it could safely be disposed of under the procedures for non-radioactive material. Through 1957, other items were buried on-site in designated locations in the southwest portion of Area B. After 1957, those items with longer half lives were held for shipment to licensed off-site facilities for processing and disposal (i.e. Radioactive Material Disposal Facility (RMDF) at Edgewood Arsenal, MD) (see section 7.3). The isotope committee/Safety Division was also responsible for ensuring the using organization complied with all requirements when closing out the portion of a project requiring use of radioactive materials.

In addition to complying with the procedures resulting from the Atomic Energy Acts of 1946 and 1954, the Army developed a series of Army Regulations (AR's, TM's, etc.) to ensure implementation of these AEC/NRC regulations within the Army. Detrick, like any other unit or installation in the Army, also issued its own guidance or Standard Operating Procedures (SOP) to ensure local compliance and provide specific details regarding implementation of the rules. This ASR gathered regulatory guidance relating to national, Army, and Detrick specific policies and it is cited specifically as applicable.[479]

When dealing with radioactive source materials, Camp/Fort Detrick was initially the only agency on the installation using source material. Following the offensive BW demilitarization of the early 1970s, the increase in tenant activities resulted in the garrison's role being reduced to receiving and disposing of radioactive materials and waste from tenants. However, the authority to transfer licensed material from the tenant license to the garrison license for purposes of disposal remained. Eventually the garrison

was completely removed from the handling of radioactive materials and the tenants became responsible for their own receipt and disposal activities. Based upon the license numbers recovered for the garrison and the tenant activities plus those for WRAMC, the AEC/NRC has issued a number of licenses, though the licenses for Fort Detrick are not unusual for a research or medical facility.

In some situations, items with a half-life of 120 days or less may be stored for 10 half-lives and then deposed of as ordinary waste. The bolded items meet that eligibility criteria for storing until no longer considered a radioactive isotope. The following list gives the approximate half-life for isotopes identified at Fort Detrick which may have resulted in the production of radioactive waste.

Isotopes	**Half-life**
Hydrogen 3 -	about 12.5 yrs
Carbon 14 -	about 5600 years
Phosphorus 32 -	**about 14 days**
Sulfur 35 -	**about 87 days**
Calcium 45	**about** 167 days
Chromium 51 -	**about 28 days**
Cobalt 60	about 5.26 years
Nickel 63	about 92 years
Zinc 65	about 244 days
Selenium 75	about 120 days
Krypton 85	about 10.76 years
Rubidium 86	**about 18.7 days**
Strontium 89	**about 51 days**
Cadmium 109	about 453 days
Indium 111 -	**about 2.8 days**
Iodine 125 -	**about 60 days**
Iodine 131 -	**about 8 days**
Iodine 132	**about 2.3 hours**
Tellurium 132	**about 78 days**
Cesium 137 -	about 30 years
Gold 198	**about 2.69 days**
Polonium 210	about 138 days
Radium 226	about 1620 years
Uranium 238	about 4,510,000,000 years
Plutonium 239	about 24,413 years
Americium 241	about 458 years

Detrick also had source items, such as Cobalt 60, Radium 226, and Uranium 238 that were not used in a manner that would produce radioactive waste. For example the U-238 in the form of Uranyl acetate was used for a shadow effect with the electron microscope to increase the clarity of the image. The sealed sources identified at Detrick included: Cobalt 60, Krypton 85,

Strontium 90, Cesium 137, Polonium 210, Radium 226, Plutonium 239 and Americium 241. Based on reviewed documents radiological activities occurred in buildings: 201, 236, 321, 427, 432, 433, 459, 467, 470, 524, 525, 538, 539, 550, 560, 567, 568, 600, 601, 605, 607, 1301 and 1412. However, only buildings 201, 459, 568, and 1301 were indentified in the 2002 decommissioning plan.[480]

The following sections provide additional details on the use of radioactive material, licensing, disposal and periodic radiation surveys on Detrick. This ASR does not address routine radioactive materials used in medical procedures by medical facilities (except for x-ray sources) or those sources held Army- or DoD-wide for equipment such as check sources for radiac instruments.

8.2 USE OF RADIOACTIVE MATERIAL

8.2.1 Pre-license Use, 1947-1956

In September 1947, Detrick entrusted radiological safety to members of the Physics Branch, who established a committee to control radiological activities for Camp Detrick. At the first committee meeting in November of that year, tentative rules for handling radioisotopes were distributed. Use of radioactive material at Detrick began in early 1948 when the Physics Branch of the PC (Physics and Chemistry) Division received two millicuries of Carbon 14 as the initial shipment of radioactive isotopes by the AEC's Radioactive Isotope Committee.
[481]

Radiological studies at Detrick between 1948 and 1951 included:

- uptake of Rubidium 86 by various plants, particularly relating to the effects of growth regulators, specifically herbicide 2, 4-D (2,4-dichlorophenoxyacetic acid) (10 millicuries of Rubidium 86 received from Oak Ridge)
- fixation of Carbon 14 labeled CO_2 by Escherichia coli.
- effect of dinitrophenol on Carbon 14 labeled CO_2 assimilation by bacteria.
- M Division used Phosphorus 32 in work conducted in the Test Tank in T-263 and assays in T-433.
- Assay of Carbon 14 for a project on physical instrumentation and techniques applicable to BW research (i.e. work focused on determining sources of error and minimizing them)
- C Division used Carbon 14 tagged 2, 4-D in examining entry, translocation and metabolism of the herbicide 2, 4-D.

The use of all these identified radioactive materials tests occurred in a laboratory environment and not in the field.[482]

In January 1951, Detrick appointed the first Radiological Safety Inspector, a member of the Safety Division, who set up a program to include film badges, laboratory monitoring, physical exams of all personnel engaged in radioactive materials work, isotope procurement, establishment of the disposal system, and improvement of the record system. He began conducting periodic Radiation Safety Inspections, some of which were recovered. These identified various radiation readings outside of normal use, including on hoods and filter intakes, a test tube holder, the mouth of a drain, the floor between a waste discharge line and floor drain and a towel. Some also contained recommendations for decontamination, disposal or prevention to address these incidents and prevent future ones.[483]

Radiological studies at Detrick between 1951 and 1953 included:[484]

- M Division used Phosphorus 32 and Sulfur 35 in work conducted in the Test Tank in T-263 (Munitions Building)
- Aerobiology Branch conducted studies on retention and decay rates with Phosphorus 32 in T-524 (Gas Chamber and Laboratory) through May 1952
- Crops Division continued studies on Carbon 14 tagged 2, 4-D in T-321 (Crop Protection Laboratory)
- MM Division began using Carbon 14 in T-427 (Laboratory) in May 1951
- In area 7, natural uranium was used to shadow specimens for the electron microscope
- Building T-605 (Infirmary), the radiological safety sub-section was designated area 1

Until October 1952, when it completed Detrick specific SOP for handling radiological material (i.e. published in the 15 November 1952 Biological and Radiological Safety Regulations for Camp Detrick Limited Areas), the Radiological Safety office relied on the SOP for the Army Chemical Center at Edgewood, MD. The 1952 Detrick regulation required the appointment of Radiological Area Supervisors for each division using radioactive materials. These Supervisors were responsible for designating, in writing, each radiological area within their division. The regulation also required: a formal written test program prior to initiation of radioisotope procurement; marking all radiological areas with appropriate signage; identifying contaminated equipment with a warning tag (glassware could be marked with a red crayon). The regulation also describes the requirements for personnel dosimeters and periodic radiological surveys, and defines permissible levels of radiological contamination. For example, radioactive waste burial in the radiological area is restricted to 7.5 mr/hr and limited to a non-detect level in areas outside of the radiological area. Radioactive liquid waste was to be stored in five-gallon glass carboys appropriately marked for radiation. Solid waste was stored in standard GI waste can and was not allowed to radiate at greater than 7.5 mr/hr on the outside of the container. Waste was to be removed and transferred to the Radiological Safety Section for final disposal (see section 8.3).[485]

Between July 1953 and June 1954, AEC granted five radioactive isotope authorizations to Detrick. The relatively low number is due to the long range nature of the studies and only one authorization is required as long as the project work continues. Also since many of the projects required Carbon 14, Detrick was able to obtain it under one authorization. Radiological studies at Detrick during that period included:[486]

- Crops Division continued studies on Carbon 14 tagged 2, 4-D and made plans for proposed field trials using 1 curie of radioactive material, though no evidence confirmed that proposal was consummated.
- Allied Sciences Physics Branch used Carbon 14 in labeling methyl and carboxyl sodium acetate and using natural uranium to shadow specimens for the electron microscope; the Chemical Branch got approval to synthesize Carbon 14 in T-201 for the general use of the post
- Pilot Plant Division had 50.45 milligrams of Radium 226 in use as actuators in gauges with close surveillance of the process and the decay element Radon 222
- Medical bacteriology Division used radium in an Alphatron to ionize gas molecules in a vacuum gauge
- X-ray machines on post

In February 1956, Crops Division planned on using Building T-321 for the large scale radiological impregnation, drying and counting of anti-crop pathogens tagged with Phosphorus 32 that had been conducted elsewhere to that point, apparently T-106 and T-107. The new Crops Laboratory Building C-1/1301 was to be used for the continued Carbon 14 studies.[487]

In 1956 the Army Chemical Center transferred a Cobalt 60 source to Fort Detrick that was at 92.1 mr/hr at one meter from the source.[488]

8.2.2 By-Product Material License No. 19-01151-01 – 1956 - 1959

In accordance with the changes resulting from the Atomic Energy Acts of 1954, in August 1956, Fort Detrick applied for a Byproduct Material License from the AEC for the possession and use of up to the following:

- 400 mCi Carbon 14
- 200 mCi Sulfur 35
- 250 mCi Phosphorus 32
- 200 mCi Rubidium 86
- 50 mCi Gold 198
- 150 mCi Cobalt 60 (in a sealed source)

AEC issued Detrick License #19-01151-0, its first formal license, on 30 October 1956. AEC amended the license twice: Amendment 1, 30 January 1957, added approval of up

to 6 mCi of Strontium 90 in a sealed source for use as a standard light source and Amendment 2, from 21 June 1957, which added 50 mCi of Iodine 131 for bacteriological staining procedures. In 1958, Fort Detrick started the process to renew their byproduct material license number 19-1151-1, which was retired in 1959 and superseded by License 19-01151-02.[489]

8.2.3 By-Product Material License No. 19-01151-02, 1959 -2004

On 21 Apr 1959, AEC issued Detrick License 19-01151-02[490] with an expiration date of 30 Apr 1961 and authorized the possession and amounts of up to the following:

- 400 mCi Carbon 14
- 400 mCi Sulfur 35
- 400 mCi Phosphorus 32
- 5 mCi Rubidium 86
- 100 mCi Iodine 132
- 20 mCi Cobalt 60 (in a sealed source)
- 4.4 mCi Strontium 90 (in a sealed source)

This license would remain in effect for 45 years before ending on 19 July 2004. It was amended 27 times, primarily to extend the expiration dates or authorize additional isotopes. The amendments were:

- Amendment 1 – not found

- Amendment 2[491], 20 September 1960, changed the name of the Radioisotope Committee Supervisor

- Amendment 3[492], 14 December 1960 added 300 mCi of Tellurium 132-Iodine 132

- Amendment 4[493], 28 April 1961 changed the expiration date to 30 Jun 1961

- Amendment 5[494], 17 May 1961 changed the expiration date to 31 May 1962 and restated the isotopes authorized as follows:

  - 400 mCi Carbon 14
  - 400 mCi Sulfur 35
  - 400 mCi Phosphorus 32
  - 5 mCi Chromium 51
  - 350 mCi Iodine 131
  - 300 mCi Tellurium 132-Iodine 132
  - 30 mCi Cobalt 60 (in a sealed source)

- 6 mCi Strontium 90 (in a sealed source)

- Amendment 6[495], 25 June 1963 added 2 mCi Hydrogen 3 and 45 mCi Krypton 85 (in a sealed source)

- Amendment 7[496], 14 August 1963 changed the expiration date to 31 Aug 1963 and restated the isotopes authorized

- Amendment 8 – not found

- Amendment 9[497], 21 May 1965 changed the expiration date to 31 Aug 1967 and listed the following isotopes:

  - 25 mCi each Any byproduct material with Atomic numbers 3-83
  - 500 mCi Carbon 14
  - 500 mCi Sulfur 35
  - 500 mCi Phosphorus 32
  - 30 mCi Cobalt 60 (in a sealed source)
  - 500 mCi Iodine 131
  - 500 mCi Iodine 125
  - 300 mCi Tellurium 132-Iodine 132
  - 10 mCi Strontium 90 (in a sealed source)
  - 90 mCi Krypton 83 (in a sealed source)
  - 150 mCi Any byproduct material in irradiated aluminum container
  - 250 mCi Hydrogen 3
  - 400 mCi Hydrogen 3 (in foils for gas chromatographs)
  - 10 mCi Cesium 137 (in a sealed source)

- Amendment 10[498], 11 August 1965 changed Hydrogen 3 in foil to 800 mCi

- Amendment 11[499], 21 June 1967, changed expiration date to 30 Jun 1972 and listed the following isotopes:

  - 50 mCi each Any byproduct material with Atomic numbers 3-83 for 500 mCi total
  - 500 mCi Carbon 14
  - 500 mCi Sulfur 35
  - 500 mCi Phosphorus 32
  - 30 mCi Cobalt 60 (in a sealed source)
  - 500 mCi Iodine 131
  - 500 mCi Iodine 125

- 300 mCi Tellurium 132-Iodine 132
- 10 mCi Strontium 90 (in a sealed source)
- 90 mCi Krypton 85 (in a sealed source)
- 250 mCi Any byproduct material in irradiated aluminum container
- 250 mCi Irradiated biological materials
- 500 mCi Hydrogen 3
- 800 mCi Hydrogen 3 (in foils for gas chromatographs)
- 10 mCi Cesium 137 (in a sealed source)

- Amendment 12[500], 6 November 1968 made changes to condition 15 of license

- Amendment 13[501], 13 February 1970 listed the following isotopes –
  - 200 mCi each Any byproduct material with Atomic numbers 3-83 1 c Total
  - 1 c Carbon 14
  - 1 c Sulfur 35
  - 1 c Phosphorus 32
  - 30 mCi Cobalt 60 (in a sealed source)
  - 1 c Iodine 131
  - 1 c Iodine 125
  - 300 mCi Tellurium 132-Iodine 132
  - 25 mCi Strontium 90 (in a sealed source)
  - 90 mCi Krypton 85 (in a sealed source)
  - 500 mCi Any byproduct material in irradiated aluminum container
  - 500 mCi Irradiated biological materials
  - 4 c Hydrogen 3
  - 1100 mCi Hydrogen 3 (in foils for gas chromatographs)
  - 25 mCi Cesium 137 (in a sealed source)
  - 25 mCi Nickel 63 (in a sealed source)
  - 10 mCi Americium 241 (in a sealed source)

- Amendment 14[502], 5 April 1971 made changes to condition 15 of license

- Amendment 15[503], 9 March 1972 made changes to condition 15 of license

- Amendment 16[504], 14 February 1973 made changes to condition 15 of license

- Amendment 17[505], 10 June 1974 changed the expiration date to 30 Sep 1974

- Amendment 18[506], 28 August 1975 changed the expiration date to 30 Sep 1979 and listed the following isotopes:

    - 200 mCi each — Any byproduct material with Atomic numbers 3-83
      1 c Total
    - 90 mCi — Krypton 85 (in a sealed source)
    - 1.1 c — Hydrogen 3
    - 25 mCi — Nickel 63 (in a sealed source)
    - 10 mCi — Americium 241 (in a sealed source)

- Amendment 19[507], 26 November 1979 changed Hydrogen 3 to 25 curies and added 15 curies of Phosphorus 32 and 3 curies of Iodine 125.

- Amendment 20 – not found

- Amendment 21 – not found

- Amendment 22[508], 6 April 1984 changed conditions 12 and 18

- Amendment 23[509], 23 July 1992 extended the expiration date beyond 30 Apr 1986 and listed the following isotopes:

    - 200 mCi each — Any byproduct material with Atomic numbers 3-83
      1 c Total
    - 25 c — Hydrogen 3
    - 150 mCi — Carbon 14
    - 25 c — Phosphorus 32
    - 5 c — Sulfur 35
    - 2 c — Chromium 51
    - 3 c — Iodine 125
    - 1 c — Iodine 131
    - 300 mCi — Cesium 137
    - 100 mCi — Cesium 137 (in a sealed source)
    - 500 mCi — Polonium 210 (in a sealed source)
    - 2 mCi — Plutonium 239 (in a sealed source)
    - 10 mCi — Americium 241 (in a sealed source)

- Amendment 24[510], 29 December 1997, changed the expiration date to 31 Dec 2007 and listed the following isotopes:

    - 200 mCi each — Any byproduct material with Atomic numbers 3-83
      1 c Total

- 25 c Hydrogen 3
- 1 c Carbon 14
- 20 c Phosphorus 32
- 5 c Sulfur 35
- 2 c Chromium 51
- 3 c Iodine 125
- 1 c Iodine 131
- 100 mCi Cesium 137

- Amendment 25[511], 3 June 2002 made changes to various conditions

- Amendment 26 – not found

- Amendment 27[512], 19 July 2004 terminated License 19-01151-02.

8.2.4 By-Product Material Use, 1959 - 2004

In 1963, Detrick updated the Radiological Safety Regulations and created a Detrick specific Radiological Safety Manual. The 10 September 1963 regulations included a section (Part C) on Radiological Safety Regulations for Fort Detrick, which primarily updated previous regulation and addresses:

- Materials produced by or under auspices of the AEC and requiring an Atomic Energy Commission "Specific License".
- Materials procurable under an AEC "General License".
- Other radioactive materials, which include primarily members of the naturally radioactive series (radium, thorium, etc.).
- Apparatus and equipment capable of, or containing materials capable of, producing ionizing radiation. This includes X-ray machines, particle accelerators, certain cathode-ray tubes, electron microscopes, etc.

The December 1963 manual outlines procedures to be followed to initiate, operate, and close-out programs involving the use of radioactive materials. It provides guidance on operations and safety procedures to be followed and lists maximum permissible levels of contamination in various situations and locations. In regard to disposal, it includes information on collecting, packaging, storing and shipping but does not indicate that on site burial is occurring at that point.[513]

On 20 July 1964, the Radiation Safety Section developed a list of the building and room numbers approved as radiation areas as follows:[514]

Building	**Room Number**
261	B (radioisotope storage and liquid waste storage) and D
432	14
433	Drying Room
470	108 and 109
525	2
538	124 and 147
550	201-A
560	Wing 1, 1st Floor 11-26, 11-34
	Wing 1, 2nd Floor 12-3, 12-6, and 12-40
560	Wing 2, 1st Floor 21-46
560	Wing 3, 1st Floor 31-15, 31-31, 31-33, 31-42, 31-44, 31-45
	Wing 3, 2nd Floor, 32-50, and 32-74
600	X-ray dept and dental X-ray
601	southeast side
607	entire and outside refrigerator
1301	115, 116, and 116-A

All areas contained small amounts of radioisotopes and were considered low hazard areas except for Building 261, which contained the radioisotope storage, burnable solids, liquid and acid wastes. It was considered a moderate hazard area.[515]

In 1964 Detrick received 22 shipments of radioisotopes with 35 items containing P-32, C-14, and I-131. The following year Detrick received 57 shipments of radioisotopes with 65 items containing P-32, C-14, I-131, and I-125.[516] The Radiation Protection Officer discussed and identified the following 31 projects involving the use of radioactive materials during 1964 and 1965.[517]

List of Approved Programs

Project	***Building No***	***Isotope***	***Status as of 1964***	***Status as of 1965***
62-1	*560*	*C-14*	*Active*	*Closed*
62-5	*525*	*Ra-226*	*Active*	*Active*
63-2	*470*	*Kr-85 & Ra-226*	*Active*	*Active*
63-3	*560*	*C-14*	*Active*	*Inactive*
63-4	*560*	*I-131*	*Active*	*Active*
64-1	*560*	*P-32*	*Active*	*Closed*
64-2	*560*	*C-14*	*Active*	*Active*
64-3	*538*	*S-35*	*Inactive*	*Inactive*
64-4	*538, 560*	*S-35, C-14, & H-3*	*Inactive*	*Inactive*
64-5	*1301*	*C-14*	*Active*	*Active*
64-6	*1301*	*C-14, P-32, S-35, and H-3*	*Active*	*Active*

Project	***Building No***	***Isotope***	***Status as of 1964***	***Status as of 1965***
64-7	*560*	*C-14*	*Inactive*	*Inactive*
64-8	*560*	*C-14*	*Inactive*	*Inactive*
64-9	*538*	*C-14*	*Active*	*Inactive*
65-1	*538*	*C-14*		*Inactive*
65-2	*525*	*H-3*		*Active*
65-3	*560*	*P-32*		*Active*
65-4	*1301*	*C-14*		*Active*
65-5	*560*	*P-32 & S-35*		*Active*
65-6	*467*	*C-14 & H-3*		*Inactive*
65-7	*538*	*I-125*		*Active*
65-8	*1301, 567*	*P-32*		*Active*
65-9	*1301, 1412*	*P-32*		*Active*
65-10	*539*	*P-32*		*Active*
65-11	*550*	*P-32*		*Inactive*
65-12	*560, 538*	*I-131*		*Active*
65-13	*539*	*C-14, P-32, S-35, & H-3*		*Active*
65-14	*539*	*P-32*		*Active*
65-15	*1301*	*P-32*		*Active*
65-16	*560*	*C-14*		*Inactive*
65-17	*560*	*I-131 & I-125*		*Inactive*

In March 1966, the U.S. Army Medical Unit had its own material license but transferred waste material to Fort Detrick. When this occurred the material then fell under the installation license and hence paperwork was required to document the transfer of the material from one license to the other.[518]

Following the BW demilitarization of Detrick in the early 1970s, tenant activities became more independent and in case of USAMRIID obtained their own By-Product Material license. In 1979, the NRC met with the Detrick Radiological Safety Office and informed them that the NRC viewed Fort Detrick as a single entity with multiple NRC licenses or more specifically, as a "federal enclave". This implied that Fort Detrick has a responsibility to monitor those licenses within its boundaries. Specifically, this involved responsibility to provide detailed instructions and operation procedures, provide periodic training in DOT and NRC regulatory requirements, and to periodically retrain employees who operate the processes which generate waste.[519] This condition continued through the 1980s and 1990s with the Garrison developing guidance and oversight for the tenant activities but with additional or more specific guidance coming from the tenants such as the USABRDL, which operated under the U.S. Army Garrison license (i.e. 19-01151-02).[520]

On 30 March 2000, Detrick terminated services with tenant organizations under license 19-01151-02 and notified the NRC of its intention to discontinue operations and request termination of the license. Fort Detrick published the Decommissioning Plan for License 19-01151-02 in December 2002. The decommissioning plan indicated that all isotopes authorized by license 19-01151-02 have decay half-lives equal to or less than 120 days except: hydrogen-3, carbon-14, calcium-45, nickel-63, zinc-65, cadmium-109, and cesium-137.[521] The decommissioning plan also involved the inspection of Buildings 261, the Radiological Waste Storage building, and Buildings 201, 459, 568, and 1301 where isotopes were used. The plan did not include many of the buildings identified in use over the course of the license (e.g. 236, 321, 427, 432, 433, 467, 470, 524, 525, 538, 539, 550, 560, 567, 600, 601, 605, 607 and 1412). Activities in Buildings 568 and 1301 were transferred to license # 19-11831-03. The decommissioning survey of Building 459 did not reveal any radiological contamination.[522] Radiological surveys were conducted for Buildings 201 and 459[523] to ensure that the buildings were within NRC release criteria. Building 261 had a more detailed inspection criteria as outlined in the Decommissioning Report on Building 261.[524] In addition to the buildings, the landfill in Area B also required assessment.[525] Upon completion of these activities the license was terminated.[526] After the termination of the license, the need for a Radiation Protection Officer (RPO) for the Garrison ended.

The 1998 Environmental Planning Guide[527] stated that the U.S. Army Garrison (License # 19-01151-02) at Fort Detrick had received radiological waste from the U.S. Army Garrison, USAMRIID, USDA, and the FCRDC.

8.2.5 Other By-Product Licenses

The NRC also issued By-Product licenses to one of the major tenants at Fort Detrick, USAMRIID including License Nos. 19-11831-01, 19-11831-03 and presumably 19-11831-02 based on the sequential numbering. The ASR did not recover all the USAMRIID licenses and amendments. Only Amendment 2[528], 23 May 2001 has been recovered for USAMRID License # 19-11831-01. This amendment listed the following isotopes:

- 2,100 curies per source — Cesium 137 (in a sealed source) 8,400 curies total
- 3,000 curies per source — Cobalt 60 (in a sealed source) 52,800 curies total

The NRC issued License 19-11831-03[529] to USAMRIID on 3 Jan 1991 and authorized the following isotopes:

- 10 curies Carbon 14
- 10 curies Krypton 85
- 10 mCi Iodine 129

- 10 mCi Any byproduct material other than alpha emitting byproducts

- Amendment 1[530], 23 July 1992 added 15 mCi of Nickel 63 in the form of foils or plated sources not to exceed 150 mCi total.
- Amendment 2[531], 27 July 1996 changed the expiration date to 31 Dec 2000
- Amendment 3[532], 12 February 1997 made changes to the conditions of the license
- Amendment 4[533], 18 September 1997 also made changes to the conditions of the license
- Amendment 5[534], 16 April 2001 changed the expiration date to 30 Apr 2011
- Amendment 6[535], 1 October 2001 made changes to the conditions of the license
- Amendment 7[536], 9 January 2002 also made changes to the conditions of the license
- Amendment 8[537], 15 May 2002 made changes to the amounts of isotopes in order to comply with state agreements

8.3 DISPOSAL AND BURIAL OF RADIOACTIVE MATERIAL

Methods for disposal of radioactive materials from Detrick prior to 1951 are unclear. Although Detrick developed tentative rules for handling radioisotopes in November 1947, a listing has not been recovered. Detrick also relied on the SOP for Radiological Safety for the Army Chemical Center at Edgewood, MD. The 1950 version of that SOP indicates waste containing short half-lives would be aged out and disposed of through non-radioactive waste channels when the highest activity measures less than twice that of background. In other areas they would adapt the methods and processes developed by AEC for radioactive waste disposal.[538] Hence AEC's published pamphlet on handling radioactive waste in October 1949 would guide procedures in use at Fort Detrick.[539] Section IV of the AEC pamphlet covers safe handling of wastes resulting from the radioisotopes distribution program. This section allows burial on user owned property at a minimum depth of five feet if the energy level is less than 4.15 ergs per gram dissipated per day. Iodine 131 may be discharged to the main sewer provided that one gram of potassium iodide is added for each millicurie discharged. Phosphorus 32 may be discharged to the sewer provided that it is diluted to 0.1 microcurie per liter of sewage. Carbon 14 may be exhausted in the air at less than 0.01 microcurie per liter and provided that particulate matter is filtered from exhausted air.

During the summer of 1951, a trench in the grid area (Area B test grid) was dug to bury solid radioactive waste (see following figure). During the last half of 1951 approximately 148 gallons of solid waste and 190 gallons of liquid waste were disposed of in the trench. Detrick diluted liquid waste to 0.1 microcurie for disposal.[540]

Use of the trench appears to be limited to approximately one year as in June 1952, Detrick dug a shaft after rain spread contamination throughout the trench previously used. The shaft was surrounded by a wire fence and marked with "radioactive" signs.[541]

The specific location of the shaft is undetermined but appears to be in the same vicinity as that trench remains labeled on maps through 1954 and is delineated on later versions in 1960 and 1970s (see section 6.7.2 Area B Disposal Areas).[542] It could also be located at other locations in the vicinity in Area B as two locations are identified as "Radiological Material Sites" on a 1979 map (see following figure).

By 1952, Detrick placed individual steel carboy containers throughout the laboratories to collect radioactive waste. Detrick also placed four 100 gallon tanks in a section of Building T-270 to store liquid waste from Carbon 14, Phosphorus 32, Sulfur 35 and one spare. The tanks allowed for concentrating material from multiple locations and providing a central location the natural decay of Phosphorus 32 (with about a 14 days half life). The tanks also allowed for the dilution of the waste as AEC allowed for the discharge of waste into the sewer system when the radiation level was less than 0.1 millicuries/liter.[543]

In the fourth quarter of 1952, 85.5 gallons of solid radioactive waste was buried at the radiological material disposal site in Area B and another 85 gallons stored in the tanks in T-270.[544]

In August 1956, the Crops Division agreed to dispose of sludge from the sewage disposal plant.[545] Detrick regulations in the 1960s continued to allow *Sludge from the Fort Detrick Monocacy River sewage disposal plant may be used on-post or off-post as fertilizer*."[546] Although not explicitly stated, this implies the Crops Division used this sludge to condition the fields on post and potentially the soils for the greenhouse. The practice of local farmers using the sludge for fertilizer was considered a common practice by the late 1980s.[547] This is mentioned here in light of the above instances of radioactive contamination entering the sewer system.

In August 1956 a Byproduct Material License application, Detrick described the waste disposal practices currently and previously in use. Liquid waste was collected in specially marked containers and held to allow any short lived isotopes to decay. Long lived ones, such as Carbon 14 were disposed of according to National Bureau of Standards Handbook 53 taking into consideration institutional sewage. Solid wastes were collected and stored until a sufficient amount accumulated for burial, with animal carcasses being separated from other solid waste. The burial facilities consisted of:

> *"two separate holes 15x15x15 feet are kept separate (physically approximately three miles from the main post) in an area that is fenced and secured by Army police, consisting of gate guard and roving patrol. Each hole is then fenced with three strands of barbed wire and radiation caution signs, with the postscript, 'Radiological Waste Only' are placed to face any direction of approach to the hole. Animal carcasses are buried in one hole and solid waste is buried in the other one. At least four feet of cover dirt is used in each burial. When a hole is completely filled, it is posted as to its contents and another hole is dug."*

With the Army's publication of AR 40-580 Control of Hazards to Health from Radioactive Materials, Detrick intended to follow the guidelines for future disposal. However, the February 1957 version of AR 40-580 and the 1956 and 1957 versions of AR 755-380, Disposal of Supplies and Equipment: Disposal of Radioactive Material do not include specific disposal guidance but includes directions on how to get approval for disposal methods and to comply with AEC regulations contained in 10 CFR 20.[548]

The end of local radiological material burial on Detrick appears to coincide with activation in 1957 of the Army's east coast Radioactive Material Disposal Facility (RMDF) at Edgewood Arsenal, MD (DPG serviced the western portion of the U.S.). The RMDF mission was to receive and consolidate radioactive waste from Army installations and to conduct final disposition of the consolidated wastes (sea dump or land burial). As such, this facility received radioactive waste from Fort Detrick for ultimate disposal.[549] The 1963 Detrick Radiological Safety Manual and regulations detailed the methods for collecting, packaging, storing and shipping but do not indicate if this includes on-site burial in keeping with the use of the RMDF. It does indicate that receipt of radioisotopes or radioactive material consigned will be delivered to the Radiological Safety Section (Building 550).[550] In Fiscal Years 1964 and 1965 Fort Detrick shipped 13,099 pounds of radioactive waste to the Edgewood Arsenal RMDF.[551] For the calendar years of 1964 and 1965, Fort Detrick made 11 shipments to the Edgewood Arsenal RMDF totaling 81 30-gallon drums of solid burnable waste, 335 gallons of liquid waste in 30-gallon containers, and 340 five-gallon containers of animal carcasses.[552]

It is undetermined when Detrick ceased shipping waste to the Edgewood RMDF. In 1979, Detrick continued storing the waste at the "Radiological Waste Storage Facility" in Building 261 and packaging it for shipment elsewhere. The Detrick Radioactive Waste Safety Regulations from 1991/1992 included directions about continuing to use Building 261, Radiation Waste Management for packaging, processing and storage of all radioactive waste for ultimate disposal under the authority of the Radiation Protection Officer (RPO). By that point, the solid waste material no longer went to the Edgewood Arsenal RMDF but rather was handled by a waste disposal contractor to the AMCCOM.[553]

In 1969, Detrick updated installation safety regulations and retained the procedures in place from 1963 regarding radiological materials: *"Regulations applicable to the use, handling, storage, and disposal of radioactive material are published separately in the Radiological Safety Manual (December 1963)."*[554]

As noted above, in 1952 Detrick released treated radioactive waste into the Detrick sewer system which flowed to the treatment plant. This was done in accordance with guidelines provided in Title 10 (Energy) of the Code of Federal Regulations (CFR), which include the requirements prescribed by the NRC binding on all persons and organizations who receive a license from NRC to use nuclear materials. This practice was codified in Part

20 Section 303 (10 CFR 20.303) and by July 1963 it authorizes disposal by release into sanitary sewerage system if it is readily soluble or dispersible in water and the quantity released into the sewer results in an average concentration less than or equal to the limits specified in Append B, Table 1 of the 10 CFR or 10 times the quantity of such material specified in Appendix C of 10 CFR. This is the guidance the Detrick continued to follow and cite in the 1991 version of the Fort Detrick Safety Regulation on Radioactive Waste.[555]

Between 1975 and 2000, the Fort Detrick sanitary wastewater treatment plant continued to receive and treat radioactive waste from research and development activities. From the mid-1970s until 1997, Detrick disposed of the dried sewage sludge containing radioisotopes from the wastewater treatment process at the post landfill in Area B. During a 1988 inspection of the facility, the NRC took a sample of sludge for analysis. The results indicated 50 pCi/gm of S-35. In response, procedures were implemented to test each batch of sludge for radioactivity prior to release to the landfill and if it exceeded standards it would not be released. It was noted that the amount of sludge was small (about 250 cubic yards per year) and the landfill had a system for collecting leachate, which would be tested for radioactivity. In May 1997 Fort Detrick ceased disposal of sludge at the landfill as a result of an NRC policy shift requiring disposal of sludge having radioactivity distinguishable from background as radioactive waste rather than solid waste. Responding to the policy shift, Detrick collected the dried sludge and transported it to a low-level radioactive waste facility in Clive, UT (i.e. Envirocare) between 1998 and 2000. The Oak Ridge Institute for Science and Education analyzed data from sludge samples in November 1998 and June 1999 for various isotopes.[556] The last disposal of radioactive waste through the sanitary sewer occurred in December 1999 with the final shipment of radioactive waste occurring in 2004.[557]

8.4 RADIATION SURVEYS

By the 1980s, an outside Army agency began performing periodic surveys of the practices being conducted at Fort Detrick and its tenant agencies, as it did for other Army facilities with an NRC By-Product Material License. In 1984 the U.S. Army Environmental Hygiene Agency conducted a Radiation Protection Survey of the USAMRIID activity at Fort Detrick. In addition to the conclusion that no health hazards resulted from the ionizing radiation at USAMRIID, the survey noted that USAMRIID transferred the radioactive waste generated to NRC License No. 19-01151-02 managed by U.S. Army Garrison Fort Detrick and they disposed of liquid radioactive waste dumping it into the Fort Detrick Sewer System.[558]

The U.S. Army Environmental Hygiene Agency conducted additional Radiation Protection Survey in 1986, 1989 and 1992 with similar findings but noted that USAMRIID operated four medical and two dental X-ray units. In 1994, the U.S. Army Environmental Hygiene Agency became U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) (currently the U.S. Army Public Health Command

(USAPHC) but the radiation surveys continued in 1995 and 1998 under USACHPPM.[559] USAMRIID continues to use a hot sink for the disposal of liquid radiological waste; however, that required the permission from the Post RPO prior to each activity. During the May 1998 Industrial Radiation Survey for Detrick USACHPPM determined that the current license did not permit the possession of Indium 111 or license exempt quantities of uranium 238 (as urnayl acetate) and therefore, a Department of Army radiation authorization (DARA) was required to authorize possession and disposal of both of these isotopes.[560]

USACHPPM continued to conduct periodic radiation protection surveys and those in August 2001, November 2003, January 2007, and December 2009 determined that there were no current health hazards at Detrick but did identify some small documentation problems that needed correction.[561]

9 SUMMARY AND CONCLUSIONS

This Archive Search Report (ASR) was undertaken to gather available historical textual, cartographic and photographic material relating to historic activities and operations conducted at Fort Detrick. The purpose of this investigation was to analyze that information and determine what, if any, potential hazardous releases to the environment may have occurred as a result of those past events that have not yet been investigated as part of the ongoing Fort Detrick Installation Restoration Program (IRP).
In simplest terms, the ASR investigation looked at quantities of chemicals, agents and materials used , the locations of their use and/or disposal, and the potential for their release into the environment, to help the U.S. Army Garrison Fort Detrick and U.S. Army Environmental Command (USAEC) determine if there is any hazard remaining on or migrating from the site.

From its beginning during World War II as the center of the U.S. Army's BW RDT&E efforts for both offensive and defensive purposes, the primary safety concern at Fort Detrick was the release of BW agents being investigated at the facility into the environment. As such, Fort Detrick made extensive efforts to contain BW agents within the laboratories, test chambers, pilot plants and other facilities on the installation. Additionally, Detrick prohibited open air testing of BW agents on post, limiting the field tests to the use of BW simulants, non-toxic substance that mimicked the properties of the pathogens being tested in the laboratories. Field test also included a limited amount of anti-crops agents, the testing of which was timed in order to eliminate any potential threat to local crops.

Fort Detrick developed decontamination methods to sterilize facilities and material contaminated during the RDT&E activities in order to continue their safe use or to prepare them for safe disposal. The sterilization methods included treating any potentially contaminated effluent or gases (air) that could possibly have come in contact with BW agents. The decontamination and/or sterilization methods developed involved thermal treatment (heat/incineration) and/or chemical treatment. The use of chemicals for decontamination/sterilization, as well as in experimental reagents, refrigeration, pest control and other historical activities at Fort Detrick may have resulted in environmental releases. The environmental releases include both intentional disposal activities and unintended releases through accidental spills or normal use of materials later found to present a potential threat to the environmental.

In accordance with the IRP being conducted at Fort Detrick under the Defense Environmental Restoration Program, the Army has conducted numerous environmental investigations to evaluate potential environmental risks and taken remedial actions to address areas where a risk to human health or the environment was identified. This ASR sought to verify and supplement the findings of those previous studies, while identifying any previously unrecognized potential issue.

APPENDIX A

REFERENCE SOURCES AND RECORDS REVIEWED

APPENDIX A

A REFERENCE SOURCES AND RECORDS REVIEWED

A.1 TEXTUAL AND CARTOGRAPHIC REPOSITORIES

The research team searched at the following locations for records relating to activities at Fort Detrick. At these repositories, the research team used finding aids and records managers to assist in locating documents relevant to the research topic. The investigation team also accumulated complementary documents reviewed on Fort Detrick, but not specifically used. These complementary documents are stored with the original ASR back-up documents. Appendix C contains the References of all in text endnote citations. The following subparagraphs describe the research team's efforts at the noted archival repositories:

A.1.1 American Biological Safety Association

1200 Allanson Road
Mundelein, IL 60060-3808
Historic Resources Committee
USDA ARS National Program Staff
Animal Production & Protection
5601 Sunnyside Ave. , Room 4-2174, Mail Stop 5148
Beltsville, MD 20705-5148
http://www.absa.org/

The research team contacted this group regarding their potential records pertinent to this investigation and was informed they had information on the early biosafety conferences as well as a collection of the Fort Detrick Safety Bulletins. The research team located this material at U.S. Department of Agriculture National Agricultural Library, Special Collections under the American Biological Safety Association Records-Manuscript Collection 359 (11 boxes in total) (see notes for that repository).

A.1.2 Air Force Historical Research Agency (USAFHRA)

600 Chennault Circle
Maxwell AFB AL 36112-6424
http://www.au.af.mil/au/afhra/

The research team queried the IRIS database for records relating to the Detrick Field and the later Camp/Fort Detrick. Once the airfield became Camp/Fort Detrick under the Chemical Warfare Service, the Air Corps/Air Force units stationed there were related to meteorological studies. No units were identified with an aerial dispersal mission.

Corps of Engineers Boxes	Detrick 02018390-02018394

K381.212	Eastern Communications Region 1966
526.01	Division/0002/Air June 1942-June 1945
215.81-2	Unit/0072/Army Air Forces Base 1946
WG-2-HI V. 1	Wing/0003/Bombardment 1942-1943
K360.4-1	Squadron/0001/Weather 1950
K360.3-4	Group/0004/Weather 1954
SQ-WEA-12-HI	Squadron/0012/Weather 1947
SQ-AB-312-HI	Squadron/0312/Base HQs and Air Base 1942-1944
K360.3-4 to K360.3-4 V. 1	Group/0004/Weather 1953-1955

A.1.3 Alvin L. Young Consulting, Inc.
Cheyenne, WY 82009
Alvin (Al) L. Young, Ph.D., Environmental Toxicologist

Since 1968, Dr. Alvin L. Young has gathered documents, reports, and photographs of the use of Agent Orange and other herbicides. A retired Colonel in the U.S. Air Force he has also been affiliated with the Epidemiology Division of the School of Aerospace Medicine; the Environmental Epidemiology Unit of the Department of Veterans Affairs; Science Advisor for the United States Department of Agriculture; Director, Center for Risk Excellence, United States Department of Energy; and a Visiting Professor and Senior Fellow with the Institute for Science and Public Policy at The University of Oklahoma. He maintains a special collection on Agent Orange at the National Agricultural Library: http://www.nal.usda.gov/speccoll/findaids/agentorange/index.htm The research team did not locate any additional documentation at this repository relating to the specifics of Fort Detrick testing than beyond those available from the DoD technical information centers/libraries (i.e. DTIC and CBRNIAC) but did locate other documents of use to the investigation.

A.1.4 Armed Forces Pest Management Board (AFPMB)
U.S. Army Garrison - Forest Glen
2460 Linden Lane, Building 172
Silver Spring, MD 20910

The research team supplemented their research efforts using the Armed Forces Pest Management Board, Defense Pest Management Information Analysis Center Literature Retrieval System (LRS) http://lrs.afpmb.org/rlgn_app/ar_login/guest/guest to locate documents not available through DTIC.

A.1.5 Chemical, Biological, Radiological, Nuclear Information Analysis Center (CBRNIAC)
Building E3330, Room 150,
Aberdeen Proving Ground – Edgewood Area, MD 21010-5423
http://www.CBRNIAC.apgea.army.mil/

Formerly CBIAC, the CBRNIAC is a full service Department of Defense (DoD) Information Analysis Center (IAC) under contract to the Office of the Secretary of Defense, Director of Defense Research and Engineering and administratively managed by the Defense Technical Information Center (DTIC see below). The CBRNIAC serves as the focal point for DoD Chemical, Biological, Radiological and Nuclear (CBRN) Defense scientific and technical information. It provides services to DoD organizations, other government groups, and their approved contractors.

Of primary interest to this research is the CBRNIAC Bibliographic Database (CBRNIAC BD). DPG's Technical Information Center's (i.e. library) former UNIX system search engine was converted and provided the basis for much of the information on the CBRNIAC BD. Formerly CBIAC, the CBRNIAC is a full service Department of Defense (DoD) Information Analysis Center (IAC) under contract to the Office of the Secretary of Defense, Director of Defense Research and Engineering and administratively managed by the Defense Technical Information Center. The CBRNIAC serves as the focal point for DoD Chemical, Biological, Radiological and Nuclear (CBRN) Defense scientific and technical information. It provides services to DoD organizations, other government groups, and their approved contractors.

Of primary interest to this research is the CBRNIAC Bibliographic Database (CBRNIAC BD). Dugway Proving Grounds' (DPG) Technical Information Center's (i.e. library) former UNIX system search engine was converted and provided the basis of much of the information on the CBRNIAC BD. The scanning in of DPG TIC collection provides the core of the CBRNIAC collection. Locating documents is most readily completed by using DTIC online search engine to locate unclassified (generally available as PDF) and classified documents at this location.

A.1.6 Defense Technical Information Center (DTIC)
8725 John J. Kingman Road Ste. 0944
Fort Belvoir, VA 22060-6218
http://www.dtic.mil/dtic/

The Defense Technical Information Center (DTIC) is the largest central resource for DoD and government-funded scientific, technical, engineering, and business related information. It is a DoD Field Activity within the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L), reporting to the Director, Defense Research & Engineering (DDR&E). DTIC provides ready access to relevant information formerly contained in their various Technical Information Centers or libraries located throughout the DoD (e.g. scanned PDFs of reports). DTIC's origins date back to WWII

and a shared Air Corps and Navy document center (i.e. library) to collect process and distribute scientific and technical reports. DTIC sponsors a number of additional Information Analysis Centers (IACs) including most relevantly to this investigation CBRNIAC (formerly CBIAC). A DTIC information query accesses not only the information catalogue / database within the DTIC holdings but also within the IACs as well, allowing a search for a report in multiple different repositories. The unclassified material is available on-line, though much of the material has distribution restrictions limiting it with DoD. Classified documents are available as well but are distributed in hard copy form.

The research team located the published Fort Detrick reports regarding the herbicide testing at Fort Detrick from DTIC and its sub-installation CBRNIAC.

A.1.7 Department of Defense (DoD) Military Health System
Force Health Protection & Readiness Policy & Programs
Skyline 4, Suite 901
5113 Leesburg Pike
Falls Church, VA 22041
http://fhp.osd.mil/CBexposures/index.jsp

The DoD and the Department of Veterans Affairs (VA) play distinct roles in dealing with chemical and biological (CB) exposures. DoD identifies and validates veteran's exposure to CB agents and provides the names of these individuals along with their exposure information to the VA. The VA then notifies individuals of their potential exposure, provides treatment, if necessary, for these individuals and adjudicates any claim for compensation. The Department of Defense (DoD) Military Health System maintains databases regarding these exposures and web page: Chemical-Biological Warfare Exposures Site, http://fhp.osd.mil/CBexposures/index.jsp. Included is a page regarding the Human Subject Research at Fort Detrick: 1943 - 1973 regarding the Project CD-22 and Operation Whitecoat.

A.1.8 Frederick National Laboratory for Cancer Research Scientific Library
(formerly National Cancer Institute at Frederick)
Wilson Information Services Corporation, Contractor
P.O. Box B, Bldg. 549, Sultan St.
Frederick MD 21702-1201
301-846-1093
NCIFredLibrary@mail.nih.gov

The research team contacted this repository in search of specific documents relating to facilities at Detrick but did not receive any material for this investigation.

A.1.9 Fort Detrick, U.S. Army Garrison – Environmental Management Office
1546 Porter Street, Suite 304A
Fort Detrick, MD 21702-5000
262 Beasley Drive
Fort Detrick, MD 21702

The research team met with Environmental and Restoration Managers numerous times over the course of this investigation, coordinating the findings and research effort.

The research team contacted the former Garrison Radiation Protection Officer (RPO), Safety and Occupational Health Specialist at Fort Detrick and determined that the files previously maintained by the RPO office were in boxes stored in Building 261. The holdings consisted of approximately 20 boxes of various sizes. The team reviewed these documents, copying documents pertinent to the report being prepared. The documents copied included NRC licenses and amendments, radiation closure files for various buildings and licenses, and similar materials. The files also contained shipping documents for the shipment of radiation waste from Fort Detrick from the 1980s which were not copied.

A.1.10 Fort Detrick, U.S. Army Garrison – Directorate of Installation Services (DIS)
201 Beasley Drive
DIS Engineering and Contracting Division, Room 247-C
Fort Detrick, MD 21702
http://www.detrick.army.mil/dis/

The research team reviewed the contents of the 452 flat files or map drawers in the Engineering Drawing/Blueprint Vault on the 2nd floor of Building 201. They copied numerous drawings, maps and sketches of the installation as catalogued in the spreadsheet Fort Detrick Maps Spreadsheet 2010-11-08.xls.

A.1.11 Fort Detrick, U.S. Army Garrison – Network Enterprise Center
Building 1422
Fort Detrick, MD 21702

The research team reviewed the approximately four linear feet of Transfer Record forms for Fort Detrick (i.e. SF 135s) beginning back in 1953. Currently they send all their files to Washington National Records Center (WNRC) in Suitland, MD

A.1.12 Fort Detrick, U.S. Army Garrison – Public Affairs Office
810 Schreider Street
Fort Detrick, MD 21702
http://www.detrick.army.mil/

The research team coordinated with the elements of the Fort Detrick Garrison regarding any material they might have from previous requests for information on this topic. As the

former Detrick Technical Library has been disbanded and dispersed, they are no longer the DoD repository for this information did not have any pertinent material that was not acquired from other sources. The Garrison Public Affairs Office provided the research team with a hard copy of the 4th Edition of "Cutting Edge, A History of Fort Detrick, Maryland: October 2000. This document can also be found online at: http://www.detrick.army.mil/cutting_edge/index.cfm

A.1.13 Former Fort Detrick Public Affairs Officer
Frederick, MD 21702-4143

The research team contacted the Public Affairs Officer and Command Historian at Fort Detrick between October 1977 and May 1999. He still lives in Frederick, Maryland, just four blocks from Fort Detrick. Among his numerous professional and commercial publications is the "Cutting Edge, A History of Fort Detrick, Maryland" available online at: http://www.detrick.army.mil/cutting_edge/index.cfm

In 1983, he was instrumental in the establishment of the Restoration Advisory Board (RAB) at Detrick and was responsible for maintaining the records of the RAB and the environmental reports and publications provided to the public (e.g. Administrative Record) with one set being maintained at the Frederick Public Library, one at the Detrick Post library and one in his office. The latter of set of material was transferred to the Garrison's Environmental Management Office, which now has members on the RAB including Joe Gortva, Restoration Manager. He believed this series of material of represents a fairly comprehensive series of environmental material from approximately 1980 onward.

In regards to the former Fort Detrick Technical Library, this occurred before his arrival on post but his understanding was that it was disbanded fairly quickly (approximately six months) in 1971 with the bulk of the material going to Dugway Proving Ground's Technical Library with other parts going to Edgewood perhaps. Portions of the material were not retained but he was uncertain as how much or what the reasoning was, such as duplication of material elsewhere.

When he retired, he left his Command Historian and other files at the post with the Garrison but could not say what happened to all the records afterwards as he was not there. Based on conversations with his contacts on post, he suspects they ended up damaged beyond repair due to improper storage and may have been subsequently ruined.

He discussed some of his challenges as PAO over nearly 20 years with Fort Detrick and the difficulties in educating the public about what occurred as evidenced by the facts as opposed to stories that have developed from people's fears. He also suggested a number of avenues of research or specific historical material to review for this investigation.

He provided an inventory of bound volumes of reprints of public science journals stored within the USAMRIID Library, presented to former director of Science Dr. Riley D.

Housewright. Mr. Covert had someone prepare a chronological list of the articles and authors.

A.1.14 National Academies Press
500 Fifth Street NW
Lockbox 285
Washington, DC 20055
http://www.nap.edu/

The research team downloaded the Executive Summary of Veterans and Agent Orange: Update 2008 by Institute of Medicine (IOM) of the National Academies. The 2008 report is the eighth volume in a series of biennial updates regarding the comprehensive evaluation of scientific and medical information regarding the health effects of exposure to Agent Orange and other herbicides used in Vietnam.

A.1.15 National Archives at Washington DC
8th and Pennsylvania
Washington, DC 20408-0001
http://www.archives.gov/dc-metro/washington/index.html

The research team did not identify any relevant holdings at this repository.

A.1.16 National Archives at College Park, Textual Records
8601 Adelphi Road
College Park, MD 20740-6001
http://www.archives.gov/dc-metro/college-park/index.html

Record Group 16 (Records of the Secretary of Agriculture)

Entry 17 General Correspondence of the Office of the Secretary, 1945
Boxes 1094-1096, 1160-1162, 1594, 1595

Record Group 18 (Records of the Army Air Forces)

Entry 1A Confidential and Secret Decimal Correspondence, 1945-1948
Box 278

Entry 1D Decimal File, 1946-1947
Box 672

Entry 2A Decimal File, 1944-1946
Boxes 2247, 2248

Entry 166 Central Decimal Files, 1917-1938
Boxes 589, 590, 592, 596, 606, 628, 636, 643, 1173, 1177, 1210

Entry 293B Central Decimal Files, 1939-1942
Box 324

Entry 295A Project Files Airfields, 1939-1943
Boxes 1492-1502

Record Group 51 (Office of the Bureau of Budget)

Entry 149A War Projects Unit General Files, 1940-1945
Boxes 9, 38-42, 51, 62, 63, 64, 65

Entry 149B War Projects Unit, Inspections, 1940-1945
Boxes 1-8, 10-75, 76-171, 217-253, 348, 608-616

Record Group 59 (Records of the Department of State)

Entry 1587 M Subject File on Biological Warfare, 1956-1962

Entry 5545 Records Relating to Agent Orange, 1961-1974

Record Group 77 (Records of the Office of the Chief of Engineers)

Entry 33 Real Property, 1952 (77-56A-0417)
Box 118

Entry 106B General Correspondence, 1918-1945
Box 777

Entry 276 Project and Geographic File, 1954
Box 14

Entry 391 Construction Completion Reports, 1917-1943
Box 12

Entry 416 Real Estate Branch, 1917-1944
Box 8

Entry 417 Real Estate Branch, 1917-1944
Boxes 45-47

Entry 433 Project Geographic Files, 1948
Box 24

Entry 435 Project and Geographic File, 1949-1950

Box 19

Entry 436 Project and Geographic Files, 1940-1952
Boxes 20, 42

Entry 437 Military Planning Design Construction, 1953
Box 9

Entry 532 Real Property Title/Hist, 1955 (59G-0814)
Boxes 24, 25

Entry 568 Realty, 1948 (52A-0088)
Boxes 23, 24

Entry 1011 Formerly Security Classified Subject Files, 1941-1945
Boxes 318, 518

Record Group 92 (Records of the Office of the Quartermaster General)

Entry 1974A Construction Completion Reports, 1917-1919
Boxes 146-148

Record Group 107 (Records of the Office of the Secretary of War)

Entry 211 Establishment of Airfields and Air Bases, 1940-1945
Boxes 203-217

Record Group 112 (Records of the Office of the Surgeon General [Army])

Entry 4 Fort Detrick, MD Human Subjects Review Board, Investigational Drug Files, 1968-1979
Boxes 1-4

Entry 5 Fort Detrick, MD, Clinical Investigation Service, Human Use Board, Drug Tests, 1970-1979
Box 1

Entry 6 Fort Detrick, MD Surgeon General Human Subjects Research Review Board, Meeting Minutes, 1984
Boxes 1-2

Entry 31-AH World War II Administrative Records-ZI (Geographic File, 1917-1949)
Boxes 213, 226, 268, 520, 522, 1045-1047, 1074, 1429

Entry 31-AL World War II Administrative Records-SWPA (Geographic File, 1917-1949)
Box 213

Entry 54A World War II Administrative Records, 1940-1949
Box 63

Entry 120 Office of the Surgeon General, Fort Detrick, MD Human Subjects Research Review Board, Minutes, 1982
Boxes 1-2

Entry 178 Inspector General Inspection Files, 1959
Box 40

Entry 192 Research and Development Studies, 1971 (63J-1605)
Box 3

Entry 221 Inspector General Inspection Files, 1962
Box 14

Entry 247 Radiation Protection Committee, 1969 (72N-3502)
Box 34

Entry 260 Inspector General Files, 1970
Box 2

Entry 282 Field Experiment Cases, 1941-1948
Boxes 1-2

Entry 295A Records of the Preventive Medicine Division: Biological Warfare Specialized Files, 1941-1947
Boxes 1-13

Entry 438A Fort Detrick, MD 1973 (79-0015)
Boxes 1-4

Entry 1011 Security Classified Administrative File
Box 33

Entry 1018 Divisions of Surgeon General Office Annual Reports

Entry 1036 U.S. Army Garrison Fort Detrick, MD Program Briefing Files, 1977-1979
Boxes 7-9

Entry 1037 U.S. Army Garrison Fort Detrick, MD General Records, 1971-1974
Box 10

Entry 1038 U.S. Army Medical Research and Development Command, Fort Detrick, MD Comptroller Division Program Development Files, FY1967-1975
Boxes 1-6

Record Group 121 (Records of the Public Building Service)

Entry 6 Real Property, 1975 (121-77-0302)
Box 5

Entry 8, Real Property, 1971 (121-76-309)
Box 3

Record Group 156 (Records of the Office of the Chief of Ordnance)

Entry 1120 Services and Installations Office, Contractor and Real Estate Branch Military Construction, Army Project Files, 1955-1957
Box 1

Record Group 159 (Records of the Office of the Inspector General)

Entry 26D General Correspondence, 1939-1947
Boxes 454

Entry 26E General Correspondence (formerly Confidential), 1939-1947
Box 178

Record Group 160 (Headquarters Army Service Forces)

Entry 27 Installations Branch Correspondence Files Relating to Construction, Utilization and Disposition of Bases, 1942-1946
Boxes 31, 34

Record Group 165 (Records of the War Department General and Special Staffs)

Entry 258 Reports and Correspondence Relating to Construction, Utilization, and Disposal of Army Installations, 1944-1947
Boxes 149-152

Entry 486 Decimal File 1943-May 1946
Boxes 26, 37, 52, 63, 113

Entry 488 Security Classified Correspondence File, 1942-1947
Boxes 180-188

Entry 489 Security Classified General Correspondence of a Special Committee on Secret Weapons, 1943-1944
Boxes 170-177

Entry 490 Agenda, Minutes of Meetings, Reports and Correspondence Relating to Suggestions, Discoveries, and Mechanisms Made by Civilian Inventors, 1940-1945
Boxes 178, 179

Record Group 175 (Records of the Chemical Warfare Service)

Entry 1 Records of the Office of the Chief Chemical Officer, 1946-1954 (67A4900)
Boxes 9-13, 17-24, 27-36, 41-58, 61-71, 76-78, 91, 194-202, 223-232, 236, 290, 300, 308, 311, 312, 315, 321, 362, 365, 395, 401, 402

Entry 2 Index Briefs, 1918-October 1942
Boxes 41, 65, 140

Entry 2A Army Chemical Center Edgewood Arsenal, 1941-1945
Box 91

Entry 4C Station Series, 1942-1945
Box 183

Entry 4E Travel Reports, 1944-1958
Boxes 68-76

Entry 4F Travel Reports, 1944-1945
Boxes 184, 185

Entry 4M Research and Development Case Files, 1921-1945
Boxes 379-382

Entry 5 General Correspondence Station Series, 1955-1959
Boxes 4-10, 12, 29-31, 36-46, 51-59, 62-68

Entry 6 Historian's Background Files, 1922-1967
Boxes 1-14

Entry 22 Biological Department Chemical Corps Fort Detrick
Boxes 1-16

Entry General Correspondence, Miscellaneous Series, 1955-1959
Boxes 88-93

Record Group 181 (Records of the Naval Districts and Shore Establishments)

Entry 81, Naval Unit Fort Detrick, Maryland Medical Research and Development Project Files, 1973-1975; Acc:#75-0183
Box 1

Record Group 218 (Records of the Joint Chiefs of Staff)

Entry 92 Joint New Weapons Committee, 1942-1945
Boxes 1, 19, 36-39

Entry 93 Joint New Weapons Committee Subject File, 1942-1946
Box 1

Record Group 227 (Records of the Office of Scientific Research and Development)

Entry 96 Division 10 (Absorbents and Aerosols) General Records, 1942-1945
Boxes 1-15

Entry 160 Tropical Deterioration Administrative Committee General Records, 1944-1946
Boxes 1-24

Record Group 310 (Records of the Agricultural Research Service[ARS])

Entry 1038, Crops Research Division, Nematology Section, Research Annual Reports 1925-1964
Boxes 1-7

Entry 1039, Crops Research Division, Research Annual Reports 1905-1967
Boxes 1-9

Record Group 319 (Records of the Army Staff)

Entry 47 Assistant Chief of Staff, 1942-1955
Box 8

Entry 47C
Box 1232

Entry 47F Army Intelligence Project Decimal File, 1949-1950

Box 75

Entry 47G Army Intelligence Project Decimal File, 1951-1952
Boxes 189, 192

Entry 47H Project Decimal Files, 1954
Box 30

Entry 68 Top Secret Correspondence, 1956-1962

Entry 82 Publications Files, 1950-1951
Boxes 3243-3244

Entry 254A War Department Liaison Officer--NDRC General File, 1940-1946
Boxes 266-285

Entry 254B War Department Liaison Officer--NDRC Daily File, 1942-1947
Boxes 411-422

Entry 1166 Medical Unit Annual Reports, 1970-1983
Boxes 4, 73

Entry A3700 (microfilm) Annual Historical Summaries of Department of the Army Agencies, 1950-1964
Reels 1-15

Record Group 330 (Records of the Office of the Secretary of Defense)

Entry Herbicide File 1965-1971
Box 1

Entry 341 Records Concerning Organization, Budget, and the Allocation of Research and Development, 1946-1953
Boxes 3, 4, 22, 23, 25, 26, 35, 37, 78, 79, 80, 319, 320, 321, 324, 336, 337, 363, 364, 365, 467

Entry 395
Boxes 1-5

Entry 396
Box 1

Entry 397
Box 1

Entry 1016 Defense Research and Engineering Office, Research and Development Board, Records Relating to Chemical and Biological Warfare, 1946-60
Box 1

Record Group 337 (Records of Headquarters of the Army Ground Forces)

Entry 93A Quartermaster Section Formerly Classified Decimal Files, 1944-1947
Box 6

Record Group 338 (Records of U.S. Army Operational, Tactical and Support Organizations World War II and Thereafter)

Entry 78-AH Unclassified Records of U.S. Army Commands Transferred from NPRC, Chemical Commands, Chemical Core Research and Engineering and Chemical Corps Material Command
Boxes 1-8 FRCs 490/32/35/1

Entry 78-P Unclassified Records of U.S. Army Commands Transferred from NPRC Chemical Corps Research and Development Command, Edgewood Arsenal
Boxes 1-3 FRCs 490/32/33/6

Entry 401-167 Fort Detrick, MD, 1975 (79-0014)
Box 1 FRC 170/46/23/7

Entry 401-172 Fort Detrick, 1968-1972 (74A-0700)
Box 1 FRC 170/46/24/5

Entry 401-238 R&D Committee Fort Detrick, 1965-1976(84-0301)
Boxes 10-12 FRCs 170/46/28/6

Entry 401-296 R&D Committee Fort Detrick, 1965-1979 (84-0302)
Boxes 1-8 FRCs 170/46/35/1

Entry 401-322 BIO Lab Fort Detrick, 1971 (74C-0925)
Boxes 5-6 FRCs 170/47/4/1

Entry 401-402 Fort Detrick, MD, 1975 (79-0013)
Box 1 FRC 170/47/14/4

Entry 401-405 BIO Lab Fort Detrick, 1962-1971 (74A-0925)
Box 1 FRC 170/47/16/4

Entry 402-12 Tubes 8-46 Fort Detrick, 1966 (72E-1057)
Tubes 8-46

Entry 402-55 Fort Detrick, 1970 (71A-0342)
Boxes 1-2

Entry 402-56 Fort Detrick Tech Report, 1970 (71G-0342)
Boxes 49-50

Entry 402-57 Fort Detrick, 1960-1969 (71K-0342)
Boxes 61-66

Entry Fort Detrick Technical Reports, 1969 (71I-0342)
Boxes 56-57

The following boxes were originally reviewed at the WNRC but have been transferred to the National Archives – College Park (Classified Holdings) and were reviewed for purposes of copying previously identified pertinent documents.

Accession 338-78-0267, Biological Laboratories Fort Detrick, Misc. Manuals and Reports, 1954-64
Boxes 3, 6, 7, and 10

Accession 338-78-0268, Biological Laboratories Fort Detrick
Box 1

Accession 338-78-0281, Biological Laboratories Fort Detrick, 1958-1960
Box 1

Accession 338-78-0282, Biological Laboratories Fort Detrick, R&D Case Files, 1956-1960
Boxes 2, 3, and 6

Accession 338-78-0290, Comptroller Fort Detrick, 1946-1958
Box 1

Accession 338-78-0292, HQ Fort Detrick, 1955
Boxes 1 and 2

Accession 338-78-0296, HQ Fort Detrick, 1953-1954
Boxes 6, 14 and 15

Record Group 342 (Records of the U.S. Air Force Commands, Activities, and Organizations)

Entry 26 Central Decimal Correspondence Files, 1919-1950
Box 1987

Record Group 389 (Records of the Office of the Provost Marshal General 1941-)

Entry 481 Subject Correspondence Files, 1947-1950
Box 2045

Record Group 407 (Records of the Adjutant General's Office 1917-)

Entry 37H Project Files, 1926-1939
Boxes 2998, 3133

Entry 360B Army AF Classified Decimal Files, 1951-1952
Box 3901

Entry 363A Army AG Decimal File, 1940-1945
Box 4426

Entry 363B Unclassified Project Decimal Files, 1946-1948
Box 1719

Entry 363C Unclassified Project Decimal Files, 1949-1950
Box 1074

Entry 363D Unclassified Project Decimal Files, 1951-1952
Box 1022

Entry Project Decimal File, 1953-1954
Box 382

Entry Unclassified Project Decimal Files and Cross Reference Sheets, 1957-1958
Box 650

Record Group 429 (Records of Organizations in the Executive Office of the President)

Entry 4 Records Relating to Federal Agencies
Boxes 1-2 (Dept of Agriculture land)

Entry 7 Records Relating to Legallon Authorizations for Property Disposition, March-May 1982
Box 1 (Dept. of Agriculture land)

Entry 12 Central Real Property Surveys
Box 34

Record Group 544 (Records of the U.S. Army Materiel Command)

Entry 1 Research and Development Case Files, 1959-1962

Entry 1 Installation Historical Files, Developmental Test Command Centers, 1920-1977
Boxes 1-18

Entry 1 USAMC Historical Office Annual Historical Summaries and Directly Related Unique Background Materials, 1964-1984
Boxes 1-5

Entry 2 USAMC Historical Office Installation Files, 1953-1977
Boxes 1-2

Entry 9 US Army Biological Defense Research Laboratory Program Records, 1965-1977
Boxes 3, 4, 16-19

Entry 34
Box 56

Entry 36 USASMC Safety Instruction Files, 1963-1965 (67G-4571)
Box 14

Entry 89 Military Construction Program, 1967 (69A-4331)
Boxes 1-2

Entry 90 Real Estate, 1974 (77-1032)
Boxes 1-4

Entry 91
Boxes 1-5

Entry 295
Box 4

Entry 645 Fort Detrick AG Organizational Planning File, 1964 (68A-3865)
Boxes 1-8

Entry 646 USA BIOLAB Fort Detrick, 1967-1968 (71B-0412)
Box 1

Entry 647 USA BIOLAB Fort Detrick (71C-0412)
Boxes 2-4

Entry 648 Fort Detrick, 1968 (72B-0520)
Box 1

Entry 649 Comptroller Fort Detrick, 1968 (72D-0520)
Boxes 19-22

Entry 650 Fort Detrick, FY68-FY69 (73C-0191)
Boxes 20-21

Entry 651 Fort Detrick, FY64-FY65 (69A-0599)
Box 1

Entry 652 Cost Ledger Fort Detrick (69C-0599)
Box 3

Entry 653 BIOCTR Fort Detrick, 1965-1967 (71C-0152)
Boxes 16-19

Entry 654 Fort Detrick, MD (70B-0624)
Box 1

Entry 655 Fort Detrick, MD, 1966 (70C-0624)
Box 2

Entry 657 Fort Detrick Tech Reports, 1969 (70G-0624)
Boxes 7-8

Entry 658 Fort Detrick, 1964-1966 (70A-0363)
Box 1

Entry 659 Fort Detrick, 1966 (70C-0363)
Boxes 25-26

Entry 660 Biological Center Fort Detrick, FY63-FY68 (71A-0152)
Box 1

Entry 661 Fort Detrick Briefing, 1965-1970 (74B-0515)
Box 3

Entry 663 BIO DEF Labs Fort Detrick, 1968-1971 (73C-3198)
Box 1

Entry 664 Fort Detrick, 1971 (73F-3198)
Box 6

Entry 665 USAMRIID Fort Detrick, 1971 (73G-3198)
Box 17

Entry 666 USAMRIID Fort Detrick (73H-3198)
Box 18

Entry 667 Fort Detrick, 1968 (72A-1014)
Boxes 1-3

Entry 668 Fort Detrick, FY68-FY70 (74A-0515)
Box 2

Entry 857 Security Program Files, 1960 (63A-1742)
Boxes 1-3

Entry 1139 Ordnance Disposal (70A-0987)
Box 1

Entry 1305 Installations History Files, 1956-1971 (73A-2089)
Boxes 1-4

Entry 1313 AMC Safety Instruction Files, 1958-1968 (68A-4175)
Box 1

Record Group 546 (Records of the United States Continental Army Command)

Entry 54 Headquarters U.S. Army Combat Development Command, U.S. Army Combat Systems Group, U.S. Army Chemical, Biological, and Radiological Subject Files, 1967-1972
Box 125

A.1.17 National Archives at College Park, Cartographic and Architectural Branch
8601 Adelphi Road
College Park, MD 20740

The research team reviewed the Military, Forts, Posts and Installations Finding Aid notebooks and located the following items:

Record Group 77 (Records of the Office of the Chief of Engineers)
Entry Fortification – WWII "Military Files"
Folder 6972 Frederick Municipal Airport (Detrick Field), 1941

The research team also looked into potential holding within the following record group with no success:

Record Group 227 (Records of the Office of Scientific Research and Development)
22 items total concerning Divisions 4, 5 and 14 (not applicable to Detrick)

A.1.18 National Archives at College Park, Still Pictures Branch
8601 Adelphi Road
College Park, MD 20740

Record Group 111 (Records of the Army Signal Corps)

Entry 111-SC Signal Corps Photographs of American Military Activity, 1941-1954
No pertinent imagery identified

Entry SC-111A Signal Corps Photographs of American Military Activity, 1941-1954, Albums
Albums 211, 5710-5723, 5937-5940A

Entry 111-SC Signal Corps Photograph s of American Military Activity, 1955-1981
Boxes 358, 412

Entry 111-C Contact Prints: Color Photograph s of Signal Corps Activities, ca.1944-1981
Boxes 47, 48, 50

Record Group 342 (Records of United States Air Force Commands, Activities and Organizations)

Entry 342FH Air Force Pre-1954 Official Still Photography Collection
Boxes 2207, 2229

A.1.19 National Archives at College Park - Motion Picture, Sound and Video Reference
8601 Adelphi Road
College Park, MD 20740
http://www.archives.gov/research/formats/film-sound-video.html#online

ARC #2123750/local identifier 175.23 “A Look into Fort Detrick 1962”

ARC #30277226/local id 175.75 “Fever”

ARC #630396/local id 342 “Half a Loaf – Evaluation of Anti-crop Weapon”
– not available

A.1.20 National Personnel Records Center Military Personnel Records (NPRC, MPR)

Appraisal and Disposition Section
9700 Page Avenue
St. Louis, MO 63132-5100
http://www.archives.gov/st-louis/index.html

The primary mission of the NPRC, MPR is to store the Official Military Personnel Files (OMPF) from all service branches for veterans for NARA. However, the NPRC, MPR retains a significant amount of Army and Air Force records accessioned after World War II that are slowing being processed for retention elsewhere in the NARA system, primarily at the College Park facility. The material is assigned to basic records groups based on whether it came from the Army or the Air Force:

Record Group 338 (Records of U. S. Army Commands, 1942-)

Record Group 342 (Records of the U.S. Air Force Commands, Organizations and Activities)

Accession 338-56A-3068 Headquarters Fort Detrick Administration 1951-1952
Boxes 1, 2, 3, 4, 6, 7, 8

Accession 338-56B-3068 Headquarters Fort Detrick Administration 1951-1952
Box 1

Accession 338-56C-3068 Headquarters Fort Detrick Publications 1951-1952
Box 1

Accession 338-56E-3068 Fort Detrick Publications 1951-1952
Box 1

Accession 338-57A-3186 Fort Detrick Administration 1953
Boxes 1, 2

Accession 338-57A-4072 Fort Detrick Administration 1953
Box 1

Accession 338-57A-5087 Fort Detrick Administration 1953
Box 1

Accession 338-57B-4072 Fort Detrick Administration 1953
Boxes 1, 2, 3

Accession 338-58A-0077 Fort Detrick Administration 1954
Boxes 2, 3, 4, 5, 6, 8, 9

Accession 338-58B-0077 Fort Detrick Administration 1954
Box 1

Accession 338-58C-0077 Fort Detrick Instructions 1953-54
Box 1

Accession 338-58D-0077 Fort Detrick Administration 1954
Box 1

Accession 338-58F-0077 Fort Detrick Publications 1954
Boxes 1-12

Accession 338-58G-0077 Fort Detrick Publications 1954
Box 1

Accession 338-58H-0077 Fort Detrick Administration 1954
Boxes 1, 2

Accession 338-58I-0077 Fort Detrick Instructions 1954
Box 2

Accession 338-58J-0077 Fort Detrick Technical Reports 1954
Boxes 1-6

Accession 338-58K-0077 Fort Detrick Technical Reports 1954
Boxes 1-4

Accession 338-58L-0077 Fort Detrick Research & Development Supervisor 1954
Box 1

Accession 338-59A-3322 Fort Detrick Administration 1955
Boxes 1-7

Accession 338-59B-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59C-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59D-3322 Fort Detrick Unit History 1955
Box 1

Accession 338-59E-3322 Fort Detrick Instructions 1955
Box 1

Accession 338-59F-3322 Fort Detrick Instructions 1955
Box 1

Accession 338-59H-3322 Fort Detrick Administration 1955
Boxes 1, 2

Accession 338-59I-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59J-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59K-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59L-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59M-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59N-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59O-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59P-3322 Fort Detrick Administration 1955
Box 1

Accession 338-59R-3322 Fort Detrick Unit History 1955
Box 1

Accession 338-60A-0147 Fort Detrick Administration 1956
Boxes 1, 3, 4, 5, 6, 7

Accession 338-60B-0147 Fort Detrick Publications 1956
Box 1

Accession 338-60C-0147 Fort Detrick Historical Background 1956
Box 1

Accession 338-60D-0147 Fort Detrick Administration 1956
Boxes 1, 3, 5, 6

Accession 338-60E-0147 Fort Detrick Research & Development PROJ 1956
Boxes 1, 2

Accession 338-60F-0147 Fort Detrick Organizational Planning 1956
Box 1

Accession 338-60G-0147 Fort Detrick Unit History 1956
Box 1

Accession 338-61A-3208 Fort Detrick Administration 1957
Boxes 1-4

Accession 338-61C-3208 Fort Detrick Technical Reports 1957
Box 1

Accession 338-61D-3208 Fort Detrick Administration 1957
Box 1

Accession 338-61E-3208 Fort Detrick Unit History 1957
Box 1

Accession 338-61G-3208 Fort Detrick Administration 1957
Box 1

Accession 338-61H-3208 Fort Detrick Organizational Planning 1957
Box 1

Accession 338-61I-3208 Fort Detrick Administration 1957
Box 1

Accession 338-62A-0061 Fort Detrick Administration 1958
Boxes 1-4

Accession 338-62B-0061 Fort Detrick Administration 1958
Boxes 1-3

Accession 338-62C-0061 Fort Detrick Instructions 1958
Boxes 1-2

Accession 338-62D-0061 Fort Detrick Instructions 1958
Box 1

Accession 338-62E-0061 Fort Detrick Instructions 1958
Box 1

Accession 338-62F-0061 Fort Detrick Publications 1958
Boxes 1-2

Accession 338-63C-4062 Headquarters Fort Detrick Operational Program 1958-1959
Box 1

Accession 338-63D-0020 Fort Detrick Instructions 1959
Box 1

Accession 338-63E-0020 Fort Detrick Publications 1959
Box 1

Accession 338-63F-0020 Fort Detrick Security Classified 1959
Box 1

Accession 338-63G-0020 Fort Detrick Technical Reports 1957
Box 1

Accession 338-63H-0020 Fort Detrick Security Classified 1959
Box 1

Accession 338-64A-0066 Fort Detrick Organizational Planning 1962
Boxes 1-2

Accession 338-64A-0108 Fort Detrick Organizational Planning 1960
Box 1

Accession 338-64A-0424 Fort Detrick Organizational Planning 1961
Box 1

Accession 338-64B-0066 Fort Detrick Technical Reports 1960
Boxes 1, 2, 3, 4, 5, (6) 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

Accession 338-64B-0108 Fort Detrick Instructions 1960
Box 1

Accession 338-64B-0424 Fort Detrick Operational Planning 1961
Box 1

Accession 338-64C-0108 Fort Detrick Security Classified 1960
Boxes 1, 2

Accession 338-64C-0424 Fort Detrick Operational Program 1961
Box 1

Accession 338-64D-0424 Fort Detrick Operational Planning 1959-1961
Box 1

Accession 338-65A-0454 Fort Detrick Organizational Planning 1962
Box 1

Accession 338-65B-0109 Fort Detrick Instructions 1961
Box 1

Accession 338-65B-0454 Fort Detrick Organizational Planning 1962
Box 1

Accession 338-65C-0109 Fort Detrick Organizational Planning 1961
Box 1

Accession 338-67A-6014 Fort Detrick Organizational Planning 1963
Box 1

Accession 338-67B-0725 Fort Detrick Operational Procedures 1963
Box 1

Accession 338-67B-6014 Fort Detrick Security Classified 1963
Box 1

Accession 338-67C-6014 Fort Detrick Technical Reports 1961
Boxes 1-6

Accession 338-67D-6014 Fort Detrick Security Classified 1963
Box 1

Accession 338-67E-6014 Fort Detrick Technical Reports 1966
Boxes 1-3

Accession 338-68A-0716 Fort Detrick Operational Procedures 1961-1964
Box 1

Accession 338-68B-0716 Fort Detrick Program Briefing 1964
Box 1

Accession 338-68C-0716 Fort Detrick Operational Procedures 1964
Box 1

Accession 338-68D-0716 Fort Detrick Instructions 1963-1964
Box 1

A.1.21 Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738
Public Document Room (PDR)
http://www.nrc.gov/reading-rm/pdr.html

The NRC has nuclear regulation responsibility. Originally this fell under the Atomic Energy Commission (AEC), which Congress established in the Atomic Energy Act of 1946. With the Atomic Energy Act of 1954, AEC gained the mission of regulating nuclear safety. The Energy Reorganization Act of 1974 created the Nuclear Regulatory Commission (NRC), which began operations on January 19, 1975. At the headquarters Public Document Room (PDR) reference librarians help in locating or obtaining documents in Agency wide Documents Access and Management System (ADAMS), the NRC official recordkeeping system. The web based ADAMS provides ready access to downloadable PDF documents on the Publicly Available Records System (PARS) Library as well as bibliographic citations on the Public Legacy Library relating to documents available in paper or microfiche formats. The research team conducted ADAMS queries of Detrick and the specific license numbers as follows:

- 19-11831-03 U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
- 08-01738-02, and 08-01738-03 Walter Reed Army Medical Center
- 19-21091-01 SAIC-FREDERICK, INC (at NCI at Detrick)
- 19-01151-1, and 19-01151-02 Dept of the Army

This resulted in locating a number of Detrick related documents which were downloaded for this investigation. Queries of the Public Legacy Library database for the microfiche citations did not reveal any pre 1990 references to Detrick documents. There were a couple hits in the 1990s regarding license 19-01151-02 but were of limited value and they were not reviewed.

A.1.22 U.S. Army and Joint Services Records Research Center (JSRRC)
7701 Telegraph Road
Kingman Building, Suite 2C08
Alexandria, Virginia 22315-3802
https://www.rmda.army.mil/organization/jsrrc.shtml

The JSRRC mission is to research military unit records in support of Veterans' claims for Post Traumatic Stress Disorder and Agent Orange exposure and serves as Secretary of the Army's action agent for direct support of the Department of Veterans Affairs. It is

formerly the U.S. Armed Services Center for Unit Records Research (CURR), and before that Research of Unit Records, Environmental Support Group (ESG). The research team did not identify relevant material at this repository not available at other repositories.

A.1.23 U.S. Army Center of Military History (CMH)
Historical References Branch
103 Third Avenue
Fort McNair
Washington DC 20319-5058
http://www.history.army.mil/

The research team reviewed applicable volumes of the CMH's multi-volume United States Army in World War II history series for The Technical Services including:

- THE CHEMICAL WARFARE SERVICE: ORGANIZING FOR WAR. by Leo P. Brophy and George J. B. Fisher. (1959, 1989; 498 pages, CMH Pub 10-1.) - Includes discussion of the Special Project Division, Biological Warfare Installations and other CWS school which include information on Detrick
- THE CHEMICAL WARFARE SERVICE: FROM LABORATORY TO FIELD. by Leo P. Brophy, Wyndham D. Miles, and Rexmond C. Cochrane. (1959, 1980; 498 pages, CMH Pub 10-2.) - Chapter V covers Biological Warfare overall and Detrick specific information.

A.1.24 U.S. Army Chemical, Biological, Radiological, and Nuclear School
Historical Office
Fort Leonard Wood, MD 65472-8926

The research team contacted the chemical school history office and archives and discussed the mission. The historian stated he did not feel the collection would contain any useful information but referred us to the Chemical Command historical office.

A.1.25 U.S. Army Chemical Materials Agency
AMSCM-SSP
5183 Blackhawk Road
APG-EA, MD 21010-5424
http://www.cma.army.mil/home.aspx

The U.S. Army Chemical Materials Agency's Non-Stockpile Chemical Materiel Project (NSCMP) provides centralized management and direction to the U.S. Department of Defense for the disposal of non-stockpile chemical warfare materiel. In 1993 the NSCMP developed a Survey and Analysis Report to identify locations, types and quantities of non-stockpile chemical material (NSCM). That report was updated in 1996 and released publicly. Fort Detrick property was not included among the listed properties.

A.1.26 U.S. Army Corps of Engineers, Baltimore District, Real Estate Branch (CENAB-RE)
City Crest Building
10 South Howard Street, Room 7710
Baltimore, MD 21201

The research team reviewed the five volume Real Estate Division Permanent Historical File for Fort Detrick, Audit No. 5066.

The real estate office also provided the team a printout of the current REMIS Outgrant Document Record listings for Fort Detrick. In general ONLY active or current outgrant files are retained and earlier ones that have expired or canceled are destroyed (i.e. the agricultural out leases between the 1950s through the 1980s were not retained). They examined the files for:

- DACA-31-4-98-1123 Department of Agriculture
- DACA-31-4-03-282 AF Medical Evaluation Support Act

The team also reviewed the Cadastral flat map files for Fort Detrick, getting copies of the three 1985 revised real estate sheets.
Note there are five drawers of Closed Military files (i.e. FUDS).

A.1.27 U. S. Army Corps of Engineers – Baltimore District, HTRW Branch (CENAB-EN-H)
City Crest Building
10 South Howard Street, Room 11000
Baltimore, MD 21201

The research team discussed and coordinated the scope of the ASR effort and any potential coordination efforts with the HTRW team's work, but did not receive any primary information used in this effort.

A.1.28 U. S. Army Corps of Engineers – Baltimore District - Fort Detrick Integrated Program Office (IPO) (CENAB-DET)
1557 Porter Street
Fort Detrick, MD 21702

The research team discussed and coordinated the scope of the ASR effort and any potential coordination efforts with the IPO team's work, but did not receive any primary information used in this effort.

A.1.29 U.S. Army Corps of Engineers - St. Louis District
Ordnance and Technical Service Branch
CEMVS-EC-P
1222 Spruce St.
St. Louis, MO 63103-2833

The research team began their research of the subject property by consulting research and back-up files. In 1996, this organization completed an ASR on Fort Ritchie for ordnance, explosives (OE) and chemical warfare material (CWM) following the recommendations of the 1995 Base Realignment and Closure (BRAC) to close Fort Ritchie. Although the installation and the report is similar in name (i.e. ASR), the focus of the 1996 effort was only on OE and CWM and did not include any information relating to herbicide testing there. The 1996 ASR back-up files did provide some general information regarding the installation, including historic aerial photographs and maps.

A.1.30 U.S. Army Dugway Proving Ground (DPG)
Dugway, UT 84022-5000

The research team contacted the Public Affairs Officer, former Program Manager for the DPG Technical Information Center (TIC), regarding Unclassified but Limited Distribution Material at the DPG TIC and available through the CBRNIAC and DTIC information services. The material in question includes a number of the formal technical reports which are unclassified but have restrictions on distribution, including

- Further Dissemination Only As Directed
- U.S. Govt. And Their Contractors
- U.S. Govt. Only; DOD Controlled
- Controlled; DOD Controlled
- U.S. Govt. Agencies Only
- U.S. Govt. Agencies and Their Contractors
- DOD Components Only
- For Official Use Only
- Approved For Public Release
- Unlimited Distribution

Although the Biological Department of the Chemical Corps headquartered at Fort Detrick (and its various other names) were the corporate authors of the documents, DPG Technical Library (i.e. TIC) is noted as the responsible authority for other distribution requests on many of the documents since it provided the documents to CBRNIAC and DTIC. The PAO contacted DPG's FOIA official and lead librarian who offered advice on how to handle the matter but suggesting other offices would likely be more suited to handle the request.

A.1.31 U.S. Army Edgewood Chemical Biological Center (ECBC) Technical Library
5183 Blackhawk Road, Building 3330
APG, MD 21010-5424

The ECBC Technical Library is a separate and distinct collection for the CBRNIAC holdings, based on the old DPG Technical Library. The ECBC Technical Library indexes their holdings with the STILAS online catalog with ~75,000 unique document records. It is separate from the CBRNIAC as well. The numbering system includes "ADE" numbers similar in series to the DTIC numbers.

The CBRNIAC librarians should also have access to the earlier Chemical Biological Archive Information Management System (CBAIMS). The purpose of CBAIMS was to collect, assemble, catalogue, and archive CB defense information from multiple service locations into a central repository and library. Battelle was the lead contractor and this served as the basis of CBRNIAC.

The CBRNIAC librarian believes the holdings of the former Fort Detrick Technical Library went to DPG in the mid-late 1970s but did not know this for certain.

The research team visited this location on 2 and 3 March 2011 and reviewed the following documents from the original distribution to acquire better copies of the photos in the reports:

- 1945-11 SR038 A Pilot Plant for the Production of Plant Pathogens CB-046956.pdf
- 1945-01-01 SR039 The Development of IR as a Biological Warfare Agent CB-046955
- 1946-01-01 SR044V1 Munitions for Biological Warfare Volume 1 CB-022690.pdf
- 1946-01-01 SR044V2 Munitions for Biological Warfare Volume 2 CB-109500.pdf
- 1946-08 SR078 Observations on The Permanent Effects of Aerial Plant Growth Inhibitory Sprays Upon Natural Vegetation CB-048759.pdf
- 1947-09 SR079 Crop Destruction by Chemical Agents AD310658.pdf
- 1947-09 SR079P2 Crop Destruction by Chemical Agents AD0310659.pdf
- 1947-09 SR079P3 Crop Destruction by Chemical Agents AD0310660.pdf
- 1948-02-24 SR092 Field Plot Experiments with Plant Inhibitors 1946 and 1947 Seasons AD0310664
- 1949-08-01 SR105 Field Plot Experiments with Plant Inhibitors, 1948 Season CB-046362.pdf
- 1952-04-11 IR006 (BLIR) Preliminary Investigation of Rotating Clusters for BW Munitions AD0310638.pdf
- 1952-09-04 IR010 (BLIR) Bomb, Biological, 750 lb., E86 AD0325445.pdf

- 1957-10 IR167 Principles and Practices of BW Decontamination 23, Decontamination of Aircraft Interiors by Means of Detroxide CB-011181.pdf
- 1958-08 Technical Study 011 Anti-crop Agents

The research team also copied the following documents not available elsewhere:

- Chemical Corps Research and Development Command Biological Warfare Laboratories, Interim Report 139 Thermal Death Time of Bacillus Anthracis Spores December 1956 (AD159387)
- Chemical Corps Research and Development Command Biological Warfare Laboratories, Interim Report 164 The Evaluation of Field Methods of BW Decontamination of Vehicles and a Study of the Hazards Created During Contamination and Decontamination of Vehicles February 1958 (AD159469)

The research team reviewed these classified documents:

- Technical Report 59 Development of a Process for Filling, Assembling, and Packaging the E412T (U) January 1965 AD357220 (not at Fort Detrick)
- Miscellaneous Publications 38 Water Test in Building 8 (U) ADE473266 (not at Fort Detrick)

A.1.32 U.S. Army Engineering and Support Center Huntsville Recovered Chemical Warfare Material & Design Center (RCWM DC or CEHNC-OE-CW)

Ordnance and Explosives Directorate
4820 University Square
P. O. Box 1600
Huntsville, AL 35807-4301
http://www.hnd.usace.army.mil/oew/RCWM_DC.aspx

The research team coordinated with the RCWM DC regarding the interviews being conducted regarding Fort Detrick of former personnel and others in the community.

A.1.33 U.S. Army Environmental Command (USAEC), Cleanup Division

U.S. Army Installation Management Command at J&M Business Park Army Environmental Command
11711 North IH 35, Suite 110
San Antonio, TX 78233
POC: Laurie Haines
410-436-1545

The ASR research team worked directly for and coordinated with USAEC throughout the entire process.

The USAEC Environmental Reporting Office collects Army-wide environmental data required by Headquarters, Department of the Army (HQDA) and DoD decision-makers. They provided Web-based collection and analysis tools used by installations, garrisons, the Installation Management Command (IMCOM), Army commands and HQDA. The Army Environmental Reporting Online (AERO) portal facilitates data collection, analysis, and access to all the AEDB reporting modules and other army environmental systems. AERO generates environmental reports and performs in-depth cross-program analyses of the Army's environmental data. ERO continuously modifies and develops AERO data elements, application modules and reports to meet the Army's environmental requirements. The ASR team queried the AERO database for Detrick related documents and downloaded selected items of interest to this investigation not located from other sources.

A.1.34 U.S. Army Legal Services Agency
Environmental Law Division
Litigation Branch
9275 Gunston Road, Suite 4300
Fort Belvoir, VA 22060-5546

The research team assisted this office of the Judge Advocate General (JAG) regarding Agent Orange testing questions at Fort Ritchie and the ASRs for Fort Detrick.

A.1.35 U.S. Army Medical Department (AMEDD) Center of History and Heritage
Directorate of Strategic Communication, MEDCOM
Fort Sam Houston, TX

The research team contacted the MEDCOM Center of History and Heritage regarding records pertaining to Fort Detrick and to discuss the current research project. This office does not have records on Fort Detrick testing which are specific to our records project. They have a collection of more general unit activities used for overall history. The Center of History and Heritage is interested in our findings and having our data in electronic format upon completion. They will be able to store classified data if necessary.

A.1.36 United States Army Medical Research Institute of Infectious Diseases
(USAMRIID) Library
1425 Porter Street
Fort Detrick, Maryland 21702-5011

The research team contacted this repository in search of specific documents relating to facilities at Detrick but did not receive any material for this investigation.

A.1.37 U.S. Army Medical Research and Materiel Command (MRMC)

Public Affairs (MCMR-PA)
504 Scott Street
Fort Detrick MD 21702-5012
https://mrmc.detrick.army.mil/

The research team visited this repository to review the contents of five, 5 drawer safes that came from U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) Command's secured room in 2009. The contents of these safes primarily consisted of the pre-1970 Detrick produced documents including numerous technical reports, studies, memorandums, etc. The reviewed material did not contain any material relating to herbicides except as an overview or general documentation regarding Detrick, such as an annual history. This makes sense as USAMRIID did not inherit that mission and would not need to retain that data as part of their reference collection.

A.1.38 U.S. Army Public Health Command (Provisional) (USAPHC)

[formerly U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)]
5158 Blackhawk Road, Bldg. E-1677
Aberdeen Proving Ground (Edgewood Area), MD 21010-5403

The ASR research team coordinated with USAPHC but did not receive any additional documentation relating to this project not acquired from another source.

A.1.39 U.S. Army Public Health Command (Provisional) - Entomological Sciences Program

E-5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5403

The research team met with the Manager Entomological Sciences Program and staffers to discuss the research mission. Burroughs stated that his office supervises the Army's pest management program. This office frequently receives outside requests inquiries regarding types of chemicals or pesticides were sprayed at different installations in the past (for lawsuits, health issues, etc.). In the past this office became the repository for Form 1532. Form 1532s list routine use by month, types, quantities, and locations of pesticides, rodenticides, herbicides, and insecticides used at different Army installations. Their collection ranges in time from late 1970s through the 1980s. The guidance changed and currently each installation is supposed to maintain their own records on types of pesticides or insecticides used and record copies are supposed to be filed in the environmental office on each installation. Army Material Command at Rock Island now oversees the monthly Form 1532 for the Army. The research team reviewed the Form 1532 file for Fort Detrick.

A.1.40 U.S. Army Research, Development and Engineering Command (RDEC)
Aberdeen Proving Ground, MD 21005-5201
www.army.mil/RDECOM/
Research and Technology Directorate

The research team requested assistance in review of Limited Distribution of Unclassified Material to release the information to the public from the RDEC FOIA office.

A.1.41 U.S. Army Research, Development and Engineering Command (RDECOM)
Historical Office
Bldg. E-5027, Blackhawk Road
Aberdeen Proving Ground Edgewood Area, MD 21010-5423

This office was formerly the U.S. Army Soldier Biological Chemical Command (SBCCOM) along with various other names. It is the historian's office / repository for the former U.S. Army Chemical Corps / Chemical Center of which Camp/Fort Detrick fell under until the 1970s. They have a large number of classified and unclassified records relating to those commands. The research team visited this location the week of 28 February 2011 and they reviewed the contents of the following unclassified cabinets:

Cabinet 04, Drawer 3 – Fort Detrick
Cabinet 80, Drawer 4 – History of the Chemical Corps
Cabinet 122, Drawers 1-2 – Chemical Corps Technical Committee (CCTC)
Cabinet 155, Drawers 1-4 – Biological
Cabinet 155, Drawer 5 – Herbicides
Cabinet 237 and 238, Drawers 1-5 – Environmental

The research team reviewed portions of the office holdings, which contained copies of the material within the repository cabinets that he had gathered for his ease of use including his notebooks on Agent Orange and Fort Detrick and his file drawer on Biological Warfare.

The research team also reviewed numerous classified documents in their vault. They acquired the following classified material to be sent:

Cabinet 10, Drawer 3

- 6th Annual Report of the Chemical Corps Biological Laboratory, 1 September 1952
- Production of Anti-crop Agents, 1952
- Brief of the Committee on Biological Warfare, 1952
- Technical Estimates AMCTC Meeting 9-68, 5 September 1968
- Compilation & Assignment of BW Agents, 26 July 1956

Cabinet 8

- Compilation of U.S. Army Biological Warfare Agent Production, Storage, Test, Disposal and Decontamination Operations, 1940-1970, November 1970

A.1.42 U.S. Department of Agriculture National Agricultural (USDA) Agricultural Research Service (ARS)
Foreign Disease - Weed Science Research Unit
1301 Ditto Ave.
Fort Detrick, MD 21702
http://www.ars.usda.gov/main/site_main.htm?modecode=19-20-00-00

The research team contacted this organization and received technical reports including copies of the Defoliation Conferences and newspaper articles and clippings regarding Fort Detrick's past activities. The records were left from other scientists upon their retirement or departure. He stated that there was no technical library currently on Fort Detrick but they have an in-house pdf listing of articles ranging from the 1970s-1980s. Generally, Department of Agriculture scientists at Fort Detrick published articles in professional journals. The National Agriculture Library in Beltsville, MD, is the main repository for journal articles written by scientists at Fort Detrick filed under the specific scientist's name.

A.1.43 U.S. Department of Agriculture National Agricultural Library, Special Collections
10301 Baltimore Avenue
Beltsville, MD 20705
301-504-5876
http://www.ars.usda.gov/main/site_main.htm?modecode=12-00-00-00

The research team reviewed records at the National Agriculture Library in their Special Collections. After reviewing the finding aids the following records were reviewed.

American Biological Safety Association Records-Manuscript Collection 359

(11 boxes in total). This collection contained meeting minutes, Photograph s from conferences, and programs from conferences. Only Box 9 contained information pertinent to our mission. The complete finding aid can be viewed on the NAL website. Box 9 contained CDs of Fort Detrick safety bulletins from approximately 1953-1960s. The research team copied all the CDs.

The Alvin L. Young Collection on Agent Orange
http://www.nal.usda.gov/speccoll/findaids/agentorange/index.htm

The research team consulted the Alvin L. Young Collection on Agent Orange within their Special Collections holdings. The research team did not locate any additional documentation at this repository relating to the Fort Detrick testing than available from the DoD technical information centers/libraries (i.e. DTIC and

CBRNIAC). Most of this collection is on line. The documents that are not posted are either copyright materials or have been restricted access due to its classification or former classification

A.1.44 U.S. Department of Agriculture National Agricultural (USDA) Natural Resources Conservation Service (NRSC) - Frederick Service Center
92 Thomas Johnson Dr Ste 240
Frederick, MD 21702-4403

The research team contacted this repository in an attempt to locate the "Soil Survey of Frederick County, Maryland. Advance sheets – Field operations of Soils, 1919" cited in Special Report No. 92 regarding the soil classification noted in the field plot experiments. Reportedly the oldest version of the county survey is from 1957. They would allow copies to be made of it but do not have extra ones to pass out. They also provided the team a link to copy Historical Soil Survey maps posted by the University of Alabama on the internet, which includes the 1919 map available:

http://alabamamaps.ua.edu/historicalmaps/soilsurvey/index.html

A.1.45 Washington National Records Center
4205 Suitland Road
Suitland, MD 20746-8001
http://www.archives.gov/dc-metro/suitland/

A research team from visited the holdings at the WNRC over a number of weeks beginning first in November 2010, and continuing in December 2010, January, March and May 2011, to conduct research on Fort Detrick.

Accession 338-09-0145, U.S. Army Medical Research and Materiel Command MCMR-RPS, 1965-96
Boxes 1-7

Accession 338-63A-1665, Fort Detrick, 1953-56
Boxes 1-4

Accession 338-74B-0925, Biological Laboratories Fort Detrick, 1962-72
Boxes 2-3

Accession 338-74D-0925, Biological Laboratories Fort Detrick BX 7-14, 1971
Boxes 7-14

Accession 338-84-0305, Fort Detrick, 1973-1982
Boxes 8-10;

Accession 338-86-0217, Fort Detrick, 1974-82
Boxes 1-2

Accession 338-71B-0342, Munitions Research & Development Fort Detrick , 1970
Boxes 3-26, 29-34, 36, 46-47

Accession 338-69D-0739, Fort Detrick Research & Development Item Case Files, 1963
Box 3

Accession 338-69E-0739, Fort Detrick Research & Development Item Case Files, 1963-1965
Box 4

Accession 338-70C-0623, Fort Detrick Research & Development Item Case Files, 1964
Boxes 3-6

Accession 338-70D-0624, Fort Detrick Spec & Drawings, 1964
Boxes 3-4

Accession 338-70H-0624, Fort Detrick Research & Development Item Case Files, 1964
Boxes 9-11

Accession 338-71A-0224, U.S. Army Biological Center (Munition Development Research and Development), 1966
Boxes 55-77

Accession 338-71H-0342, Fort Detrick Research & Development Cases, 1970
Boxes 51-55

Accession 338-71J-0342, Fort Detrick Research & Development Cases (Plant Sciences), 1970
Boxes 58-60

Accession 338-72D-1057, Fort Detrick Plans and Programs, 1969-1970
Boxes 6-7

Accession 338-72A-2679, Fort Detrick, 1965-1971
Boxes 1

Accession 338-75A-0156, Fort Detrick Miscellaneous Administration, 1960-1971
Boxes 1-2

Accession 338-78-0267, Biological Laboratories Fort Detrick (Miscellaneous Manuals & Reports), 1954-1964
Boxes 1-9

Accession 338-78-0276, Biological Laboratories Fort Detrick (Miscellaneous Administration), 1959-1965
Boxes 1-12

Accession 338-78-0278, Biological Laboratories Fort Detrick, 1957
Boxes 1-3

Accession 338-78-0279, Biological Laboratories Fort Detrick (Budget Files), 1959-1962
Box 1

Accession 338-78-0280, Biological Laboratories Fort Detrick (Technical Reports), 1958-1960
Boxes 1-2

Accession 338-78-0281, Biological Laboratories Fort Detrick, 1958-1960
Box 1

Accession 338-78-0282, Biological Laboratories Fort Detrick (Research & Development Case Files), 1956-1960
Boxes 1-8

Accession 338-78-0283, Comptroller Fort Detrick (Budget), 1955-1960
Boxes 1-2

Accession 338-78-0284, Fort Detrick (Miscellaneous & Technical Reports), 1958
Boxes 1-3

Accession 338-78-0285, Fort Detrick Research & Development Reports, 1955-1957
Boxes 1-12

Accession 338-78-0288, Biological Laboratories Fort Detrick (Research & Development Administration Files), 1954-1956
Boxes 1-16

Accession 338-78-0289, Biological Laboratories Fort Detrick, 1945-1956
Boxes 1-11

Accession 338-78-0290, Comptroller Fort Detrick, 1946-1958
Box 1

Accession 338-78-0291, HQ Fort Detrick, 1955
Boxes 1-3

Accession 338-78-0292, HQ Fort Detrick, 1955
Boxes 1-4

Accession 338-78-0293, HQ Fort Detrick, 1953-1955
Boxes 1-8

Accession 338-78-0295, HQ Fort Detrick, 1953-1954
Boxes 1-16

Accession 338-78-0296, HQ Fort Detrick, 1953-1954
Boxes 1-39

Accession 338-78-0297, HQ Fort Detrick, 1950-1954
Box 1

Accession 338-78-0298, HQ Fort Detrick, 1953
Boxes 1-2

Accession 338-78-0299, HQ Fort Detrick, 1953
Boxes 1-5

Accession 338-78-0386, Biological Laboratories Fort Detrick, 1963-1964
Boxes 1-2

Accession 338-78-0398, Comptroller & Projects Cord Detrick, 1959-1963
Box 1

Accession 338-78-0554, Fort Detrick, 1961-1966
Boxes 1-4

Accession 338-78-0555, Fort Detrick, 1966
Boxes 1-2

Accession 338-78-0825, Biological Laboratories Fort Detrick, 1948-1952
Boxes 1

Accession 338-80A-0413, CBW Fort Detrick Laboratory Notebooks, 1943-1971
Boxes 1-46
Accession 338-80B-0413, CBW Fort Detrick, 1943-1971
Boxes 47-192

As discussed in section 1.3.1 of this ASR, this is a 192 box accession of laboratory notebooks, with handwritten notes primarily on investigations and tests conducted from 1943 through December 1971. Based on an index for the accession, there were originally approximately 6,150 notebooks, however only about three fourths of the notebooks remain in this accession. In some cases, Detrick destroyed the notebooks and in other cases, the investigators withdrew the notebooks and did not return them to the central Detrick repository. Hence these notebooks are not in the collection sent to the record center. Using the index, the ASR research team identified the notebooks associated with the Crops Division (the group conducting herbicide and defoliation investigations), identified 476 notebooks, of those only 306 notebooks remained in the record center accession. The ASR team reviewed these notebooks and copied the portions of the notebooks dealing with outdoor field testing that occurred on Fort Detrick, as well as other locations.

A.2 AERIAL PHOTOGRAPHY REPOSITORIES

The following repositories were consulted for aerial imagery of the property. Note historical imagery that exceeded 1:40,000 scale was not considered for acquisition. The light gray shading indicates historical imagery that was acquired.

A.2.1 U.S. Army Geospatial Center (AGC)

Warfighter Geospatial Support & Production Directorate Hydrologic & Environmental Analysis Branch (CEAGC-TO-H)
7701 Telegraph Road
Alexandria, VA 22315-3864
http://www.tec.army.mil/

The research team contacted the former U.S. Army Corps of Engineers, Engineer Research and Development Center Topographic Engineering Center (ERDC-TEC) Operation Division, Hydrologic and Environmental Analysis Branch (CEERD-TO-H) regarding the Fort Detrick, MD, Photogeologic Analysis completed in August 2000. The research team sought information regarding the aerial imagery acquisition that occurred for it, in order to locate any contact prints or film diapositives remaining there or where the acquired material was shipped to.

A.2.2 U.S. Environmental Protection Agency-Office of Research and Development

Environmental Sciences Division
PO Box 93478
Las Vegas, NV 89193-3478

The research team contacted this office regarding the January 2001 Aerial Photographic Analysis of Fort Detrick (Area B) Site and the aerial imagery acquisition that occurred for it, in order to locate any contact prints or film diapositives remaining there or where the acquired material was shipped to.

A.2.3 Fort Detrick, US. Army Garrison – Directorate of Information Services (DIS)
201 Beasley Drive
DIS Engineering and Contracting Division, Room 247-C
Fort Detrick, MD 21702
http://www.detrick.army.mil/dis/

The research team reviewed the contents of the 452 flat files / map drawers in the Engineering Drawing/Blueprint Vault on the 2nd floor of Building 201. The research team took temporary control (i.e. borrowed) the following items from Drawer 236 "Photographs":

Aerial Film Cans
- 1972-11-16 at 1:12,800
- 1982-07-21 at 1:13,750

Aerial Film Prints 9" by 9"
- 1952 (6) AHA-4K-98 through 100 and 145-147
- 1976-08095 (2) 2-1 through 2-4
- "Fort Detrick" no date (10), 4-3, 4-13, 5-16, 6-15, 6-20, 6-21, 6-22, 6-27, 6-28 and 7-89. Potentially these are the missing prints to a series provided by Gortva in October 2010
- Undated "Spot" (2) #2 and #3

Aerial Mylars 30" by 42"
- 1975 March (4) Sheets 3, 4, 5 and ?

Miscellaneous Aerial Obliques "C" size
- (8)

Aerial Film Prints 26" by 26"
- 1958-6-9

Aerial Film Prints Annotated Reproductions
- 1937-10-30 prints

AMS Aerial Photo Mosaic
- 1947-09/10 on 1948 photo mosaic map

The oversized photos were returned on 17 November 2010 with the 9-inch by 9-inch prints and cans being retained.

A.2.4 National Archives at College Park, Cartographic & Architectural Branch
8601 Adelphi Road
College Park, MD 20740

The research team consulted the aerial photo coverage overlays in Record Group 373 (Records of the U.S. Defense Intelligence Agency) for imagery at a scale of 1:40,000 or better covering the area. They pulled the index sheet for N39 W77.

Date	Scale	Record Group	Can Number	Frames	Total Frames
9/12/1952	1:20,000	373	DN3728	AHA-4K-99, 100, 101, 144, 145, 146	6

The research team also consulted *Aerial Photographs in the National Archives-Special List 25*, 1990, for available imagery from:

Record Group 57 (Records of the U.S. Geological Survey)
Record Group 95 (Records of the U.S. Forest Service)
Record Group 114 (Records of the Soil Conservation Service)
Record Group 145 (Records of the Agriculture Stabilization and Conservation Service)

The team located the following imagery in Record Group 145:

Date	Scale	Record Group	Can Number	Frames	Total Frames
9/18/1943	20,000	145	ON 38556	DCO-10-26 thru 28 DCO-11-27 thru 29	6

A.2.5 U.S. Geological Survey - EROS Data Center Sioux Falls, South Dakota 57198

CEMVS-EC-S conducted an initial search of available imagery for Fort Detrick and identified the following imagery that covers the property.

Aerial Photography Single Frame

Acquisition Date	Scale	Entity ID	Image Type	Project	Roll No.	Frame No.	Remarks
04/18/1974	12000	AR1VDNO	BW	VDNO00	1	149- thru 153 123 thru 127	

Note: *Last four digits of the Entity ID are the frame number (replace XXXX with frame number – include leading zeros).*

NAPP

Acquisition Date	Entity ID	Project	Roll No.	Frame No.	Film Type	Project Number	Remarks
2/10/1987	NP0NAPP000108XXX	NAPP	108	1	CIR	Frederick	
4/11/1988	NP0NAPP000008XXX	NAPP	8	14 thru 16	CIR	Frederick	
4/6/1998	N10NAPPW10588XXX	NAPPW	10588	43 thru 44	BW	Frederick	
3/20/1999	N10NAPPW10590	NAPPW	10590	93 thru 94	BW	Frederick	
3/26/2000 3/31/2000	N10NAPPW12134XXX N10NAPPW12139XXX	NAPPW	12134 12139	93 & 212	BW	Frederick	

Note: *Last three digits of the Entity ID are the frame number (replace XXX with frame number – include leading zeros).*

NHAP

Acquisition Date	Scale	Entity ID	Project	Roll No.	Frame No.	Film Type	Remarks

4/2/1981	58000	NB1NHAP80033XXX	NHAP80	439	214-215	CIR	

Note: *Last three digits of the Entity ID are the frame number (replace XXX with frame number – include leading zeros).*

A.2.6 U.S. Department of Agriculture - Aerial Photography Field Office
2222 W 2300 S
Salt Lake City, Utah 84119-2020

CEMVS-EC-S conducted an initial search of available imagery for Fort Detrick and identified the following imagery that covers the property.

Frederick County, MD

YEAR	RES/SCL	PROG	%COV *	BND/FLM	FMT	QTY *	REMARKS
1958	20000	FSA	100	BW	PI	4	5006
1964	20000	FSA	100	BW	PI	4	5007
1970	50000	FSA	100	BW	PI	4	5008
1979	40000	FSA	100	BW	PI	6	5009
1981	60000	NHAP1	100	CIRP			
1988	1	NDOP	100	BW	MR	1	CCM
1988	40000	NAPP1	100	CIRP	SI	1	16705
1998	40000	NAPP3	100	BW	DI	1	
2005	1	NAIP05	100	NC	MR	72	QQ 10,249GB
2006	1	NAIP06	45	NC	MR	1	CCM 1.344GB
2007	1	NAIP07	100	NC	MR	1	CCM .703GB
2009	1	NAIP09	100	NC	MR	1	CCM .729GB
2011	1	NAIP11	100	NC	GT	122	CCM .704GB

* %COV and QTY represents amounts for entire county and not necessarily the site

The following repositories were consulted for primarily for textual and cartographic information regarding this investigation.

APPENDIX B

REFERENCES AND REFERENCE MATERIAL *(i.e. endnotes)*

B REFERENCES AND REFERENCE MATERIAL *(i.e. endnotes)*

The reference numbers below refer to the endnote citations in the main text of the document. The citations refer to file names of digital scans of the source material backup documents. The listing and scope of repositories searched for the gathered documents are listed in Appendix A - Reference Sources and Records Reviewed. The following list of endnote references only represents the items directly cited in preparation of this report, and do not illustrate all the documents reviewed or copied for the reference material files.

[1] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[2] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[3] 2010-08-26 Detrick Solid Waste Landfill Fact Sheet.pdf

[4] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[5] 1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[6] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf

[7] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; publicly available through Fort Detrick's web page (http://www.detrick.army.mil/responsible/ArchivalReport2012.pdf

[8] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents
1977-02-25 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf

[9] 1959-10 Bibliography of Special and Interim Reports, 1943-1959, AD-323323.pdf
1960-09 Abstracts of Technical Publications, AD 319446.pdf

[10] 1958-05-12 Test 58-TE-1016 CB-119659.pdf

[11]1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf.
1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf

1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf
1960-06-01 Safety Program at Detrick CY1959 CB-126117.pdf
1963-01 General Chem, Bio and Rad Safety Regulation 403532.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1963-12 Radiological Safety Manual.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[12] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[13] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1977-02-24 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Volume 2. Annexes ADB193427.pdf

[14] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1977-02-24 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Volume 2. Annexes ADB193427.pdf

[15] 1981-06-01 Field Investigations of Uncontrolled Hazardous Waste Sites and Installation Environmental Assessment Preliminary Assessment.pdf

[16] 1989-05 Fort Detrick Sanitary Landfill Area B Landfill Site Evaluation Phase III Report Phase II Modifications.pdf

[17] 1992-01-22 Phase 1 Geohydrologic Study No. 38-26-KI32-92 Fort Detrick, Maryland.pdf
1992-05-10 Phase 2 Geohydrologic Study No. 38-26-KI32-92 Fort Detrick, Maryland.pdf

[18] 1992-10-11 Geohydrologic Study No. 38-26-KF70-93 Area B, Fort Detrick, Frederick, Maryland.pdf
1993-04-23 Ground-Water Consultation No. 38-26-KlKJ-93 Area B, Fort Detrick, Frederick, Maryland.pdf

[19] 1993-07 TCE Contamination - Building 568 - Site Investigation Report AERO.pdf

[20] 1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf

[21] 1996-06-05 Hazardous Waste Study No. 37-EF-5012-96 Area A Laboratory Complex, Fort Detrick, Frederick, Maryland.pdf

[22] 1998-03-05 Ground-Water Consultation No. 38-EH-8004-98 Ground-Water Quality at Buildings 940 and 950 Fort Detrick, Frederick, Maryland.pdf

[23] 1999-09-01 Sampling Protocol Hazardous Waste Study, Building 1058, Environmental Health Chemical Sampling Plan, Fort Detrick, Frederick, Maryland.pdf

[24] 2001-01-01 EPA_Aerial_Photographic_Analysis,_Fort_Detrick_(Area_B)_Site,_Fredrick,_Maryland_TS-PIC-20103434S[1].pdf

[25] 2001-07-31 Ground-Water Consultation No. 38-EH-6380-01 Ground-Water Quality, Building 950 Fort Detrick, Maryland.pdf

[26] 2003-03 Landfill Sludge Disposal Radiological Assessment.pdf

[27] 2003-09 Area B-11 Burial Trenches Radiological Assessment.pdf

[28] 2003-12-17 Closed, Transferring, and Transferred Site Inventory Report, Fort Detrick, Maryland AERO.pdf

[29] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[30] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf

[31] Norm Covert, Cutting Edge: A History of Fort Detrick, Maryland, 4th Ed. (Oct. 2000)

[32] 1991 Historical Survey Bennett Files.pdf

[33] 1937_10_30_FD_Aerial_Image__Paper_AHA-24 FDDrwr235.jpg

[34] 1942-05-16 Report of the Annual General Inspection of the Army Air Base.pdf
1942-12-17 Frederick, Maryland - Detrick Field - CAA War Training Service.pdf
1943-02-26 Transfer of Detrick Field to Chemical Warfare Service.pdf.
1943-03-16 Frederick, Maryland - Abandonment of Detrick Field.pdf

[35] 1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf.
Leo P. Brophy and George J.B. Fisher, The Chemical Warfare Service: Organizing for War (Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1959), pp. 107-109.

1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf
Detailed Survey Report of Camp Detrick, Frederick, Maryland, Wolf Management Engineering Company, Chicago, Illinois (27 January 1955)
Office of the Assistant Chief Chemical Officer for BW, Camp Detrick, Data on the Organization and Mission of the Chemical Corps BW Program (1 April 1955)
Rexmond C. Cochrane, Biological Warfare Research in the United States, Vol. II, Office of Chief, Chemical Corps (Nov. 1947)
Richard M. Clendenin, Science and Technology at Fort Detrick, 1943-1968 (Technical Information Division: Frederick, April 1968), preface.

[36] 1968-04 Science & Technology Fort Detrick 1943-1968.pdf
1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf
1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf.

[37] 1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf

[38] Organization and Management Manual (Fort Detrick: Frederick, Maryland, 1966)
1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf.
The Chemical Warfare Service: Organizing for War (Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1959), pp. 107-109
George Merck, Activities of the United States in the Field of Biological Warfare, A Report to the Secretary of War (1944)
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf.

[39] 1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf.
War Department, Memorandum for the Chief of Staff (6 January 1944)
George Merck, Activities of the United States in the Field of Biological Warfare, A Report to the Secretary of War (1944)
1944-09-14 Bacteriological Warfare - Army RG 115, A47-30.pdf
1956-10-05 Organization Manual.pdf

[40] 1944-11 Historical Report of the War Research Service, November 1944 - Final.pdf.;
Memorandum for the Secretary of War (14 September 1944)
War Department, Memorandum for the Chief of Staff (6 January 1944)
1946-05-07 Historical Data Concerning Camp Detrick, Given to the Maryland War Records Division.pdf

[41] 1944-10-03 CD Plot Plan B-491-60-100.30 FFDrwr383.TIF

[42] 1944-09-11 Organizational Chart Chemical Warfare Service Special Projects Division CB-024760.pdf
1943-06-09 B Division, Division and Branch Chiefs.pdf
1944-11-08 Camp Detrick Organizational Chart.pdf

1945-09-21 Commanding Officers, Camp Detrick.pdf.

[43] 1955-04-01 Data on the Organization and Mission of the Chemical Corps BW Program, Camp Detrick, MD.pdf
1946-05-14 Administrative Activities in Special Projects Division.pdf.
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf.

[44] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf

[45] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; Section 3 Fort Detrick Real Estate History

[46] 1968-04 Science & Technology Fort Detrick 1943-1968.pdf

[47] 1968-04 Science & Technology Ft. Detrick 1943-1968.pdf

[48] 1956-10-05 Organization Manual.pdf
1950-09-22 Report of the Biological Department, Chemical Corps, to the Panels of the Committee on Biological Warfare Research and Development Board CB-110030.pdf

[49] 1951-04 Fort Detrick Reg. Organization & Mgmt Manual.pdf

[50] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; Section 3 Fort Detrick Real Estate History

[51] 1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf

[52] 1951-10-12 CD Proposed Addition to Camp Detrick SK 59-51 FFDrwr414.TIF

[53] 1957-08 Summary Major Events & Problems 1957.pdf

[54] 1968-04 Science & Technology Fort Detrick 1943-1968.pdf
1966-09-01 Fort Detrick Organization & Mgmt. Manual Sep 1966.pdf

[55] 1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf

[58] 1968-04 Science & Technology Ft. Detrick 1943-1968.pdf

[59] 1968-04 Science & Technology Ft. Detrick 1943-1968.pdf

[60] 1963-12-13 Reduction in FY 65 and FY 66 RDTE Program.pdf
1969-11-29 The President's Talking Points Congressional Leadership Meeting.pdf.

1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.

[61] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1973-08-14 Executive Order 11508 Installation Survey Report.pdf.

[62] 1973-08-14 Executive Order 11508 Installation Survey Report.pdf.
1974-09-13 MSR 09742010 - Termination of Vegetation Control - Transferred to Dept of Agriculture.pdf

[63] 1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf
1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
2000-10 Cutting Edge: A History of Fort Detrick, Maryland, 4th Ed.pdf
2012-04-04 ASR Herbicides at Fort Detrick.pdf; Section 3 Fort Detrick Real Estate History

[64] 1972-01-28 General Orders No. 10 - United States Army Material Command - Surgeon General.pdf
1973-08-14 Executive Order 11508 Installation Survey Report.pdf.
1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf
1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.

[65] 1973-12-31 AMEDD Activities, Annual Historical Report, CY1973.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf.

[66] 1998-06 Environmental Planning Guide for Fort Detrick, Frederick, MD.pdf

[68] 1968-04 Science & Technology Ft. Detrick 1943-1968.pdf

[71] 2010 Ft_Detrick Post Guide and Telephone Directory.pdf

[73] 2012-02-06 DCMilitary.com_ Fort Detrick.pdf

[74] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1977-02-24 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Volume 2. Annexes ADB193427.pdf

[75] 1943-10-31 DDIVPR19431031 Initial Progress Report, 31 October 1943, D Division (June-October 1943) CB-109441.pdf

[76] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1977-02-24 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Volume 2. Annexes ADB193427.pdf

[77] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
[78] 1948 ca CD 751 Field Tests with C Division.pdf
1948 CD 680 20mm Tests.pdf

[79] 1954-03-01 SR219 I Cereal Rust, 1, Development of Equipment for Harvesting Cereal Rust Spores from Host Plants CB-022700.pdf
1955-07 SR219 IV Cereal Rust 4, Processing, Packaging and Storage of Cereal Rust Spores AD0325397.pdf, page 28

[80] 1943-06-09 B Division, Division and Branch Chiefs.pdf

[81] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1946-02-18 SR066 Removal of Bacillus Anthracis from Contaminated Buildings and Equipment CB-048761.pdf
1947-12 S Div Admin Reports for 1944-1947 CB-187740.pdf
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf

[82] 1944-09-11 Organizational Chart. Chemical Warfare Service Special Projects Division CB-024760.pdf
1944-11-08 Camp Detrick Organizational Chart.pdf

[83] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf

[84] 1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf

[85] 1948-08-10 SR099 THE REMOVAL OF BACILLUS GLOBIGII SPORES FROM VARIOUS SURFACES AD222726.pdf

[86] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf

[87] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas

[88] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[89] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[90] 1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States b228585.pdf

[91] 1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States b228585.pdf

[92] 1956-10-26 CCTC 1956 Meeting No 2 Minutes CB-024745.pdf

[93] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; publicly available through Fort Detrick's web page (http://www.detrick.army.mil/responsible/ArchivalReport2012.pdf

[94] 1970-11 MP037 History of Crops Division-Plant Sciences Laboratories, 1943-1969 AD0512829, unclassified portions of a Confidential document

[95] 1946-07 Crops Division, Administrative Report and Technical Summary.pdf
1970-11 MP037 History of Crops Division-Plant Sciences Laboratories, 1943-1969 AD0512829
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf

[96] 1945-07 Technical Progress Report - C Division, Fort Detrick - 1945.pdf
1945-09-1946-05 Technical Progress Report.pdf

[97] 1977-02-15 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf.
1977-02-24 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Volume 2. Annexes ADB193427.pdf

[98] 1945-11 SR027 The Development of C for Offensive Use In Biological Warfare AD310763.pdf
1954-03-01 SR219 I Cereal Rust, 1, Development of Equipment for Harvesting Cereal Rust Spores from Host Plants CB-022700.pdf
1955-07 SR219 IV Cereal Rust 4, Processing, Packaging and Storage of Cereal Rust Spores AD0325397.pdf, page 28
1950-12-31 Qtrly Tech Rpt Munitions Div CB-110052.pdf

[99] 1946-01-01 SR028 Laboratory Branch Report on the BW Agent N (Spores of Bacillus anthracis) CB-039155.pdf
1945-10 SR016 The Development, Operation, and Experimental use of the American Autoclave Type BW Chamber CB-046965.pdf

[100] 1946-01-01 SR044V2 Munitions for Biological Warfare Volume 2 CB-109500.pdf

[101] 1948-08-20 SR097 Studies on Disinfection of Ship Compartments CB-048752.pdf

[102] 1944-01-08 DDIVPR19440108 Monthly Progress Report, 31 December 1943, D Division CB-109439.pdf
1944-03-31 DDIVPR19440331 Monthly Progress Report, 31 March 1944, D Division CB-109436.pdf
1944-04-30 DDIVPR19440430 Monthly Progress Report, 30 April 1944, D Division CB-109435.pdf
1944-05-31 DDIVPR19440531 Monthly Progress Report, 31 May 1944, D Division CB-109434.pdf
1944-06-30 DDIVPR19440630 Monthly Progress Report, 30 June 1944, D Division CB-109433.pdf
1945-01-02 Camp Detrick Meeting, 1940-2330.pdf
1945-01-31 Monthly Progress Rpt PC Div CB-109486.pdf
1945-02-28 Monthly Progress Rpt PC Div CB-109485.pdf
1945-03-31 Monthly Progress Rpt PC Div CB-109484.pdf
1945-05-31 Monthly Progress Rpt PC Div CB-109482.pdf
1945-10-01 SR030 Laboratory Testing of Canisters CB-046374.pdf
1946-06-15 SR035 Decontamination in Biological Warfare CB-022689.pdf

[103] 1946-06-15 SR035 Decontamination in Biological Warfare CB-022689.pdf

[104] 1945-10-15 SR033 The Effects Produced on Cotton and Woolen Fabrics by Certain Decontaminating Procedures CB-048058.pdf
1946-01-01 SR019 Control of Anthrax in a Biological Warfare Installation CB-046962.pdf
1946-06-15 SR035 Decontamination in Biological Warfare CB-022689.pdf
1946-02-18 SR066 Removal of Bacillus Anthracis from Contaminated Buildings and Equipment CB-048761.pdf
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States b228585.pdf

1953-10 Safety Bulletin V2 N3.pdf

[105] 1946-02-18 SR066 Removal of Bacillus Anthracis from Contaminated Buildings and Equipment CB-048761.pdf

[106] 1946-07 Safety Division, Monthly Report.pdf
1947-01 PC Division, Technical Summary.pdf
1947-02-25 SR80 Ethlene Oxide, A Gaseous Disinfectant NARA CP.pdf

[107] 1946-07 PC Division, Administrative Report and Technical Summary.pdf
1946-09 PC Division, Administrative Report and Technical Summary.pdf
1947-02 PC Division, Technical Summary.pdf
1947-03 PC Division, Technical Summary.pdf
1947-08 PC Division, Technical Summary.pdf
1948-01-26 SR091 Small Scale Water Purification with Silver Asboloxane S-Filter Powder and Pump CB-108137.pdf
1948-04-01 PC Division, Quarterly Technical Summary.pdf
1948-08-10 SR099 THE REMOVAL OF BACILLUS GLOBIGII SPORES FROM VARIOUS SURFACES AD222726.pdf
1948-08-20 SR097 Studies on Disinfection of Ship Compartments CB-048752.pdf
1949-03-31 PC Division, Quarterly Technical Summary.pdf
1950-03-31 Qtrly Tech Rpt PD Div CB-109983.pdf
1950-09-22 Fourth Annual Report Biological Department Chemical Corps.pdf
1950-09-22 Report of the Biological Department, Chemical Corps, to the Panels of the Committee on Biological Warfare Research and Development Board CB-110030.pdf

1953-02 Summary of Major Events and Problems Chem Corps sep-52 to Dec 52 CB-024727.pdf
1953-07-01 Chemical Corps Bio Labs Seventh Annual Report DPG538385.pdf
1953-09-04 Summary Major Events & Problems 1953.pdf
1953-10 Safety Bulletin V2 N3.pdf

[108] 1952-03-31 Qtrly Tech Rpt, Safety Div CB-111578.pdf
1952-06-30 Qtrly Tech Rpt Safety Div CB-111577.pdf

[109] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf

[110] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[111] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
[112] 1956-11-26 Memorandum Report No. 5, The Decontamination of Barracks by Means of Beta-Propiolactone.pdf

[113] 1955-05-01 SR228 Development of Processes for the Production and Use of Bacillus Globigii Spores as a Simulant CB-000433.pdf

[114] 1956-11-26 Memorandum Report No. 5, The Decontamination of Barracks by Means of Beta-Propiolactone.pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1957-10 IR138 Principles and Practices of BW Decontamination, 29, The Decontamination of Barracks by Means of Beta-Propiolactone CB-011182.pdf
1957-10 IR167 Principles and Practices of BW Decontamination 23, Decontamination of Aircraft Interiors by Means of Detroxide CB-011181.pdf
1958-01 TMEM004-001 Development of Ethylene-oxide-freon Decontaminant In 16-ounce Disposable Containers CB-048227.pdf
1958-08 TR002 Beta-Propiolactone CB-026724.pdf
1960-07 TR026 Disinfection Of Aerosol Chambers With Beta-Propiolactone CB-026276.pdf

[115] 1959-04 TR013 Development of a Thickened Bleach Slurry, Detrochlorite, for Vertical Surface Decontamination AD0214790.pdf

[116] 1962-03 TMAN002 Practical Procedures for Microbial Decontamination AD0282728.pdf

[117] 1962-09 TMAN012 Decontamination Procedures For Personnel Handling Biological Weapons CB-023607.pdf

[118] 1963-06-30 Qtrly Tech Rpt Medical Research CB-127612.pdf
1963-12 TMAN111 The Effect of Moisture on Ethylene Oxide Sterilization CB-044013.pdf
1964-03-31 Qtrly Tech Rpt Medical Research CB-129591.pdf
1965-06-30 Qtrly Tech Rpt Medical Research CB-131733.pdf
1965-11-30 Qtrly Tech Rpt Medical Research CB-131774.pdf
1966-06 TMAN295 Observations On Beta-propiolactone Vapor Decontamination CB-042962.pdf
1966-09 TMAN309 Effect Of Sub-zero Use Of Sporicides Peracetic Acid And Beta-propiolactone CB-132805.pdf
1968-03 TMAN441 Sporicidal Activity Of Sodium Hypochlorite At Subzero Temperatures CB-105361.pdf
1968-03 TMAN442 Effect Of Bacterial Cell Moisture On The Sporicidal Activity Of Beta-propiolactone Vapor CB-137940.pdf

[119] 1966-12 TMEM103 Design, Operation, and Limitations of a Peracetic Acid Shower CB-134288.pdf

[120] 1967-05 MP018 An Evaluation of Large-Volume Decontamination With Beta-Propiolactone CB-135268.pdf

[121] 1969-01 TMAN500 Paraformaldehyde For Surface Sterilization And Detoxification CB-054951.pdf

[122] 1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[123] 1969-05 TMEM149 Design and Development of a Medical Research Mobile Laboratory AD0854094.pdf

[124] 1970-08 Decon Cert and Stand-by for buildings Assoc with Bio Activities 1943-1970 CB-024113.pdf

[125] 1971-03-11 Permit to Department of Agriculture from USACE Baltimore District.pdf

[126] 1974-11-22 DACA-31-4-75-157 Agricultural Research Service Amendment.pdf
1974-11-29 Permit DACA-31-4-72-413.pdf
1998-08-04 DACA-31-R-98-1123 Permit to Other Federal Government Department or Agency to Use Property.pdf

[127] 1998-08-04 DACA-31-R-98-1123 Permit to Other Federal Government Department or Agency to Use Property.pdf

[128] 1973-01-22 Decon Building 434 CB-024787.pdf

[129] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[130] 1970-08 Decon Cert and Stand-by for buildings Assoc with Bio Activities 1943-1970 CB-024113.pdf

[131] 1977-12-02 FD Military Reservation Real Estate Map Sheet 1 MAD 59 FDDrwr334.TIF
1977-12-02 FD Military Reservation Real Estate Map Sheet 2 MAD 59 FDDrwr334.TIF
1985-07-26 FD Real Estate Military Reservation Sheet 1 CENAB_RE.TIF
1985-09-03 Reality Control File Summary.pdf

[132] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf
1977-02-25 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Vols 1 and 2.pdf

[133] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1977-02-25 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Vols 1 and 2.pdf

[134] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1971-01 Disposal, Of Anti-crop Material at Fort Detrick CB-024780.pdf
1972-01 Disposal, Of Anti-crop Material at Fort Detrick Phase I CB-024069.pdf
1972-01 SOP Disposal of anti-crop material at Detrick Phase 1 CB-024069.pdf
1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf

[135] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1971-01 Disposal, Of Anti-crop Material at Fort Detrick CB-024780.pdf
1972-01 Disposal, Of Anti-crop Material at Fort Detrick Phase I CB-024069.pdf
1972-01 SOP Disposal of anti-crop material at Detrick Phase 1 CB-024069.pdf
1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf

[136] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1972-05-26 Destruction and Disposal of Inactivated Anti-Crop Biological Agent CB-024609.pdf
1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf
1972-10-12 Quarterly Progress Report Bio Demil at Detrick CB-024116.pdf
1977-02-25 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Vols 1 and 2.pdf

[137] 1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf
1977-02-25 U.S. Army Activities in the United States Biological Warfare Programs 1942-1977, Vols 1 and 2.pdf
1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.tif

[138] 1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.tif

[139] 1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf

[140] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents AD0310756.pdf

[141] 1945-00-00 CD Key Plan General Plot Plan B-491-60-400.5 FFDrwr375.TIF
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[142] 1946-01-01 SR019 Control of Anthrax in a Biological Warfare Installation CB-046962.pdf

[143] 1952-05 Safety Bulletin V1 N1.pdf
1953-11 Bacteriological Safety article CB-064424.pdf

1959-07 Biological Safety Cabinets CB-024199.pdf

[144] 1959-07 Biological Safety Cabinets CB-024199.pdf
1953-11 Bacteriological Safety article CB-064424.pdf

[145] 1983-07 Plant Pathogen Containment Facility at Frederick.pdf
1983-07 Plant Pathogen Containment Facility at Frederick CB-024617.pdf

[146] 1971-03-11 Permit to Department of Agriculture from USACE Baltimore District.pdf
1974-11-22 DACA-31-4-75-157 Agricultural Research Service Amendment.pdf
1974-11-29 Permit DACA-31-4-72-413.pdf
1983-07 Plant Pathogen Containment Facility at Frederick.pdf
1983-07 Plant Pathogen Containment Facility at Frederick CB-024617.pdf
1998-08-04 DACA-31-R-98-1123 Permit to Other Federal Government Department or Agency to Use Property.pdf

[147] 1977-02-25 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf

[148] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents

[149] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents

[150] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents

[151] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents

[152] 1945-10-15 SR018 Cloud Chamber Studies, 1, Methods Developed at Camp Detrick B Division for Production and Study of Clouds of Highly Infective Agents

[153] 1947-04 Munitions Division, Technical Summary.pdf
1947-04-01 Munitions Division, Technical Summary.pdf
1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf

[154] 1954-01-03 Decontamination of Test Tank 1 CB-114246.pdf

[155] 1950-01-07 Bldg 263 Mod Firing Chamb Plumb Layout D93-1-1525 FDDrwr437.tiff
1950-05-25 Bldg 263 Add Firing Chamb Elec Layout D93-1-1525 FDDrwr437.tiff
1950-01-07 Bldg 263 Mod Firing Chamb Vent and AC D93-1-1524 FDDrwr437.tiff
1950-05-19 Bldg 263 Mod Firing Chamb Bldg Alter D93-1-1523 FDDrwr437.tiff

[156] 1947-02-10 CD Cloud Study Chamber (Elevations and Sections) F-93-527-107 FFDrwr399.TIF
1948-03-02 CD Building for Cloud Study Chamber (Plans) F-93-527-106 FFDrwr399.TIF
1948-03-02 CD Cloud Study Chamber (Details) F-93-527-105 FFDrwr399.TIF
1948-03-02 CD Cloud Study Chamber F-93-527-104 FFDrwr399.TIF
1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1954-03-09 Bldg 527 Utility Room D-93-527-240 FDDrwr399.tiff

[157] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)
1960-07 TR026 Disinfection Of Aerosol Chambers With Beta-Propiolactone CB-026276.pdf
1964-04-10 Bldg 568 Test Chamber FDDrwr9.tiff
1964-04-10 Bldg 568 Test Chamber Refrig Process Piping Plans Sect FDDrwr9.tiff
1964-03-23 Alt to test tanks in Bldgs 567 and 568 Large Tank Cab Layout FDDrwr9.tiff
1964-03-23 Alt to test tanks in Bldgs 567 and 568 Small Tank Cab Layout FDDrwr9.tiff

[158] 1964-03-23 Alt to test tanks in Bldgs 567 and 568 Large Tank Cab Layout FDDrwr9.tiff
1964-03-23 Alt to test tanks in Bldgs 567 and 568 Small Tank Cab Layout FDDrwr9.tiff

[159] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1956-01-01 Camp Detrick Building Schedule.pdf
1956-03-22 Sampling for Agent XQ in Bldg 376.pdf
1956-06-12 Sampling for N in Bldg 376.pdf
1956-11-28 Aerosol Studies in Aerobiology Branch, Bldg 376 .pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf
1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf

[160] 1955-04-15 Detrick Constr Specs Bio Lab Bldg 1412 FDDrwSpecs.pdf
1974-01-15 Bldg 1412 Bio Lab Basement Plan F-1412-100 FDDwr56.tiff
1975-05-01 Bldg 1412 Bio Lab 1st Floor Plan F-1412-101 FDDwr56.tiff
1961-06-10 Bldg 1412 Bio Lab 2nd Floor Plan F-1412-102 FDDwr56.tiff
1961-06-10 Bldg 1412 Bio Lab 3rd Floor Plan F-1412-103 FDDwr56.tiff
1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf

[161] 1945-11 SR038 A Pilot Plant for the Production of Plant Pathogens CB-046956.pd

[162] 1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf

[163] 1945-11 SR038 A Pilot Plant for the Production of Plant Pathogens CB-046956.pd

[164] 1945-11 SR038 A Pilot Plant for the Production of Plant Pathogens CB-046956.pd

[165] 1945-11 SR038 A Pilot Plant for the Production of Plant Pathogens CB-046956.pd

[166]1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Black Maria AD0222841.pdf

[167] 1943-08-31 CD Plot Plan B-491-60-110 FDDrwr374.jpg
1943_10-29_FD_Aerial_Image.jpg
1944-10-03 CD Plot Plan B-491-60-100.30 FFDrwr383.jpg

[168] 1943-08-31 CD Plot Plan B-491-60-110 FDDrwr374.jpg.

[169] 1944-10 SR005 Pilot Plant Construction and Operation AD0325516.pdf
1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SIII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Plant 1, Area 2 AD0310673.pdf

[170] 1944-10 SR005 Pilot Plant Construction and Operation AD0325516.pdf
1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SIV Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant 2 CB-025026.pdf
1945-11-15 SR042 SV Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant T-63 CB-048722.pdf
1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf

[171] 1946-02-18 SR066 Removal of Bacillus Anthracis from Contaminated Buildings and Equipment CB-048761.pdf

[172] 1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf

[173] 1970-08 Decon Cert and Stand-by for buildings Assoc with Bio Activities 1943-1970 CB-024113.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[174] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[175] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SVII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant III AD0222844.pdf
1945-11 SR027 The Development of C for Offensive Use In Biological Warfare AD310763.pdf

[176] 1953-10-06 List of Buildings.pdf
1956-01-01 Camp Detrick Building Schedule.pdf

[177] 1950-03-31 PP Division, Quarterly Technical Report.pdf

[178] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SVIII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant Area CB-108102.pdf
1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf

[179] 1945-11-15 SR042 SVIII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant Area CB-108102.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf

[180] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf
1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf

[181] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SVIII Engineering Construction, Operation, Maintenance and Development in Restricted Area, Pilot Plant Area CB-108102.pdf
1950-06-27 Survey of Required Buildings Fort Detrick Volume 1 CB-109988.pdf

1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[182] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf

[183] 1973-01-22 Decon Building 434 CB-024787.pdf

[184] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-09 Safety Program at Detrick 1956-57 CB-122125.pdf
1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf

[185] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)

[186] 1977-12-02 FD Military Reservation Real Estate Map Sheet 1 MAD 59 FDDrwr334.TIF
1977-12-02 FD Military Reservation Real Estate Map Sheet 2 MAD 59 FDDrwr334.TIF
1985-07-26 FD Real Estate Military Reservation Sheet 1 CENAB_RE.TIF
1985-09-03 Reality Control File Summary.pdf
Norm Covert, Cutting Edge: A History of Fort Detrick, Maryland, 4th Ed. (Oct. 2000)
2003-05 NCI Frederick POSTER.pdf
2003-08 NCI Frederick POSTER.pdf
2003-11 NCI Frederick POSTER.pdf

[187] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf (1 July 1953 to 30 June 1954)
1960-07-22 Safety Program at Detrick 1955-56 CB-116907.pdf
1960-08 Safety Program at Detrick 1956-57 CB-122125.pdf
1960-09 1962-06-01 Safety Program at Detrick CY1959 CB-126117.pdf

[188] 1944-10-03 CD Plot Plan B-491-60-100.30 FFDrwr383.TIF

[189] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[190] 1946-12 Pilot Plants Division Administrative Report and Technical Summary.pdf

[191] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[192] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[193] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[194] 1947-01 Pilot Plants Technical Summary.pdf
1947-02 Pilot Plants, Technical Summary.pdf
1947-03 Pilot Plants, Technical Summary.pdf
1948-12-31 S Division, Quarterly Technical Summary.pdf

[195] 1946-07 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf

[196] 1947-05 Safety Division., Technical Summary.pdf

[197] 1947-06 Pilot Plants, Technical Summary.pdf

[198] 1948-03-31 Pilot Plants, Quarterly Technical Summary.pdf

[199] 1948-06-30 Pilot Plants, Quarterly Technical Summary.pdf

[200] 1948-12-31 E Division, Quarterly Technical Summary.pdf

[201] 1948-12-31 E Division, Quarterly Technical Summary.pdf
1948-12-31 S Division, Quarterly Technical Summary.pdf

[202] 1949-09-30 E Division, Quarterly Technical Summary.pdf

[203] 1949-09-30 E Division, Quarterly Technical Summary.pdf
1949-10-01 Rpt of the Bio Dept.pdf

[204] 1950-06-30 E Division, Quarterly Technical Report.pdf
2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[205] 1955-12-19 Disposal of Structures at Camp Detrick.pdf

[206] 1956-08-15 Memo, Request for Approval of Disposal of Buildings and Improvements.pdf
1956-11-21 Disposal of 6 WW II Buildings.pdf

[207] 1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf
1971-06-16 CD Master Plan Schedule of Facilities F-93-1-5602 FFDrwr374.pdf
1971-12-10 FD Grass Mowing Schedule Areas A and C SK-5075 (Sheet 1) FFDrwr410.TIF
1972-05-02 FD General Site Map Outleasing Areas Sheet 6 F-93-1-7892 FDDrwr326.TIF

[208] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[209] 1947-05 Safety Division., Technical Summary.pdf
1948-03-31 Pilot Plants, Quarterly Technical Summary.pdf
1948-12-31 E Division, Quarterly Technical Summary.pdf
1948-12-31 E Division, Quarterly Technical Summary.pdf
1948-12-31 S Division, Quarterly Technical Summary.pdf

[210] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf
Norm Covert, Cutting Edge: A History of Fort Detrick, Maryland, 4th Ed. (Oct. 2000)

[211] 1988-05-19 Environmental Audit No. 38-26-7001-89 Fort Detrick, Frederick, Maryland.pdf
1989-05 Fort Detrick Sanitary Landfill Area B Landfill Site Evaluation Phase III Report Phase II Modifications.pdf

[212] 1944-02-21 Acquisition of Land for Sewer Line Right-of-Way.pdf
1943-08-16 CD Montevue Water Line and 12' Sewer Line B-491-60-2.61 FFDrwr374.TIF
1944-04-13 CD Water and Sewer Lines Key Plan FFDrwr374.TIF
1945-03-00 CD Key Plan Sanitary Sewers B-491-60-400.3 FFDrwr375.TIF

[213] 1944-02-21 Acquisition of Land for Sewer Line Right-of-Way.pdf
1943-08-16 CD Montevue Water Line and 12' Sewer Line B-491-60-2.61 FFDrwr374.TIF
1944-00-00 CD Building Schedule (circa 1944) SK335 FFDrwr415.TIF
1944-04-13 CD Water and Sewer Lines Key Plan FFDrwr374.TIF
1944-07-05 CD Plot Plan Monocacy Water and Sewerage B-491-60-500.10 FFDrwr375.TIF
1945-03-00 CD Key Plan Sanitary Sewers B-491-60-400.3 FFDrwr375.TIF
1948-12-31 S Division, Quarterly Technical Summary.pdf

1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[214] 1956-08-06 Disposition Form 96, Sludge from Sewage Disposal Plant.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[215] 1975-01 Solid Waste Management Study Fort Detrick Sept 1973 - April 1974 b001623.pdf

[216] Communication with the US Army Health Services Command radiation safety staff officer from 1988 to 1992 (Bob Cherry) who worked the sludge issue at Detrick at the time.

[217] 1945-11 TM 5-665 Operation of Sewerage and Sewage Treatment Facilities.pdf

[218] 1944-12-07 CD Grid Area Sewer and Water Lines Septic Tank and Dry Well B-491-60-49.71 FFDrwr374.TIF
1950-07-12 CD Plot Plan Limited Area B 491-60-49.7 NARACP_R77_E435_B19.TIF

[219] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf
1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf

[220] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf
1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf
1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf

[221] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[222] 1943-08-31 CD Plot Plan B-491-60-110 FDDrwr374.TIF
1943-09-18 CD Sewers CW and Service Piping Trench Layout B-491-60-50.2 FFDrwr374.TIF
1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.tif

1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf

[223] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[224] 1946-08 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1946-09 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1946-10 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf

[225] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[226] 1958-11-19 Memo, Inventory of Military Real Property.pdf

[227] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[228] 1946-05 CWS Research and Development Department, Technical and Administration Report.pdf
1946-07 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1949-09-30 E Division, Quarterly Technical Summary.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1958-11-19 Memo, Inventory of Military Real Property.pdf

[229] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[230] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf

[231] 1945-11-15 SR042 SIX Engineering Construction, Operation, Maintenance and Development in Restricted Area, Incinerator, Water CB-048720.pdf
1947-03-05 SR081 Sewage Decontamination at Camp Detrick, Its Process, Its Failure, Detection of Failure and Recommendation AD222713.pdf
1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[232] 1946-05 CWS Research and Development Department, Technical and Administration Report.pdf
1946-06 CWS Research and Development Department, Administrative Report and Technical Summary.pdf
1946-07 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1946-08 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1946-09 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf
1946-10 CWS Engineering and Research Division, Administrative Report and Technical Summary.pdf

[233] 1947-03-05 SR081 Sewage Decontamination at Camp Detrick, Its Process, Its Failure, Detection of Failure and Recommendation AD222713.pdf
1948-08-06 Emergency Construction F.Y. 1949 (Camp Detrick).pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[234] 1952-03-26 Additions to Post Headquarters and Contaminated Sewers.pdf

[235] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[236] 1943-12-28 Sanitary Fill Method of Disposing of Garbage and Refuse.pdf
1946-10-46 Refuse Collection and Disposal.pdf
1958-07-02 Refuse Collection and Disposal.pdf

[237] 1947-05 Safety Division., Technical Summary.pdf

[238] 1947-06 Pilot Plants, Technical Summary.pdf
1946-05 CWS Research and Development Department, Technical and Administration Report.pdf

[239] 1948-03-31 Pilot Plants, Quarterly Technical Summary.pdf
1948-12-31 E Division, Quarterly Technical Summary.pdf
1948-12-31 E Division, Quarterly Technical Summary.pdf
1948-12-31 S Division, Quarterly Technical Summary.pdf

[240] 1949-09-30 E Division, Quarterly Technical Summary.pdf
1949-10-01 Rpt of the Bio Dept.pdf

[241] 1950-06-30 E Division, Quarterly Technical Report.pdf

[242] 1947-02 Safety Division, Technical Summary.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[243] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf

[244] 1949-03-31 S Division, Quarterly Technical Summary.pdf
1949-06-30 S Division, Quarterly Technical Summary.pdf
1949-06-30 Qtrly Tech Rpt Safety Div CB-187725.pdf
1949-09-30 S Division, Quarterly Technical Summary.pdf
1949-12-31 S Division, Quarterly Technical Report.pdf
1950-03-31 S Division, Quarterly Technical Report.pdf
1950-06-30 S Division, Quarterly Technical Report.pdf

[245] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[246] 1956-ca Refuse Disposal at Fort Detrick.pdf

[247] 1956-02-08 Memo, Report of Refuse and Salvage Collections, RCS ENG-49, Biological Warfare Laboratories, Fort Detrick, MD.pdf
[248] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[249] 1947-05 Safety Division., Technical Summary.pdf

[250] 1948-12-31 E Division, Quarterly Technical Summary.pdf

[251] 1952-08-07 CD Plot Plan Limited Area B 39-7-52 FFDrwr395.TIF

[252] 1953-09-01 CD Plot Plan Limited Area B B-491-60.49.7 FFDrwr381.TIF
1954-02-01 CD Demolition Pit and Firing Bunker in Area B D-93-1-2964 FFDrwr439.TIF

[253] 1952-08-07 CD Plot Plan Limited Area B 39-7-52 FFDrwr395.TIF

[254] 1963-09-10 Detrick General Site and Building Use Map - Leasable Areas FDDrwr374.pdf
1966-06-01 FD Grid Area Replacement Underground Elec Circuits Site Plan Sheet 1 F-93-1-7518 FDDrwr320.TIF
1967-05-05 FD RDT and E Laboratory Locator Plan Sheet 2 F-93-1-7643 FDDrwr322.TIF

[255] 1963-09-10 Detrick General Site and Building Use Map - Leasable Areas FDDrwr374.pdf

[256] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[257] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[258] 1967-06-06 FD General Site Plan Sheet 2 F-93-1-6826 FDDrwr315.TIF

[259] 1967-06-06 FD General Site Plan Sheet 2 F-93-1-6826 FDDrwr315.TIF

[260] 1968-01-30 FD Mowing Grass in Area B F-93-1-7697 FDDrwr323
1970-01-27 FD Roads and Grounds Mowing Grass in Area B F-93-1-7820 FDDrwr325.TIF

[261] 1968-01-30 FD Mowing Grass in Area B F-93-1-7697 FDDrwr323

[262] 1970-09 FD Area B Disposal Areas SK-5009 NARACP_R338_E401-322_B6.tif

[263] 1970-09 FD Area B Disposal Areas SK-5009 NARACP_R338_E401-322_B6.tif

[264] 1970-09 FD Area B Disposal Areas SK-5009 NARACP_R338_E401-322_B6.tif

[265] 1972-05-02 FD General Site Map Outleasing Areas Sheet 6 F-93-1-7892 FDDrwr326.tif

[266] 1973-12-06 FD Site Allocation Map 93-1-8034 FDDrwr288.TIF

[267] 1973-12-06 FD Site Allocation Map 93-1-8034 FDDrwr288.TIF
1974-08-01 FD Site Allocation Map 93-1-8034 USDA Permit CENAB_RE.tif

[268] 1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.tif

[269] 1974-09-05 FD Land Use Plan 18-04-17 FDDrwr334.TIF

[270] 1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.TIF

[271] 1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.TIF

[272] 1977-08-18 FD Master Plan Area B Disposal Areas Sheet 6 F93-1-8261 FDDrwr291.tif

[273] 1979-03-09 FD Area B Disposal Area Detail Site Map F93-1-8336 FDDrwr293.TIF

[274] 1979-03-09 FD Area B Disposal Area Detail Site Map F93-1-8336 FDDrwr293.TIF

[275] 1979-03-09 FD Area B Disposal Area Detail Site Map F93-1-8336 FDDrwr293.TIF

[276] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[277] 1971-10 Disposal of OPLAN Material at Ft Detrick. CB-024779.pdf
1972-09-15 News Release Fact Sheet QnA for Anti-crop Agent Disposal CB-024115.pdf

[278] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; publicly available through Fort Detrick's web page (http://www.detrick.army.mil/responsible/ArchivalReport2012.pdf

[279] 1981-06-01 Field Investigations of Uncontrolled Hazardous Waste Sites and Installation Environmental Assessment Preliminary Assessment.pdf

[280] 1983-04-01 FD Area B Utilization Plan F-93-1-8624 FDDrwr304

[281] 1988-05-19 Environmental Audit No. 38-26-7001-89 Fort Detrick, Frederick, Maryland.pdf

[282] 1989-05 Fort Detrick Sanitary Landfill Area B Landfill Site Evaluation Phase III Report Phase II Modifications.pdf

[283] 1998-06 Environmental Planning Guide.pdf
1998-06 Environmental Planning Guide for Fort Detrick, Frederick, MD.pdf

[284] 1992-10-11 Geohydrologic Study No. 38-26-KF70-93 Area B, Fort Detrick, Frederick, Maryland.pdf

[285] 1993-04-23 Ground-Water Consultation No. 38-26-KlKJ-93 Area B, Fort Detrick, Frederick, Maryland.pdf

[286] 1994-05-18 Nuclear Regulation Radioactive Contamination at Sewage Treatment Plants.pdf
1994-05-18 Nuclear Regulation Radioactive Contamination at Sewage Treatment Plants GAO.pdf
2003-03 Landfill Sludge Disposal Radiological Assessment.pdf
2003-09 Area B-11 Burial Trenches Radiological Assessment.pdf

[287] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf

[288] 2001-01-01 EPA_Aerial_Photographic_Analysis,_Fort_Detrick_(Area_B)_Site,_Fredrick,_Maryland_TS-PIC-20103434S[1].pdf

[289] 2009-08 FD Area B and Monocacy Area C.tif

[290] 1957-05-15 FD Proposed Disposal Areas in Area C.TIF

[292] 1958_08_09_FD_Aerial_Image_56.tif

[293] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[294] 1968-08-07 FD Mowing Grass in Area A and Area C F-93-1-7696 FDDrwr323.TIF
1970-01-26 FD Roads and Grounds Mowing Grass in Area A and Area C Sheet 1 F-93-1-7819 FDDrwr325.TIF
1970-09-16 FD General Site Plan Sheet 1 F-93-1-6826 FDDrwr315.TIF

[295] 1970_07_06_FD_Aerial_Image_50.tif

[296] 1974-09-05 FD Land Use Plan 18-04-17 FDDrwr334.TIF

[297]1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[298] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf
2012-09-12 FORT_DETRICK_Installation Action Plan.pdf

[299]1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[300] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf
2012-09-12 FORT_DETRICK_Installation Action Plan.pdf

[301] 1946-01-01 SR044V2 Munitions for Biological Warfare Volume 2 CB-109500.pdf

[302] 1944-03-02 Construction of Magazines for Storage of Explosives - Request for Clearance.pdf

[303] 1946-01-01 SR044V1 Munitions for Biological Warfare Volume 1 CB-022690.pdf
1946-01-01 SR044V2 Munitions for Biological Warfare Volume 2 CB-109500.pdf

[304] 1950-08-24 Biological Warfare Disseminating Devices - 1950.pdf

[305] 1948 ca CD 751 Field Tests with C Division.pdf
1948 CD 680 20mm Tests.pdf

[306] 1950-09-30 Crops Division, Quarterly Technical Report.pdf

[307] 1952-02-10 Memo, Program of Test, M Div Test No 1223.pdf

[308] 1953-05-15 STR53-13 BW Mine AD0310705.pdf
1952-01 circa Program of Test No. 1223.pdf

[309] 1953-09 SR193 An Experimental Investigation of Viable Aerosol Travel from Sea to Land AD0310679.pdf

[312] 1945-07 Technical Progress Report - C Division, Fort Detrick - 1945.pdf

[313] 2012-04-04 ASR Herbicides at Fort Detrick.pdf; publicly available through Fort Detrick's web page (http://www.detrick.army.mil/responsible/ArchivalReport2012.pdf

[314] 1948-12-31 C Division, Quarterly Technical Summary.pdf

[315] 1954-03-01 SR219 I Cereal Rust, 1, Development of Equipment for Harvesting Cereal Rust Spores from Host Plants CB-022700.pdf
1955-07 SR219 IV Cereal Rust 4, Processing, Packaging and Storage of Cereal Rust Spores AD0325397.pdf, page 28

[316] 1955-06-27 CD 2726 Rust Infections.pdf

[317] 1946-07-24 Acquisition of Land.pdf
1946-04-29 CD Real Estate FDDrwr334.TIF

[318] 1944-01-31 CD Munitions Development Area Plot Plan B-491-60-49.7 FFDrwr381.TIF

[320] 1944-00-00 CD Munitions Development Area (circa 1944) B-491-60-49.5 FFDrwr381.TIF
1944-01-24 CD Munitions Development Area Land Included B-491-60-49.4 FFDrwr381.TIF

1944-01-31 CD Munitions Development Area Plot Plan B-491-60-49.7 FFDrwr381.TIF
1944-02-23 CD Munitions Development Grid Electrical Layout B-491-60-49.10 FFDrwr374.tif
1953-09-01 CD Plot Plan Limited Area B B-491-60.49.7 FFDrwr381.TIF

[321] 1946-01-01 SR044V1 Munitions for Biological Warfare Volume 1 CB-022690.pdf

[322] 1944-02-23 CD Munitions Development Grid Electrical Layout B-491-60-49.10 FFDrwr374.tif

[323] 1946-01-01 SR044V1 Munitions for Biological Warfare Volume 1 CB-022690.pdf

[324] 1946-01-01 SR044V1 Munitions for Biological Warfare Volume 1 CB-022690.pdf

[325] 1950-08-24 Biological Warfare Disseminating Devices - 1950.pdf

[326] 1951-06-30 Qtr Tech Report of Field Test and Meteorology Division.pdf

[327] 1958_05_30_FD_Aerial_Image_24.tif
1967-01-12 FD Mowing Map Area B M10-2-80C FDDrwr321.TIF

[328] 1958_05_30_FD_Aerial_Image_24.tif
1967-01-12 FD Mowing Map Area B M10-2-80C FDDrwr321.TIF
1963-03 TR033 Termination Report of the Investigation of Non-Rotating Glide Shapes for use in Self Dispersing Munition Applications AD0402719.pdf
1977-02-25 US Army Activity in the United States Biological Warfare Programs, 1942-1977, Volumes 1 and 2 CB-150545.pdf

[329] 1964-05-01 Design and Evaluation of an Interim Anticrop Weapons System AD0350588, Technical Report 047 (classified document, page 56)

[330] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[331] 1951-05-09 CD Test Firing Tower Installation Guying Details C93-1-1823 FFDrwr431.TIF

[332] 1958_05_30_FD_Aerial_Image_24.tif
1967-01-12 FD Mowing Map Area B M10-2-80C FDDrwr321.TIF

[333]1952-04-16 CD Dugout Limited Area B Plot Plan C93-1-2091 FFDrwr432.TIF

[334]1952-08-07 CD Plot Plan Limited Area B 39-7-52 FFDrwr395.tif

[335] 1953-10-06 List of Buildings Outside Limited Area A.pdf

[336]1953-09-01 CD Plot Plan Limited Area B B-491-60.49.7 FFDrwr381.tif

[337] 1951-07-02 Test Pits, Area B - 20mm Range.pdf

[338] 1952-02-15 Memo, Electric Service - Firing Range Service Building.pdf

[339] 1952-08-07 CD Plot Plan Limited Area B 39-7-52 FFDrwr395.TIF

[340] 1954-08-09 CD Exterior Ballistics Building and Test Tower SK-35-06-65 FFDrwr414.TIF

[341] 1966-06-01 FD Grid Area Replacement Underground Elec Circuits Site Plan Sheet 1 F-93-1-7518 FDDrwr320.TIF

[342] 1957-09 Program of Test MD-1779.pdf

[343] 1959-06-25 Plan of Test MD-1857 (E134 Demilitarization Investigation).pdf

[344] 1960-09 TMEM002-041 A High-speed Line-source Test Vehicle CB-048234.pdf
1959-09-03 Record of Test MD-1860.pdf

[345] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[346] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[347] 1954-01-06 Demolition Pit and Firing Bunker.pdf

[348] 1955-02-24 Disposition Form 96, Explosive Magazine Control.pdf

[349] 1957-07-03 Investigation of Damage to Private Property (Taylor).pdf

[350] 1954-02-01 CD Demolition Pit and Firing Bunker in Area B D-93-1-2964 FFDrwr439.TIF
1958_Mosaic_Extracted.TIF

[351] 1958-05-26 Disposal of M114 Bombs.pdf

[352] 1964-12-16 Post Memorandum, No. 385-4 Use of Area B.pdf

[353] 1966-06-01 FD Grid Area Replacement Underground Elec Circuits Site Plan Sheet 1 F-93-1-7518 FDDrwr320.TIF
1967-01-14 FD Mowing Grass Areas F-93-1-7616 FDDrwr321
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf

[354] 1966-06-01 FD Grid Area Replacement Underground Elec Circuits Site Plan Sheet 1 F-93-1-7518 FDDrwr320.TIF

[355] 1968-01-30 FD Mowing Grass in Area B F-93-1-7697 FDDrwr323.tif
1970_07_06_FD_Aerial_Image_95.tif
1979_07_07_FD_Aerial_Image_279-61.tif

[356] 1970_07_06_FD_Aerial_Image_95.tif
1979_07_07_FD_Aerial_Image_279-61.tif

[357] 1951-06-30 Qtr Tech Report of Field Test and Meteorology Division.pdf

[358] 1951-06-30 Qtr Tech Report of Field Test and Meteorology Division.pdf

[359] 1956-04 SR223 Preliminary Field Trials of the Aero X1A, Airborne Dry Agent Dissemination Unit AD0325456.pdf

[360] 1956-04 SR223 Preliminary Field Trials of the Aero X1A, Airborne Dry Agent Dissemination Unit AD0325456.pdf

[361] 1955-02-24 Disposition Form 96, Explosive Magazine Control.pdf

[362] 1956-07-03 Inspection Report of the Explosive Storage Area.pdf

[363] 1988-05-19 Environmental Audit No. 38-26-7001-89 Fort Detrick, Frederick, Maryland.pdf
1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf

[364] 2007-09-20 EPA TCE_Summary.pdf

[365] 1994-08 EPA 749-F-94-020a.pdf

[366] 1945-11-15 SR042 SI Engineering Construction, Operation, Maintenance and Development in Restricted Area, General AD0222840.pdf

[367] 1951-06-25 Bldg 568 Basement Floor Plan FDDrwr9.tiff
1964-04-10 Bldg 568 Test Chamber Refrig and Tank Cond Flow FDDrwr9.tiff
1964-04-10 Bldg 568 Test Chamber Service Room Tank Cond Piping FDDrwr9.tiff

[368] 1955-09-01 Technical Requirements for the Design of BW Research and Development Facilities, CB-115632.pdf

[369] 1955-04-15 Detrick Constr Specs Bio Lab Bldg 1412 FDDrwSpecs.pdf
1974-01-15 Bldg 1412 Bio Lab Basement Plan F-1412-100 FDDwr56.tiff

[370] 1955-08-21 BW Specialized Items CB-115695.pdf
1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[371] 1954-03-09 Bldg 527 Utility Room D-93-527-240 FDDrwr399.tiff

[372] 1950-01-07 Bldg 263 Mod Firing Chamb Plumb Layout D93-1-1525 FDDrwr437.tiff
1950-05-25 Bldg 263 Add Firing Chamb Elec Layout D93-1-1525 FDDrwr437.tiff
1950-01-07 Bldg 263 Mod Firing Chamb Vent and AC D93-1-1524 FDDrwr437.tiff
1950-05-19 Bldg 263 Mod Firing Chamb Bldg Alter D93-1-1523 FDDrwr437.tiff

[373] 1983-07 Plant Pathogen Containment Facility at Frederick.pdf

[374] 1958-08 TMEM002-016 An Evaluation of Driers Based on Characteristics of Dried Fills of Serratia Marcescens AD0252402.pdf
1961-11 Operating Procedures For Freeze-drying With The NRC Tray Dryer System CB-022958.pdf

[375] 1963 ca Safety Bulletin V8 N1.pdf

[376] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf

[377] 1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[378] 1957-08 IR151 An Adhesive Seal for the Final Closure on the E61 AD0139841.pdf
1957-09 IR150 Impact-Forged E61 Body AD0142808.pdf
1964-04 TMEM041 Application of Polysulfide Sealing Compounds in Biological Safety Cabinets AD0439963.pdf
1967-09 TMEM115 Repair Potential of Polysulfide Sealants AD0821057.pdf

[379] 1965-06-30 Qtrly Tech Rpt Medical Research CB-131733.pdf

[380] 1988-05-19 Environmental Audit No. 38-26-7001-89 Fort Detrick, Frederick, Maryland.pdf

[381] 1993-07 TCE Contamination - Building 568 - Site Investigation Report AERO.pdf

[382] 1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf
1993-07 TCE Contamination - Building 568 - Site Investigation Report AERO.pdf

[383] 2009-09-23 Fort Detrick DERP Installation Action Plan.pdf

[384] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[385] 2009-09-23 Fort Detrick DERP Installation Action Plan.pdf
2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf

[386] 1944-04-30 DDIVPR19440430 Monthly Progress Report, 30 April 1944, D Division CB-109435.pdf

[387] 1947-07 BSDIVRDTS Jul 1947 Technical Summary CB-109447.pdf

[388] 1949-12-07 Insecticides, Miticides & Rodenticides - Vol 19 - Part I - Dec 1949.pdf

[389] 1998-06 Environmental Planning Guide.pdf

[390] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf
2012-09-12 FORT_DETRICK_Installation Action Plan.pdf

[391] 1943-00-00 CD Rifle Range in Bldg T-812 (circa 1943) SK67 FFDrwr415.TIF
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf

[392] 1958-10-23 CD Bullet Stop Flair Armory-USARTC (Sheet 1) C93-1-15616 FFDrwr433.TIF
1958-10-23 CD Target Board for Bullet Stop Flair Amory (Sheet 2) C93-1-5616 FFDrwr433.TIF

[393] 1958-01-13 Flair US Army Reserve Center Small Arms Range.pdf

[394] 1956-05-28 Competitive Marksmanship Program During FY 1957.pdf
1964-09-08 Post Memorandum, No. 350-3, HQ Fort Detrick, MD.pdf

[395] 1975-Circa FD Dept of Agriculture Research Land F93-1-8433 FDDrwr296.TIF

[396] 2010-12-24 ENVIRONMENTAL ASSESSMENT ON AREA B OF FORT DETRICK.pdf

[397] 1943-08-31 CD Plot Plan B-491-60-110 FDDrwr374.TIF

[398] 1946-07-24 Acquisition of Land.pdf

1946-04-29 CD Real Estate FDDrwr334.TIF

[399] 1944-03-02 Construction of Magazines for Storage of Explosives - Request for Clearance.pdf

[400] 1950-07-12 Memo, Relocation of Five Munition Storage Buildings and CNS Toxic Gas Storage Building.pdf

[401] 1950-11-03 Construction of Munitions Loading Building.pdf

[402] 1955-07-14 Estimate of Cost for Installing Mix-Melt Equipment in the Munition Loading Facility, Bldg 1221.pdf

[403] 1955-07-14 Estimate of Cost for Installing Mix-Melt Equipment in the Munition Loading Facility, Bldg 1221.pdf

[404] 1956-07-03 Inspection Report of the Explosive Storage Area.pdf
1956-01-01 Camp Detrick Building Schedule.pdf

[405] 1956-07-03 Inspection Report of the Explosive Storage Area.pdf
1956-01-01 Camp Detrick Building Schedule.pdf

[406] 1966-06-01 FD Grid Area Replacement Underground Elec Circuits Site Plan Sheet 1 F-93-1-7518 FDDrwr320.TIF

[407] 1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[408] 1956-01-26 Memo, Insect and Rodent Activities.pdf

[409] 1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States CB-024040.pdf

[410] 1969 Armed Forces Pest Control Board History.pdf
1949-12-07 Insecticides, Miticides & Rodenticides - Vol 19 - Part I - Dec 1949.pdf
1949-12-07 Insecticides, Miticides & Rodenticides - Vol 19 - Part II - 1949.pdf

[411] 1944-08-08 Memo. DDT, Col. Karl Lundgren, Medical Corps.pdf

[412] 1946-05 CWS Research and Development Department, Technical and Administration Report.pdf
1946-09-27 Post Engineer Activities.pdf
1956-02-08 Memo, Insect and Rodent Control Activities.pdf

[413] 1946-11 Safety Division, Administrative Report and Technical Summary.pdf

[414] 1956-01-26 Memo, Insect and Rodent Activities.pdf

[415] 1956-01-26 Memo, Insect and Rodent Activities.pdf
1963-11-12 TB Med 144 Rodent Control AFPMB 018627.pdf

[416] 1956-02-08 Memo, Insect and Rodent Control Activities.pdf
1962-01-17 Insect and Rodent Control by Chemical Means AFPMB 043401.pdf
1963-11-12 TB Med 144 Rodent Control AFPMB 018627.pdf
1968-09-18 SB 3-40 Herbicides Pest Control Agents AFPMB 050641.pdf

[417] Undated Report, For the Preparation and Use of the Pest Management Report, DD Form 1532.pdf

[418] 1956-02-08 Memo, Insect and Rodent Control Activities.pdf
1962-01-17 Insect and Rodent Control by Chemical Means AFPMB 043401.pdf
1963-11-12 TB Med 144 Rodent Control AFPMB 018627.pdf

[419] 1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[420] 1975-03-25 FD Post Wide Pest Control Program Sheet 1 F93-1-8114 FDDrwr289.TIF
1975-03-25 FD Post Wide Pest Control Program Sheet 2 F93-1-8114 FDDrwr289.TIF
1975-03-25 FD Post Wide Pest Control Program Sheet 3 F93-1-8114 FDDrwr289.TIF
1975-03-25 FD Post Wide Pest Control Program Sheet 4 F93-1-8114 FDDrwr289.TIF
1975-03-25 FD Post Wide Pest Control Program Sheet 5 F93-1-8114 FDDrwr289.TIF

[421] 1979-06-29 FD Pest Control Serv Steam Manhole Map F93-1-8355 FDDrwr294.TIF
1979-06-29 FD Pest Control Serv Sanitary Sewer Map F93-1-8355 FDDrwr294.TIF

[422] 1982-07-07 Pest Control Report, Fort Detrick, MD.pdf

[423]1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[424] 2010-08-26 Detrick Solid Waste Landfill Fact Sheet.pdf

[425] 1941-02-24 Construction Program at Air Corps Stations, No. 2. Frederick, MD, War Department, US Engineer Office, Washington DC.pdf

[426] 1941-07-31 Frederick Airport Location of Sewer, Steam and Water Lines B-491-31-1 FFDrwr374.TIF

[427] 1943-08-31 CD Plot Plan B-491-60-110 FDDrwr374.TIF

1944-10-03 CD Plot Plan B-491-60-100.30 FFDrwr383.tif
1945-00-00 CD Key Plan General Plot Plan B-491-60-400.5 FFDrwr375.tif
1945-06-20 CD Plot Plan Restricted Area D-93-1-301 FFDrwr434.tif
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1952-03-19 CD Existing Planting Sheet 1 20-3-52 FFDrwr395.TIF

[428] 1955-02-18 CD Exist Utilities and prop, roads around bldg MV 2-5 10-2-55 FFDrwr398.tif
1956-01-01 Camp Detrick Building Schedule.pdf
1957-11-13 FD Master Plans for Future Development SK 35-57 FFDrwr414.tif
1960-02-18 FD Plot Plan of Area A (Sheet 1) F-127-3-1010 FFDrwr421.tif
1964-10 FD Mobilization Overlay Map F-93-1-6852 FDDrwr315.pdf
1967-05-05 FD RDT and E Laboratory Locator Plan Sheet 1 F-93-1-7643 FDDrwr322.tif

[429] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[430] 1955-09-29 Disposal of Coal Stokers, Grates, elevator and Housing - Central Boiler Plant T-100.pdf

[431] 1950-06-30 E Division, Quarterly Technical Report.pdf

[432] 1952-03-19 CD Existing Planting Sheet 1 20-3-52 FFDrwr395
1953-10-06 List of Buildings Outside Limited Area A.pdf
1955-02-18 CD Exist Utilities and prop, roads around bldg MV 2-5 10-2-55 FFDrwr398
1956-01-01 Camp Detrick Building Schedule.pdf

[433] 1951-00-00 CD Utilities Key Plan Area A (circa 1951) 59-11-53 FFDrwr396.tif
[434] 1956-01-01 Camp Detrick Building Schedule.pdf

[435] 1955-12-19 Disposal of Structures at Camp Detrick.pdf

[436] 1956-09-24 Disposal of Central Boiler Plant, T-900.pdf
1957-11-13 FD Master Plans for Future Development SK 35-57 FFDrwr414

[437] Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf

[438] 1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf

[439] 1971-06-16 CD Master Plan Schedule of Facilities F-93-1-5602 FFDrwr374.TIF
1970-09-16 FD General Site Plan Sheet 1 F-93-1-6826 FDDrwr315.tif
1974-09-05 FD Land Use Plan 18-04-17 FDDrwr334
1979-06-29 FD Pest Control Serv Herbicide Treatment Map2 F93-1-8355 FDDrwr294

[440] 1941-07-31 Frederick Airport Location of Sewer, Steam and Water Lines B-491-31-1 FFDrwr374.TIF

[441] 1970-09-16 FD General Site Plan Sheet 1 F-93-1-6826 FDDrwr315.TIF 1975-03-25 FD Post Wide Pest Control Program Sheet 2 F93-1-8114 FDDrwr289.TIF

[442] 1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf
2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf
1998-03-05 Ground-Water Consultation No. 38-EH-8004-98 Ground-Water Quality at Buildings 940 and 950 Fort Detrick, Frederick, Maryland.pdf

[443] 1995-12-06 Geohydrologic Study No. 38-EM-3925-95 Area A UST Investigation Fort Detrick, Frederick, Maryland.pdf 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[444] 2010-03-18 ENVIRONMENTAL ASSESSMENT FOR ARMY-CONTROLLED LAND AT AREAS A AND C.pdf

[445] 2010-08 FD Main Post.tif

[446] 2005 -02 CO-17 Vehicle Maintenance.pdf

[447] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[448] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[449] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[450] 1956-01-01 Camp Detrick Building Schedule.pdf
1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[451] 1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Post Wide Pest Control Program Sheet 2 F93-1-8114 FDDrwr289.TIF

[452] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1956-01-01 Camp Detrick Building Schedule.pdf

[453] 2005-07 CO-20 Locomotive Maintenance.pdf

[454] 1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Post Wide Pest Control Program Sheet 2 F93-1-8114 FDDrwr289.TIF

[455] 1945-03-31 Monthly Progress Rpt PC Div CB-109484.pdf
1945-10-15 SR033 The Effects Produced on Cotton and Woolen Fabrics by Certain Decontaminating Procedures CB-048058.pdf
1945-12-05 SR034 Protective Clothing for use in Biological Warfare CB-022683.pdf
1947-11-01 History of the Chemical Warfare Service in World War II. Volume 2. Biological Warfare Research in the United States b228585.pdf
1951-04 Ft. Detrick Reg. Organization & Mgmt Manual.pdf
1963-04-24 U.S. Army Bio Labs Organization Manual.pdf
1966-09-01 Ft. Detrick Organization & Mgmt. Manual Sep 1966.pdf

[456] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.tif
1950-09-30 Safety Division, Quarterly Technical Report.pdf
1953-10-06 List of Buildings Outside Limited Area A.pdf
1956-12-20 Inspection Schedule 3rd and 4th Quarters FY 1957.pdf
1961-01 Fort Detrick Telephone Directory.pdf
1962-02 Fort Detrick Telephone Directory.pdf

[457] 1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1963-01 General Chem, Bio and Rad Safety Regulation 403532.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[458] 1947-05 Safety Division., Technical Summary.pdf

[459] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1956-01-01 SR211 Microbiological Applications of Ultraviolet Radiations CB-115954.pdf
1960-11 SR211 (Revision) (BL28) Use of Ultraviolet Radiation in Microbiological Laboratories AD0250124.pdf
1960-11 TR028 Use of Ultraviolet Radiation in Microbiological Laboratories CB-048279.pdf

[460] 1959-03 TMEM001-002 Evaluation of Standard and Modified Laundering Procedures as BW Decontamination Methods AD0252270.pdf
1962-05 TMAN005 Biological Decontamination Methods Applicable to Civil Defense AD0276117.pdf

[461] 1975-03-25 FD Post Wide Pest Control Program Sheet 2 F93-1-8114 FDDrwr289.TIF

[462] 1962-02 Fort Detrick Telephone Directory.pdf
1974-11-11 Ft. Detrick Facts & Illustrative Acct. Manual.pdf
2005-02 CO-13 Laundry and Dry Cleaning Report.pdf

[463] 2010 Ft_Detrick_Post Guide and Telephone Directory.pdf

[464] 2005-02 CO-13 Laundry and Dry Cleaning Report.pdf

[465] 2006-05 CO-15 Medical Operations.pdf

[466] 1945-10 SR023 Measurement of the Respiratory Volumes of Laboratory Animals CB-108116.pdf
1945-11-01 SR040 Studies of the Virus Agents of the SI Group CB-046954.pdf
1945-11-10 SR050 Development of X for Offensive use in Biological Warfare CB-046950.pdf
1949-05-16 SR106 Effects of Trypan Blue on the Distribution of Streptomycin in Mice CB-108112.pdf
1952-12-31 Qtrly Tech Rpt Safety Div CB-111572.pdf
1953-05-04 SR181 Diagnosis of Psittacosis From Pathological Changes in Laboratory Animals AD0222781.pdf
1955-03 IR091 Principles and Practices of BW Decontamination, 20, Second Inter. Conf. on Mechanisms and Kinetics of Virus and Spore Inactivation AD0067793.pdf
1961-08 TR031 Laboratory Evaluation of Rickettsia Rickettsii AD0325488.pdf
1962-04 TMEM006 Studies On Aerosol-Induced Psittacosis In Rhesus Monkeys CB-125047.pdf

[467] 1945-11 SR041 An Assay Method for Streptomycin and its Application to in Vivo Studies of the Antibiotic CB-108117.pdf
1945-11-01 SR026 The Physiology of X Toxin CB-056868.pdf
1961-02 SR254 Studies on the Aerobiology of B Anthracis Spores AD0325460.pdf
1963-03 TMAN038 Factors Influencing the Growth of Listeria Monocytogenes in the Organs of Mice AD0401302.pdf
1965-02 TMAN199 Characterization of Bacillus Cereus Phospholipases, Their Effects on Erythrocytes, Bone, and Kidney Cells CB-025938.pdf
1967-02 TMAN359 Reticular Changes In The Rabbit Appendix Following Thymic Transplants CB-135370.pdf
1967-06 TMAN392 Pathophysiological Changes in the Rat Associated With Anthrax Toxin CB-055204.pdf
1967-07 TMAN404 Anthrax Toxin, Primary Site of Action CB-055191.pdf
1967-09 SR Armed Forces Epidemiological Board Symposium on Infection and Metabolism AD0829517.pdf
1968-05 TMEM134 Experimental Studies on the Life-Span of Aedes (Stegomyia) Aegypti (Linn.) CB-137793.pdf

[468] 1958-09-30 Qtrly Tech Rpt, Aerobiology Div CB-024242.pdf
1959-05 TNEM009-007 Studies On The Viability, Aerosol Stability, And Virulence Of Pasteurella Tularensis Stored At 5 Degrees C CB-013408.pdf

1960-11 TMEM009-020 Influence Of Aerosol Particle Size On Respiratory Infectivity, II Exposure Of Thesus Monkeys To Aerosols Pasteurella Tularensis CB-013367.pdf
1961-03 TMEM009-025 Clinical And Pathological Studies On Rhesus Monkeys And Chimpanzees Exposed To Aerosols Of Venezuelan Equine CB-122358.pdf
1962-09 TMEM020 Response of Monkeys to Pasteurella Tularensis, Histopathology of Tularemia Induced with Aerosols of Different Particle Size AD0285613.pdf

[469] 1966-03 SR Armed Forces Epidemiological Board Project No. 1B533001D164 AD0479454.pdf
1968-09 TMAN475 Reticular Cell Response In The Rabbit Appendix To Autologous And Homologous Transplants CB-137487.pdf
1969-02 TMAN504 Comparative Study Following Injection Of Autologous Lymphocyte Bisdiazotized Benzidine Foreign Protein CB-140741.pdf
1970-08 TMAN622 Experimental Infection of Monkeys with Bunyamwera and Germiston Viruses CB-142419.pdf

[470] 2007-09-20 EPA TCE_Summary.pdf

[471] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf
1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf

[472] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf
1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf

[473] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf
1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[474] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf
1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_1 CB-006244.pdf
1977-01 Installation Assessment Fort Detrick Report 106 Vol_2 CB-006243.pdf

[475] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1953-10-06 List of Buildings Outside Limited Area A.pdf

1956-01-01 Camp Detrick Building Schedule.pdf
1975-03-25 FD Schedule of Facilities Sheets 1-5 F93-1-8114 FDDrwr289.pdf

[476] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF
1956-01-01 Camp Detrick Building Schedule.pdf

[477] 1945-08-13 CD Key Chart of Post Building Numbers PE-68-8-45 FFDrwr393.TIF

[478] 1946 atomic energy act.pdf

[479] 1946 atomic energy act.pdf
1949-10 AEC Radioactive Wastes.pdf
1963-12 Radiological Safety Manual.pdf
1980-09-24 NUCLEAR REGULATORY COMMISSION IE BULLETIN 79-19, AUGUST 1979.pdf
1956-05-17 AR 755-380 Disposal of Rad Waste.pdf
1957-02-01 AR 40-580 Hazards of Radioactive Materials.pdf
1962-04-10 AR 755-380 Disposal of Rad Waste.pdf
1963-12-17 AR 700-52 Licensing and Control of Rad Sources.pdf
1966-02-04 AR 700-52 Licensing and Control of Rad Sources.pdf
1966-05-20 TM 3-261.pdf
1966-11-04 AR 755-15 Disposal of Radioactive Material.pdf
1968-05-22 AR 700-52 Licensing and Control of Rad Sources.pdf
1980-05-01 AR 385-11 Ionizing Radiation Protection.pdf
1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1963-12 Radiological Safety Manual.pdf
1989-10-12 Procedure for Disposal of Radioactive Waste From Infectious Suites.pdf
1991-10-01 Safety Radioactive Waste Fort Detrick Regulation 385-3.pdf
1998-06 Environmental Planning Guide for Fort Detrick, Frederick, MD.pdf

[480] 2002-12 Decommissioning Plan for US Nuclear Regulatory Commission.pdf

[481] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[482] 1948-04-01 PC Division, Quarterly Technical Summary.pdf
1948-09-30 PC Division, Quarterly Technical Summary.pdf
1949-03-31 PC Division, Quarterly Technical Summary.pdf
1949-09-30 C Division, Quarterly Technical Summary.pdf
1949-12-31 C Division, Quarterly Technical Report.pdf
1950-03-31 C Division, Quarterly Technical Report.pdf
1950-06-30 C Division, Quarterly Technical Report.pdf
1950-09-30 Crops Division, Quarterly Technical Report.pdf

1950-12-31 Crops Division, Quarterly Technical Report.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[483] 1951-05-15 Contaminated Apparatus, CD.pdf
1951-05-15 Contaminated Apparatus, CD.pdf
1951-05-31 Contaminated Equipment, CD.pdf
1951-06-12 Contaminated Equipment CD.pdf
1951-08-09 Contaminated Equipment CD.pdf
1951-08-09 Contaminated Equipment1 CD.pdf
1951-08-14 Contaminated Floor Section, CD.pdf
1951-08-15 Contaminated Equipment CD.pdf
1951-09-21 Contaminated Area CD (Radioactive Material).pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[484] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[485] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1950-04-04 SOP Radiological Division ArmyChemCenter CB-096834.pdf
[486] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf

[487] 1956-02-13 Proposed use of T-321 by Crops Division.pdf

[488] 1956-12-03 Memo, Description of CO60 Source.pdf

[489] 1956-10-30 License 19-01151-01.pdf
1958-12-12 Renewal of Byproduct Material License.pdf

[490] 1959-04-21 License 19-01151-02.pdf

[491] 1960-09-20 Amend 2 to License 19-01151-02.pdf

[492] 1960-12-14 Amend 3 to License 19-01151-02.pdf

[493] 1961-04-28 Amend 4 to License 19-01151-02.pdf

[494] 1961-05-17 Amend 5 to License 19-01151-02.pdf

[495] 1963-06-25 Amend 6 to License 19-01151-02.pdf

[496] 1963-08-14 Amend 7 to License 19-01151-02.pdf

[497] 1965-05-21 Amend 9 to License 19-01151-02.pdf

[498] 1965-08-11 Amend 10 to License 19-01151-02.pdf

[499] 1967-06-21 Amend 11 to License 19-01151-02.pdf

[500] 1968-11-06 Amend 12 to License 19-01151-02.pdf

[501] 1970-02-13 Amend 13 to License 19-01151-02.pdf

[502] 1971-04-05 Amend 14 to License 19-01151-02.pdf

[503] 1972-03-09 Amend 15 to License 19-01151-02.pdf

[504] 1973-02-14 Amend 16 to License 19-01151-02.pdf

[505] 1974-06-10 Amend 17 to License 19-01151-02.pdf

[506] 1975-08-28 Amend 18 to License 19-01151-02.pdf

[507] 1979-11-26 Amend 19 to License 19-01151-02.pdf

[508] 1984-04-06 Amend 22 to License 19-01151-02.pdf

[509] 1992-07-23 Amend 23 to License 19-01151-02.pdf

[510] 1997-12-29 Nuclear Materials License, Amendment No. 24 Fort Detrick, MD.pdf

[511] 2002-06-02 Amend 25 to License 19-01151-02.pdf

[512] 2004-07-19 Amend 27 to License 19-01151-02.pdf

[513] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1963-12 Radiological Safety Manual.pdf

[514] 1964-07-20 Location of Areas Using Radioisotopes

[515] 1964-07-20 Location of Areas Using Radioisotopes

[516] 1966-03-03 FD Radioisotope Committee Minutes of Annual Mtg 1966 and 1965 ML023380558.pdf

[517] 1966-03-03 FD Radioisotope Committee Minutes of Annual Mtg 1966 and 1965 ML023380558.pdf

[518] 1966-03-03 FD Radioisotope Committee Minutes of Annual Mtg 1966 and 1965 ML023380558.pdf

[519] 1980-09-24 NUCLEAR REGULATORY COMMISSION IE BULLETIN 79-19, AUGUST 1979.pdf

[520] 1991-10-01 Safety Radioactive Waste Fort Detrick Regulation 385-3.pdf
1991-03-19 Lab Requirements for Safe Storage and Disposal of Radionuclides.pdf
1996-10-10 Safety Use of Radioactive Materials.pdf
1999-11-01 Radiation Safety Manual.pdf

[521] 2002-12 Decommissioning Plan for US Nuclear Regulatory Commission.pdf

[522] 1991-01-09 Memo. Decommissioning of Building 459.pdf

[523] 1991-01-09 Memo Regarding the Decommissioning of Building 459.pdf

[524] 2003-02-18 Building 261 Decommissioning Report of Post Remediation Radiological Surveys.pdf

[525] 2003-09 Area B-11 Burial Trenches Radiological Assessment.pdf

[526] 2004-07-19 Amend 27 to License 19-01151-02.pdf

[527] 1998-06 Environmental Planning Guide.pdf

[528] 2001-05-23 Amend 2 to License 19-11831-01.pdf

[529] 1991-01-03 License 19-11831-03.pdf

[530] 1992-07-23 Amend 1 to License 19-11831-03.pdf

[531] 1996-07-27 Amend 2 to License 19-11831-03.pdf

[532] 1997-02-12 Amend 3 to License 19-11831-03.pdf

[533] 1997-09-18 Amend 4 to License 19-11831-03.pdf

[534] 2001-04-16 Amend 5 to License 19-11831-03.pdf

[535] 2001-10-01 Amend 6 to License 19-11831-03.pdf

[536] 2002-01-09 Amend 7 to License 19-11831-03.pdf

[537] 2002-05-12 Amend 8 to License 19-11831-03.pdf

[538] 1957-02 SR261 Safety Program at Camp Detrick AD0325109.pdf
1952-11-15 Bio & Radiological Safety Regs for Camp Detrick Limited Areas.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf
1950-04-04 SOP Radiological Division ArmyChemCenter CB-096834.pdf

[539] 1949-10 AEC Radioactive Wastes.pdf

[540] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[541] 1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[542] 1952-08-07 CD Plot Plan Limited Area B 39-7-52 FFDrwr395.TIF
1953-09-01 CD Plot Plan Limited Area B B-491-60.49.7 FFDrwr381.TIF
1954-02-01 CD Demolition Pit and Firing Bunker in Area B D-93-1-2964 FFDrwr439.TIF
1968-01-30 FD Mowing Grass in Area B F-93-1-7697 FDDrwr323
1970-01-27 FD Roads and Grounds Mowing Grass in Area B F-93-1-7820 FDDrwr325.TIF

[543] 1952-06-30 Qtrly Tech Rpt Safety Div CB-111577.pdf
1953-07-01 SR185 SAFETY PROGRAM AT CAMP DETRICK 1944 TO 1953 AD310671.pdf

[544] 1952-12-31 Qtrly Tech Rpt Safety Div CB-111572.pdf

[545] 1956-08-06 Disposition Form 96, Sludge from Sewage Disposal Plant.pdf

[546] 1956-08-06 Disposition Form 96, Sludge from Sewage Disposal Plant.pdf
1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[547] Communication with the US Army Health Services Command radiation safety staff officer from 1988 to 1992 (Bob Cherry) who worked the sludge issue at Detrick at the time.

[548] 1956-10-30 License 19-01151-01.pdf
1956-05-17 AR 755-380 Disposal of Rad Waste.pdf
1957-02-01 AR 40-580 Hazards of Radioactive Materials.pdf

[549] 1966-10 US Army Radioactive Waste Disposal Program CONUS 807777.pdf

[550] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1963-12 Radiological Safety Manual.pdf

[551] 1966-10 US Army Radioactive Waste Disposal Program CONUS 807777.pdf

[552] 1966-03-03 FD Radioisotope Committee Minutes of Annual Mtg 1966 and 1965 ML023380558.pdf

[553] 1980-09-24 NUCLEAR REGULATORY COMMISSION IE BULLETIN 79-19, AUGUST 1979.pdf
1991-10-01 Safety Radioactive Waste Fort Detrick Regulation 385-3.pdf

[554] 1963-09-10 Safety Regulations Bio, Cmcl, Radiological.pdf
1963-12 Radiological Safety Manual.pdf
1969-05-09 FD Reg 385-1 Safety CB-141587.pdf

[555] 1952-06-30 Qtrly Tech Rpt Safety Div CB-111577.pdf
1963-12 Radiological Safety Manual.pdf
1991-10-01 Safety Radioactive Waste Fort Detrick Regulation 385-3.pdf

[556] 1998-11-24 Final Data Report for Samples From Fort Detrick, Frederick, MD, Collected May 27, 1998 and July 14, 1998.pdf
1999-06-11 Draft Final Data Report for Samples from Fort Detrick, Frederick, MD, Collected April 29, 1999.pdf

[557] 1997-08-21 Memo. Response to Technical Assistance Request, Disposal of Fort Detrick Sewer Sludge Control No. 105102.pdf
2002-12 Decommissioning Plan for US Nuclear Regulatory Commission.pdf
2003-03 Landfill Sludge Disposal Radiological Assessment.pdf
2012-07 CFR Title-10 NRC regulations.pdf
2012-11-01 Last Load of Sludge to Utah.pdf

[558] 1984-01-18 Radiation Protection Survey 28-43-0938-84 (USAMRIID).pdf

[559] 1986-11-12 Radiation Protection Survey 28-43-0420-87 USAMRIID.pdf
1989-09 Radiation Protection Survey 28-43-0253-90 (USAMRIID).pdf
1992-01 Radiation Protection Survey 28-43-FH61-92 (USAMRIID).pdf
1995-02 Radiation Protection Survey 28-83-3267-95.pdf

1998-04 Radiation Protection Consultation 28-MF-6180-NA01-98.pdf

[560] 1998-05-15 Industrial Radiation Survey No. 27-MH-7754-98, Fort Detrick, MD.pdf

[561] 2001-10-02 Radiation Protection Survey 26-MF-3709-01.pdf
2003-11 Radiation Protection Survey 26-MF-01SP-04.pdf
2007-01 Radiation Protection Survey 26-MF-FTDT-07.pdf
2010-02-16 Radiation Protection Survey USAMRIID 26-MF-0CFL-A-10.pdf

APPENDIX C

ABBREVIATIONS, ACRONYMS, AND BREVITY CODES

ABBREVIATIONS, ACRONYMS AND BREVITY CODES

The following list contains abbreviations, acronyms and brevity codes within this Archives Search Report

AEC	Atomic Energy Commission
AFPCB	Armed Forces Pest Control Board
AFPMB	Armed Forces Pest Management Board
AGC	Armu Geospatial Center
AMCCOM	Armaments Munitions and Chemical Command
AR	Army Regulation
ARS	Agriculture Research Service
ASR	Archives Search Report
BD/DR	Building Demolition/Debris Removal
BRAC	Base Realignment and Closure
BW	Biological Warfare
BWL	Biological Warfare Laboratory
c	curie
CAA	Civil Aeronautics Authority
cal	Caliber
CBR	Chemical, Biological, Radiological
CBRNIAC	Chemical, Biological, Radiological, Nuclear Technical Information Center
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMH	Center of Military History
CON/HTRW	Containerized/Hazardous, Toxic, and Radioactive Waste
cpm	counts per minute
CPTP	Cadet Pilot Training Program
CW	Chemical Warfare
CWM	Chemical Warfare Materials
CWS	Chemical Warfare Service
DA	Department of the Army
DANC	Decontaminating mixture of CC No. 1 (a chlorine mixture) and acetylene tetrachloride
DARA	Department of the Army Radiation Authorization
DCMA	Defense Contract Management Agency
DD	Department of Defense
DDT	dichlorodiphenyltrichloroethane
DERP	Defense Environmental Restoration Program
DHHS	Department of Health and Human Services
DIS	Directorate of Installation Services
DoD	Department of Defense

DOT	Department of Transportation
DPG	Dugway Proving Ground
DTIC	Defense Technical Information Center
ECBC	Edgewood Chemical Biological Center
ECTC	East Coast Telecommunications Center
EPA	Environmental Protection Agency
FM	Field Manual
FRC	Federal Records Center
FCRDC	Frederick Cancer Research and Development Center
FS	Liquid Smoke consisting of a mixture of Sulfur Trioxide and Chlorosulfonic Acid
FSN	Federal Stock Number
FUDS	Formerly Used Defense Sites
HC	Hexachoroethane
HMX	cyclotetramethylenetetranitramine (a type of high explosive)
HTH	High Test Hypochlorate (60% to 70% available chlorine)
HTRW	Hazardous Toxic and Radioactive Waste
HUD	Housing and Urban Development
HVAR	High Velocity Aircraft Rocket
IRP	Installation Restoration Program
JSRRC	Joint Services Records Research Center
mc	microcurie
MEC	Munitions and explosives of concern
MEDCOM	Medical Command
MMRP	Military Munitions Response Program
mr	milliroentgen
NARA	National Archives and Records Administration
NCI	National Cancer Institute
NIH	National Institutes of Health
NRC	Nuclear Regulatory Commission
OSRD	Office of Scientific Research and Development
PAO	Public Affairs Officer
PCB	Polychlorinated Biphenyls
PCE	Perchloroethylene or tetrachloroethylene
PETN	pentaerythritol tetranitrate (a type of high explosive)
POL	Petroleum, Oil and Lubricant
RDX	Royal Dutch Explosive - cyclotrimethylenetrinitramine; also known as cyclonite or hexogen (a type of high explosive)
RDT&E	Research, Development, Testing and Evaluation
RECOM	Research and Engineering Command
RG	Record Group
RMDF	Radioactive Material Disposal Facility
RPO	Radiation Protection Officer
SF	Standard Form

SOP	Standing Operating Procedure
STB	Super Tropical Bleach
SVOC	Semi-Volatile Organic Compounds
TATRC	Telemedicine and Advanced Technology Research Center
TCE	Trichloroethylene
TM	Technical Manual
TO	Technical Order
USABDRL	U.S. Army Biological Defense Research Laboratory
USABRDL	U.S. Army Bioengineering Research and Development Laboratory
USABRL	U.S. Army Biomedical Research Laboratory
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAFHRA	U.S. Air Force Historical Research Agency
USAMERDL	U.S, Army Medical Equipment Research and Development Laboratory
USAMMA	U.S. Army Medical Material Agency
USAMMDA	U.S. Army Medical Materiel Development Activity
USAMRAA	U.S. Army Medical Research Acquisition Activity
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
USAMRMC	U.S. Army Medical Research and Material Command
USAPHC	U.S. Army Public Health Command
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
USDA	U.S. Department of Agriculture
UV	Ultraviolet
UXO	Unexploded Ordnance
WBC	War Bureau of Consultants
WNRC	Washington National Records Center
WRAMC	Walter Reed Army Medical Center
WRS	War Research Service
WTS	War Training Service
WW II	World War II

Fort Detrick Organization

B Division	Biological Research Division
C Division	Crops Division
D Division	Defensive Development Division
M Division	Munitions Division
PC Division	Physics and Chemistry Division
PD Division	Physical Defense Division
S Division	Safety Division

Chemical Agent Codes

2,4,5-T	2,4,5-trichlorophenoxyacetic acid	Anti-Crop Agent
2,4-D	2,4-dichlorophenoxyacetic acid	Anti-Crop Agent
AF	Aspergillus fumigates	Simulant Agent
BG	Bacillus globigii	Simulant Agent
C	Southern Blight	Anti-Crop Agent
CG	Phosgene	Chemical Agent
E	Brown Spot of Rice	Anti-Crop Agent
EA	Alternate code for SM	Simulant Agent
EC	Escherichia coli	Simulant Agent
FP	Fluorescent particles	Simulant Agent
HD	Mustard	Chemical Agent
HI	Melioidosis	Anti-Personnel Agent
HN3	Nitrogen Mustard	Chemical Agent
IE	Wheat Blight	Anti-Crop Agent
IR	Rice Blast	Anti-Crop Agent
L	Lewisite	Chemical Agent
LO	Late Blight of Potatoes	Anti-Crop Agent
LX	Pircularia oryzae	Anti-Crop Agent
N	Anthrax	Anti-Personnel Agent
NU	Venezulan Equine Encephalitis	Anti-Animal Agent
OU	Q Fever	Anti-Personnel Agent
SI	Psittacosis	Anti-Personnel Agent
SM	Serratia marcescens	Simulant Agent
T-3	Bacteriophage of E Coli	Simulant Agent
TX	Wheat Stem Rust	Anti Crop Agent
UL	Tularemia	Anti-Personnel Agent
US	Brucellous	Anti-Personnel Agent
VKA	Vegetable Killer Acid	Anti-Crop Agent
WP	White Phosphorus	Smoke Agent
X	Botulinum toxin	Anti-Personnel Agent