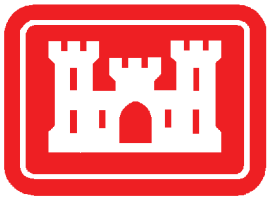
Proposed Plan

CCFTBR-H
Fort Bragg, North Carolina



U.S Army Corps of Engineers
Savannah District

November 2022

Certification

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Proposed Plan
CCFTBR-H
Fort Bragg, North Carolina

1.0 INTRODUCTION

This Proposed Plan (PP) presents the U.S. Army's (Army's) preferred alternative for addressing soil and groundwater contamination at CCFTBR-H which is located in the northeastern portion of Fort Bragg (Fort Bragg, North Carolina). This plan describes the investigation, assessment, cleanup activities, and risk to human health at CCFTBR-H. The preferred alternative for remedial action at CCFTBR-H is excavation and disposal of contaminated soils with groundwater treatment using hydrogen release compound (HRC) and micro-scale carbon injections. Other remedial alternatives examined were no action and institutional controls with groundwater monitoring. The rationale for the preferred alternative is that it meets the statutory requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) part 121(b) by being protective of human health and the environment; being cost-effective; being a permanent solution; and offering treatment of the groundwater. This is the only alternative that offers a groundwater treatment component.

The public comment period for the CCFTBR-H Proposed Plan is open from December 16, 2022 to January 23, 2023. To be considered in the remedy selection process, comments from the public must be received by Fort Bragg by the close of the comment period.

The Administrative Record is located and available for review at:

Cumberland County Public Library
300 Maiden Lane
Fayetteville, NC 28301

All comments regarding this Proposed Plan should be mailed to:

Dustin Cates
Fort Bragg Environmental Management Branch
Building 3-1137
Fort Bragg, North Carolina 28310

Questions may be directed to the Fort Bragg Installation Restoration Program Support, Mr. Dustin Cates, at 910-432-8467.

Additional information about the site can be found in the Remedial Investigation (RI) Feasibility Study (FS) (Bay West, 2016) and the Supplemental RI (USACE, 2020) at the Cumberland County Public Library.

This plan is issued by the Army as the lead agency for cleanup at CCFTBR-H in cooperation with the North Carolina Department of Environmental Quality (NCDEQ), as support agency, and in accordance with the public participation requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. §9601 et seq. as amended) Section

117(a), the Defense Environmental Response Program (10 U.S.C. §2701), and under 40 CFR Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Based on prior discussions with NCDEQ, the state is expected to concur with the recommendations in this PP. NCDEQ concurred with the recommendation to create this PP in a letter dated 20 October 2020 (NCDEQ, 2020). There will be no Applicable or Relevant and Appropriate Requirement (ARAR) waiver needed for this proposed remedy.

The public may review the Proposed Plan and offer comments on the alternatives presented during the comment period. Comments will be reviewed with responses provided in the Responsiveness Summary that will become part of the Record of Decision (ROD).

1.1 Proposed Plan Organization

The main topics discussed in the PP are:

- Section 1: Introduction
- Section 2: Site Background
- Section 3: Site Characteristics
- Section 4: Scope and Role
- Section 5: Summary of Site Risks
- Section 6: Remedial Action Objectives
- Section 7: Summary of Alternatives
- Section 8: Evaluation of Alternatives
- Section 9: Preferred Alternative
- Section 10: Community Participation

1.2 Base Background

Pope Air Force Base (PAFB) was established in 1919 as Pope Field and initially housed balloons and planes for aerial photography, artillery spotting, forest fire reporting, and mail carrying. In the 1920s, PAFB activities were minimal; equipment and facilities consisted of a few planes and a motor pool. In the 1930s, facilities grew to include two aircraft hangars, a balloon hangar, and a few other buildings. As with many of the military installations throughout the United States, PAFB underwent fundamental change beginning in 1942. Additional facilities were constructed, and the Base's airlift activities began during World War II. Air and ground crews were trained at PAFB, along with Army airborne units for airborne assault and aerial re-supply missions.

PAFB became independent of Army control in 1947. During the early 1950s, the Base supported the Tactical Air Command mission. The Base underwent a major facility expansion during 1954-55 to meet a renewed tactical airlift mission during the Cold War. The main runway was extended to accommodate new aircraft and the previous two runways were converted to taxiways and parking aprons.

Many of the existing buildings and support facilities were developed during this period. From the mid-1950s to 1992, Pope AFB's primary mission was to support the Military Airlift Command (MAC) and coordinate activities with Fort Bragg Army airborne units.

On June 1, 1992, the Air Force reorganized, and PAFB was transferred from MAC to the Air Combat Command (ACC). Under ACC, the host unit at Pope AFB was the 23d Wing "Flying Tigers." Major groups within the 23d Wing included Operations, Logistics, Support, Medical, and Air Support. On April 1, 1997, ACC re-designated the 23d Wing as the 23d Fighter Group and relinquished its host unit responsibilities for Pope AFB to the 43d Airlift Wing under Air Mobility Command. PAFB is currently home to the 43d Airlift Wing and various mission partner units. Operational units assigned to PAFB were transitioned in accordance with the Department of Defense (DoD) 2005 Base Realignment and Closure (BRAC) plan. As part of the 2005 BRAC proceedings, Pope AFB was selected for realignment. Operational units assigned to PAFB were transitioned during the Department of Defense (DOD) 2010 Base Realignment and Closure (BRAC). With BRAC, Pope AFB was placed under Army ownership with the Air Force remaining as a tenant. The airfield is now known as Pope Army Airfield (PAAF).

2.0 SITE BACKGROUND

The development and opening of the Pope Army Airfield Golf Course (formerly Pope AFB Golf Course) took place in the early 1970s with the golf course remaining operation until 2012. After the golf course closed in 2012, the area was evaluated for near-surface soil and groundwater contamination. A total of 52 surface and subsurface soil samples were collected across the golf course. These samples indicated pesticide contamination was present near the area of golf cart parking, maintenance, and chemical/pesticide storage. This became CCFTBR-H (site) also known as the PAAF Golf Course Pesticide (GCP) site. The site is located near the southeast corner of Reilly Road and Sidewinder Street (**Figure 1).** The GCP site Area of Interest (AOI) covers an area that is approximately 2 acres in the vicinity of Building 192. This building was used for golf cart parking, maintenance, and chemical storage. Contaminants of concern at the site are the pesticides aldrin and dieldrin in near-surface soil and groundwater.

2.1 Previous Investigations

2.1.1 Site Investigations – 2011-2016

In December 2011, the Fort Bragg Directorate of Public Works (DPW) conducted soil sampling in the vicinity of Building 192. The soil samples were collected from 0-6 inches below ground surface (bgs) and analyzed for organochlorine pesticides by EPA method 8081A. Aldrin and dieldrin were detected in six of the soil samples above the EPA Regional Screening Levels (RSLs).

After the golf course was closed in 2012, the U.S. Army Corps of Engineers (USACE) Savannah District collected soil samples course-wide to determine if there was contamination related to prior application and storage of pesticides. The samples collected as part of this study were analyzed for Resource Conservation and Recovery Act (RCRA) Metals by EPA method 6010C/7471A and organochlorine pesticides by EPA method 8081B (USACE, 2012). This sampling was divided into three events, February 2012, May 2012, and August 2012.

The February 2012 event consisted of the collection of 21 soil samples from 0-6 inches bgs distributed across the golf course. All of the sample results were below the EPA RSLs.

In May 2012, an additional 12 surficial soil samples were collected adjacent to Building 192. Three soil samples were found to exceed the EPA RSL for aldrin and dieldrin.

Based on the data of the prior two sampling events by the USACE, additional samples were collected in August 2012 to determine the extent of pesticide contamination in the vicinity of Building 192. During this sampling event, 11 soil samples were collected up to a depth of 2-feet bgs. The vertical extent of the contamination was not determined as three locations had detections of pesticides above the EPA RSL at 2-feet bgs.

In 2015, Bay West was contracted to delineate the extent of soil and groundwater contamination and to complete an RI/FS (Bay West, 2016). The soil and groundwater investigation was completed in three phases, June 2015, October 2015, and February 2016.

During the first phase of investigation in June 2015, groundwater was evaluated by the installation of a temporary well, MW-01. The sample collected from this well had detections of dieldrin exceeding the North Carolina Groundwater Quality Standards in 15A North Carolina Administrative Code (NCAC) 02L (NC2L). Soil samples collected in the vicinity of MW-01 verified contamination in this area identifying it as the source area.

The second phase of investigation was conducted in October and November 2015. Additional soil and groundwater samples were collected, MW-01 was converted to a permanent monitoring well, and four temporary monitoring wells were installed. Detections of aldrin and dieldrin at the four temporary monitoring well locations were found to be above the NC2L standard. Groundwater samples were collected in November 2015 to assess the potential for an oil-based carrier solvent by analyzing samples for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The laboratory data did not indicate the presence of an oil-based carrier solvent. Soil samples collected during this phase indicated that the soil contamination had been delineated as no detections were above the U.S. EPA Residential Soil Screening Levels.

The third phase of investigation was conducted in February 2016. This included the installation of three permanent monitoring wells. The newly installed wells were developed and allowed to stabilize and equilibrate with the aquifer prior to sample collection. Filtered and unfiltered groundwater samples were collected from the three wells. Samples from monitoring wells FTBR-H-MW-01 and FTBR-H-MW-04, filtered and unfiltered, indicated that pesticides were present above the NC2L standard. Based on the results of the groundwater sampling, it was determined that additional investigation was needed to fully delineate the groundwater contamination.

2.1.2 **Supplemental Investigation – 2018**

The USACE mobilized a field crew to the site in February, March, and May of 2018 to delineate the groundwater plume using twenty-one temporary well locations. These temporary wells were installed between 18-28 feet bgs. The groundwater samples were analyzed for organochlorine pesticides by EPA Method 8081B (USACE, 2018).

During the February 2018 sampling event, 12 screen point (SP) locations, FTBRH-SP-01 through FTBRH-SP-12, were sampled for organochlorine pesticides. Dieldrin was detected at estimated concentrations in four of the locations sampled: FTBRH-SP-06, FTBRH-SP-08, FTBRH-SP-09, and FTBRH-SP-10. All four dieldrin detections exceed the NC2L standard of 0.002 µg/L. Of the remaining eight locations sampled, there were no detections of dieldrin. None of the sampled locations had detections of aldrin.

Sampling in March 2018 saw the installation of five additional temporary well locations, FTBRH-SP-13 through FTBRH-SP-17. Of these five locations, FTBRH-SP-16 and FTBRH-SP-17 had detections of dieldrin above the NC2L standard of 0.002 µg/L. Of the remaining three locations sampled, there were no detections of dieldrin. None of the sampled locations had detections of aldrin. All detections had J-flags indicating the value was estimated by the laboratory.

North Carolina Department of Environmental Quality (NCDEQ) requested that additional samples be collected in the vicinity of Building 236 based on the results of the March 2018 sampling. In May 2018, four additional locations, FTBRH-SP-18 through FTBRH-SP-21, were sampled for organochlorine pesticides. Dieldrin was detected at three of the four locations. The three detections exceeded the NC2L standard of 0.002 µg/L. None of the sampled locations had detections of aldrin.

The report concluded that based on site topography, the detections were upgradient of the golf course and are not associated with the site. The report recommended that three monitoring wells be installed. These monitoring wells were installed in October 2018 and sampled as part of the Supplemental Remedial Investigation described in the following section.

2.1.3 Supplemental Remedial Investigation (2020)

In February 2020, the eight monitoring wells (**Figure 2 Site Map**) at the site were sampled for organochlorine pesticides by EPA Method 8081B. Sampling of the monitoring wells was conducted using low-flow sampling methods. Only monitoring well FTBR-H-MW-01 had a detection of dieldrin (0.161 µg/L), above the NC2L standard of 0.002 µg/L.

Based upon the information collected during the Supplemental Remedial Investigation (SRI), it was determined that the Human Health Risk Assessment (HHRA) was still applicable for decision making purposes. The conclusion was based upon the concentrations being lower during the SRI sampling, no changes to the risk characteristics, and the same regulatory criteria. At the completion of the SRI, groundwater had been fully delineated.

2.1.4 Previous Remedial Actions

No remedial actions or removals have taken place at CCFTBR-H.

2.1.5 CERCLA Enforcement

There is no record of CERCLA enforcement activities at CCFTBR-H.

2.1.6 Public Participation Activities

To date, no public participation activities have been conducted or requested. Documentation regarding prior activities at CCFTBR-H have been placed into the repository at the Cumberland County Public Library. The documents are available for review by the public during normal business hours.

3.0 SITE CHARACTERISTICS

The site consists of approximately two acres of mixed land cover, including pavement and grass covered areas surrounding Building 192. The site is bounded to the north by Sidewinder Street, to the south and east by an intermittent stream, wetlands and paved areas, and to the west by Reilly Road. Building 192 was used for golf cart parking and maintenance, and chemical and pesticide storage. The site was used for this purpose until the golf course closed in 2012.

3.1 Extent of Contamination

The pesticides aldrin and dieldrin are present in the soil at concentrations exceeding risk-based screening criteria. Exceedances are associated with a total estimated volume of approximately 1,500 cubic yards. The deepest contamination is to about 11-feet bgs in the area of FTBRH-MW-01. **Figure**

3 shows the approximate boundary for the soil contamination. Results demonstrate that contaminants in soil have not migrated, indicating that contaminants are bound to the soil and are relatively immobile. **Figure 4** shows the relative soil contamination concentrations in comparison to the EPA Residential RSL of $3.9X10^{-2}$ mg/kg for Aldrin and $3.4X10^{-2}$ for Dieldrin (EPA, 2022). Laboratory concentrations can be viewed in **Table 2**. **Figures 5 and 6** are cross-sections across the site that show the depth and extent of the soil contamination.

In groundwater, dieldrin contamination is localized to the area of monitoring well FTBR-H-MW-01 (**Figure 7**). The area immediately around monitoring well FTBR-H-MW-01 has the highest soil concentration of dieldrin which is contributing to the degradation of groundwater quality. Aldrin has not been detected in groundwater samples collected at the site. Groundwater flow is noted as to the southeast (**Figure 8**).

4.0 SCOPE AND ROLE

This PP addresses the contaminants identified in the soil and groundwater as detected and documented in the Remedial Investigation and Supplemental Remedial Investigation. The overall strategy for the site is to restore unrestricted access for this site so that the current use as a recreational area may be maintained. To achieve this strategy, the PP indicates that soil removal with off-site disposal and groundwater treatment will provide a permanent and comprehensive remedy for CCFTBR-H. This will reduce the mobility and source volume of containments within soil materials while the groundwater source volume will be reduced through treatment. The Army has authorized the preparation of this document as required to attain a Record of Decision (ROD) for CCFTBR-H in advance of initiating the proposed remedy.

5.0 SUMMARY OF SITE RISKS

The primary chemicals of concern at this site in groundwater and soil are aldrin and dieldrin. The current assumption is that land and groundwater use will remain the same. The land is currently used as a recreational area while the groundwater is not used in this area. Adjacent to the area is additional commercial, industrial, and residential areas typical of a military base. Building 192 is within the bounds of the site and is an unused covered parking stall. Previously, Building 192 used to store and maintain golf carts as well as storage of herbicides and pesticides. A qualitative and quantitative human health risk assessment and screening-level ecological risk assessment was performed as part of the remedial investigation to evaluate and identify the existing or potential adverse effects to human health and the environment by exposure to hazardous substances at the site.

Potential human receptors with a complete exposure pathway that were evaluated included a construction worker, recreational user, and future resident. All analyses were consistent with the current and anticipated future land use. Carcinogenic risk and noncarcinogenic hazard were evaluated

for aldrin and dieldrin for potential exposure routes. A carcinogenic risk is one associated with an increased risk of developing cancer and a noncarcinogenic hazard is one where noncancer health effects result from an exposure to the contaminants.

Carcinogenic risks were not provided for a current/future construction worker or current/future visitor to the site. For a future resident the carcinogenic risk was above the target risk range of $1X10^{-6}$. The risk calculated for a future resident due to exposure to surface soil, shallow soil, subsurface soil, and groundwater combined is $6X10^{-4}$. Risk for a future adult resident is as follows: surficial soils is $1.5X10^{-5}$, shallow soils $8.7X10^{-5}$, $1.5X10^{-5}$ for subsurface soils, and $5.1X10^{-4}$ for groundwater. For noncarcinogenic risks, a Hazard Index (HI) greater than one (1.0) indicates a potential hazard due to exposure. For combined soil and groundwater, the HI for an adult is 1 and a child is 3. As a result, the noncancer hazards are considered unacceptable for these receptors, which indicates that exposure to the contaminants of concern (COC) at CCFTBR-H does pose a potential concern for adverse noncarcinogenic human health effects.

A potential for ecological risk was identified in the surface soil. However, the anticipated cleanup to protect human health will effectively address ecological risks. Although CCFTBR-H currently includes some undeveloped grassland and individual ecological receptors could be at the site, it is located near a wooded area and these receptors, while present, are unlikely to be affected by the small areal extent. Considering the limited area affected and the presence of similar unaffected habitat nearby and adjacent to the site, the affected area is unlikely to have substantial effects on wildlife populations.

The risk characterization followed the methodology described in EPA guidance (EPA, 1989, 1997). The EPA methods are appropriately designed to be health-protective and tend to overestimate, rather than underestimate, risk. The risk results are, therefore, conservative.

It is the lead agency's current judgement that the Preferred Alternative identified in this PP, or one of the other active measures considered in the PP, is necessary to protect public health or the environment from actual or threatened releases of hazardous substances into the environment.

6.0 REMEDIAL ACTION OBJECTIVES

Based on the results of the risk assessment for CCFTBR-H, a Remedial Action Objective (RAO) was developed, and remedial alternatives were assessed. RAOs are goals that the selected remedial alternative must meet to protect human health and the environment. RAOs for CCFTBR-H are based on site-specific information, including the nature and extent of chemicals of concern, human and ecological risk assessment results, existing site conditions, and future land use plans.

The RAO for CCFTBR-H is to prevent receptor exposure to contaminated soils that exceeds acceptable risk. The cleanup goal for the site is to remove soils above the soil to groundwater EPA Regional Screening Level (RSL) (EPA, 2022) of $1.5X10^{-4}$ mg/kg for aldrin and $7.1X10^{-5}$ mg/kg for dieldrin. The North Carolina Preliminary Soil Remediation Goals (PSRG) (July 2022) has a protection of groundwater level of $6.6X10^{-3}$ mg/kg for aldrin and $1.6X10^{-3}$ mg/kg for dieldrin. Utilization of the EPA RSL for soil removals will meet both state and federal guidance. Groundwater will be treated to obtain the objective of being below the NC2L standard of 0.002 µg/L for aldrin and dieldrin. This will protect potential future human receptors from exposure to contaminated soils through ingestion, dermal contact and inhalation above unacceptable risk. The removal of the source soils to the water table will remove the source for groundwater contamination. Treatment of the groundwater will protect future human receptors from exposure to contaminated groundwater by ingestions or dermal contact above unacceptable risk.

7.0 SUMMARY OF ALTERNATIVES

The focus of the Proposed Plan is to recommend a remedial alternative to eliminate the unacceptable risk to human health and the environment from soil and groundwater contamination at the CCFTBR-H site. The National Contingency Plan (NCP) has specific statutory requirements for remedial actions that must be addressed in the Record of Decision (ROD) and supported by the Feasibility Study (FS). These requirements state that remedial actions must:

- Be protective of human health and the environment
- Attain Applicable Relevant and Appropriate Requirements (ARARs) (or provide grounds for invoking a waiver)
- Be cost-effective
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element *or* provide an explanation in the ROD as to why it does not

In addition, the NCP emphasizes long-term effectiveness and related considerations, including:

- The long-term uncertainties associated with land disposal;
- The goals, objectives, and requirements of the Solid Waste Disposal Act;
- The persistence, toxicity, and mobility of hazardous substances and their constituents, and their propensity to bioaccumulate;
- Short- and long-term potential for adverse health effects from human exposure;
- Long-term maintenance costs;
- The potential for future remediation action costs if the alternative remedial action in question were to fail; and

- The potential threat to human health and the environment associated with excavation, transportation, and re-disposal, or containment.

The nine evaluation criteria listed in the NCP (40 CFR 300.430(e)) encompass statutory requirements and technical, cost, and institutional consideration the program has determined appropriate for thorough evaluation.

Four alternatives were considered in the evaluation of how to best satisfy the nine evaluation criteria in the NCP and achieve the RAOs for this site. The alternatives are:

- Alternative 1 – No Action
- Alternative 2 – Institutional Controls and Groundwater LTM
- Alternative 3 – Soil Excavation, Offsite Disposal, and Groundwater LTM
- Alternative 4 – Soil Excavation, Offsite Disposal, Groundwater Treatment, and Groundwater Monitoring

7.1 Alternative 1 – No Action

Alternative 1 is required to be evaluated by the NCP in order to compare with other remedial alternatives. Alternative 1 consists of no remedial action and does not address the Remedial Action Objectives (RAOs). ARARs would not be met with this alternative. This alternative is not compatible with current or future projected use for the site. There is no implementation time for this alternative. Total present net worth cost would be $0 over a 30-year project lifetime.

7.2 Alternative 2 – Institutional Controls (ICs) and Groundwater LTM

Alternative 2 consists of a restriction to be specified in Fort Bragg's annual Land Use Controls Certification Letter to NCDEQ and the Installation Master Plan. Personnel conducting intrusive activities at the site would require training to avoid exposure to site contaminants. Land use would be limited to industrial or commercial use. Long-term groundwater monitoring would ensure that the groundwater plume does not migrate to the intermittent stream that is adjacent to the site. Additional monitoring wells would need to be installed to ensure monitoring downgradient of FTBRH-MW-01. The Institutional Controls (ICs) would also prohibit any use of groundwater at the site for potable use. Additional restrictions would be necessary to restrict access to the contaminated surficial soils. Any additional actions, such as fencing, needed to restrict access are not included in this estimate as they would need to be determined by NCDEQ. This option would require ARAR waivers for soil and groundwater being above the preliminary remedial goals (PRGs). Implementation time would be approximately six to nine months to implement the ICs and required access restrictions. Groundwater would be monitored until PRGs are met which is expected to be greater than 30-year project lifetime evaluated. The total present net worth cost of Alternative 2 is $364,230.10.

7.3 Alternative 3 – Soil Excavation, Offsite Disposal, and Groundwater LTM

Alternative 3 consists of excavation of all soils exceeding PRGs to a depth of up to 11 ft bgs using conventional earth-moving equipment. Excavated soils would be placed into lined roll-offs for characterization. Soils that were determined to be non-hazardous would be transported by a licensed transport and disposal company to the nearest available RCRA Subtitle D landfill for disposal. Soils that were determined to be characteristically hazardous would be sent to a designated hazardous waste landfill. Soil sampling of the sidewalls and base of the excavation would be performed to determine whether any soil exceeding PRGs remain. If soil exceeding PRGs does remain, the excavation would be expanded, and the confirmation sampling would be repeated. Upon removal of all contaminated soil, the site would be graded, and restored to prevent soil erosion. Groundwater would be monitored until PRGs are met which is expected to be greater than 30-year project lifetime evaluated. An ARAR waiver would be needed for the groundwater portion of this remedy. Implementation time for the soil removal would be approximately 12 months. The total present net worth cost of Alternative 3 is $701,865.00.

The major components of Alternative 3 include the following:

- Placement of silt fencing and other temporary drainage control features.
- Clearing and grubbing of the proposed excavation areas and adjacent staging areas.
- Placement of temporary construction fencing and signs to discourage unauthorized entry.
- Removal of contaminated soil exceeding PRGs up to a depth of 11 ft bgs with a total estimated volume of approximately 1,500 CY.
- Disposal of non-hazardous waste at a RCRA Subtitle D landfill.
- Confirmation sampling of excavation.
- Decontamination of equipment.
- Disposal of decontamination water at a licensed disposal facility.
- Reinstallation of monitoring wells removed during excavation.

7.4 Alternative 4 – Soil Excavation, Offsite Disposal, Groundwater Treatment, and Groundwater Monitoring

Alternative 4 consists of excavation of all soils exceeding preliminary remedial goals (PRGs) to a depth sufficient to remove contamination above PRGs or until groundwater is encountered using conventional earth-moving equipment. Excavated soils would be placed into lined roll-offs for characterization. Soils that were determined to be non-hazardous would be transported by a licensed transport and disposal company to the nearest available RCRA Subtitle D landfill for disposal. Soils that were determined to be characteristically hazardous would be sent to a designated hazardous waste landfill. Soil sampling of the sidewalls and base of the excavation would be performed to determine

whether any soil exceeding PRGs remain. If soil exceeding PRGs does remain, the excavation would be expanded, and the confirmation sampling would be repeated. Upon removal of all contaminated soil, the site would be graded, and restored to prevent soil erosion.

Replacement monitoring wells would then be installed to replace those removed during excavation activities. Injection of the hydrogen release compound (HRC) and micro-scale carbon would then commence to treat the groundwater plume. HRC would work to break down the contaminants of concern and the micro-scale carbon will provide insurance that if any dieldrin back diffuses out of saturated soils, not accessible to be removed during excavation, the contaminant will be immobilized while natural breakdown processes occur.

These injections would take place in the area where groundwater contamination exceeds the NC2L of 0.002 µg/L. It is estimated that after injections are completed at the site, groundwater concentrations will decrease allowing site closure with no restrictions after the required post-remediation monitoring period. Post-remediation monitoring will be quarterly for two years to determine the effectiveness of the injections. The groundwater monitoring program will be evaluated at two years to determine if groundwater PRGs are met, or additional monitoring is needed and what the monitoring schedule should be in year three and beyond. All ARARs would be met with this option and would not require a waiver. The time to implement this option is the longest at 16-24 months. The expected outcome is that groundwater and soil cleanup will allow the site to be returned to unrestricted use with no ICs required. The present net worth cost of Alternative 4 is: $824,065.00

The major components of Alternative 4 include the following:

- Placement of silt fencing and other temporary drainage control features.
- Clearing and grubbing of the proposed excavation areas and adjacent staging areas.
- Placement of temporary construction fencing and signs to discourage unauthorized entry.
- Removal of contaminated soil exceeding PRGs up to a depth of 11 ft bgs with a total estimated volume of approximately 1,500 CY.
- Disposal of non-hazardous waste at a RCRA Subtitle D landfill.
- Confirmation sampling of excavation.
- Decontamination of equipment.
- Disposal of decontamination water at a licensed disposal facility.
- Reinstallation of monitoring wells removed during excavation.
- Injection of HRC using a direct push rig.
- Injection of micro-scale carbon using a direct push rig.
- Groundwater sampling post-injection.

HRC and micro-scale carbon injections were chosen due to the wide availability of tooling, knowledge, and applicability for the contaminants of concern. This is an in-situ process which does not require the installation of any additional permanent wells, above ground infrastructure, or power usage. Using HRC in combination with the micro-scale carbon injections provides a permanence, reduction in toxicity and reduction of mobility of the contaminants that other methods do not provide in-situ. Other technologies were evaluated (i.e. in-well air stripping, pump and treat) but the contaminant concentrations are too low to be greatly effective and this would generate water which would need to be released requiring a National Pollutant Discharge Elimination System permit. The feasibility of the power usage, limited applicability, and the need for permits makes any system like pump and treat or air stripping unviable.

7.4.1 Additional Information for Alternative 4

Alternative 4 was not evaluated as part of the original feasibility study (FS) due to some of the technology not being commercially available at the time. This section will provide an overview of information that would have been considered as part of the FS.

- Threshold Criteria: Alternative 4 meets all ARARs and provides protection of human health and the environment. No restrictions would be needed for the site once Alternative 4 is fully implemented.
- Balancing Criteria: Alternative 4 provides a permanence not seen in Alternative 1, 2, and 3 as groundwater is directly addressed through injections of amendments. Alternative 3 and 4 reduces the mobility of the soil contaminants by placing them into a permitted and lined solid waste landfill. Alternative 4 also addresses groundwater contamination to reduce the toxicity, mobility and volume of contamination present through the use of injectable amendments. Short-term risks are present during the removal phase by site workers being exposed to contaminated soils. Following health and safety protocols and proper training of site workers can mitigate these risks. Exposure risks to the contaminants during the injections are not expected as all injectants are emplaced under the ground surface at a depth greater than 11 feet below ground surface.
- Implementability: Alternative 4 is easily implementable.
- Cost: Alternative 4 is the highest cost of the alternatives at $824,065.00 but is expected to fully resolve the site, including groundwater PRGs, prior to 30-years. This would not require continued groundwater monitoring or continued 5-year reviews providing a long-term cost savings. Alternative 3 is the next highest cost at $701,865.00. This will leave the groundwater impacted and necessitate groundwater monitoring for at least 30 years and require 5-year reviews into perpetuity.

8.0 EVALUATION OF ALTERNATIVES

Evaluation of the alternatives ensures the following: overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of contaminants through treatment; short-term effectiveness; implementability; cost; state/support agency acceptance; and community acceptance. Based on the

comparative analysis detailed in the Feasibility Study and additional information provided in this Proposed Plan, Alternative 4- soil excavation, offsite disposal, groundwater treatment, and groundwater monitoring provides the greatest permanence and greatest implementability. With Alternative 2, the risk remains as the contaminants are still present at the surface, subsurface, and in groundwater at the site. It is unlikely that groundwater goals would be obtained using Alternative 2 requiring continued groundwater LTM beyond the 30-year estimate. Alternative 3 with the soil excavation, offsite disposal, and groundwater LTM would leave contaminant concentrations in the groundwater above the NC2L which will act to contaminate clean soil brought in during times of high groundwater. It would be unlikely that groundwater PRGs would be achieved at the site with this alternative. Selecting Alternative 4 yields a permanence not available in Alternative 2 or Alternative 3 with LTM by removing the contaminants in the soil and treating groundwater to reach site closure. The groundwater treatment is fiscally advantageous as it will yield long-term savings over the 30-year estimate of long-term groundwater monitoring. The U.S. Army expects this alternative to meet the CERCLA requirements for remedies. The Preferred Alternative can change in response to public comments and new information.

Based on the information currently available, the U.S. Army believes the preferred alternative meets the threshold criteria. The U.S. Army expects the preferred alternative to satisfy the following statutory requirements of CERCLA § 121(b):

1. Be protective of human health and the environment;
2. Be cost-effective;
3. Utilize permanent solutions; and
4. Explain why the preference for treatment will not be fully met.

The preferred alternative to protect human health and the environment is soil excavation, off-site disposal, groundwater treatment, and groundwater monitoring, as determined in consideration of the nine CERCLA criteria:

1. Protectiveness

Alternative 4 would achieve RAOs and be protective of human health and the environment. Soils exceeding PRGs would be removed from the site and disposed of at a RCRA Subtitle D landfill. This would eliminate all unacceptable risks to human health and the environment and eliminate any potential migration of contamination to other media. Groundwater will still be above PRGs after excavation which will be addressed with the HRC and micro-scale carbon treatment. After the groundwater treatment, groundwater across the site is expected to be below PRGs prior to the 30-year estimate.

2. Compliance with ARARs

Alternative 4 would comply with all ARARs. Special considerations would need to be taken during construction of the remedy to comply with location specific ARARs that apply to surrounding surface water bodies, suppression of fugitive dust, and solid waste disposal. Confirmation soil sampling would be performed to ensure that the remedy complies with all chemical-specific ARARs. Groundwater will be treated and be monitored going forward to ensure compliance with ARARs.

3. Long Term Effectiveness and Permanence

Alternative 4 would be effective in the long-term. All soils that exceed PRGs would be removed from the site. Residual risk would be within an acceptable range for the anticipated future site use. Excavation and disposal are proven technologies that are effective at eliminating unacceptable site risks and reducing the mobility of contaminants in the soil. Soil contamination above levels that allow unrestricted use will not remain on-site. To obtain groundwater PRGs, HRC and micro-scale carbon treatment will be utilized. After the HRC and micro-scale carbon treatment is completed, groundwater will be monitored quarterly for two years before evaluating if additional monitoring is needed, the schedule of those events, or if the site qualifies for closure. If groundwater PRGs are not met within five years, a Five-Year Review will be conducted to review the site, work done to date, and assess future remedy options.

4. Short-Term Effectiveness

Alternative 4 would present a low to moderate risk to construction workers, the community, and the environment during implementation of the remedy. Engineering controls can be implemented relatively easily to mitigate these risks. The major risks to construction workers are incidental ingestion of contaminated soil, dermal contact with contaminated soil, and inhalation of contaminated particulates in fugitive dust. Proper personal protective equipment (e.g. gloves, dust masks, etc.) would be used to prevent incidental ingestion and dermal contact, and a water truck and sprayers would be used as needed to mitigate the risk of fugitive dust. Air monitoring may also be implemented at the construction site as needed. Additional risks to construction workers exist due to operation of large equipment. Proper health and safety procedures would be followed in order to mitigate these risks. Risks to the community are expected to be minimal but may be caused by transportation of contaminated soil from the site to the landfill and increased truck traffic on roads. Engineering controls including dumpster tarps would mitigate this risk. In addition, temporary construction fencing, and signs would be located along the perimeter of the construction area in order to discourage unauthorized entry. Erosion and stormwater control would be implemented in order to mitigate risk to the environment.

5. *Reduction of Toxicity, Mobility, or Volume through Treatment*

Alternative 4 does not employ treatment of the soil as a principal element, therefore there would be no reduction in toxicity, mobility, or volume through treatment. The addition of groundwater treatment using HRC and micro-scale carbon will be a principal element to reduce the toxicity, mobility, or volume through treatment. The statutory preference for treatment as a principal element is partially satisfied through the groundwater treatment. Soil treatment is not feasible at the site given the timelines, cost of implementability, required infrastructure not being available, and the contaminants of concern.

6. *Implementability*

Alternative 4 would be readily implementable. Excavation and offsite disposal are routinely employed for site cleanups involving contaminated soils. The equipment is commonly available and there are multiple vendors that are experienced in excavation and disposal of contaminated soil. There is ample space available on site for equipment staging. The biggest issue with technical feasibility is the location of the nearest landfill. Groundwater injections of HRC and micro-scale carbon are also routinely employed for groundwater. The equipment needed is commonly available and can be completed by USACE or contractors.

7. *Cost*

Direct Capital Cost: $824,065.00
Annual O&M Cost: $11,342.25
Total Periodic Cost: $5,000
Total Present Net Worth Cost: $840,407.25

8. *State Acceptance*

The State of North Carolina Department of Environmental Quality is expected to concur with the preferred alternative at CCFTBR-H.

9. *Community Acceptance*

This PP is intended to inform the public and to promote stakeholder input during the required 30-day public comment period. After completion of the public comment period and review of all comments, community acceptance will be evaluated and addressed in the Record of Decision for the Site. It is expected that community acceptance to this alternative will be high as it addresses the immediate concern with surficial soil contamination and the longer-term concerns with the contaminated groundwater and subsurface soil contamination.

9.0 PREFERRED ALTERNATIVE

The preferred alternative for CCFTBR-H is Alternative 4. Alternative 4 is the only alternative that addresses both the soil and groundwater contamination. This alternative will address the soil source materials through excavation of the soil source and addressing the groundwater source area through injections of amendments. This alternative also has the greatest permanence and has a low barrier to implementability. This alternative will reduce risk of exposure at the site and any future concerns by addressing the groundwater and soil contamination at the site.

The preferred alternative can be modified or changed based on the response to public comment or if new information is made available.

The four most decisive considerations from the nine criteria were protectiveness; reduction of toxicity, mobility, or volume through treatment; long-term effectiveness and permanence; and cost. The horizontal and vertical extent of the soil and groundwater contamination is well known which removes most uncertainties. If soil contamination extends below the water table, that is expected to be indicative of the groundwater contamination which will be treated through other methods. Excavation will not extend below the water table. If contamination is found to extend to unknown areas based on confirmation sampling of the sidewalls and floor, a reasonable attempt will be made to remove accessible contamination above the PRGs.

Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The USACE expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA § 121 (b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; 5) satisfy the preference for treatment as a principal element. Prior to completion of the Remedial Design (RD), a comprehensive groundwater sampling event for all pesticide, herbicide, and volatile organic compounds is recommended to ensure correct dosing of the injectants.

10.0 COMMUNITY PARTICIPATION

Public participation is an important part of selecting the final remedy. The public is encouraged to submit written comments to the Army. The Army will review all written and oral comments prior to finalizing the remedy selection in the form of a ROD. All public comments and associated responses will be included in the Responsiveness Summary Section of the ROD.

For an in-depth review of the material presented in this plan, the Army has made the RI reports and other information pertinent to CCFTBR-H available for public review. This information is available for review at the repository listed below.

10.1 Information Repository

The RI and FS reports, this Proposed Plan, and supporting documents are part of the Fort Bragg administrative record and are available for public review at:

The Cumberland County Public Library
300 Maiden Lane
Fayetteville, North Carolina 28301

Alternatively, interested members of the public may review and comment on the Proposed Plan during a 30-day Public Comment Period, from December 16, 2022 to January 23, 2023. The Proposed Plan may be reviewed online at the following link:

https://www.sas.usace.army.mil/About/Divisions-and-Offices/Planning-Division/Plans-and-Reports/

10.2 Public Meeting

The Army will schedule a public meeting, should the public express sufficient interest. The public will be notified of the date, time and location through a notice in the *Fayetteville Observer*.

10.3 Public Comment Period

The public comment period for the CCFTBR-H Proposed Plan will run from December 16, 2022 to January 23, 2023. Please submit all written comments to:

Dustin Cates
Fort Bragg Environmental Management Branch
Building 3-1137
Fort Bragg, North Carolina 28310

Comments received will be addressed in the Responsiveness Summary Section of the upcoming ROD for CCFTBR-H.

Contact for More Information

DA Directorate Public Works
Attn: IMBG-PWE-M (Dustin Cates)
2175 Reilly Rd Stop A
Fort Bragg, NC 28310

Qu Qi
North Carolina Department of Environmental Quality
217 West Jones Street
Raleigh, North Carolina 27603
Phone: (919) 707-8213

11.0 REFERENCES

Bay West, 2016. *Remedial Investigation/Feasibility Study, Pope AAF Golf Course Pesticide Site, CCFTBR-H, Fort Bragg, North Carolina,* September 2016.

NCDEQ, 2020, *Re: Supplemental Remedial Investigation Report Site CCFTBR-H*, Harry Zinn, 20 October 2020.

United States Army Corps of Engineers (USACE), 2018. *Delineation of Groundwater, Pope Golf Course Pesticide Site, Pope Army Airfield, Fort Bragg, North Carolina*, June 2018.

United States Army Corps of Engineers (USACE), 2020, *Supplemental Remedial Investigation Report*, Site CCFTBR-H, Fort Bragg, North Carolina, May 2020.

United States Environmental Protection Agency (USEPA), 2022, *Regional Screening Levels (RSLs) – Generic Tables* (TR=1E-06 THQ=1.0), https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables, Accessed November 1, 2022.

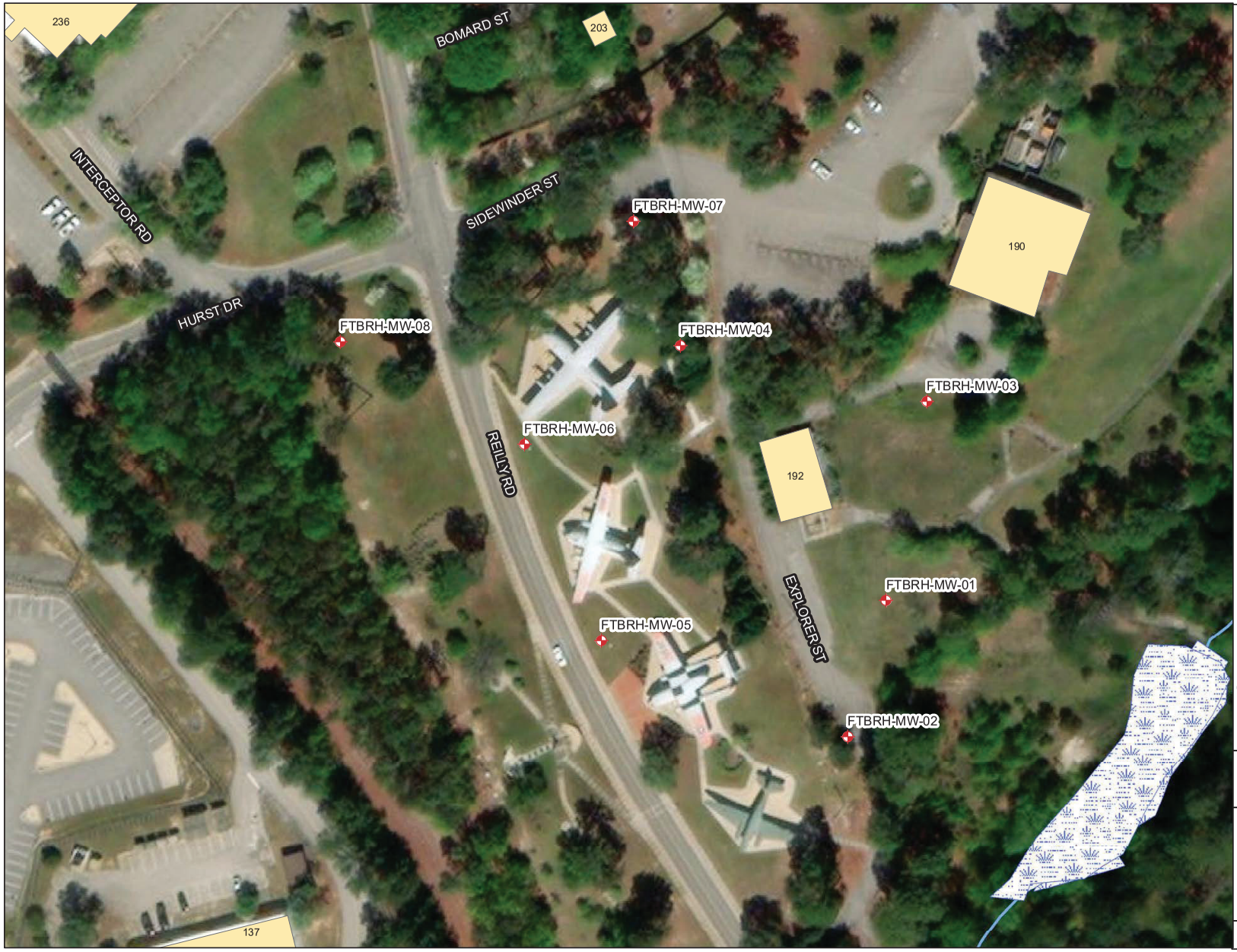
Figures

CCFTBR-H Site

Site Vicinity Map
CCFTBR-H

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

Figure 1



Legend

- Groundwater Monitoring Well
- Stream
- Building
- Wetland

N

0 50 100 200 Feet

1 inch = 100 feet

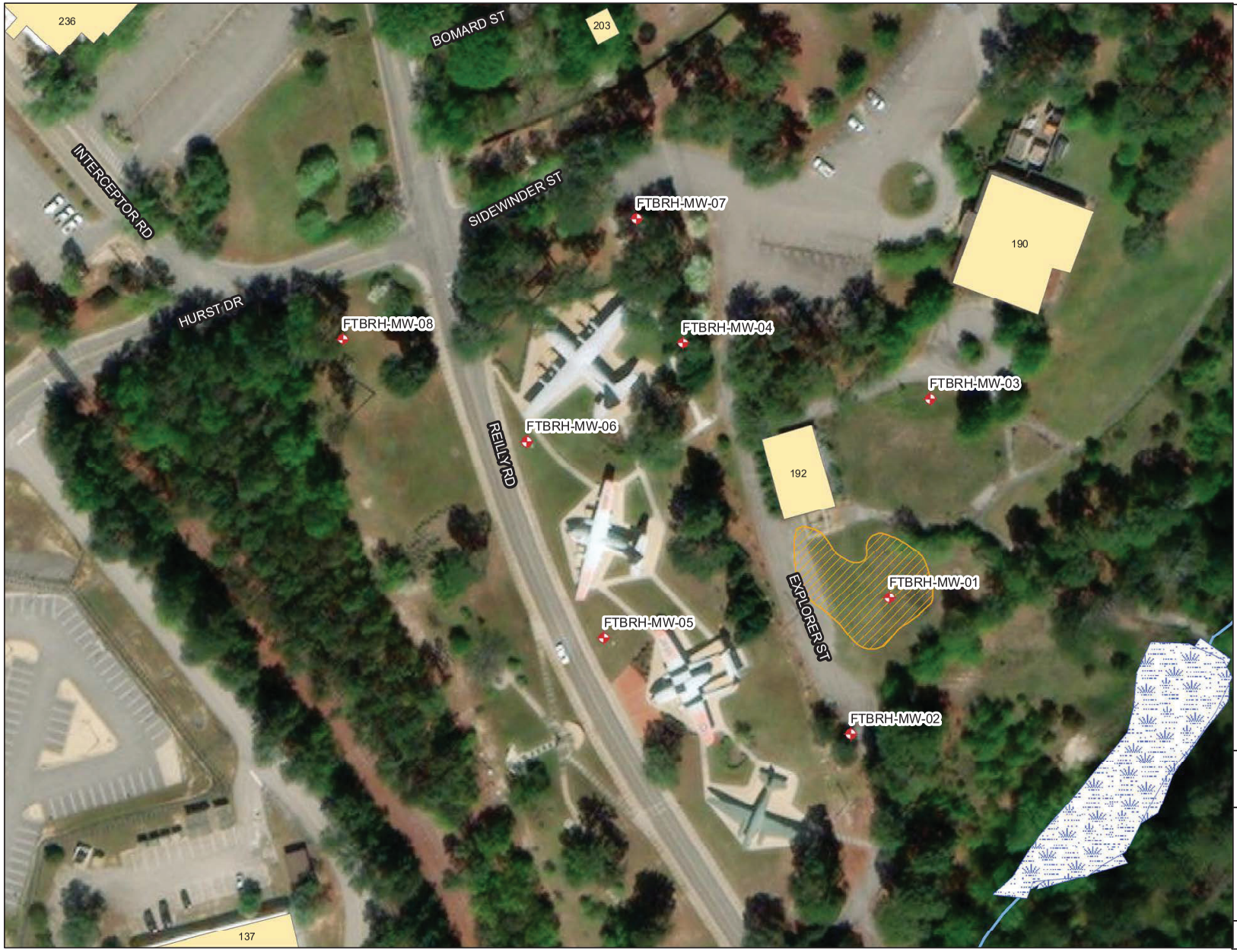
U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
Geology, Hydrogeology, and HTRW Design Section

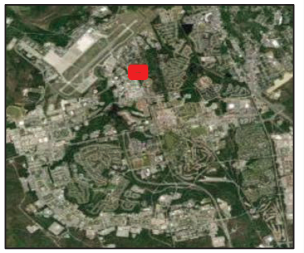
Pope Army Airfield Golf Course Pesticide Site CCFTBR-H

Site Map

Fort Bragg, North Carolina

November 2021 | Figure 2





Legend

- Groundwater Monitoring Well
- Streams
- Wetland
- Soil Contamination Extent
- Building

N

0 50 100 200 Feet

1 inch = 100 feet

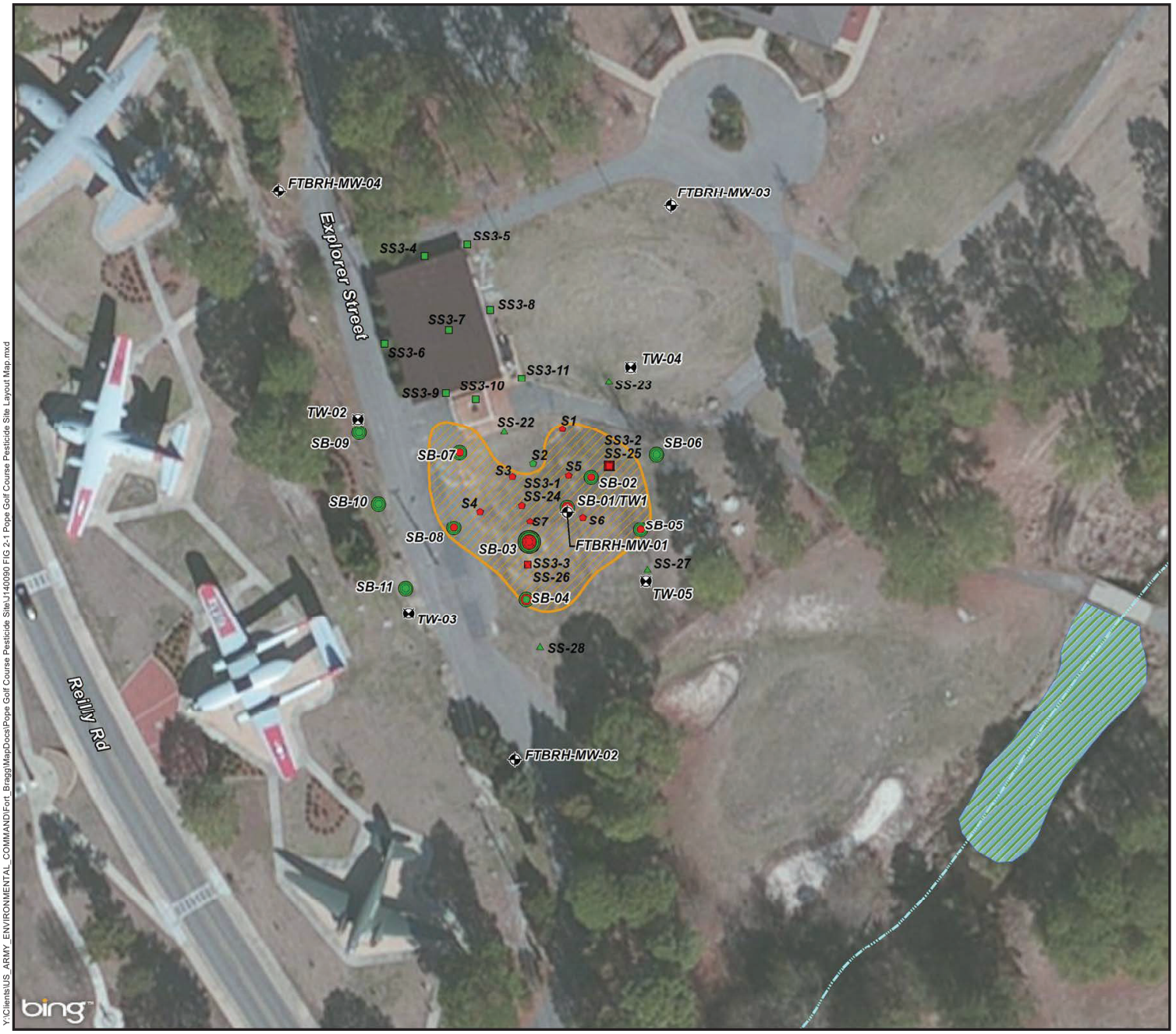
U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
Geology, Hydrogeology, and HTRW Design Section

Pope Army Airfield Golf Course Pesticide Site CCFTBR-H

Soil Contamination Extent

Fort Bragg, North Carolina

November 2021	Figure 3



Y:\Clients\US_ARMY_ENVIRONMENTAL_COMMAND\Fort_Bragg\MapDocs\Pope Golf Course Pesticide Site\J140090 FIG 2-1 Pope Golf Course Pesticide Site Layout Map.mxd

Figure 4

Pope Golf Course Pesticide Site Site Map with Boring and Well Locations

Fort Bragg, North Carolina

Map Projection: NAD 1983 StatePlane North Carolina FIPS 3200 Feet
Basemap: Bing Aerial Imagery WMS

0 50 100 Feet

0 15 30 Meters

Features

- Soil Boring (Bay West 2015)
- Previous Surface Soil Boring (Feb/May 2012)
- Previous Soil Boring (August 2012)
- Previous Surface Soil Boring (December 2011)
- Temporary Monitoring Well
- Permanent Monitoring Well
- Intermittent Stream
- Intermittent Surface Water Feature
- Estimated Extent of Soil Pesticide Concentrations Exceeding the EPA RSL

Sample Interval

- 0.0' - 0.5'
- 2.0' - 3.0'
- 5.0' - 6.0'
- 9.5' - 10.0'
- 11.0' - 11.5'

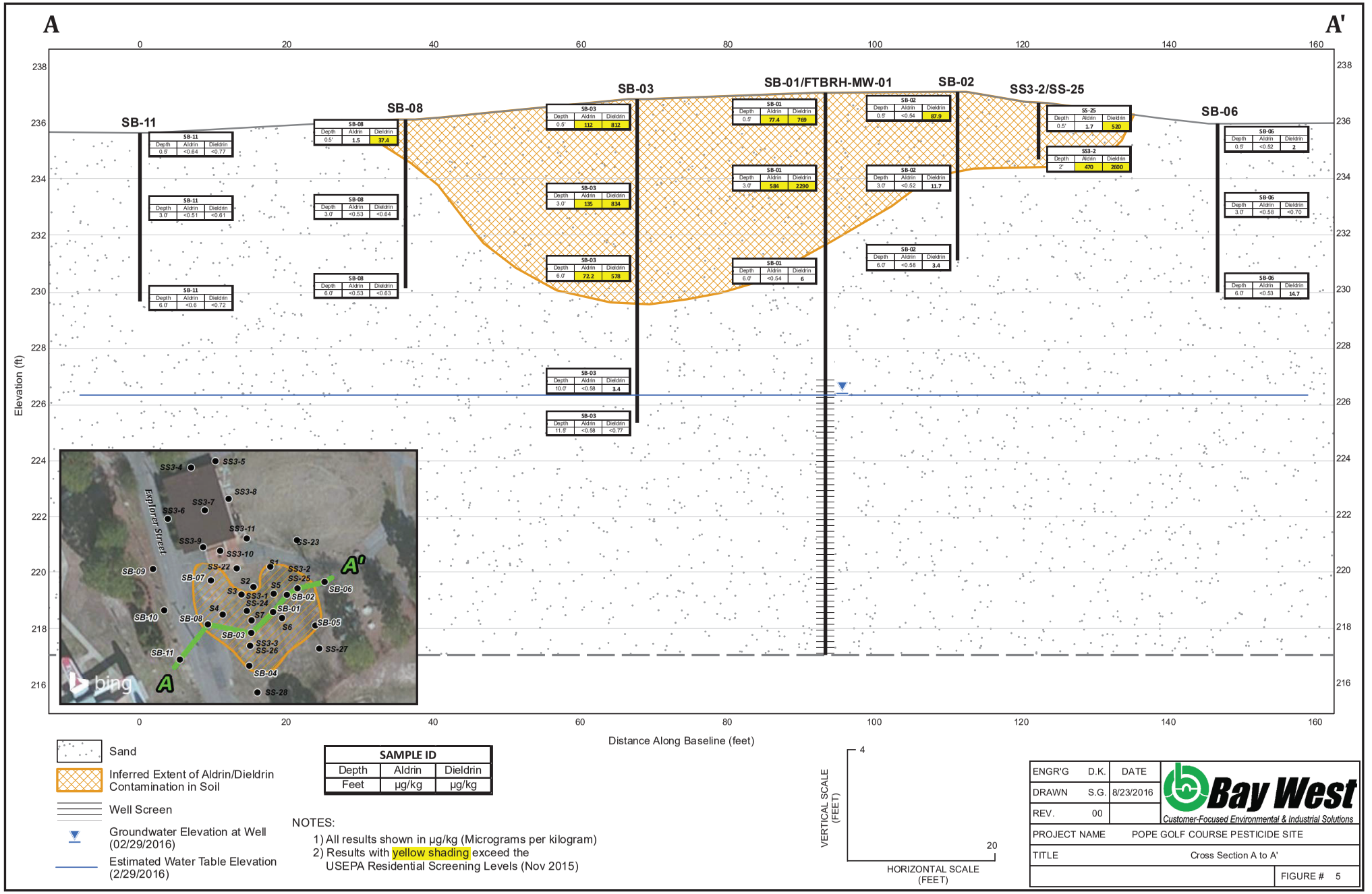
Sample Shading

- Below USEPA Residential Screening Levels
- Above USEPA Residential Screening Levels

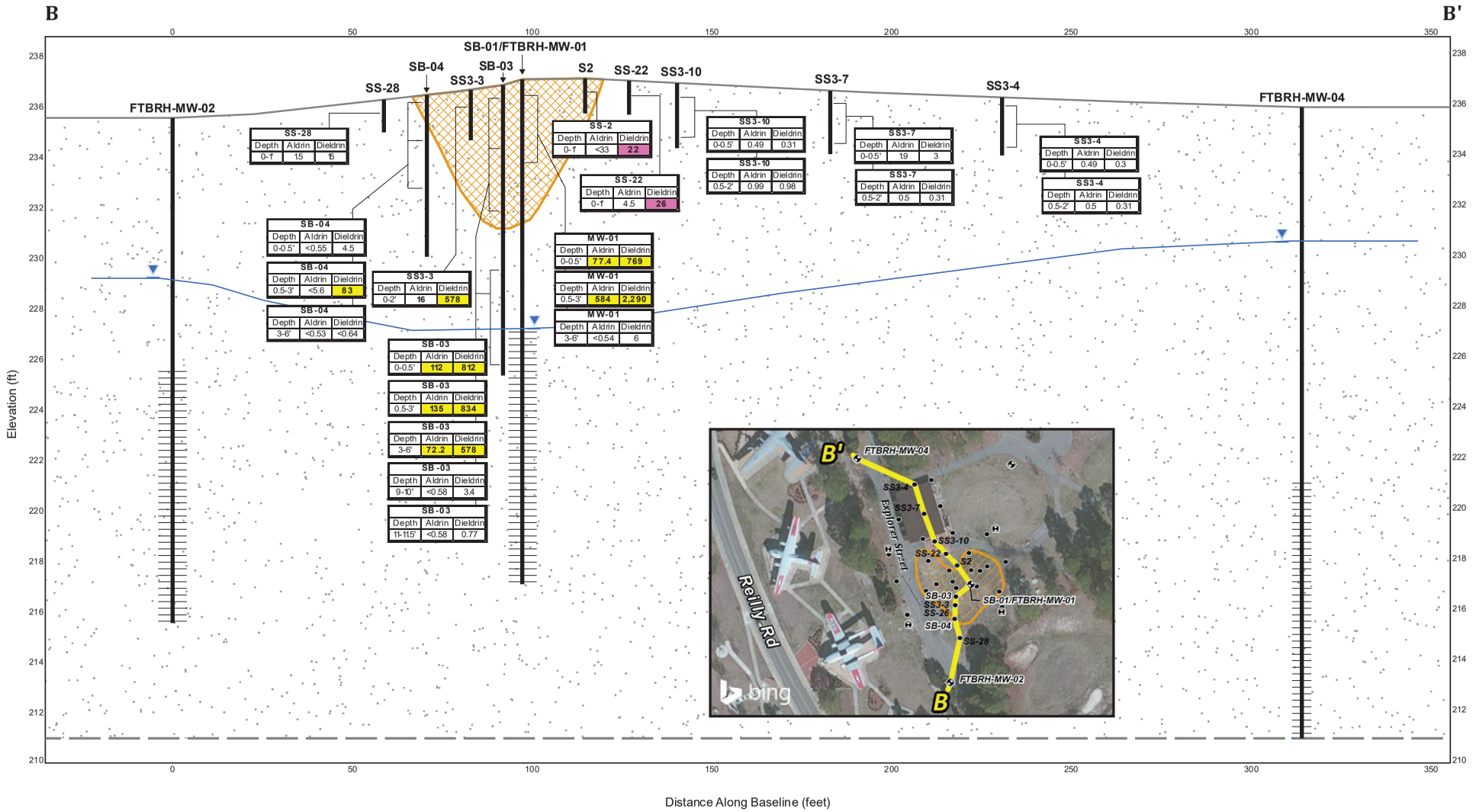
EPA Screening Level Aldrin: 39 µg/kg Dieldrin: 34 µg/kg

Bay West
Customer-Focused Environmental & Industrial Solutions

Drawn By: SG | Date Drawn/Revised: 6/10/2016 | Project No. J140090



Y:\Clients\US_ARMY_ENVIRONMENTAL_COMMAND\Fort_Bragg\MapDocs\Pope Golf Course Pesticide Site\J140090 FIG 4-1 Cross Section A to A.mxd



Y:\Clients\US_ARMY_ENVIRONMENTAL_COMMAND\Fort_Bragg\MapDocs\Pope Golf Course Pesticide Site\J140090 FIG 4-2 Cross Section B to B.mxd

Sand

Inferred Extent of Aldrin/Dieldrin Contamination in Soil

Well Screen

Groundwater Elevation at Well (02/29/2016)

Estimated Water Table Elevation (2/29/2016)

SAMPLE ID		
Depth	Aldrin	Dieldrin
Feet	µg/kg	µg/kg

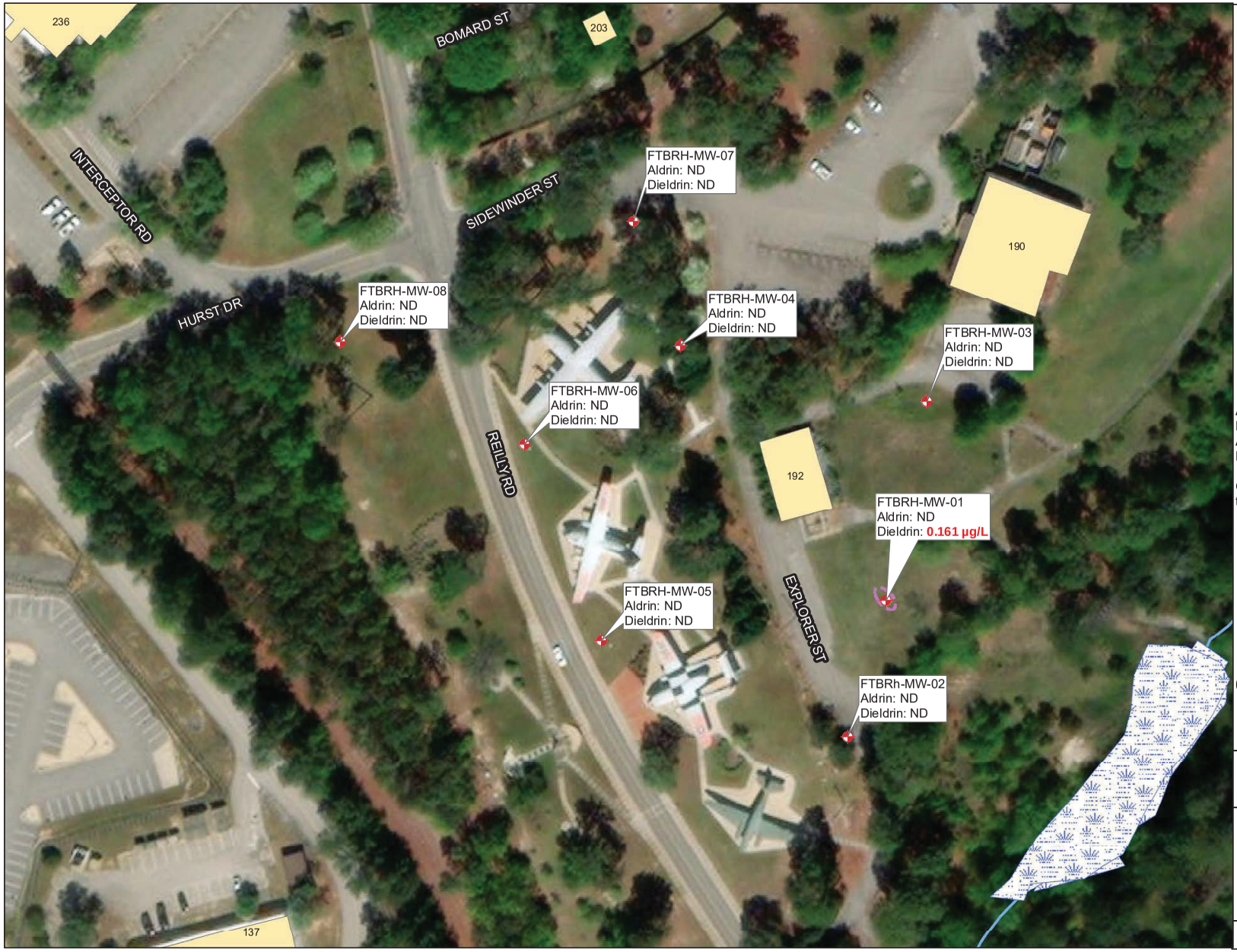
NOTES:

1) All results shown in µg/kg (Micrograms per kilogram)
2) Results with yellow shading exceed the USEPA Residential Screening Levels (Nov 2015)
3) Results with pink shading exceed the USEPA Ecological Soil Screening Level

VERTICAL SCALE (FEET) 4

HORIZONTAL SCALE (FEET) 20

ENGR'G	D.K.	DATE	Bay West
DRAWN	S.G.	8/26/2016	Customer-Focused Environmental & Industrial Solutions
REV.	00		
PROJECT NAME	POPE GOLF COURSE PESTICIDE SITE		
TITLE	Cross Section B to B'		
J140090		FIGURE #	6



Legend

- Groundwater Monitoring Well
- Streams
- Wetland
- Dieldrin Groundwater Plume
- Building

All results in micrograms per liter (µg/L)
NC2L Standard:
Aldrin: 0.002 µg/L
Dieldrin: 0.002 µg/L

Groundwater plume is estimated extent to non-detect

N

0 50 100 200 Feet

1 inch = 100 feet

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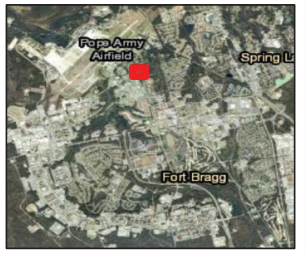
SAVANNAH DISTRICT
Geology, Hydrogeology, and HTRW Design Section

Pope Army Airfield Golf Course Pesticide Site CCFTBR-H

February 2020 Groundwater Results & Plume Map

Fort Bragg, North Carolina

November 2021 | Figure 7



Legend

- Groundwater Monitoring Well
- Potentiometric Contour
- Wetland
- Streams
- Building

Elevations are in feet above mean sea level

N

0 50 100 200 Feet

1 inch = 100 feet

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Geology, Hydrogeology, and HTRW Design Section

Pope Army Airfield Golf Course Pesticide Site CCFTBR-H

Groundwater Elevation

Fort Bragg, North Carolina

November 2022 | Figure 8

Tables

Table 1
Historicial Groundwater Data
CCFTBR-H

Client ID:	NC2L GWQS	FTBRH-MW-01	FTBRH-MW-01	FTBRH-MW-01	FTBRH-MW-01	FTBRH-MW-01	FTBRH-MW-02	FTBRH-MW-02	FTBRH-MW-02	FTBRH-MW-02
Matrix:		GW	GW	GW	GW	GW	GW	GW	GW	GW
Sampled Date:		11/20/2015	2/29/2016	2/29/2016	12/12/2018	2/4/2020	2/29/2016	2/29/2016	12/12/2018	2/4/2020
Filtered		UNK	Yes	No	UNK	No	Yes	No	UNK	No
Pesticides (GC) by Method 8081B (µg/l)										
Aldrin	0.002	ND	ND (0.023)	ND (0.021)	ND (0.0070)	ND (0.0250)	ND (0.021)	ND (0.020)	ND (0.0070)	ND (0.0250)
Chlordane	0.1	NA	NA	NA	**2.2**	NA	NA	NA	**0.20**	NA
Dieldrin	0.002	**0.084**	**0.35**	**0.78**	**1.3**	**0.161**	ND (0.010)	ND (0.010)	ND (0.0037)	ND (0.0250)

Client ID:	NC2L GWQS	FTBRH-MW-03	FTBRH-MW-03	FTBRH-MW-03	FTBRH-MW-03	FTBRH-MW-04	FTBRH-MW-04	FTBRH-MW-04	FTBRH-MW-04
Matrix:		GW	GW	GW	GW	GW	GW	GW	GW
Sampled Date:		2/29/2016	2/29/2016	12/12/2018	2/4/2020	2/29/2016	2/29/2016	12/12/2018	2/4/2020
Filtered		Yes	No	UNK	No	Yes	No	UNK	No
Pesticides (GC) by Method 8081B (µg/l)									
Aldrin	0.002	ND (0.020)	ND (0.021)	ND (0.0070)	ND (0.0250)	0.16 J	0.095 J	ND (0.0070)	ND (0.0250)
Chlordane	0.1	NA	NA	**0.12 J**	NA	NA	NA	**5.0**	NA
Dieldrin	0.002	ND (0.010)	ND (0.010)	ND (0.0037)	ND (0.0250)	ND (0.010)	0.21	**0.088**	ND (0.0250)

Client ID:	NC2L GWQS	FTBRH-MW-05	FTBRH-MW-05	FTBRH-MW-06	FTBRH-MW-06	FTBRH-MW-07	FTBRH-MW-07	FTBRH-MW-08
Matrix:		GW	GW	GW	GW	GW	GW	GW
Sampled Date:		12/12/2018	2/4/2020	12/12/2018	2/4/2020	12/12/2018	2/4/2020	2/4/2020
Filtered		UNK	No	UNK	No	UNK	No	No
Pesticides (GC) by Method 8081B (µg/l)								
Aldrin	0.002	ND (0.0070)	ND (0.0253)	ND (0.0070)	ND (0.0253)	ND (0.0070)	ND (0.0250)	ND (0.0250)
Chlordane	0.1	**0.44 J**	NA	**2.0**	NA	**0.86**	NA	NA
Dieldrin	0.002	ND (0.0037)	ND (0.0253)	**0.063**	ND (0.0253)	**0.034 J**	ND (0.0250)	ND (0.0250)

ND: Not Detected
NA: Not Analyzed
µg/L: microgram per liter

Table 2
CCFTBR-H
Soil Analytical Results

Bay West Sampling October 2015																
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB03-SL-10.0		FB-GCP-SB03-SL-11.5		FB-GCP-SB09-SL-0.5		FB-GCP-SB09-SL-3.0		FB-GCP-SB09-SL-6.0		FB-GCP-SB10-SL-0.5	
Lab Sample ID:			FA28900-10		FA28900-11		FA28900-1		FA28900-2		FA28900-3		FA28900-4	
Date Sampled:			10/27/2015		10/27/2015		10/27/2015		10/27/2015		10/27/2015		10/27/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.58	U	**0.58**	**U**	0.53	U	0.53	U	0.60	U	0.58	U
Dieldrin	34	22	**3.4**	-	**0.77**	**J**	0.64	U	0.64	U	0.73	U	0.7	U

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB10-SL-3.0		FB-GCP-SB10-SL-6.0		FB-GCP-SB11-SL-0.5		FB-GCP-SB11-SL-3.0		FB-GCP-SB11-SFD-3.0		FB-GCP-SB11-SL-6.0	
Lab Sample ID:			FA28900-5		FA28900-6		FA28900-7		FA28900-8		FA28900-15		FA28900-9	
Date Sampled:			10/27/2015		10/27/2015		10/27/2015		10/27/2015		10/27/2015		10/27/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.55	U	0.62	U	0.64	U	0.51	U	0.62	U	0.60	U
Dieldrin	34	22	0.67	U	0.75	U	0.77	U	0.61	U	0.75	U	0.72	U

Bay West Sampling June 2015														
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB01-SFD-0.5		FB-GCP-SB01-SL-0.5		FB-GCP-SB01-SL-3.0		FB-GCP-SB01-SL-6.0		FB-GCP-SB02-SL-0.5		FB-GCP-SB02-SL-3.0	
Lab Sample ID:			FA25497-23		FA25497-22		FA25497-24		FA25497-25		FA25497-26		FA25497-27	
Date Sampled:			6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	**10.8**	**J**	**77.4**	**J**	**584**	**J**	<0.54	-	<0.54	-	<0.52	-
Dieldrin	34	22	**81.6**	**-**	**769**	**-**	**2290**	**-**	**6**	**-**	**87.9**	**U**	11.7	-

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB02-SL-6.0		FB-GCP-SB03-SFD-0.5		FB-GCP-SB03-SL-0.5		FB-GCP-SB03-SL-3.0		FB-GCP-SB03-SL-6.0		FB-GCP-SB04-SL-0.5	
Lab Sample ID:			FA25497-28		FA25497-21		FA25497-18		FA25497-19		FA25497-20		FA25497-12	
Date Sampled:			6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	<0.58	-	**70.8**	**J**	**112**	**-**	**135**	**-**	**72.2**	**J**	<0.55	-
Dieldrin	34	22	**3.4**	-	**529**	**-**	**812**	**-**	**834**	**-**	**578**	**-**	**4.5**	-

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB04-SL-3.0		FB-GCP-SB04-SL-6.0		FB-GCP-SB05-SL-0.5		FB-GCP-SB05-SL-3.0		FB-GCP-SB05-SL-6.0		FB-GCP-SB06-SL-0.5	
Lab Sample ID:			FA25497-13		FA25497-14		FA25497-35		FA25497-36		FA25497-37		FA25497-29	
Date Sampled:			6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	<5.6	-	<0.53	-	**3.9**	-	<0.59	-	<0.60	-	<0.52	-
Dieldrin	34	22	**83.0**	-	<0.64	-	**44.6**	-	<0.71	-	<0.73	-	**2**	-

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB06-SL-3.0		FB-GCP-SB06-SL-6.0		FB-GCP-SB07-SL-0.5		FB-GCP-SB07-SL-3.0		FB-GCP-SB07-SL-6.0		FB-GCP-SB08-SFD-0.5	
Lab Sample ID:			FA25497-30		FA25497-31		FA25497-1		FA25497-2		FA25497-3		FA25497-7	
Date Sampled:			6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015		6/22/2015	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	<0.58	-	<0.53	-	<31	-	<6.1	-	<0.60	-	<12	-
Dieldrin	34	22	<0.70	-	**14.7**	-	**1150**	-	<7.4	-	**0.87**	**J**	**24.1**	**J**

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB08-SFD-3.0		FB-GCP-SB08-SL-0.5		FB-GCP-SB08-SL-3.0		FB-GCP-SB08-SL-6.0	
Lab Sample ID:			FA25497-8		FA25497-4		FA25497-5		FA25497-6	
Date Sampled:			6/22/2015		6/22/2015		6/22/2015		6/22/2015	
Matrix:			Soil		Soil		Soil		Soil	
Aldrin	39	22	<0.54	-	**1.5**	**J**	<0.53	-	<0.53	-
Dieldrin	34	22	**0.65**	**J**	**37.4**	**-**	<0.64	-	<0.63	-

Soil units in ug/kg.

SPLP units in ug/L.

Table 2
CCFTBR-H
Soil Analytical Results

USACE Sampling - August 2012																		
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS3-1 (2')		SS3-2 (2')		SS3-3 (2')		SS3-4 (0')		SS3-4 (2')		SS3-5 (0')	
Lab Sample ID:			680-81828-16		680-81828-18		680-81828-17							
Date Sampled:			August 2012		August 2012		August 2012		August 2012		August 2012		August 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	**90**	-	**470**	-	**16**	-	0.49	U	0.5	U	0.5	U
Dieldrin	34	22	**690**	-	**2600**	-	**290**	-	0.3	U	0.31	U	0.5	U

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS3-5 (2')		SS3-6 (0')		SS3-6 (2')		SS3-7 (0')		SS3-7 (2')		SS3-8 (0')	
Lab Sample ID:														
Date Sampled:			August 2012		August 2012		August 2012		August 2012		August 2012		August 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.57	U	0.6	U	0.55	U	1.9	U	0.5	U	0.52	U
Dieldrin	34	22	0.35	U	0.37	U	0.34	U	3	J	0.31	U	14	

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS3-8 (2')		SS3-9 (0')		SS3-9 (2')		SS3-10 (0')		SS3-10 (2')		SS-11 (0')	
Lab Sample ID:														
Date Sampled:			August 2012		August 2012		August 2012		August 2012		August 2012		August 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.5	U	0.56	U	0.55	U	0.49	U	0.99	U	0.54	U
Dieldrin	34	22	0.31	U	2.2	J	0.34	U	0.31	U	0.98	U	2.5	J

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS3-11 (2')	
Lab Sample ID:				
Date Sampled:			August 2012	
Matrix:			Soil	
Aldrin	39	22	0.55	U
Dieldrin	34	22	0.34	U

Soil units in ug/kg.

SPLP units in ug/L.

Table 2
CCFTBR-H
Soil Analytical Results

USACE Sampling - May 2012																
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-22		SS-23		SS-24		SS-25		SS-26		SS-27	
Lab Sample ID:			680-79156-1		680-79156-2		680-79156-4		680-79156-5		680-79156-6		680-79156-7	
Date Sampled:			May 2012		May 2012		May 2012		May 2012		May 2012		May 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	4.5	J	0.68	J	400	-	1.7	J	32	-	4	-
Dieldrin	34	22	26	-	3.7	-	2400	-	520	M	300	-	5.5	-

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-28	
Lab Sample ID:			680-79156-8	
Date Sampled:			May 2012	
Matrix:			Soil	
Aldrin	39	22	1.5	J
Dieldrin	34	22	15	-

Soil units in ug/kg.

SPLP units in ug/L.

Table 2
CCFTBR-H
Soil Analytical Results

USACE Sampling - February 2012																
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-01		SS-02		SS-03		SS-04		SS-05		SS-06	
Lab Sample ID:			680-77458-8		680-77458-9		680-77458-20		680-77458-6		680-77458-5		680-77458-21	
Date Sampled:			February 2012		February 2012		February 2012		February 2012		February 2012		February 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.59	U	0.68	U	0.53	U	0.52	U	0.52	U	0.48	U
Dieldrin	34	22	0.37	U	0.42	U	0.33	U	0.32	U	0.32	U	0.3	U

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-07		SS-08		SS-09		SS-10		SS-11		SS-12	
Lab Sample ID:			680-77458-19		680-77458-18		680-77458-3		680-77458-4		680-77458-1		680-77458-2	
Date Sampled:			February 2012		February 2012		February 2012		February 2012		February 2012		February 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.6	U	0.51	U	0.47	U	0.52	U	0.52	U	0.50	U
Dieldrin	34	22	0.37	U	0.32	U	0.31	U	0.30	U	**1.8**	**J**	0.49	U

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-13		SS-14		SS-15		SS-16		SS-17		SS-18	
Lab Sample ID:			680-77458-22		680-77458-23		680-77458-10		680-77458-11		680-77458-12		680-77458-14	
Date Sampled:			February 2012		February 2012		February 2012		February 2012		February 2012		February 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.5	U	0.55	U	0.48	U	0.51	U	0.50	U	0.5	U
Dieldrin	34	22	**0.84**	**J**	0.34	U	0.30	U	0.32	U	0.31	U	**0.76**	**J**

Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	SS-19		SS-20		SS-21		SS-DUP-1		SS-DUP-2	
Lab Sample ID:			680-77458-15		680-77458-16		680-77458-17		680-77458-7		680-77458-13	
Date Sampled:			February 2012		February 2012		February 2012		February 2012		February 2012	
Matrix:			Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	0.5	U	0.52	U	0.75	U	0.56	U	0.50	U
Dieldrin	34	22	0.31	U	0.32	U	0.47	U	0.35	U	0.31	U

Soil units in ug/kg.
SPLP units in ug/L.

Table 2
CCFTBR-H
Soil Analytical Results

Fort Bragg Garden Plot Sampling - December 2011																
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	S-1		S-2		S-3		S-4		S-5		S-6	
Lab Sample ID:			1112414-01		1112412-02		1112412-03		1112412-04		1112412-05		1112412-06	
Date Sampled:			December 2011		December 2011		December 2011		December 2011		December 2011		December 2011	
Matrix:			Soil		Soil		Soil		Soil		Soil		Soil	
Aldrin	39	22	<33	-	<33	-	<33	-	<33	-	44	-	<33	-
Dieldrin	34	22	73	-	22	-	60	-	250	-	250	-	58	-

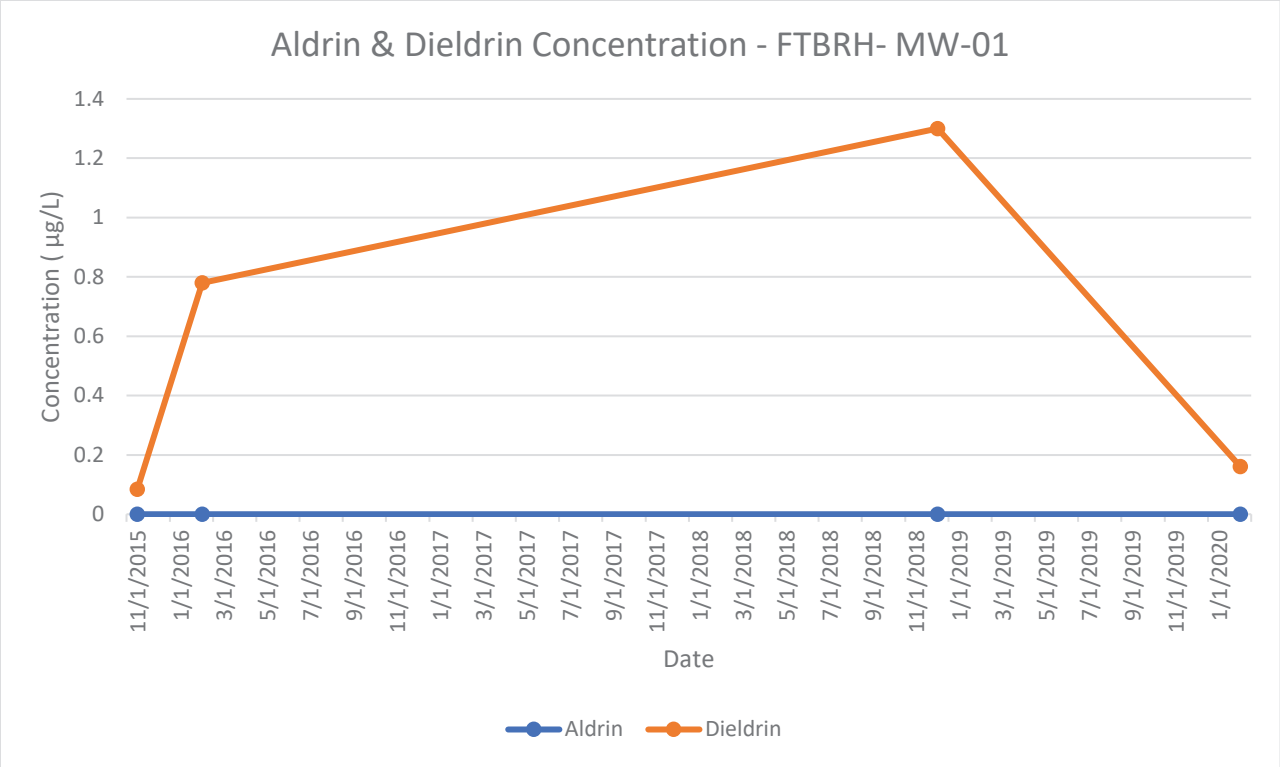
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	S-7		S-8		S-9		S-10	
Lab Sample ID:			1112412-07		1112412-08		1112412-09		1112412-10	
Date Sampled:			December 2011		December 2011		December 2011		December 2011	
Matrix:			Soil		Soil		Soil		Soil	
Aldrin	39	22	<33	-	<33	-	<33	-	<33	-
Dieldrin	34	22	75	-	<1.6	-	13	-	9.7	-

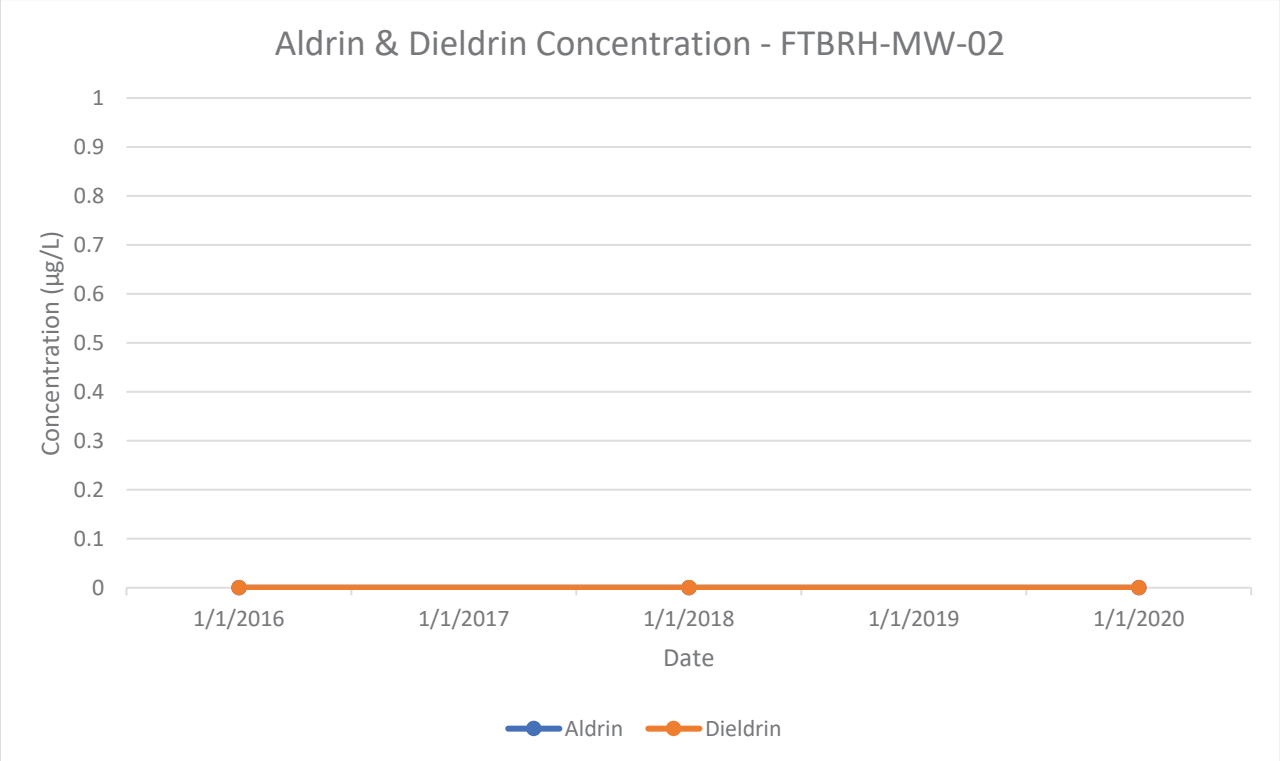
Legend:	Exceed USEPA RSL	Exceed Ecological Soil Screening Level
All units in ug/kg.		

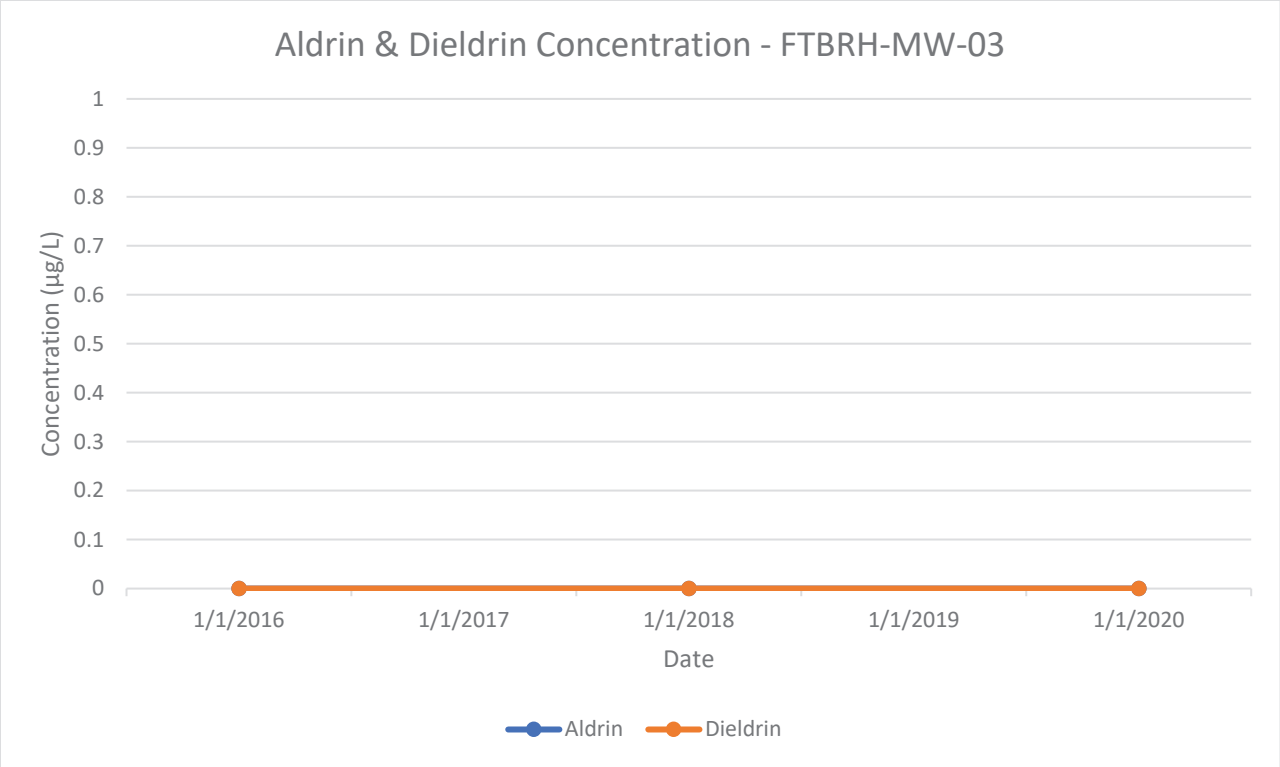
Golf Course Pesticide Site - SPLP vs. Total										
Client Sample ID:	USEPA Residential Screen Levels (November 2015)	USEPA Ecological Soil Screening Level	FB-GCP-SB01-S-3.0		FB-GCP-SB01-SL-3.0		FB-GCP-SB03-S-3.0		FB-GCP-SB03-S-3.0	
Lab Sample ID:			FA28900-13		FA25497-24		FA28900-12		FA25497-19	
Date Sampled:			10/27/2015		6/22/2015		10/27/2015		6/22/2015	
Matrix:			SPLP Soil (ug/L)		Soil		SPLP Soil (ug/L)		Soil	
Aldrin	39	22	0.0016	U	584	J	0.0064	U	135	-
Dieldrin	34	22	0.04	-	2290	-	0.94	-	834	-

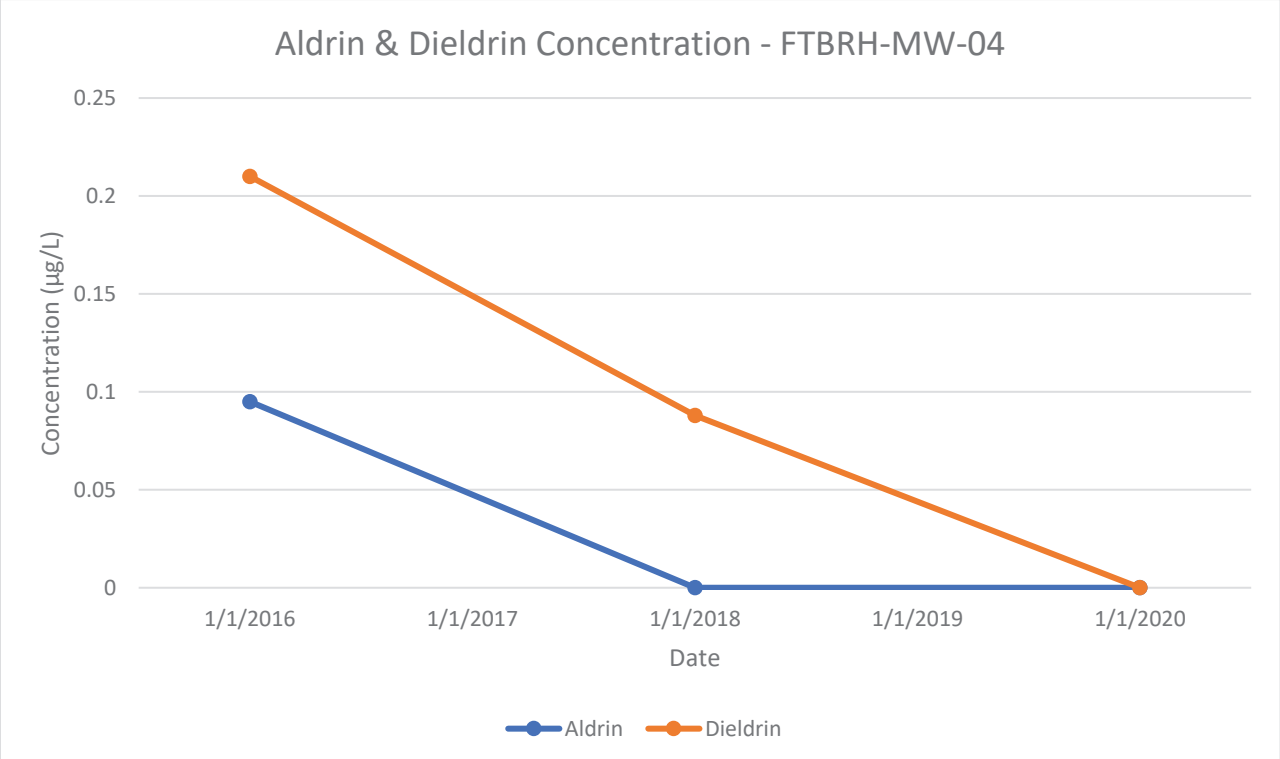
Soil units in ug/kg.
SPLP units in ug/L.

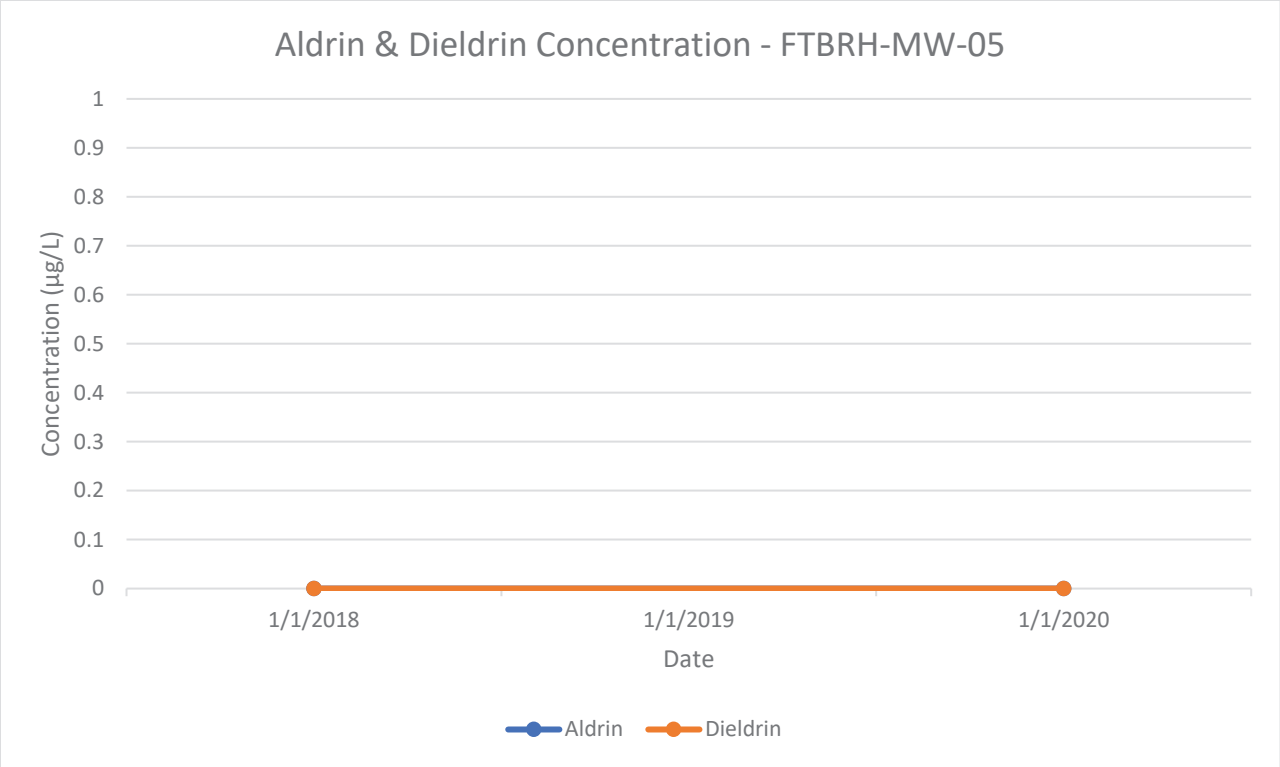
Graphs – Aldrin & Dieldrin Concentrations

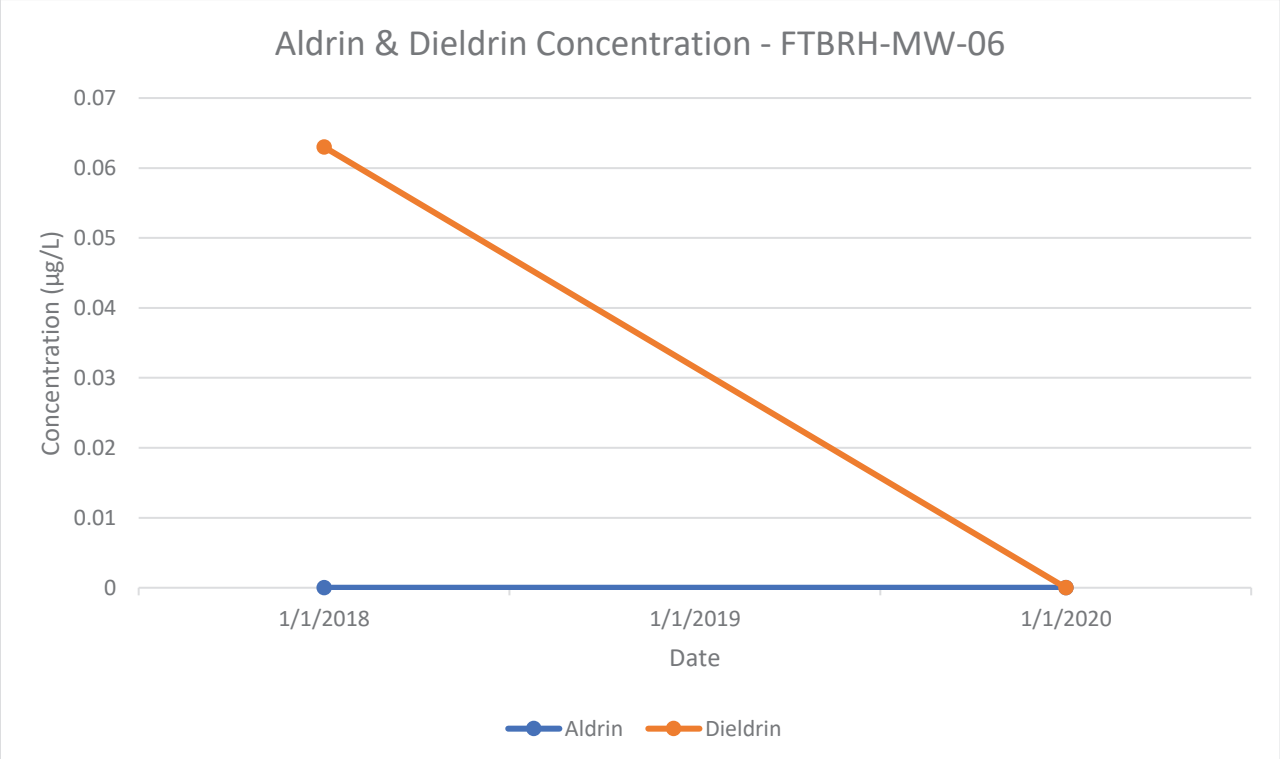

Aldrin & Dieldrin Concentration - FTBRH- MW-01
Concentration (µg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
11/1/2015
1/1/2016
3/1/2016
5/1/2016
7/1/2016
9/1/2016
11/1/2016
1/1/2017
3/1/2017
5/1/2017
7/1/2017
9/1/2017
11/1/2017
1/1/2018
3/1/2018
5/1/2018
7/1/2018
9/1/2018
11/1/2018
1/1/2019
3/1/2019
5/1/2019
7/1/2019
9/1/2019
11/1/2019
1/1/2020
Date
Aldrin
Dieldrin

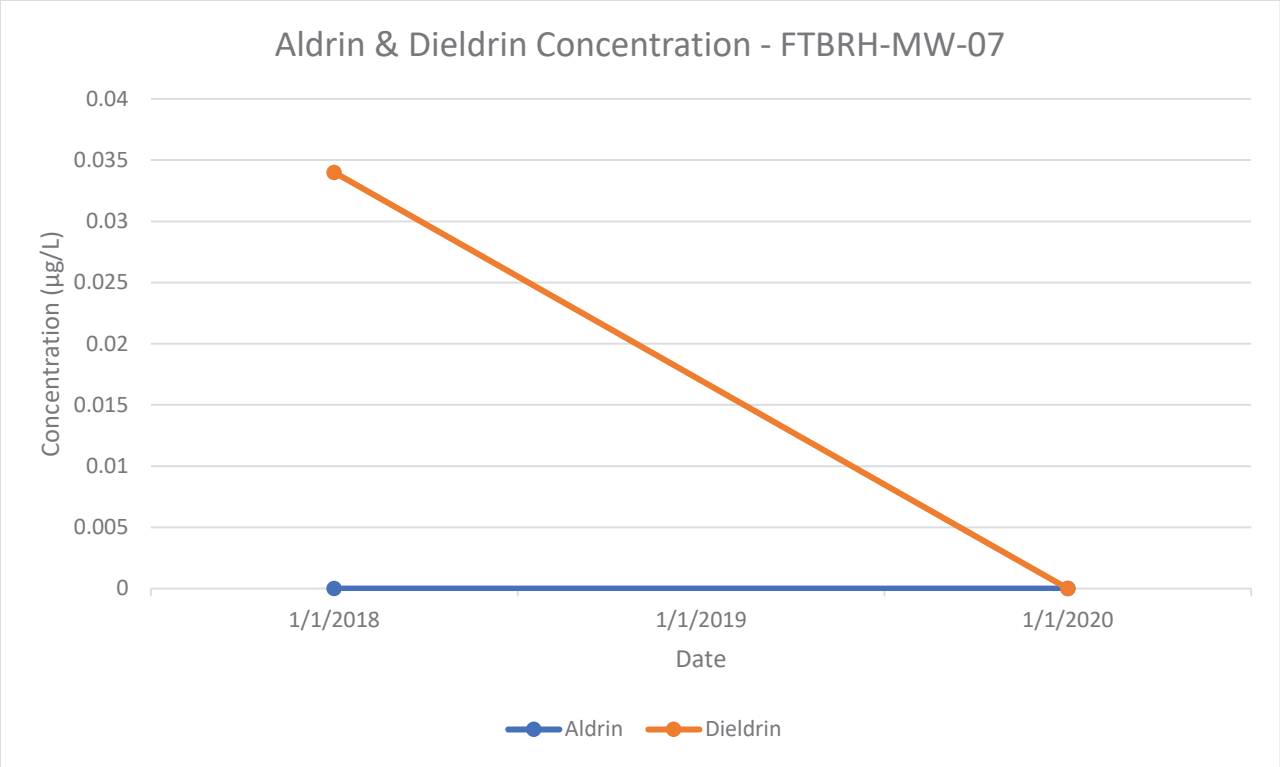

Aldrin & Dieldrin Concentration - FTBRH-MW-02
Concentration (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin


Aldrin & Dieldrin Concentration - FTBRH-MW-03
Concentration (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin


Aldrin & Dieldrin Concentration - FTBRH-MW-04
Concentration (µg/L)
0.25
0.2
0.15
0.1
0.05
0
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin


Aldrin & Dieldrin Concentration - FTBRH-MW-05
Concentration (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin


Aldrin & Dieldrin Concentration - FTBRH-MW-06
Concentration (µg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin


Aldrin & Dieldrin Concentration - FTBRH-MW-07
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (µg/L)
1/1/2018
1/1/2019
1/1/2020
Date
Aldrin
Dieldrin