

DEPARTMENT OF THE ARMY
PUBLIC WORKS BUSINESS CENTER
HEADQUARTERS, FORT BRAGG GARRISON COMMAND (AIRBORNE)
INSTALLATION MANAGEMENT AGENCY
FORT BRAGG, NORTH CAROLINA

FINAL

DECISION DOCUMENT

FOR RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
REMEDIAL ACTION (RA)

SOLID WASTE MANAGEMENT UNIT (SWMU) 63, (AEDBR #FTBR063)
FORT BRAGG, NORTH CAROLINA

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1.0 Summary.

a. The Solid Waste Management Unit (SWMU) 63 facility was the pre-Resource Conservation and Recovery Act (RCRA) container storage area for the Directorate of Engineering and Housing compound, now identified as the Public Works Business Center (PWBC) (see Figure 1). The 50 ft by 30 ft facility operated between 1977 and 1982 and was utilized for storage of hazardous materials such as polychlorinated biphenyl (PCB) wastes, acids, caustic materials, waste oil, paint wastes, solvents, photographic wastes, and insecticides. The facility lacked an impermeable base or other leak control system. State RCRA inspections conducted in 1981 and 1982 reportedly noted evidence of leaking drums stored at the former SWMU 63 facility; however, the substances observed leaking were not specifically identified in the inspection report.

b. Seven pesticides were detected in the soil near the former SWMU63 storage facility in well boring 63ZMW7, but only dieldrin exceeded the North Carolina soil standard. A second pesticide was detected in adjacent well boring 63ZMW12, but it was below the North Carolina soil standards and it was not detected in the duplicate. Many of these pesticides have been detected in soil samples collected by the United States Geological Survey (USGS) between 1994 and 1997. This is the same general location that the interim corrective action was conducted to excavate pesticide-contaminated soil.

c. The distribution of pesticides in groundwater is well defined near the former SWMU 63 storage facility. The source for pesticides here has been removed and no exposure pathways remain to pose a threat to human health or the environment. Outside of the former SWMU 63 storage facility, the detections of low levels of pesticides in groundwater near the boundary of Joint Special Operations Command (JSOC) and Pope Air Force Base (PAFB) and north of the former asphalt plant operations area seem to be sporadic, but overall decreasing in nature. These two areas are not indicative of a pesticide plume that extends much beyond the former SWMU 63 storage area. Concentrations of pesticides in all three areas are generally low, narrowly exceeding their North Carolina 2L (NC 2L) standards.

d. Chlorinated solvents have been detected in groundwater near the boundary of JSOC and PAFB, just west of the former asphalt plant. Chlorinated solvents, like pesticides, were reportedly stored at the former SWMU 63 storage facility and this area is downgradient of the release area. Although these solvents could also be traveling to the north from an unknown distant source, their presence is likely attributable to the proximity of impacted wells to the small former asphalt plant disposal pit, where end-of-day disposal took place. As evident from the latest groundwater-sampling event, historical data of these chlorinated solvents indicate overall decreasing concentrations with time.

e. Low concentrations of Semivolatile organic compound (SVOCs) and RCRA metals have been detected in groundwater at isolated wells. As with the solvents, they also do not appear to be connected with the former SWMU63 storage facility. Recent exceedances of chromium, lead, and arsenic are likely attributable to concentrations of naturally occurring metals.

f. Pursuant to 15A North Carolina Administrative Code 2L .0106 (1), Fort Bragg selects Long-Term Monitoring (LTM) and institutional controls documented in the Base Master Plan (BMP) to document decreasing concentrations through natural attenuation. Institutional controls will consist of a survey plat and a copy of this Decision Document (DD) restricting access to areas documented in this DD. A sampling frequency of every nine months is recommended to mitigate seasonal effects on fluctuating concentrations. Future development of the SWMU 63 study area is anticipated. By 2006, JSOC Facilities Management plans to develop the property south of Hurst Drive between Saberjet Drive and the railroad tracks on PAFB. By 2009, JSOC wants to expand this development to include the area around the former SWMU 63 storage facility for industrial use office space.

2.0 AREA OF INVESTIGATION.

a. The SWMU 63 study area is located on the Fort Bragg Military Installation and PAFB, Cumberland County, North Carolina and is centered on a partially wooded fenced-in area where a former asphalt plant once operated. Adjacent parcels to the study area are the JSOC facility to west, PAFB to the north, Fort Bragg PWBC to the south, and Willow Lakes Golf Course to the east (just beyond a rail line and Reilly Road). The actual former SWMU 63 storage facility was only 50 by 30 feet and was located near the southern end of the study area, now in the rear (northern) portion of the PWBC (see Figure 1).

2.1 NATURE OF CURRENT PROPERTY USE.

a. The former container storage area for SWMU63 is currently undeveloped, and land surface consists of sand that is sparsely vegetated with grasses. Approximately 125 ft west of the former SWMU 63 storage area is a Quonset hut used for equipment storage. Approximately 125 feet east of the former SWMU 63 storage area is a salt storage dome. Various piles of mulch, gravel, and soil are located approximately 150 to 300 feet to the south. The former SWMU 63 storage facility is located within the PWBC compound, which consists of administrative offices, maintenance offices, and storage areas. The land use at SWMU 63 is categorized as industrial; residential use is not planned.

b. Northwest of the former SWMU 63 storage facility is JSOC, a highly secure, fenced-in compound with parking lots, administrative buildings, and industrial buildings. The former asphalt plant area to the north was recently acquired by JSOC for added security of the perimeter. Joint Special Operations Command replaced the fence line

around the former asphalt plant area, and cleared, graded, and constructed a gravel road along the inside perimeter. The former SWMU 63 storage facility area will also eventually be acquired by JSOC for perimeter security. Joint Special Operations Command has plans to construct new facilities in the area around the former SWMU 63 storage facility in 2009 if it can acquire permission from Fort Bragg PWBC.

c. The portion of PAFB utilized in this study contains a training facility (Combat Control School), a practice tower, large antenna, administrative buildings, parking lots, and grassy open space. By 2006, JSOC has plans to develop this land, which includes the area between Saberjet Drive and the railroad tracks, south of Hurst Drive.

2.2 Property Ownership. The site is currently owned and operated by the United States Department of Defense/Department of the Army. The Fort Bragg Real Property contact is Ms. Dewanna Kennedy. The contact address is: Public Works Business Center, Attn: AFZA-PW-CR, Dewanna Kennedy, Fort Bragg, North Carolina 28310, phone (910) 396-7819. Mr. Edward Schwacke is the contact for the Installation Restoration Program and can be reached at (910) 432-8470.

3.0 Site Investigations. The paragraphs below summarize the investigations completed at SWMU 63.

3.1 Groundwater Investigation.

a. Groundwater was sampled and analyzed for volatile organic compound (VOCs), SVOCs, pesticides, PCBs, metals, and nutrients. Trichloroethene was reported in one groundwater-monitoring well (MWDAP4D) at a concentration of 7.7 µg/l, exceeding the United States Environmental Protection Agency (U.S. EPA) maximum contaminant level (MCL) of 5.0 µg/l. Bis (2-ethylhexyl) phthalate was detected in groundwater samples from MWDAP4D and MWDAP5S at 3.8 and 180 µg/l, respectively; its presence was attributed to laboratory contamination. Two or more of eight pesticides (a-BHC, b-BHC, d-BHC, g-BHC, 4,4'-DDT, dieldrin, endrin, and heptachlor) were reported in four groundwater monitoring wells (MWDAP2S2, MWDAP3D, MWDAP4S, and MWDAP4D); of these, concentrations of g-BHC exceeded the MCL of 0.2 µg/l in two wells (MWDAP2S and MWDAP4D) and combined concentrations of d-BHC and heptachlor exceeded the U.S. EPA MCL of 0.4 µg/l in wells MWDAP2S2, MWDAP4D, and MWDAP4S; the other pesticides had no MCL. One well contained a fluoride concentration of 5.2 mg/l, which exceeds the U.S. EPA MCL of 4.0 mg/l. Total and dissolved metal concentrations were generally typical of background levels.

b. Thirteen pesticides were detected in groundwater samples from the SWMU 63 study area. Dieldrin and isomers of BHC (alpha, beta, delta, and gamma) were the most frequently detected pesticides. Other detected pesticides included isomers of chlordane (alpha and gamma), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, endosulfan sulfate, endrin, and heptachlor epoxide. At least one of these pesticides was detected in wells 63MW1 (1997), 63MW5 (1995 and 1997), 63MW6 (1997 duplicate), MWDAP1S (1997), MWDAP2S2 (1995

and 1997), MWDAP4S (1997), MWDAP4D (1997), and MW2-6 (1997). The highest pesticide concentrations typically were in groundwater samples from well MWDAP2S2, adjacent to the former SWMU 63 storage facility. The USGS was unclear as to the degree to which the former SWMU 63 storage facility was the sole source of pesticides in the more distant wells because pesticides were never detected at intermediate wells 63MW3, 63MW4, or 63MW6 (except one isolated 1997 detection of d-BHC in well 63MW6 at 0.0052 µg/l (J)). Dieldrin was also detected in the upgradient, background well 63MW1 in 1997, but not in 1995.

3.2 Surface Water Investigation.

a. One surface water and one streambed sediment sample were collected from the eastern tributary to Tank Creek. Bis (2-ethylhexyl) phthalate was the only SVOC detected in the surface water; its concentration was 130 µg/l. Total petroleum hydrocarbons (113 mg/kg), several pesticides [4,4'-DDD (1,400 mg/kg), 4,4'-DDE (210 mg/kg), 4,4'-DDT and endosulfan sulfate (480 mg/kg combined)], several total metals (aluminum, chromium, copper, iron, manganese, vanadium, and zinc), and one Toxicity Characteristic Leaching Procedure metal (barium) were detected in the streambed-sediment sample.

b. The USGS also analyzed groundwater for total dissolved solids, cyanide, major anions, total and dissolved metals, and radioactive chemicals. Cyanide was detected at well MWDAP2S2 in 1995 at the concentration of 0.010 mg/L; however, it was not detected in its duplicate sample. Cyanide was not detected at any other sample collected in 1995 and therefore, was not analyzed during the 1997 sampling event. Total dissolved solids were detected at concentrations ranging from 9.2 to 16,400 mg/L. The highest concentrations of chloride (9,570 mg/L), nitrate (9.7 mg/L), and sulfate (73.6 mg/L) were at well 63MW4, downgradient of the former SWMU 63 storage facility. Various metals were detected in groundwater samples from the SWMU 63 study area. Total aluminum and iron were detected in all of the groundwater samples. Calcium, manganese, and sodium were detected in all but one sample. Aluminum, calcium, iron, and sodium were the total metals present in the largest concentrations. The highest gross alpha activity (106 pCi/l) was at well 63MW2 (1997). The highest gross beta activity (119 pCi/l) was at well 63MW4 (1995).

3.3 Interim Corrective Action at SWMU 63 (1999).

a. An interim corrective measure to address the pesticide-contaminated soil identified by USGS in their 1999 RFI was completed in late 1999 by Environmental Restoration Company (ERC), Fredericksburg, Virginia. Much of the excavated soil was contaminated with chlordane, DDT, and dieldrin. The primary investigation focused on the area where former buildings 3-1544 and 3-1542, and where former monitoring wells MWDAP2S2 and MWDAP2S1 were located (both wells were abandoned before excavation activities commenced).

b. Initially, the scope of work consisted of removing soil within an area approximately 200 ft by 200 ft, and approximately 2 ft

deep. The ERC used real-time immunoassay field screening for pesticide contamination of in-situ soil to guide the extent of excavation and removal of soil. After the first 1-foot of soil was removed, the lateral extent of excavation ceased short of the planned boundaries in several areas based upon favorable field screening results. Confirmation samples (based upon field screening) were collected and analyzed by a laboratory.

c. After regulatory review of the confirmation sample results, Fort Bragg directed further site screening to investigate the extent and nature of remaining contamination. Twenty-nine locations were selected based upon the USGS RFI report and the JSOC construction plans. Nine locations were within the original planned excavation area but outside the extent of initial excavation. Soil samples were collected at 1 ft, 4 ft, and 9 ft depths. The other twenty sample locations were scattered throughout the JSOC expansion construction area. The samples were collected at the 1 ft, 4 ft, and 9 ft depths, except in three locations where the third sample interval was at 6.5 feet. All samples were field screened for pesticides. Selected samples were sent to a laboratory for confirmation analysis.

d. Surface soil at one sample location was found to have high concentrations of pesticides and the soil around that sample was also excavated. Because of contamination remaining in some sidewall samples, the main excavation area continued to the north and east. Based on the remaining levels of contamination in the floor of the excavation, it was decided to excavate an additional 2 to 4 feet deeper and take a second round of confirmation samples. Upon regulatory review of the final round of confirmation samples, ERC backfilled the excavation with clean material.

4.0 POTENTIAL RECEPTORS SURVEY.

a. Surface Water and Topography. An east-west trending ridge divides Fort Bragg into two drainage sub-basins. The northern sub-basin drains into the Little River; the southern sub-basin drains into tributaries of Cross Creek and Rockfish Creek. Surface runoff at the SWMU 63 study area, which is in the northern sub-basin, drains into tributaries of Tank Creek, which is a tributary of the Little River. The Little River runs along the PAFB northern boundary, approximately 2 miles north of the former SWMU 63 storage facility. The Little River is a tributary of the Cape Fear River, which is east of Fort Bragg. One of the Tank Creek tributaries originates and drains the southeastern portion of the former asphalt plant operations area, directly north of the former SWMU 63 storage facility. There are also Tank Creek tributaries draining the western sides of PWBC and JSOC, as well as PAFB to the north. Streams at Fort Bragg generally are low gradient and in many areas have poorly defined channels that grade into swampy areas. Streambeds consist of unconsolidated materials, such as silt, sand, or clay.

b. Several impoundments are present at Fort Bragg, including Young Lake and McFayden Pond in the northern portion of the cantonment area, Lake Arthur in the northwestern corner of the installation, McKellars Pond beyond the western edge of the cantonment area, and Smith Lake and Texas Pond in the southeastern part of the cantonment area. The closest impoundment to the former SWMU 63 storage area is McFayden Pond, located approximately 2000 ft southwest. It drains directly into Tank Creek.

c. Fort Bragg is in the Sandhills hydrologic area of the North Carolina Coastal Plain. The Coastal Plain extends eastward from the Piedmont physiographic province to the Atlantic Ocean. The Sandhills area is characterized by deep, sandy soil and has the most variable topography and highest land-surface elevations in the Coastal Plain. Topography at Fort Bragg is characterized by gently to steeply sloping ridges, the highest of which are located in the western and central parts of the installation. Elevations range from about 550 ft in the western part of Fort Bragg to about 150 ft in the northeastern part along the Little River (USGS, 1999).

d. The former SWMU 63 storage facility site is currently undeveloped, and land surface consists of sand that is sparsely vegetated with grasses. The topography at the former SWMU 63 storage facility is fairly flat, with some eroded drainage features breaking up the level terrain. Elevations near the former SWMU 63 storage facility range from approximately 253 to 255 ft. Land elevation gradually increases toward the former asphalt plant operations area and JSOC to a maximum elevation of 275 ft. Land elevation then gradually decreases toward PAFB to an elevation of 252 ft near well MW2-6.

4.1 PUBLIC DRINKING WATER SUPPLIES.

a. Fort Bragg currently draws an average of 8.5 million gallons of water each day from the Little River. Fort Bragg also has the option to purchase up to 3 million gallons per day from the City of Fayetteville to meet emergency needs. Fort Bragg operates five public water systems that are permitted for operation by the state of North Carolina. The primary water treatment plant, located on Manchester Road, was built in 1918 and upgraded in 2000 to a 16 million gallon per day capacity. The water treatment plant treats and supplies drinking water to the entire cantonment area, Simmons Army Airfield, the Central Vehicle Wash Facility, and all of PAFB (including the golf course).

b. Water supplies for the City of Fayetteville, which is southeast of Fort Bragg, is obtained from the Cape Fear River and impoundments along the Cross Creek and Little Cross Creek, which drain the southeastern part of Fort Bragg. Water supplies for the Town of Spring Lake, which is adjacent and northeast of Fort Bragg, is purchased from the City of Fayetteville and Harnett County.

4.2 AREA LAND USE. Most of the land around the SWMU 63 study area has industrial or military uses. A rail line runs along the east side of the SWMU 63 study area. The PAFB Reilly Street Gate and visitor

center is to the northeast. East of the PWBC and across Reilly Street are a veterinary facility and the Willow Lakes Golf Course. South of the PWBC and across Butner Road are horse stables and open pasture space.

4.3 GEOLOGY.

a. The principal geologic units in the Fort Bragg area, from oldest to youngest, include units of the Carolina Slate Belt, and the Coastal Plain's Cape Fear and Middendorf Formations. The Carolina Slate Belt is composed of metavolcanic, metasedimentary, and igneous rocks of Precambrian to Cambrian age. This is the basement unit and is described as a gray-green chlorite schist. In some areas, rocks of the Carolina Slate Belt were exposed to weathering before the overlying sediments were deposited, creating a zone of porous saprolite at the top of the basement rock. Where present, the saprolite is described as a sandy, gray clay with some green and red clay. The elevation of the top of weathered basement rock is 180 ft at Southern Pines near the western edge of Fort Bragg, 100 ft in a USGS background well approximately two miles from the former SWMU 63 storage facility, and 110 ft near the confluence of the Cape Fear River and Rockfish Creek, south of Fayetteville.

b. The Cape Fear and Middendorf Formations of Late Cretaceous age overlie the weathered and unweathered basement rock. These formations are part of the generally southeastward-dipping and thickening wedge of sediments that constitute the Atlantic Coastal Plain. They are non-marine and are considered to represent deltaic deposits. In the Sand Hills, these formations appear to have been deposited in an upper delta-plain environment. The Cape Fear Formation is continuous throughout the Fort Bragg area. It is overlain by the Middendorf Formation except along the Little River and some of its tributaries and along the Rockfish Creek where the Middendorf Formation has been eroded.

c. The Cape Fear Formation consists of pale to medium-gray clays and sandy clays with some sand units; the lower part contains beds of greenish-gray clays, some of which have red mottling. This formation is more clayey, and individual quartz-sand beds are generally thinner and finer-grained than in the Middendorf Formation. The uppermost part of the Cape Fear Formation consists of clay and sandy clay ranging in thickness from 10 to 15 feet.

d. The Middendorf Formation is exposed at land surface throughout the Fort Bragg area and unconformably overlies the Cape Fear Formation. This formation is thickest beneath the upland areas of Fort Bragg where it is as much as 150 feet. Clay layers occur within the Middendorf Formation at Fort Bragg and were recorded during installation of monitoring well 63MW4 at elevation 234 to 227 feet.

e. The Middendorf Formation is composed of tan, cross-bedded, medium- and fine-grained, micaceous quartz sand and clayey sand interbedded with clay or sandy-clay lenses or layers.

4.4 GROUNDWATER HYDROLOGY.

a. The Fort Bragg area is underlain by three freshwater aquifers: the "saprolite-basement", the Cape Fear, and the Middendorf aquifers. The saprolite-basement aquifer is composed of saprolite underlying the Cape Fear Formation and fracture zones in the uppermost part of the metamorphic and crystalline Cambrian and Precambrian basement rock. The saprolite-basement aquifer is generally assumed to yield little water, and no supply wells in this area are known to solely tap this aquifer. The Cape Fear Aquifer (also known as the Upper Cape Fear Aquifer) is a confined aquifer within the Cape Fear Formation, and is primarily clay interbedded with silt and silty sand. The uppermost 5 to 10 ft of the Cape Fear Formation in the Fort Bragg area forms the Cape Fear confining unit and is composed of clay and sandy clay. This confining unit restricts vertical movement of water between overlying (Middendorf) sediments and the silty-sand units of the Cape Fear Aquifer. No potable water-supply wells in the cantonment area are known to tap the Cape Fear aquifer. Because of the thickness of the clay units within the Cape Fear Formation, sandy-clay units within the Cape Fear Formation may act as hydraulically isolated systems within the lower part of the Cape Fear Aquifer. In counties east of Fort Bragg, the Cape Fear Aquifer is used for public and industrial water supplies.

b. The Middendorf Aquifer (also called the Sandhills Aquifer and the Black Creek Aquifer) primarily consists of silty or clayey coarse- to fine-grained sands with interbedded light gray to tan clays. In the Sandhills area, some of the interbedded and discontinuous clay layers in the upper part of the Middendorf Formation support local perched-water zones. Perched-water zones (which are underlain by unsaturated strata) are present in the Middendorf formation, not only at Fort Bragg, but throughout much of the upland areas around Southern Pines (west of Fort Bragg). Perched-water zones in the Fort Bragg area generally (but not exclusively) are within 20 ft of land surface, and groundwater in these perched zones is unconfined. The saturated thickness of the perched water table typically is only a few feet. Many of the perched water zones dry out during the growing season or times of drought.

c. In some areas of Fort Bragg, a laterally extensive clay bed is present separating the Middendorf Aquifer into two water-bearing zones. Groundwater in the upper part of the Middendorf Aquifer is unconfined, whereas groundwater in the lower part of the Middendorf Aquifer is under confined or semi-confined conditions. Although the potentiometric surface in the aquifer is as much as 80 ft bgs in upland areas of Fort Bragg, it is near land surface along perennial streams, which are discharge areas for the Middendorf Aquifer. According to the USGS RFI cross-sections and water level data, the Middendorf aquifer is generally unconfined in the vicinity of the SWMU 63 study area,

although semi-confined conditions occur locally at wells MWDAP3D, MWDAP1S, and 63MW4.

5.0 RCRA INVESTIGATION CONCLUSIONS.

5.1 SOILS.

a. Analytical results from soil samples collected from well borings advanced in July 2002 and October 2003 did not determine the presence of excessive levels of most target constituents, with many of those compounds detected at levels below North Carolina soil standards. Exceedances of North Carolina soil standards for arsenic occurred at each of the seven new monitoring wells. These results closely correlate with the findings presented by the USGS in the late 1990's. Even though arsenic levels exceed the NC soil standard, the USGS concluded that the arsenic concentrations were not excessive when compared to those commonly found in the Sand Hills Middendorf Formation.

b. Of seven pesticides detected in soil sample 63ZMW7-1, only dieldrin exceeded the NC soil standard. Similar pesticides had been detected in soil samples from this vicinity by the USGS between 1994 and 1997. Monitoring well boring 63ZMW7 is located adjacent to the former SWMU63 storage facility, where interim corrective action was conducted in 1999 to remove pesticide-impacted soils. As summarized below, pesticide impacted groundwater still resides in this area. This soil sample's proximity to the fluctuating water table likely reflects the smear zone of contaminated groundwater. Furthermore, the single exceedance of dieldrin was detected only slightly above the NC soil standard and may not be detected in a reanalysis.

5.2 GROUNDWATER.

a. Three RCRA metals were detected at levels only slightly above the NC 2L groundwater standards; arsenic in a 2001 groundwater sample from monitoring well MWDAP4D, chromium in a 2002 groundwater sample from monitoring well 63ZMW7, and lead in a 2003 groundwater sample from monitoring well 63ZMW12. In the latter, lead did not exceed the NC 2L standard in this samples QC duplicate. Based on the sporadic distribution and relatively low concentrations of detected metals, their presence is likely naturally occurring.

b. Two SVOCs were detected in the 2002 groundwater sample from well 63ZMW10. Neither has an established NC 2L standard and neither was detected in past investigations; their presence, therefore, appears to be isolated.

c. Three separate areas of pesticide contamination have been identified in groundwater. The first area is near the former SWMU63 storage facility where these compounds were reportedly stored. In August 2002, monitoring well 63ZMW7 detected five pesticides (four exceeding the NC 2L standard as discussed in paragraph 2.1 b.).

Concentrations at this replacement well were similar to past concentrations of former well MWDAP2S2, which was abandoned in 1999 just prior to the interim corrective action to remove pesticide contaminated soil. Pesticide-related constituents in the groundwater from well 63ZMW8, installed approximately 100 feet northwest and downgradient of well 63ZMW7, indicated seven analytes exceeding their respective NC 2L standard.

d. The Fort Bragg water treatment plant currently provides treated municipal water to the cantonment area for drinking water; therefore, groundwater in the cantonment area is not used as a source of drinking water. As long as Fort Bragg adheres to this practice and does not allow use of the groundwater near the former SWMU 63 storage facility as a water-supply source, any potential risks posed by groundwater contaminants should be minimized.

6.0 SELECTED REMEDY CONCLUSIONS.

a. Based on a single soil exceedance of North Carolina standards of pesticides in well boring 63ZMW7, it is concluded that the extent of pesticides in soil is limited to the area near the former SWMU 63 storage facility where pesticide impacted soil was removed in 1999. No additional soil investigation is required.

b. Low concentrations of SVOCs and RCRA metals have been detected in groundwater at isolated wells and do not appear to be connected with the former SWMU63 storage facility. Recent exceedances of chromium, lead, and arsenic are likely attributable to naturally occurring concentrations of metals.

c. The source of the chlorinated solvents in groundwater is likely related to the former asphalt plant operations and not the former SWMU 63 storage area. As evident from the latest groundwater sampling event, historical data of trichloroethene and tetrachloroethene indicate overall decreasing concentrations with time.

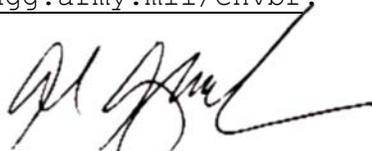
d. The distribution of pesticides in groundwater is well defined near the former SWMU 63 storage facility. The source for pesticides here has been removed and no exposure pathways remain to pose a threat to human health or the environment. Outside of the former SWMU 63 storage facility, the detections of low levels of pesticides in groundwater near the boundary of JSOC and PAFB and north of the former asphalt plant operations area seem to be sporadic in nature. These two areas are not indicative of a pesticide plume that extends much beyond the former SWMU 63 storage area.

e. Pursuant to 15A North Carolina Administrative Code 2L .0106 (1), Fort Bragg selects LTM and institutional controls documented in the BMP to document decreasing concentrations through natural attenuation. A sampling frequency of every nine months is recommended to mitigate seasonal effects on fluctuating concentrations. Fort Bragg recommends that each of the existing wells be monitored for VOCs

and pesticides, until levels are determined to be below NC 2L standards or otherwise directed by North Carolina Department of Environment and Natural Resources (NCDENR). The wells that did not detect target compounds were generally downgradient of contaminated wells; therefore, sampling these wells will serve to detect migration of contaminants in the groundwater. Because of a previous detection of two SVOC's from monitoring well 63ZMW10, groundwater from this well should also be analyzed for SVOC's, until levels are determined to be below NC 2L standards or otherwise directed by NCDENR.

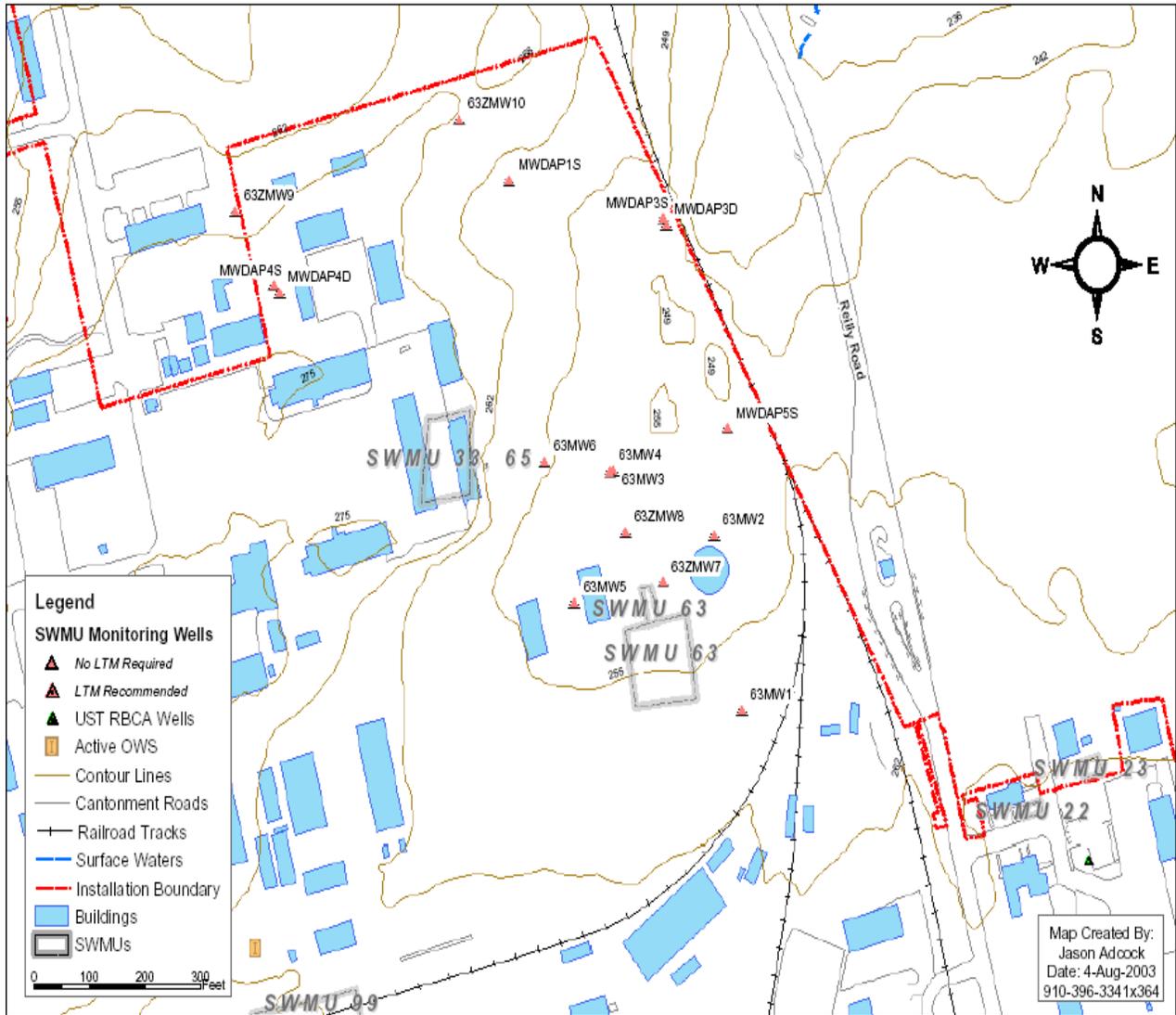
f. Results of this LTM will be summarized in Annual Groundwater Monitoring Reports. To enable the ability to track trends in concentrations, the data will be portrayed in a comprehensive summary of groundwater analytical data. Once four consecutive sampling events establish no exceedance of the North Carolina Groundwater 2L Protection Standards for constituents, a NFA determination would be requested.

6.1 CONCLUSION. The selected remedy for SWMU 63 is Long-term Groundwater Monitoring and land use restrictions with a survey plat documented in the BMP. Based on the results of the previous sampling events and previous investigations, Fort Bragg has selected long-term monitoring of wells, historically exhibiting groundwater contaminant levels in excess of North Carolina Groundwater Protection Standards, every nine months for a total of five sampling events, as it's selected remedy for this site. Once four consecutive sampling events establish no exceedance of the North Carolina Groundwater Protection Standards for these constituents, a NFA determination would be requested. Anticipated annual cost for each semi-annual sampling event is \$60,000.00, for a projected lifecycle cost of \$300,000 for long-term monitoring of groundwater for SWMU 63. Copies of this DD will be published on the Fort Bragg website for public review on the Fort Bragg website <http://www.bragg.army.mil/envbr>,



AL AYCOCK
COL, SF
Garrison Commander

FIGURE 1.



ACRONYMS

| | |
|---------|--|
| AOC | Area of Concern |
| ASTM | American Society for Testing and Materials |
| bgs | below ground surface |
| BHC | hexachlorocyclohexane |
| BTEX | benzene, toluene, ethylbenzene, xylene |
| CDQM | Chemical Data Quality Management |
| CMS | Corrective Measures Study |
| COCs | chemicals of concern |
| DEH | Directorate of Engineering and Housing |
| ERC | Environmental Restoration Company |
| °F | degrees Fahrenheit |
| FID | flame ionization detector |
| ft | feet |
| ft/ft | foot per foot |
| GC | gas chromatograph |
| HEA | human health and ecological assessment |
| HH CPC | human health chemicals of potential concern |
| I.D. | inside diameter |
| IDW | investigative derived waste |
| in. | inches |
| IRP | Installation Restoration Program |
| JSOC | Joint Special Operations Command |
| MCL | maximum contaminant level |
| mg/kg | milligrams per kilogram |
| mg/l | milligrams per liter |
| ml | milliliters |
| NC DENR | North Carolina Department of Environment and Natural Resources |
| NAD83 | North American Datum of 1983 |
| NFA | No Further Action |
| NGVD | National Geodetic Vertical Datum |
| NTU | nephelometric turbidity unit |
| O.D. | outside diameter |
| OU | operable unit |
| oz. | ounce |
| PAFB | Pope Air Force Base |
| PAH | polynuclear aromatic hydrocarbons |
| PCB | polychlorinated biphenyls |
| PCE | tetrachloroethene |
| pCi/l | picocuries per liter |
| ppb | parts per billion |
| PVC | polyvinyl chloride |
| PWBC | Public Works Business Center |
| QA | quality assurance |
| QC | quality control |

QCSR Quality Control Summary Report
RBC risk-based concentration
RCRA Resource Conservation and Recovery Act
RFA RCRA Facility Assessment
RFI RCRA Facility Investigation
RPD Relative Percent Difference
SAIC Science Applications International Corporation
SLE screening level evaluation
SVOC semi-volatile organic compound
SWMU Solid Waste Management Unit
TCE trichloroethene
TCLP toxicity characteristics leaching procedure
TOC top of casing
TPH total petroleum hydrocarbon
µg/l micrograms per liter
USACE United States Army Corps of Engineers
USEPA United State Environmental Protection Agency
USGS United States Geological Survey
UST underground storage tank
VOC volatile organic compound