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**Preliminary Assessment Report for
National Guard Training Center,
Georgia Army National Guard,
Fort Stewart, Georgia**

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Acronyms

ACM	asbestos-containing material
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSMS	Combined Support Maintenance Shop
DEH	Directorate of Engineering and Housing (Fort Stewart)
DNR	Department of Natural Resources (Georgia)
DoD	U.S. Department of Defense
DRMO	Defense Reutilization Marketing Organization
EPA	U.S. Environmental Protection Agency
ESO	environmentally significant operation
FISP	Facility Inventory and Stationing Plan
GAARNG	Georgia Army National Guard
gpm	gallons per minute
IRP	Installation Restoration Program
MATES	Mobilization and Training Equipment Site
NGTC	National Guard Training Center
NPDES	National Pollution Discharge Elimination System
PA	preliminary assessment
RCRA	Resource Conservation and Recovery Act
RTSM	Regional Training Site Maintenance
SWMU	solid waste management unit
USAEC	U.S. Army Environmental Center (formerly USATHAMA)
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency (now USAEC)
USGS	U.S. Geological Survey
UST	underground storage tank

**Preliminary Assessment Report for
National Guard Training Center,
Georgia Army National Guard,
Fort Stewart, Georgia**

Summary

This report presents the results of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Georgia Army National Guard (GAARNG) facility near Hinesville, Georgia, known as the National Guard Training Center (NGTC). Preliminary assessments of federal facilities are being conducted to compile the information necessary for completing preremedial activities and to provide a priority basis for completing corrective actions (where necessary) in response to releases of hazardous substances. The principal objective of the PA is to characterize the site accurately and determine the need for further action by examining previous site activities, types and quantities of hazardous substances utilized, and potential pathways by which contamination could affect public health and the environment. The scope of this assessment is limited to the facilities and past activities contained within the NGTC. Preliminary assessment site score sheet information is also provided for the NGTC. However, this assessment report is intended to be read in conjunction with a previous IRP assessment of Fort Stewart completed in 1992 (USATHAMA 1992) and to provide comprehensive information on the NGTC area for incorporation with information contained in that previous assessment for the entirety of Fort Stewart.

The NGTC is a 757.08-acre site located on the Fort Stewart Military Reservation in the southeastern portion of Georgia, about one mile north of Hinesville, in the county of Liberty. The major facilities in the NGTC included in this PA are the Mobilization and Training Equipment Site, the Combined Support Maintenance Shop, and the Regional Training Site Maintenance. The environmentally significant operations associated with the property are the "Bird Bath" vehicle wash facility, the motor pool vehicle wash racks and motor repair sheds, and outdoor vehicle maintenance areas containing grease/inspection ramps, a steam cleaning facility, and sandblasting areas.

The review of both historical and current practices at the property indicates that the NGTC property poses a low level of risk to human health or the environment and does not represent any immediate or imminent threat. No significant releases of contaminants from the NGTC have been

documented, and only minor areas of apparent contamination have been observed. However, Argonne's assessment has resulted in the following areas of concern:

- The previous IRP assessment at Fort Stewart (USATHAMA 1992) did not comprehensively identify all areas of potential contaminant release within the NGTC. Vehicle wash racks in motor pools were only partially identified, and wash racks in vehicle maintenance areas were not identified. Grease/inspection ramps and steam cleaning facilities were not specifically identified as potential contaminant release points.
- The previous IRP assessment determined that contaminants of concern for the identified potential contaminant release points were limited to oils and grease. However, circumstantial evidence contained in earlier environmental studies at Fort Stewart indicates that degreasing solvents (stoddard type, carbon tetrachloride, trichloroethylene), in widespread use in previous years, are also likely to have been used at the identified potential release points and should be considered as having been potentially released to the environment from those areas. The evidence also indicates that during most of the period when degreasing solvents were in use, the NGTC facilities were occupied by active Army units rather than the Georgia Army National Guard.
- Previous IRP studies assessed groundwater usage in areas downgradient of Fort Stewart as relying on the relatively deep, Upper Floridan bedrock aquifer. This deep aquifer is not considered to be in jeopardy from contaminant releases from Fort Stewart, because the remoteness of recharge areas and the presence of natural aquitards effectively isolate it from the impacts of surface or near-surface activities. Potable water wells at Fort Stewart are all completed in the Upper Floridan aquifer system and are protected from surface or near-surface contamination. However, this investigation has determined that community water supply wells for the town of Hinesville, some of which are located generally downgradient of identified contaminant release points at Fort Stewart, draw groundwater simultaneously from shallow and deep aquifers. Contaminants released to the land surface or surface water bodies have the potential to contaminate the shallowest aquifer (the surficial aquifer), thus jeopardizing the Hinesville community's potable supply. No information is available on the proportion of groundwater withdrawn from the shallow

aquifer, but no data indicate that the Hinesville potable water supply is now contaminated.

As a result of the findings of this investigation, and in consideration of the findings from the previous IRP assessment of Fort Stewart, the following recommendations are offered:

- Ensure that the information contained in this report relative to PA site scoring is incorporated with similar information contained in the previous Fort Stewart IRP assessment, so that a comprehensive PA site score for the entire Fort Stewart installation can be developed.
- Inspect the oil-water separators at each of the vehicle wash racks to ensure that they do not contain residual contamination that could ultimately be discharged to adjacent open drainage ditches.
- Implement a sampling plan for the soils in drainage ditches throughout the NGTC, particularly in areas immediately adjacent to oil-water separator discharge points, to determine the residual levels of long-lived environmental contaminants such as chlorinated solvents.
- Sample the surface soils in the areas of apparent contamination at the vehicle grease/inspection ramps to identify residual contamination and evaluate the need for remediation in those areas.
- Sample surface soils in the immediate vicinity of areas where sandblasting has taken place to determine whether residual contamination might require remediation.

1 Introduction

This document is a report of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Georgia Army National Guard (GAARNG) property known as the National Guard Training Center (NGTC), located on the Fort Stewart Military Reservation in southeastern Georgia, near the town of Hinesville, Georgia.

1.1 Authority for the Preliminary Assessment

The National Guard Bureau, Army Directorate, has engaged Argonne to perform PAs of selected properties. These assessments are being done in a manner consistent with both the Department of Defense (DoD) Installation Restoration Program (IRP) and the U.S. Environmental Protection Agency's (EPA's) Potential Hazardous Waste Site Preliminary Assessment Guidance. Preliminary assessments of these properties are conducted under the authority and direction of the IRP; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or, more commonly, Superfund); and the Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499).

1.2 Objectives

This PA report is based on existing information from the GAARNG records that were made available to Argonne investigators and from other sources. Although this PA effort did not extend to the generation of new data, it nonetheless identifies areas where existing data are incomplete, unreliable, or ambiguous and recommends ways to address such shortcomings.

The objectives of the PA are to satisfy Phase I of the IRP and to

- Identify and characterize the environmentally significant operations (ESOs),
- Identify property areas or ESOs that may require a site investigation,
- Identify ESOs or areas of environmental contamination that may require immediate removal,

- Identify properties for which no further action is needed, and
- Provide information sufficient to prescore the site by using the EPA's PA Scoresheets (September 1991).

A unique objective of this assessment derives from the fact that the NGTC is contained within an active Army installation. Under current DoD policies, the host command, the 24th Infantry Division (Mechanized), is primarily responsible for completing a comprehensive Phase I assessment for Fort Stewart, including those areas currently or previously occupied by tenant organizations. Further, tenant organizations such as the GAARNG are expected to cooperate fully in all such comprehensive assessments. This assessment, therefore, has been developed as an addendum to the assessment and site characterization previously completed for the Fort Stewart Military Reservation and must be compatible with that earlier assessment in order to ensure full incorporation of the information contained herein into the overall characterization and evaluation of Fort Stewart.

1.3 Procedures

The PA began with a review of files located at the GAARNG Headquarters in Atlanta, Georgia, on January 25-27, 1993. A site visit was conducted on January 28, 1993, to obtain additional information through direct observation and interviews with personnel familiar with the property and its operations. Other relevant published information was obtained from the U.S. Geological Survey (USGS), the Georgia Geologic Survey, the Technical Information Center of the U.S. Army Environmental Center (formerly the U.S. Army Toxic and Hazardous Materials Agency, USATHAMA), and the Fort Stewart environmental office. Additional information was obtained from interviews with personnel from the Fort Stewart Facility Engineer's Office on February 11 and 22, 1993, and from interviews with public works officials from the town of Hinesville, Georgia, on February 11, 19, and 22, 1993.

1.4 Report Format

This PA report presents a summary and evaluation of the data relevant to the PA for this property. Section 2 describes the property and its surrounding environment and land uses. Section 3 identifies and characterizes the ESOs at the site. Section 4 summarizes the known and

suspected releases to the environment, and Section 5 discusses potential human and environmental receptors for such releases. Section 6 summarizes the findings and conclusions, discusses the quality and reliability of the supporting information, identifies areas requiring further action, and (as appropriate) suggests how such actions can be accomplished. Section 7 lists pertinent materials reviewed. The Appendix gives interview information.

2 Property Characterization

2.1 General Property Information

The NGTC, operated by the GAARNG, is located in the extreme southern portion of the Fort Stewart Military Reservation, an active Army installation currently under the command of the 24th Infantry Division (Mechanized). Fort Stewart is located in southeastern Georgia, near the community of Hinesville. A general location map for Fort Stewart is provided in Figure 1. The NGTC is located in the eastern half of the cantonment area of Fort Stewart. A partial facility map for Fort Stewart, showing the NGTC boundaries, is provided in Figure 2. The site plan for the NGTC appears in Figure 3.

The GAARNG occupies the NGTC under lease agreement DACA21-3-70-1031, first issued in July 1970. Six amendments to the lease agreement, all minor in scope, have addressed such topics as extension of the period of the lease agreement, assignment of maintenance responsibilities for roads and trails within the NGTC, modification of the boundaries to include two residential structures, and the razing of minor structures. (See Table 1 for additional details on the lease agreement.) Currently, the NGTC encompasses a land area of 757.08 acres. Contained within this area are three parcels that are excluded from the lease agreement: (1) water well pump house 4 (part of the Fort Stewart potable water supply system), (2) the Fort Stewart Theater, and (3) the "Z Club," headquarters for the 24th Infantry Band, and Fort Stewart sewage lift pump house 5. With these exclusions, the total acreage under actual GAARNG control becomes 742.78 acres. In addition to the general license agreement, usage agreements are negotiated annually between the GAARNG and Fort Stewart officials. Additional relevant property information is contained in Table 1.

2.2 Description of Facilities

The major facilities within the NGTC at which a potential exists for release of contaminants to the environment include the Mobilization and Training Equipment Site (MATES), the Combined Support Maintenance Shop (CSMS), the "Bird Bath" vehicle washing facility, Regional Training Site Maintenance (RTSM), motor pools, vehicle wash racks, a steam cleaning facility (at CSMS), underground storage tanks (USTs) (for both product and waste oils), and vehicle maintenance areas (including outdoor grease/inspection ramps). Each of the environmentally significant NGTC facilities is discussed in greater detail below. Their locations are shown in Figure 3.

FIGURE 1 General Location of National Guard Training Center (Source: Adapted from USATHAMA 1992 and McMaster 1983)

FIGURE 2 National Guard Training Center Property Boundaries (Source: Adapted from USATHAMA 1992 and USGS 1973a)

FIGURE 3 National Guard Training Center Site Plan (Source: Georgia Army National Guard, undated blueprint)

TABLE 1 Identifying Information for National Guard Training Center

Installation address	National Guard Training Center Georgia Army National Guard Fort Stewart Military Reservation Liberty County, Georgia 31314-5000
Geographic location	
Latitude	31°51'00"N
Longitude	81°36'00"W
Section	Not applicable in this geographic region
Township and range	Not applicable in this geographic region
FISP ^a installation number	13170
Commander	Col Bobby Duncan
Engineer	Major Kenneth Lee
Types of facilities	Mobilization and Training Equipment Site (MATES) Combined Support Maintenance Shop (CSMS) Regional Training Site Maintenance (RTSM) Vehicle Wash Facility (Bird Bath) Motor pools (each with vehicle wash rack and motor repair shed) Wet pool (training area for recovery techniques from water/mud) Outdoor vehicle maintenance areas Administrative/classroom facilities Barracks
License information	
Initial License	DACA21-3-70-1031 (July 1, 1970)
Modification 1	Extends period of agreement from 1 to 5 years (December 17, 1970)
Modification 2	Extends period of agreement from 5 to 25 years (November 4, 1975)
Modification 3	Initiates joint responsibility for road/trail maintenance (April 20, 1975)
Modification 4	Modifies legal description of property (December 5, 1978)
Modification 5	Adds two cottages and approximately two acres (January 30, 1985)
Modification 6	Reflects the razing of two minor structures (January 4, 1989)
Principal contact	Captain Bruce Berger Environmental Protection Specialist Facility Management Office/Environmental Branch Department of Defense Georgia Army National Guard Headquarters P.O. Box 17965 Atlanta, Georgia 30316-0965 (404) 624-6585

^a Facility Inventory and Stationing Plan.

In addition, numerous permanent and temporary structures at the NGTC function as administrative office space, classrooms, barracks, officers' quarters, mess halls, communication stations, recreational facilities, and equipment storage areas. These facilities are discussed briefly below. Facilities in these categories of use are considered to have a low potential for environmental impact.

As noted above, three parcels within the NGTC are excluded from the lease agreement and remain outside the control and responsibility of the GAARNG. These parcels contain the Fort Stewart Theater, well pump house 4 for the Fort Stewart potable water supply system, and the Z Club, headquarters of the 24th Infantry Band. Each of these facilities is outside the scope of this assessment and will not be discussed further. Likewise, in 1985 the Fort Stewart Directorate of Engineering and Housing (DEH) constructed a storm water equalization basin in the extreme southern portion of the NGTC. This basin receives storm water runoff from land areas within and adjacent to the NGTC. This equalization basin is not formally acknowledged on the lease agreement, although it is contained within the area defined by that agreement. Nevertheless, the equalization basin is functionally outside the responsibility of the GAARNG and consequently is also outside the scope of this assessment.

Under the terms of the lease agreement, the Fort Stewart DEH provides potable water, sanitary sewer service, electrical power (including the maintenance of all outdoor electrical transformers, capacitors, switchgear, etc.), and other general infrastructure support to the NGTC. NGTC personnel do, however, engage in routine and minor building maintenance activities. The Fort Stewart DEH also provides solid waste pickup services to the NGTC. Solid wastes from the NGTC are currently deposited with other Fort Stewart solid wastes at the Fort Stewart south central sanitary landfill. Hazardous wastes are also collected by DEH for delivery to the Fort Stewart hazardous waste storage facility, operated by the Defense Reutilization and Marketing Office (DRMO). Waste lubricating oils are collected by DEH, tested to verify that they are not hazardous wastes, and burned in an energy recovery system at the Fort Stewart central heating plant. Since 1989, facilities within the NGTC that generate waste degreasing solvents have had those solvents managed through recycling under a state-wide contract between the GAARNG and Safety-Kleen Corporation.

2.2.1 Mobilization and Training Equipment Site

The Mobilization and Training Equipment Site is located in Block 10500 of the NGTC. The MATES function was established elsewhere at Fort Stewart in about 1950. The GAARNG moved its MATES operation to its current location in 1961. The main MATES building, 10501, was constructed in 1959 and occupied briefly by active Army before GAARNG occupancy. The MATES provides storage for vehicles and equipment for National Guard units from Georgia, Florida, Tennessee, North Carolina, South Carolina, Alabama, and Nebraska, all of which hold field training exercises at Fort Stewart.

Although the primary mission of the MATES is to provide storage facilities, the MATES also performs routine inspections and first-level maintenance on the vehicles and equipment under its control. First-level maintenance extends to such activities as maintaining fluid levels, charging or replacing batteries, and replacing defective lights, windshield wipers, and other mechanical or electrical components. Wastes generated as a result of first-level maintenance are very limited in both type and volume. Administrative activities and some shop activities occur in Building 10501. Additional MATES activities occur in the yard area south of Building 10501.

Located within the MATES yard are a motor shed, vehicle wash racks, and a grease/inspection rack for maintenance of track vehicles. None of these facilities is currently in service. A loading ramp and vehicle fuel dispensing pump (with UST directly below), located east of Building 10501, are both currently in service.

2.2.2 Combined Support Maintenance Shop

Sharing a portion of Block 10500 with the MATES is the Combined Support Maintenance Shop. Although they are located within the NGTC area of control, the CSMS functions are administratively separate from the NGTC. The CSMS performs higher-level maintenance and refurbishment of vehicles and equipment for all GAARNG units stationed in the southern third of the state (approximately the geographic regions south of Macon, Georgia). Maintenance activities include repair/rebuilding of engines, transmissions, radiators, and other mechanical systems. Support activities include solvent and steam cleaning of equipment, sandblasting, vehicle body repair, painting, machining, carpentry, electronics/communications repair, welding and brazing, and sheet metal fabrication.

The majority of the aforementioned activities occur within Building 10531. However, some maintenance activities on larger vehicles are conducted on the concrete-paved aprons south of the building. Sandblasting and steam cleaning operations also currently take place in the CSMS yard south of Building 10531 in the vicinity of the vehicle wash rack. The wash rack is equipped with a single-stage oil-water separator. Water from this separator discharges to the Fort Stewart sanitary system. Waste oils and other materials retained in the nonaqueous phase are directed to a UST. The UST is periodically evacuated by Fort Stewart DEH personnel. Outdoor grease racks, also located in the CSMS yard, are no longer in service.

2.2.3 "Bird Bath" Vehicle Wash Facility

The "Bird Bath" vehicle wash facility is located in the extreme southeastern portion of the NGTC. Vehicles and equipment returning from the nearby training ranges undergo exterior washing at this facility before they are returned to their respective motor pool areas or to the MATES. The facility, which has been operational since 1989, consists of two separate high-pressure spray washing stations, the first of which also involves partial immersion of the vehicle. No soaps or detergents are used in either stage of washing, and no degreasing activities are allowed at the Bird Bath. Consequently, wastes removed from the vehicles are primarily adhered soils and stones and limited amounts of oils and grease. Drainage from the wash stations is directed to a grit chamber. Settled solids are periodically removed from the grit chamber and used as area fill. An oil containment boom positioned ahead of an overflow weir serves to collect nonaqueous-phase oils and grease from the grit chamber. Wash waters exit the grit chamber to a settling basin that discharges to a secondary basin, from which makeup water is drawn and recycled through the system. Both basins are fitted with synthetic membrane liners. Neither has yet been cleaned of accumulated solids. The water used during the first-stage washing operation is drawn exclusively from the secondary holding basin. Potable water is supplied to the secondary wash stations.

The secondary holding basin is designed to direct overflow to Peacock Canal, which lies immediately east of the wash facility. Peacock Canal is a natural drainageway that has received engineering enhancements to expedite the removal of storm water that is discharged to the canal from various open ditches in the southern half of the cantonment area and to prevent wholesale flooding of the easternmost portion of the cantonment area and adjacent woodlands. Peacock Canal has its origins at the wash facility, from which it travels south to Melvin Swamp, which eventually joins Peacock Creek.

Peacock Canal is considered a water of the state because of its hydraulic connection to the North Newport River, which discharges into Saint Catherine Sound. Consequently, the discharge from the secondary basin is covered by a National Pollution Discharge Elimination System (NPDES) permit (GA0027685), issued to the GAARNG by the Georgia Department of Natural Resources (DNR) in September 1989. (The permit identifies the Medway River in the Ogeechee River Basin as the receiving stream for the Bird Bath discharges, an apparent error that is clearly contradicted by USGS topographic maps.) Limitations imposed on effluent from the secondary basin are for total oil and grease and total suspended solids, both to be determined by quarterly composite sampling at the effluent pipe. No exceedances of permit limitations have occurred to date.

2.2.4 Regional Training Site Maintenance

The Regional Training Site Maintenance occupies blocks 9300 and 9400 and portions of blocks 9100 and 9700 of the NGTC. Administratively, the RTSM is a tenant organization to the NGTC. The primary mission of the RTSM is to provide hands-on and classroom training on the maintenance of a wide variety of vehicles and equipment. This training is extended to both active Army and GAARNG personnel. Administrative headquarters for the RTSM are in Building 9496.

The areas currently occupied by the RTSM are reported to have always been used to support maintenance training activities and were used by active Army units from 1939 until 1962. Many of the structures, especially those serving as administrative centers and barracks, were part of the original Fort Stewart construction in 1939-1940. The GAARNG has occupied these areas since 1966, but the RTSM was formally established only in 1989. The RTSM is also responsible for an area south of Troupe Avenue known as the "Wet Pool," used for training on the methods for recovering vehicles and equipment from flooded/muddy areas.

Facilities in the RTSM yard include vehicle wash racks, grease/inspection ramps, motor pools, and bulk fuel dispensing (with UST). RTSM officials report that the GAARNG's use of the wash racks ceased within six months of the RTSM's establishment in this area in 1989. The grease/inspection ramps, originally designed for the servicing of M-60 tanks, are no longer in use. No information is available to show when the use of the tank grease racks ceased. The fuel UST, installed in 1987, is double walled and equipped with leak detection devices. No other USTs are known to have been located or abandoned within the RTSM area. Sandblasting (on a very limited

basis, for demonstration purposes only) is also performed outdoors in the RTSM yard, south of Building 9496.

Many of the training activities occur in the open yard of the RTSM. However, training activities occur on a "dry" vehicle whenever possible. That is, lubricating oils, fuels, or antifreeze coolants are normally removed from the vehicle before training begins, except, of course, when the training involves the maintenance or changing of such fluids. Nevertheless, the full complement of wastes related to vehicle and equipment maintenance and refurbishment is generated at the RTSM, albeit in limited quantities. In addition, substantial amounts of chlorofluorocarbon solvents (Freons) are also generated at the RTSM as a result of training on refrigeration equipment. No releases of refrigerants to the environment at the RTSM have been recorded. All wastes generated at the RTSM are turned over to the MATES for eventual delivery to the Fort Stewart waste storage facility. This has been the case since the inception of RTSM activities.

2.2.5 Motor Pools

Twelve areas within the NGTC are designated as motor pools. These areas are in blocks 9100, 9600, 9900, 10100, 10200, 10300, 12700, 12900, 13100, 13300, 13400, and 13500. Units training at Fort Stewart use these motor pools for vehicle and equipment parking during their training periods. When maintenance intervals coincide with training exercises, units also perform the required basic maintenance at the assigned motor pool.

Each motor pool area consists primarily of an unpaved and unvegetated vehicle parking area. Also included in each motor pool are a motor repair shed with accompanying roofed concrete parking area, on which basic vehicle maintenance can be performed, and a vehicle wash rack that discharges to adjacent open ditches through a three-stage oil-water separator. The wash racks are no longer in service, but drains connecting the wash rack platforms to their oil-water separators have not been plugged. However, basic vehicle maintenance is still performed in the motor pool areas. The NGTC has equipped each motor pool area with a 275-gal skid-mounted tank (converted hot water tanks) for collection of waste lubricating oils that result from vehicle maintenance performed in the motor pools. Waste oils are subsequently collected by Fort Stewart DEH personnel for delivery to the Fort Stewart central heating facility, where they are burned for heat recovery.

2.2.6 Vehicle Wash Racks

In all, 19 vehicle wash racks are at the NGTC. (An earlier study [McMaster 1983] identified 20 wash racks within the NGTC. Because their locations were not specified, this discrepancy could not be resolved.) As noted above, each of the 12 motor pool areas is equipped with a vehicle wash rack. In addition, vehicle wash racks of identical design exist in blocks 9300, 9400, 9700, and 9800 and at DAS-3 (south of Troupe Avenue and north of the Wet Pool facility). As with the motor pool wash racks, none of these wash racks is currently functional.

In their initial configurations, motor pool wash racks discharged directly to the ground surface. Oil-water separators were installed in the mid-1970s, and their discharges were directed to the adjacent storm water drainage ditches (McMaster 1983). In 1982, all wash racks at Fort Stewart except those operated by the NGTC and two others were connected to a newly constructed industrial waste water treatment plant. The NGTC wash racks continued to discharge to the ditches, as did the remaining two, which were operated by active Army units. The discharges from the NGTC wash racks were subject to an NPDES permit issued by the Georgia DNR. Before the installation of the Bird Bath wash facility in 1989, the wash racks in the motor pool areas received extensive use, serving as the primary wash stations for vehicles and equipment returning from field training. The wash rack at DAS-3 probably was used to clean vehicles and equipment retrieved from the Wet Pool facility.

A vehicle wash rack is located south of the CSMS in Block 10500. This facility is currently operational. Steam cleaning of vehicles and equipment undergoing repair/refurbishment at the CSMS also occurs at this wash rack. The wash rack discharges to a single-stage oil-water separator, connected to the Fort Stewart sanitary sewer system. Nonaqueous-phase wastes collected in the separator are diverted to a UST that is periodically evacuated by Fort Stewart DEH personnel for burning at the central heating plant.

A vehicle wash rack also exists in the southern portion of the MATES yard. As with the CSMS wash facility, the MATES facility discharges to a single-stage oil-water separator. Accumulated nonaqueous wastes are diverted to a UST that is evacuated periodically by DEH personnel. Wash waters are discharged to the Fort Stewart sanitary sewer system.

2.2.7 Steam Cleaning Activities

Steam cleaning facilities exist south of the CSMS in Block 10500. Steam generating equipment is located in a separate building adjacent to the vehicle wash rack (Section 2.2.6). Portable steam cleaning equipment is also present at the MATES and CSMS buildings. These portable steam cleaning units are reported to no longer be used. However, when they were in use, the activity probably occurred on the concrete-paved aprons south of the CSMS and MATES buildings. Both of these aprons are served by storm sewers that drain to open ditches.

2.2.8 Underground Storage Tanks

Nine USTs are within the NGTC, all still in use. Six USTs are used to store vehicle fuels. Three USTs are used to store waste oils: a 2,000-gal tank at the vehicle grease rack in Block 9800, a 500-gal tank at the wash rack south of the CSMS in Block 10500, and a 500-gal tank at the vehicle wash rack south of the MATES, also in Block 10500. All six product storage tanks are registered with the state of Georgia. None of the waste oil tanks is registered. The registered product storage tanks undergo periodic leak testing in accordance with state regulations. The waste oil tanks have not undergone integrity testing, and no leaks are suspected. No abandoned USTs occur within the NGTC. Because all existing USTs on the NGTC are still in service, they are not eligible for consideration under the IRP program and therefore fall outside the scope of this evaluation.

2.2.9 Vehicle Maintenance Areas

Outdoor vehicle maintenance areas exist in the RTSM, MATES, and CSMS yards. Particularly, grease/inspection ramps are located in blocks 9300, 9400, 9700, 9800, and 10500. Each of these ramps was originally designed to service the M-60 tank. None of the ramps is currently operational. Limited vehicle maintenance activities are performed on larger vehicles in the CSMS and MATES areas, usually on the concrete aprons south of the respective buildings. In addition to maintenance activities, equipment and vehicle sandblasting takes place at the wash rack south of the CSMS in Block 10500.

2.2.10 Administration Buildings and Barracks Areas

Much of the land area of the NGTC is occupied by barracks and administration buildings. Most of these structures were part of the original Fort Stewart construction in 1939-1940. However, barracks for the RTSM in Block 9100 were constructed in 1972-1976. The exterior siding and interior wallboard of some of these buildings may be made of asbestos-containing materials (ACMs). Management and remediation of ACMs is the responsibility of the Fort Stewart DEH. Original structures were initially heated by coal and later converted to oil heat, supplied from dedicated 250-gal aboveground tanks. The NGTC is currently engaged in a program to convert the buildings to propane heat, replacing the fuel oil tanks with individual propane tanks. The conversion is approximately one-third complete.

Although some minor spillage of fuel oil from the aboveground tanks and the fuel supply lines has undoubtedly occurred, NGTC personnel report no incidents of wholesale or significant release from any of the indirect heating oil tanks, and no instance of wholesale oil contamination was encountered in the oil-to-propane conversions completed to date. No other environmental impacts can be associated with administration or barracks structures.

2.3 Property History

Fort Stewart, initially known as Camp Stewart, was activated in 1940 as an antiaircraft weapons training center. Camp Stewart was declared inactive and put into caretaker status in 1945, but it was reactivated in 1950 to provide antiaircraft weaponry training for troops in support of the Korean Conflict. Armored vehicle training activities were introduced in 1953. Camp Stewart was renamed Fort Stewart and designated a permanent Army installation in 1956. In 1966, Fort Stewart became a United States Army Flight Training Center for both fixed- and rotary-wing aircraft. Hunter Army Airfield, an Air Force installation located approximately 22 miles east northeast in Savannah, Georgia, came under Army control and became a subinstallation to Fort Stewart and the center of flight training activities.

Fort Stewart was redesignated an Army Garrison in 1972 as Army flight training activities waned. With the activation of the 1st Battalion, 75th Infantry (Ranger), in 1974, Fort Stewart became the center for tank, field artillery, helicopter gunnery, and small arms training. Army, U.S. Army Reserve and Army and Air National Guard units used Fort Stewart for field training

exercises. The 24th Infantry Division (Mechanized) took permanent command of Fort Stewart in 1975.

The NGTC has been in its present location since 1970, although some functions (e.g., MATES) began much earlier in other locations at Fort Stewart. The NGTC area has always been used for vehicle and equipment maintenance and for troop billeting. The motor pools were originally used by active Army and U.S. Army Reserve units, as well as Army National Guard units training at Fort Stewart. The vehicle maintenance areas now occupied by the RTSM were originally constructed for similar maintenance activities conducted by active Army units.

2.4 Permitting Status

Currently, the Bird Bath vehicle washing facility is operated under an NPDES permit issued to the GAARNG by the Georgia DNR. The permit, GA 0027685, was issued in September 1989. See Section 2.2.3 for additional details on the Bird Bath and its NPDES permit. The NPDES permit for the Bird Bath replaced an earlier permit (with the same number) issued in 1982, which collectively addressed the motor pool oil-water separator discharges to open storm water drainage ditches. Correspondence in the file indicates that the NGTC had routinely violated the oil and grease limitations for discharges from the motor pool oil-water separators to the open ditches.

In 1989 the Fort Stewart DEH constructed an equalization basin in the extreme southern portion of the NGTC. This basin collects storm water runoff from the south central portion of the cantonment area (from land areas both within and outside the NGTC) and also receives discharges from two operational vehicle wash racks located in Army motor pools along Troupe Avenue, adjacent to the western boundary of the NGTC. This equalization basin ultimately discharges overflows to Melvin Swamp, which drains to the North Newport River and Saint Catherine Sound, but these discharges are not currently covered by an NPDES permit. Maintenance of the equalization basin is the responsibility of the Fort Stewart DEH.

Hazardous wastes generated at Fort Stewart (including those generated in the NGTC) are stored in a Resource Conservation and Recovery Act (RCRA) interim status storage facility operated by the DRMO. Recently, the DRMO was required by the Georgia DNR to submit a Part B permit application for the facility. As is often the case, as part of the processing of the final hazardous waste storage permit, the DNR has required Fort Stewart to conduct a RCRA Facility Assessment on the entirety of Fort Stewart. An initial identification and assessment of RCRA solid

waste management units (SWMUs) was completed in January 1991. A total of 52 SWMUs were identified, none of them located within the NGTC (Houston 1993). However, an environmental evaluation of Fort Stewart, completed in 1983, established that, prior to the mid 1960s, practices at all vehicle maintenance areas involved mixing degreasing solvents, hydraulic fluids, and waste oils and storing the mixtures in 55-gal drums and in USTs (McMaster 1983). Because degreasing solvents used in the past included 1,1,1-trichloroethane and trichloroethylene, both of the waste oil USTs in the NGTC should be considered RCRA SWMUs. A hazardous waste study conducted at Fort Stewart (USAEHA 1988) identified 24 categories of RCRA SWMUs, including waste oil USTs. The waste oil USTs located at the MATES and CSMS wash racks in Block 10500 were included. The USAEHA study described the wastes placed into these tanks as a "mixture of waste oil, nonhazardous used stoddard type II solvent (flash point >140°F), used antifreeze, and used hydraulic fluid." The study also indicated that previous sampling of representative waste mixtures recovered from waste oil tanks had met the specifications of 40 CFR 266.40(e), making the mixtures suitable for burning for energy recovery.

Neither the USATHAMA nor the USAEHA assessment of Fort Stewart listed vehicle wash racks or grease/inspection ramps as RCRA SWMUs. Oils and grease are not categorically identified as hazardous waste under the authorized Georgia hazardous waste management program. In the opinion of staff of the Fort Stewart environmental office, the wash racks at the motor pools and all outdoor vehicle maintenance areas (including the M-60 tank grease/inspection ramps) were historical sources of only oil and grease wastes (Houston 1993). No sampling at the wash racks or inspection ramps has been conducted to confirm this belief, however.

Hazardous wastes generated as a result of NGTC activities are accumulated in storage areas specified for less than 90 days of storage and ultimately delivered to the DRMO hazardous waste storage facility. No RCRA-permitted facilities are within the NGTC.

Fort Stewart maintains a number of on-post sanitary landfills for disposal of nonhazardous solid wastes and landscape debris. Landfills located in the remote areas of Fort Stewart are dedicated to isolated training ranges and camps. The south central landfill receives all solid wastes from the cantonment area (including the NGTC). The Georgia DNR issued an operating permit for the south central landfill in August 1982, permit 089-010D(SL).

Fort Stewart also holds a permit from the DNR for operation of a number of community potable water supply systems, serving the cantonment area and some of the training ranges. Groundwater withdrawn from the Upper and Lower Floridan aquifer supplies these potable water

systems. Although one of the groundwater wells supplying potable water is located within the NGTC, the GAARNG has no responsibilities with respect to operation, maintenance, or sampling of the Fort Stewart potable water supply systems.

As noted above, Peacock Canal has received engineering enhancements to facilitate the rapid capture and release of storm water runoff from the eastern portion of the NGTC and surrounding woodland areas, as well as discharges from the Bird Bath. However, no Clean Water Act Section 404 permits were obtained from the Army Corps of Engineers for the dredging of Peacock Canal.

No permits exist for discharges to the air from any NGTC facility. Most air discharges within the NGTC are associated with indirect heating systems, and consequently they are exempt from permit requirements. Air discharges from industrial sources such as welding hoods and paint spray booths, however, have not been covered by air discharge permits.

2.5 Surrounding Environment and Land Use

2.5.1 Demographics and Land Use

The on-post population at Fort Stewart consists of approximately 24,027 workers including active military personnel, civilian personnel, and personnel in training. Of this population, approximately 16,599 are residents. At any time, 3,583 individuals are undergoing training at Fort Stewart (USATHAMA 1992). According to the 1990 decennial census, the population of Hinesville is 21,600, the population of Flemington is 500, and the population of the rest of Liberty County residing within a four-mile radius of the Fort Stewart boundary is 11,875 (USATHAMA 1992). Of the off-post population, only the residents of Hinesville and Flemington are likely to be influenced by activities occurring at the NGTC.

The cantonment area of Fort Stewart is approximately 7.8 square miles in size. The NGTC occupies 742.78 acres of this area. The cantonment area, including the NGTC, is characterized by open grass lawns with shrubs and trees planted around buildings and along roads and walkways. Within the NGTC, significant acreage is used for motor pools and vehicle maintenance areas. The motor pool areas consist primarily of unvegetated, undeveloped parcels of land. The maintenance areas consist of shops, garages, and large associated paved lots.

2.5.2 Climate

The vicinity of Fort Stewart has a humid subtropical climate characterized by long, hot summers and mild winters. Average monthly temperatures range from 81°F in July to 50°F in January. Daily maximum temperatures during the summer months, June through August, are 80-91°F. Daily minimum temperatures during the winter months, December through February, are 38-43°F. Most of the winter is characterized by extended periods of mild weather punctuated by cold snaps. The first and last killing frosts occur on about December 1 and March 1, respectively.

The average annual precipitation is 49 in., over half of which falls during the months of June through September. July is usually the wettest month, averaging 7.85 in. of precipitation, and November is the driest month, averaging 1.65 in. The periods of heaviest precipitation are usually associated with hurricanes or tropical storms, which are most common in August and September. Snowfall is rare.

The prevailing wind direction at Fort Stewart is variable. The average annual wind speed is less than 5 knots, although gusty winds associated with summer thunderstorms may exceed 25 knots. Extremely strong winds, up to 78 knots, may be associated with the hurricanes or tropical storms.

2.5.3 Physiography and Surface Water

Fort Stewart is located in the lower Georgia Coastal Plain physiographic province, a segment of the Atlantic Coastal Plain of eastern North America. The general topography of this province is flat to gently rolling with relatively low elevations that decrease gradually to sea level at the Atlantic Ocean. The topography is marked by the presence of numerous marine terraces, many of which consist of low elongated ridges that parallel the coastline. These low ridges generally are separated by wide swampy valleys.

Most of Fort Stewart is located within the Canoochee River watershed (Figure 4). The Canoochee River runs through the northwest, central, and southeastern portions of the reservation and joins the southward flowing Ogeechee River. Most surface water runoff at Fort Stewart is captured by the Canoochee River or the Ogeechee River. However, along the southeastern border

FIGURE 4 Surface Water Drainage Patterns for Fort Stewart (Source: USATHAMA 1992 and USGS Quadrangle Maps)

of the reservation, surface water runoff flows southward along a number of tributaries into the Jerico River and the North Newport River. Four major lakes and ponds are located at Fort Stewart, only one of these, Holbrook Pond, is within a four-mile radius of the NGTC. In addition, approximately 20% of Fort Stewart consists of designated wetlands areas (USATHAMA 1992), most of which are associated with surface streams, rivers, and ponds.

The NGTC is located on the edge of a terrace trending northeast-southwest (USGS 1973a, 1973b, 1973c, and 1973d). The surface elevation of the NGTC ranges from a high of 80 ft above mean sea level in the northwest quarter to a low of approximately 30 ft above mean sea level in the southeast corner. Surface water on the southeast portion of the NGTC drains to the southeast along a series of engineered drainageways located adjacent to the NGTC boundary and leading to Peacock Canal and Melvin Swamp. Peacock Canal drains into Melvin Swamp, which joins with Peacock Creek and eventually drains into the North Newport River. Surface water on the northwest quarter of the NGTC drains to the northwest along drainageways that empty into Taylors Creek, approximately two miles northwest of the NGTC boundary, and then into the Canoochee River.

Natural soils present at the NGTC, like those throughout most of the cantonment area, range from moderately well drained, fine sands to poorly drained, loamy sands (USDA 1982). In general, the better drained soils occur at higher elevations, and the less permeable soils occur at lower elevations in association with swampy land. At the NGTC, the poorly drained soils are primarily concentrated in the easternmost corner. Regardless of their permeability, many of the soils at Fort Stewart are characterized by seasonally high water tables (0.5-5.0 ft) during the fall, winter, and spring months because of the low topographic relief of the area.

All of the surface water bodies discussed above are fed primarily by accumulated precipitation. Infiltration of surface water recharges the shallowest groundwater aquifer, but it probably does not contribute significantly to the deeper aquifers because relatively impermeable intervening layers are present (see Section 2.5.4).

2.5.4 Groundwater and Hydrogeology

2.5.4.1 Geology

The Coastal Plain province is characterized by a wedge of interbedded clastic and carbonate sediments of Cretaceous age and younger. These sediments generally dip seaward and thicken from a featheredge at their inland margin to great thicknesses along the Atlantic coast. The inland margin of the oldest outcropping formations, referred to as the Fall Line, occurs along a northeast-southwest trend located approximately 115 miles northwest of Hinesville.

The Coastal Plain sediments were deposited in fluctuating fluvial and shallow marine environments associated with a long series of successive sea level advances and retreats. As a result, the formations are complexly interbedded, and lithologic variations may be great over short lateral distances. In general, clastic formations are predominant in the older (deeper) Coastal Plain formations and in the inland section of the sedimentary wedge. These formations grade laterally into predominantly carbonate rocks along the Georgia coast.

Table 2 is a generalized correlation chart describing the Paleocene through Holocene stratigraphic section along the Georgia coast. This chart identifies commonly accepted formation names, geologic ages, and corresponding hydrologic units. It reflects the most recent interpretations of the regional geology as described by Johnston and Bush (1988), Clarke et al. (1990), and Miller (1992). In general, the pre-Miocene formations consist of carbonate rocks such as evaporites, dolomites, and limestones that were deposited in either shallow tidal flats or warm, shallow open marine waters. The Miocene-aged units represent three separate depositional sequences that are related to cycles of sea level advance and retreat. Each sequence consists of a basal limestone layer, a middle clay layer, and an upper sand layer. The post-Miocene formations are largely undifferentiated, consisting of interlayered sand, clay, and thin limestone beds.

2.5.4.2 Regional Groundwater

Unless otherwise noted, the information presented in this section regarding regional groundwater conditions is derived from Clarke et al. (1990) and Johnston and Bush (1988). Groundwater resources in the Coastal Plain province are relatively plentiful. One of the most

TABLE 2 Generalized Correlation Chart of the Paleocene-Holocene Stratigraphic Section along the Georgia Coastal Plain

FORMATION NAME	GEOLOGIC UNIT	HYDROLOGIC UNIT
Undifferentiated Deposits	Post-Miocene	Surficial Aquifer
Hawthorne Group	Miocene Unit A	Confining Unit
	Miocene Unit B	Upper Brunswick Aquifer
	Miocene Unit C	Confining Unit
		Lower Brunswick Aquifer
Suwanee Limestone	Oligocene	Confining Unit
Ocala Limestone	Upper Eocene	Upper Floridan Aquifer
Avon Park Formation	Middle Eocene	Confining Unit
Oldsmar Formation	Lower Eocene	Lower Floridan Aquifer
Clayton Formation	Paleocene	
Cedar Keys Formation		

--- Unconformable contact

Sources: Johnston and Bush (1988); Clarke et al. (1990); Miller (1992).

prolific aquifers in the United States, the Floridan aquifer system, is located in this region. Previously referred to as the "principal artesian aquifer," the Floridan aquifer system underlies all of Florida, southern Georgia, and parts of Alabama and South Carolina. The Floridan aquifer system is overlain by other water-bearing units that serve as secondary groundwater aquifers (Table 2).

In most areas, the Floridan aquifer system consists of two permeable zones, referred to as the Upper and Lower Floridan aquifers, separated by a confining unit of variable age and character. Throughout most of the Coastal Plain, including the Fort Stewart area, the Floridan aquifer system is under artesian conditions, with the groundwater confined under pressure by overlying units. In general, the Lower Floridan aquifer has not been extensively developed because its groundwater is quite saline and does not meet established drinking water standards (O'Connell and Davis 1991). Within the Upper Floridan aquifer, permeability contrasts can be quite significant with relatively to highly permeable zones being separated by less permeable zones. As a result of the variable permeability, the transmissivity of the aquifer varies greatly, ranging from 10,000 to over 500,000 ft²/day. Depth to the Upper Floridan aquifer in the Hinesville area is estimated at 375 to 445 ft. Typical well yields range from 5,000 to 10,000 gallons per minute (gpm).

The Floridan aquifer system is overlain by younger sediments that serve as alternate sources of groundwater in the Hinesville area (Table 2). Two water-bearing zones, referred to as the Upper and Lower Brunswick aquifers, have been identified in Miocene-aged fine to coarse sands. In the vicinity of Hinesville, the Upper Brunswick aquifer is less than 140 ft thick, and the Lower Brunswick aquifer is less than 80 ft thick. Approximate depth to the Upper Brunswick aquifer ranges from 155 to 230 ft. These aquifers are characterized by confining to semiconfining conditions. Transmissivity of the Brunswick aquifers ranges from 680 to 5,700 ft²/day, and typical well yields are 3-180 gpm.

Post-Miocene sediments are an alternate groundwater source, referred to as the surficial aquifer (Table 2). Across most of the Georgia Coastal Plain, the surficial aquifer is characterized by water table conditions; however, discontinuous lenses of clay may result in localized confined conditions. The configuration of the water table in the surficial aquifer generally represents a subdued replica of the land surface. Within a 30-mile-wide zone along the Atlantic coast, the influence of tidal fluctuations on the water table is observable; however, Fort Stewart is situated inland of this zone. In the vicinity of Hinesville, the thickness of the surficial aquifer is 155-230 ft. The surface of the water table in the surficial aquifer is approximately 40 ft above

mean sea level near Hinesville. The depth to the water table at the NGTC ranges from 0 to 50 ft, depending on local surface elevations. Transmissivity of the surficial aquifer ranges from 14 to 6,700 ft²/day, and typical well yields range from 2 to 180 gpm.

Groundwater in the Floridan and Brunswick aquifers is recharged primarily by precipitation that falls in outcrop areas located inland to the northwest and north. Discharge from these aquifers is through withdrawal from wells and, where the head gradients are favorable, vertical leakage into overlying units. The surficial aquifer is recharged primarily by local infiltration of precipitation and surface waters. Discharge from the surficial aquifer is primarily through evapotranspiration, discharge to surface waters, and withdrawal from wells.

Regional groundwater flow in the water-bearing units of the Coastal Plain is to the southeast; however, local variations in flow direction may result from the influence of groundwater pumping and surface water bodies. Within the Upper Floridan aquifer, groundwater flow in the vicinity of Fort Stewart is easterly because of the effects of a potentiometric low to the northeast, around Savannah (Kellam 1986). This potentiometric low results from extensive drawdown of the Upper Floridan aquifer in the Savannah area.

2.5.4.3 Local Groundwater

Within a four-mile radius of the geographic center of the NGTC, 11 active water wells serve public water supply systems. Table 3 provides summary information about these wells, and Figure 5 shows their locations within the four-mile radius.

Nine of the public water supply wells are located at Fort Stewart; five are within the main cantonment area, two at Wright Field, and two at recreational areas located at Holbrook Pond. Water supply wells at both the cantonment area and Wright Field contribute to blended distribution systems. All of the Fort Stewart water supply wells are completed in the Upper Floridan aquifer (Walters 1993). Locally, this aquifer is referred to as the Ocala Limestone.

The City of Hinesville currently operates three water supply wells that contribute to a blended water distribution system. Two of the city wells are located within the four-mile radius of the NGTC. On the basis of their combined pumping capacities, these two wells contribute 48% of the city's total water supply (Copeland 1993). All of the city wells are drilled to a depth of

TABLE 3 Information on Public Water Supply Wells Located within a Four-Mile Radius of the National Guard Training Center, Fort Stewart

Map Number	Well Location/Name	Casing Depth (ft)	Well Depth (ft)	Pump Capacity (gpm)
1	Ft. Stewart (W. First and Wilson)	451	816	1,750
2	Ft. Stewart (Hero Rd.)	393	508	1,400
3	Ft. Stewart (W. 13th and Wilson)	436	750	1,400
4	Ft. Stewart (E. 12th and Bultman)	439	805	1,400
5	Ft. Stewart (W. 15th St.)	560	779	1,100
6	Wright Field (W. Lowe Cir.)	393	500	500
7	Wright Field (E. Lowe Cir.)	374	472	500
8	Holbrook Pond (Skeet Range)	- -	605	- -
9	Holbrook Pond (Campground)	- -	605	- -
10	City of Hinesville No. 4	125	700	650
11	City of Hinesville No. 6	115	700	1,450

Sources: USATHAMA (1992); Walters (1993); Copeland (1993).

approximately 700 ft with water intakes set at depths of 115 to 128 ft. According to Copeland (1993), the entire interval from intake to total depth is open in each well, indicating that the city water supply is drawn from the bottom half of the surficial aquifer, both Brunswick aquifers, and the Upper Floridan aquifer.

In addition to the public water supply wells, a number of other water wells are located within the four-mile radius of the NGTC. However, information describing their location and completion is not available at this time. Most residences and private businesses located off Fort Stewart property and outside the Hinesville city limits are served by private wells. In addition, some private wells might still exist within the city limits of Hinesville. According to Copeland (1993), most private wells in the area are completed at depths of 200-250 ft. Available geologic information indicates that most of these wells produce water from the Miocene-aged Upper Brunswick aquifer, although some of them also may be open in the shallower surficial aquifer.

FIGURE 5 Locations of Water Supply Wells within a Four-Mile Radius of the National Guard Training Center (Sources: USATHAMA 1992; USGS Quadrangle Maps; Walters 1993; Copeland 1993)

A number of water wells were drilled on Fort Stewart property before the military reservation was established. These wells, referred to as artesian wells, presumably have been abandoned, although no records of their abandonment are available. Because they were called artesian wells, these wells were probably drilled at least to the Miocene-aged aquifers and possibly to the Upper Floridan aquifer. The conditions and locations of these wells are not known (Walters 1993), although USGS topographic maps plot the locations of at least some of them. One such well is located within the four-mile radius of the NGTC and is indicated on Figure 5.

The most recent population data indicate that the drinking water populations served by the above itemized wells are approximately as follows: Fort Stewart public supply system, 24,027; city of Hinesville, 21,600; private wells in the community of Flemington, 500. In addition, the five wells (Table 3) in the Fort Stewart public supply system serve approximately the following populations: Well 1 (W. First and Wilson), 6,007; Well 2 (Hero Rd.), 4,805; Well 3 (W. 13th and Wilson), 4,805; Well 4 (E. 12th and Bultman), 4,805; and Well 5 (W. 15th St.), 3,604.

2.5.5 Sensitive Environments

Approximately 20% of the Fort Stewart Military Reservation is designated as wetland (USATHAMA 1992). Except for the surface water drainageways that traverse the area, none of the NGTC acreage appears to include wetlands. However, wetland areas are located within a four-mile radius of the NGTC (USGS 1973a, 1973b, 1973c, and 1973d). Surface water runoff from the NGTC enters wetland areas to the east and southeast (associated with Peacock Canal and Melvin Swamp) and to the northwest (associated with Taylors Creek).

Three federally listed threatened or endangered species reside at Fort Stewart: the American alligator (*Alligator mississippiensis*), the Eastern indigo snake (*Drymarchon coralais couperi*), and the red-cockaded woodpecker (*Picoides borealis*) (USATHAMA 1992).

No archeologically or historically significant sites occur anywhere on Fort Stewart (McMaster et al. 1983).

3 Environmentally Significant Operations

Argonne has identified four categories of ESOs at the NGTC: (1) vehicle wash racks and their oil-water separators; (2) outdoor vehicle maintenance areas; (3) sandblasting areas; and (4) motor repair shops. Figure 6 shows the locations of all identified ESOs.

3.1 Vehicle Wash Racks and Oil-Water Separators

As indicated in Section 2, 19 vehicle wash racks are within the NGTC, 12 at motor pools, 4 at former vehicle maintenance areas (now maintenance training areas within the RTSM), and 1 each at DAS-3, MATES, and the CSMS. Wash racks at the 12 motor pool areas and at DAS-3 (south of Troupe Avenue and north of the wet pool facility) have been inactive since the opening of the Bird Bath central washing facility in 1989. Before that time, vehicles and equipment returning from field training exercises came directly to the motor pool assigned to the particular unit for washing. Prior to GAARNG occupancy in 1970, wash racks at the NGTC motor pools were used by active Army units, but details of this use are not available. Until their replacement by the Bird Bath in 1989, the motor pool wash racks and their associated oil-water separators were maintained by the Fort Stewart Facility Engineer's Office.

The Fort Stewart Environmental Office has concluded that *only* oils and grease could have been released from the wash racks. However, old blueprints of the NGTC area labeled the concrete pads of the vehicle wash racks as "maintenance platforms," suggesting that activities other than exterior vehicle washing may have taken place there and further suggesting that the full complement of waste automotive fluids as well as waste degreasing solvents could also have been generated at these locations. An early environmental study at Fort Stewart confirmed that vehicle maintenance did occur routinely at the motor pools (McMaster et al. 1983). That study also reported that motor pool vehicle wash racks were installed in the mid 1970s and that prior to that time, wastes from vehicle washing (and limited maintenance activities) were discharged directly to the open storm water ditches. That study also reported that degreasing solvents previously in use at Fort Stewart included stoddard type I, 1,1,1-trichloroethane, and trichloroethylene.

A 1987 assessment of Fort Stewart (USAEHA 1988) identified a variety of automotive maintenance fluids being discharged to the waste oil USTs throughout the cantonment area,

FIGURE 6 Locations of Environmentally Significant Operations at the National Guard Training Camp, Fort Stewart

including the USTs at the CSMS and the MATES wash racks. However, this assessment provided no specifics on whether such waste fluids were generated at the wash racks or elsewhere. The information is, however, corroborated by a 1983 environmental study of Fort Stewart (McMaster et al. 1983), which reported that, before the mid 1960s, degreasing solvents were intermixed with waste lubricating oils in USTs throughout the cantonment area. That 1983 report also noted numerous reports of waste petroleum, oils, and lubricants being discharged to open drainage ditches.

All wash waters from the vehicle wash racks at the motor pools were directed to adjacent three-stage oil-water separators, which discharged ultimately to adjacent open storm water drainage ditches. The design of these oil-water separators required a minimum level of water to be maintained in the first chamber for the separator to work correctly. Because motor pools may have received sporadic use, initial water levels in the first chambers could have fallen below minimum levels between usage periods (as a result of evaporative losses), making the separators initially ineffective in stopping oil phases from discharging to the ditches.

During the site inspection, the oil-water separator at the motor pool in Block 10300 showed evidence of oil phases in each of the three chambers (heavy oil staining on the walls of the chambers). Such oily wastes would have been allowed to discharge to the adjacent drainage ditch when the oil-water separator had reached its ultimate volume capacity (through rainfall entering the open separator chambers either directly or as runoff from the concrete pad of the adjacent wash facility). The GAARNG personnel have indicated that the last unit to use this motor pool was an active Army unit from Fort Benning, Georgia. This usage occurred just recently, well after water to the motor pool vehicle wash racks had been shut off (after the Bird Bath became operational), suggesting that no waste materials should have been discharged to the oil-water separator in the first place. The NGTC personnel are making the necessary arrangements to retrieve the oily liquids found in the Block 10300 oil-water separator for analysis and proper disposal.

The condition of the Block 10300 separator gives clear evidence of the difficulty that would have existed in policing waste generating activities at the motor pool areas in the past and ensuring that all oil-water separators were functioning properly. However, except for Block 10300, oil-water separators in the motor pool areas apparently did not contain waste liquids. In fact, many had silted in, had accumulated rain water, and were supporting healthy indigenous wetland vegetation. Nevertheless, other separators did show oil staining on the inner walls of their secondary and final chambers, indicating improper functioning of the separator in the past.

Organic solvents released to a properly functioning oil-water separator might be expected to partition into the oil phase to some extent, but not completely. Oil-water separators of this design cannot be relied upon to remove all organic solvents contained in waste waters discharged to them simply by separating aqueous and nonaqueous phases because many organic degreasing solvents are miscible with or partially soluble in water.

Therefore, sufficient circumstantial and hearsay evidence exists to suggest that the ditches adjacent to the motor pools might have received a variety of wastes related to vehicle cleaning and maintenance, including oils, grease, coolants, and degreasing solvents, as a result of discharges of such wastes at the "maintenance platforms," and/or as a result of poor maintenance of the oil-water separators. Thus, even with separators functioning properly, some release of water-soluble or water-miscible solvent contaminants to the ditches would have been expected.

Similar circumstantial arguments can be made for the vehicle wash racks in the former maintenance areas of the NGTC, blocks 9300, 9400, 9700, and 9800. Wash racks and oil-water separators at these locations are identical in design to the motor pool wash racks. Although these wash racks are no longer in use, wastes related to vehicle and equipment maintenance could well have been released to the adjacent ditches, either as a result of unauthorized discharges or poor maintenance. Because these wash facilities were associated with vehicle maintenance centers, the potential for release of maintenance-related wastes (e.g., degreasing solvents) is greater at these facilities than for the motor pool wash racks. However, the fact that these wash racks would have been used exclusively by maintenance personnel assigned to the two facilities greatly reduces but does not eliminate the potential for unauthorized discharges to the oil-water separators (as was apparently the case most recently at the Block 10300 separator).

Wash racks and their associated oil-water separators at the MATES and the CSMS, both in Block 10500, are of fundamentally different design from the wash racks and separators discussed above. The potential for release of contaminants to open ditches from these facilities is substantially less. Both facilities divert accumulated nonaqueous wastes to underground storage tanks and discharge waste waters to the Fort Stewart sanitary sewer. Therefore, contaminant release to open ditches could have occurred only with overflows of the concrete wash pads. As is the case for the wash racks at blocks 9300, 9400, 9700, and 9800, the MATES and CSMS wash racks were closely associated with vehicle and equipment maintenance centers. Therefore, these wash racks have an increased potential to have received maintenance-related wastes in addition to oils and grease and a reduced but still real potential to have received unauthorized waste materials.

Finally, with respect to wash racks, the earlier IRP assessment of Fort Stewart (USATHAMA 1992) identified vehicle wash racks categorically as areas where contaminants were previously released to the environment. However, the report was not specific regarding the nature of contaminants released. Inexplicably, only some of the wash racks in the NGTC were specifically identified.

3.2 Outdoor Vehicle Maintenance Areas

Outdoor vehicle maintenance areas within the NGTC must also be considered as potential points of contaminant releases to the environment. Maintenance activities occurred on either native soils or graveled areas. Of particular concern are grease/inspection ramps located in blocks 9300, 9400, 9700, 9800, and 10500. None of these ramps is currently in use, and their use predates GAARNG occupancy of the NGTC. No records reflect the extent to which these ramps were used, but they were the only facilities at which M-60 tank inspection and maintenance activities could have taken place. Thus, the entire complement of M-60 maintenance-related wastes was probably generated at these ramps. Inspections during the site visit revealed heavily stained ground surfaces beneath some of the ramps.

Vehicle maintenance areas in blocks 9300, 9400, 9700, and 9800 were designated in the previous Fort Stewart IRP assessment as areas of contaminant release (USATHAMA 1992). Presumably, the tank grease/inspection ramps were intended to be included in this designation. However, the outdoor vehicle maintenance activities and the tank grease/inspection ramps south of the MATES in Block 10500 were not identified in that study.

Finally, an environmental evaluation of Fort Stewart conducted in 1983 reported that vehicle maintenance wastes (including some RCRA-controlled solvents used in degreasing operations) were stored in 55-gal drums in outdoor locations within the vehicle maintenance areas (McMaster et al. 1983). No additional details of these storage activities were provided. No NGTC personnel could provide additional information regarding past waste storage areas.

3.3 Sandblasting Areas

Sandblasting of vehicles and equipment is reported to have taken place in outdoor areas of the vehicle maintenance yards. The RTSM personnel reported that sandblasting instructions and hands-on training are conducted in the open yard south of Building 9496, but to a very limited

degree. More extensive sandblasting is also reported to occur at the vehicle wash facility south of the CSMS facility.

Sandblasting at the CSMS is performed in an unprotected area where the wind could remove sandblasting wastes. Sandblasting wastes are routinely allowed to remain on the paved ground surface in and around the wash facility. Some sandblasting wastes might be washed to adjacent drainage ditches with storm water runoff, while some ultimately enter the wash facility drain, where they may precipitate in the facility's grit chamber or be carried into the sanitary sewer (as suspended solids). The sandblasting wastes have never been characterized in accordance with Georgia hazardous waste regulations. Depending on the paint or coating being removed, uncontrolled sandblasting wastes could provide a source of heavy-metal contamination of air, soil, and surface water and could cause waste oils collected in the UST to become hazardous waste as a result of application of the RCRA mixture rule, 40 CFR 261.3(a)(2)(iv).

3.4 Motor Repair Sheds

Each of the 12 motor pools within the NGTC is equipped with a motor shed, adjacent to which is a paved and roofed concrete vehicle parking area. NGTC personnel report that these paved areas are used for basic vehicle maintenance activities. Spills to these concrete parking areas will run by existing grade to the adjacent soil or graveled areas and will eventually be carried to the nearest open drainage ditch by storm water runoff. However, none of the paved areas or the adjacent ground areas inspected during the site visit showed the heavy staining that would be indicative of previous releases.

4 Known and Suspected Releases

4.1 Releases to Groundwater

No releases of contaminants to groundwater are known.

Releases of contaminants to surface waters or to the land surface could affect the surficial groundwater aquifer, which has a hydraulic connection with surface waters. Shallow groundwater impacts are especially possible when heavy precipitation results in high water table elevations.

4.2 Releases to Surface Water

Known releases to surface water include (1) waste water discharges from oil-water separators to open drainage ditches, (2) NPDES-permitted releases from the Bird Bath secondary holding basin to Peacock Canal, and (3) unpermitted discharges to an unnamed drainage ditch leading to Melvin Swamp from the equalization basin in the extreme southern portion of the NGTC.

Suspected releases to surface water include releases of oils, grease, and other vehicle-maintenance-related wastes to the open drainage ditches from the oil-water separators (except the separators at RTSM and CSMS, which discharge to the sanitary sewer) and from the maintenance platforms in the motor pool areas. Other suspected releases to surface water are surface water runoff from areas with contaminated soils, including the outdoor vehicle maintenance areas, especially near the grease/inspection ramps.

4.3 Releases to Soil

Known releases to soils include (1) the discharge of vehicle-maintenance-related wastes at the maintenance platforms in the motor pools and at the outdoor vehicle maintenance areas in the RTSM, the MATES, and the CSMS and (2) discharges of sandblasting wastes at the RTSM and near the CSMS wash rack.

Suspected releases to soils include vehicle-maintenance-related wastes that are contained in waste waters discharged to open drainage ditches from oil-water separators in the motor pools and

the outdoor vehicle maintenance areas. The wash racks at MATES and CSMS drain to the sanitary sewer and could affect adjacent soils only as a result of overflows of the wash pad.

4.4 Releases to Air

Known releases to air include sandblasting wastes generated in outdoor, unprotected areas near the CSMS wash rack and (to a very limited degree) in the RTSM yard.

Suspected releases to air include contaminants exhausted from industrial point sources that are not covered by air emissions permits. These sources include welding fume control hoods in shop areas of the CSMS and the MATES and exhausts from paint booths in the CSMS and the MATES. (The MATES paint booth is no longer operational.) However, none of the identified air emission point sources is considered to be a significant source of airborne contaminant release.

4.5 Other Releases

No other significant releases of contaminants to the environment have been identified for the NGTC.

5 Human and Environmental Receptors

5.1 Groundwater

Groundwater is the primary source of potable water in the Georgia Coastal Plain province. Within a four-mile radius of the NGTC, public water supply systems are operated by Fort Stewart and the city of Hinesville. All of the Fort Stewart wells recover groundwater from the Upper Floridan aquifer, located at a depth of 375 ft (or more). Hinesville municipal wells apparently pump water from the bottom half of the surficial aquifer, the Upper and Lower Brunswick aquifers, and the Upper Floridan aquifer. Private wells located within the same radius reportedly draw water from the Upper Brunswick aquifer. Some of these private wells could also draw water from the unconfined surficial aquifer, but the number of private wells (if any) completed in this aquifer has not been quantified, and no documentation on private wells is available.

The Upper Floridan and Brunswick aquifers are largely confined aquifers that are recharged primarily by precipitation falling in distant outcrop areas located to the north and northwest. As a result, no direct contaminant migration pathway is apparent between activities at the NGTC and these groundwater supply aquifers. No contaminant releases to these deeper aquifers are suspected. Individuals whose potable water supplies are derived only from these aquifers are not considered to be potential receptors of contaminated groundwater.

The surficial aquifer is an unconfined aquifer that is recharged primarily by local infiltration of precipitation and surface waters. In some areas of the NGTC, the water table of the surficial aquifer is very shallow. As a result, a potential contaminant migration pathway exists between surface activities and groundwater in the surficial aquifer; contaminant releases to the surficial aquifer are suspected. Potential receptors of this contaminated groundwater include individuals whose potable water supplies include water pumped from this aquifer.

Hinesville municipal wells appear to be open in the bottom half of the surficial aquifer, rendering its residents potential human receptors of contaminants derived from both the NGTC and other areas within Fort Stewart. However, monthly water sampling by the city of Hinesville has revealed no organic compounds or metals in excess of allowable drinking water standards (Copeland 1993). Several factors, as yet unquantified, may determine whether these wells will produce contaminated groundwater. These factors include the extent to which contaminants have migrated beyond the uppermost surficial soil layer (0-6 ft) into the groundwater, the mobility of

the contaminants in groundwater, the direction of contaminant migration (if any) in the surficial aquifer, and the dilution effect of water produced from deeper artesian aquifers in multiple-completion water supply wells.

The predominant groundwater flow direction in the surficial aquifer is expected to be toward the southeast; therefore, contaminants originating from the NGTC could migrate toward the town of Flemington. No community water supply system operates in Flemington. In addition to the residents of Hinesville, other potential receptors of contaminated groundwater are individuals who rely solely on the surficial aquifer for their potable water supply. The number of private wells tapping the surficial aquifer downgradient of the NGTC is not known at this time.

5.2 Surface Water

Surface water is abundant in the area surrounding the NGTC, primarily in the form of streams, rivers, and their associated swamps and wetlands. Groundwater is the primary source for potable water in this region, and no known surface water intakes are within a 15-mile radius of the NGTC. However, some of the streams located within this radius are deemed suitable for fishing and recreation by the state of Georgia (USATHAMA 1992).

The system of engineered drainageways that traverses the NGTC provides a direct pathway for runoff of potentially contaminated surface waters. Most of the surface water originating on the NGTC drains to the southeast into Peacock Canal and Melvin Swamp. However, surface water that accumulates in the northwest quarter of the NGTC drains northwest into Taylors Creek. Potential receptors of contaminated surface water include fauna living in or having direct contact with contaminated waters and humans having direct contact with or ingesting contaminated aquatic species. After significant precipitation events, local flooding as a result of overflows of drainage ditches will provide opportunities for additional personnel to contact contaminated surface waters.

Melvin Swamp, south of the Fort Stewart cantonment area, is the nearest sensitive environment that would be affected by contaminants released to surface waters within the NGTC. Wetlands associated with Taylors Creek, which receives surface drainage from the northwestern quarter of the NGTC, might also be affected.

5.3 Soil

Contaminated soils are most likely to be present in outdoor vehicle maintenance areas and in open storm water drainage ditches, especially in portions of the ditches adjacent to oil-water separators. The surficial soils at Fort Stewart are of a sandy or sandy loam variety and are easily subject to fugitive dusting, especially in vehicle maintenance areas where tracked vehicles have disturbed and pulverized the uppermost portions of bare ground to depths as great as 1 ft. However, except during storm events, prevailing winds at Fort Stewart are light and variable, and windblown dust is not normally a problem. The entire population of the Fort Stewart cantonment area is subject to contact with windblown contaminated soils. Because of the location of the NGTC and the prevailing weather conditions, no off-base populations are expected to be significantly affected by contaminated windblown soils.

In addition, Fort Stewart experiences significant and perpetual soil erosion, requiring storm water ditches to be routinely cleaned of silt buildup by Fort Stewart DEH personnel. These personnel are especially subject to contact with contaminated soils, which can be expected to be most concentrated in these drainage ditches. Furthermore, maintenance of ditches is usually performed by hand, with eroded soils removed from ditches and culverts and piled along the uppermost portions of the ditch embankments. Contaminated soils handled in such a manner would be subject to air drying and then subsequent transport by wind throughout the cantonment area.

5.4 Air

The entire population of the Fort Stewart cantonment area is subject to windblown contamination, especially individuals working in outdoor maintenance areas. However, the only significant sources of airborne contamination (exclusive of windblown contaminated soils) are the sandblasting activities that take place in the CSMS yard and, to a very limited degree, in the RTSM yard. Sandblasting occurs in unprotected areas, but not over significant periods of time. However, because the sandblasting wastes are not immediately recovered, they are subject to transport by wind well after sandblasting activities have ceased.

Given the location of the NGTC, the limited sources, and the limited potential for airborne contamination, no off-base receptors have been identified.

5.5 Other Receptors

No other receptors of contaminants from the NGTC have been identified.

6 Preliminary Assessment Findings and Conclusions

6.1 Summary of Preliminary Assessment Findings

The NGTC, operated by the GAARNG, is located in the extreme southern portion of Fort Stewart Military Reservation, an active Army installation currently under the command of the 24th Infantry Division (Mechanized). Fort Stewart is in southeastern Georgia, near the community of Hinesville. The primary ESOs are (1) vehicle wash racks and oil-water separators in motor pools and vehicle maintenance areas, (2) outdoor vehicle maintenance areas, (3) sandblasting areas, and (4) vehicle maintenance platforms at motor repair sheds in the motor pools. Figure 6 shows the general locations of the ESOs.

Two previous IRP-related assessments of Fort Stewart have been completed (USAEHA 1988; USATHAMA 1992). Each of these assessments was intended to address the entirety of Fort Stewart, including areas occupied previously or currently by tenant organizations. However, neither of the assessments comprehensively identified all potential areas of contaminant release within the NGTC, although those areas were at least partially identified in both studies.

The USATHAMA study in 1992 concluded that surficial aquifers were not currently being used as potable supplies and that deeper groundwater supplies were not in jeopardy from contaminant releases to the land or to surface waters at Fort Stewart. This investigation has determined, however, that the surficial aquifer is being used by the city of Hinesville to partially supply its community potable water system and that private wells located south of Fort Stewart might also be drawing potable water from the surficial aquifer. A pathway does exist, therefore, for land and surface water contaminants from Fort Stewart to reach private and public potable water supplies. Currently, no data indicate contamination in such supplies.

6.2 Recommendations for Further Action

The primary objective of the PA is to identify and evaluate ESOs to determine whether they warrant (1) immediate action, (2) site investigation, or (3) no further PA/IRP action. Generally, the available information indicates that the NGTC presents a minimal threat to human health and the environment. No imminent or substantial threat to human health or the environment exists, and no immediate remedial actions are warranted. However, on the basis of the information made

available to Argonne, several areas deserve further consideration to ensure protection of the resident Fort Stewart community and of the environment.

- Circumstantial evidence indicates that storm water drainage ditches adjacent to oil-water separators may have received contaminants from vehicle wash racks and maintenance areas. Because a pathway of contaminant migration from surface water to potable (surficial) groundwater supplies has been established, sampling these drainage ditches to determine the nature and extent of residual contamination is a reasonable and prudent action.
- Sampling and analysis of soils and sediments in the vicinity of the sandblasting areas, especially in the area south of the CSMS, is also warranted to determine the extent of any heavy-metal contamination. Irrespective of these analysis results, sandblasting protocols need to be modified to ensure prompt characterization of resulting wastes in accordance with the RCRA Toxicity Characteristic Leaching Procedure as found in 40 CFR 261.24 and prompt collection and management of sandblasting wastes in a manner consistent with those RCRA characterization results.
- Stained soils in the vicinity of the grease/inspection ramps in blocks 9300, 9400, 9700, 9800, and 10500 should be analyzed to determine the nature and extent of residual contamination.
- Engineering and/or administrative controls should be established to prevent the unauthorized discharge of wastes to the motor pool oil-water separators by current and future users of those motor pools.
- To ensure comprehensive identification of areas of potential contaminant release at Fort Stewart and comprehensive and coordinated site characterization activities, the information contained in this report should be provided to USATHAMA for incorporation with information contained in previous IRP assessments of Fort Stewart.

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Appendix:
Interview Information

Appendix:

Interview Information

Individuals Interviewed

Environmental Protection Specialist
Georgia Army National Guard
Atlanta, Georgia

Facility Management Officer
Georgia Army National Guard
Atlanta, Georgia

Officer in Charge, National Guard Training Center
Georgia Army National Guard
Fort Stewart, Georgia

UST Compliance Representative
Georgia Army National Guard
Fort Stewart, Georgia

CSMS Foreman
Georgia Army National Guard
Fort Stewart, Georgia

Officer in Charge, Regional Training Site Maintenance
Georgia Army National Guard
Fort Stewart, Georgia

Environmental Coordinator
Fort Stewart Military Reservation
Fort Stewart, Georgia

Environmental Protection Specialist
Fort Stewart Military Reservation
Fort Stewart, Georgia

Public Works Department
City of Hinesville
Hinesville, Georgia

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**DATE
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10/04/93

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