1 of 1

ARGONNE NATIONAL LABORATORY
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**Preliminary Assessment Report for
Fort Custer Training Center,
Installation 26035,
Augusta, Michigan**

Prepared for

National Guard Bureau, Army Directorate
Aberdeen, Maryland

August 1993

Prepared by

Applied Geosciences and Environmental Management Section
Environmental Research Division
Argonne National Laboratory

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REPORT DOCUMENTATION PAGE			FORM APPROVED OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302 and to the Office of Management and Budget, Paperwork Reduction Project (0704-01880), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave Blank)	2. REPORT DATE August 1993	3. REPORT TYPE AND DATES COVERED Preliminary site visit to complete assessment.		
4. TITLE AND SUBTITLE Preliminary Assessment Report for Fort Custer Training Center, Installation 26035, Augusta, Michigan			5. FUNDING NUMBERS MIPR-3788 MIPR-4188	
6. AUTHOR(S) Sam Flaim; Michael Krokosz				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Candace M. Rose Argonne National Laboratory 9700 South Cass Avenue Argonne, IL 60439			8. PERFORMING ORGANIZATION REPORT NUMBER None	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) National Guard Bureau Army Directorate Aberdeen, MD 21010-5420			10. SPONSORING/MONITORING AGENCY REPORT NUMBER IR-CR-93082	
11. SUPPLEMENTARY NOTES None.				
12a. DISTRIBUTION/AVAILABILITY Distribution is to government agencies only. Outside requests must be made to the National Guard Bureau, Army Directorate.			12b. DISTRIBUTION CODE	
13. ABSTRACT (MAXIMUM 200 WORDS) This report addresses the information necessary to complete the PA.				
14. SUBJECT TERMS			15. NUMBER OF PAGES PA-48	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS REPORT Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	

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Notation

Acronyms

ARNG	Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	U.S. Environmental Protection Agency
ESO	environmentally significant operation
IRP	Installation Restoration Program
LCCTDS	Lansing Community College Truck Driving School
MIARNG	Michigan Army National Guard
MOUT	militarized operations on urban terrain
NCO	noncommissioned officer
PA	preliminary assessment
RCRA	Resource Conservation and Recovery Act
ROTC	Reserve Officers' Training Corps
RTSM	regional training site maintenance
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UST	underground storage tank
UTES	unit training equipment site

Units of Measure

d	day
ft	foot
ft ²	square foot
ft ³	cubic foot
gal	gallon
in.	inch
L	liter
lb	pound
mg	milligram

**Preliminary Assessment Report for
Fort Custer Training Center,
Installation 26035,
Augusta, Michigan**

Summary

This report presents the results of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Michigan Army National Guard property near Augusta, Michigan. Preliminary assessments of federal facilities are being conducted to compile the information necessary for completing preremedial activities and to provide a basis for establishing corrective actions 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 site activities, quantities of hazardous substances present, and potential pathways by which contamination could affect public health and the environment. This PA satisfies, for the Fort Custer Training Center, phase I of the Department of Defense Installation Restoration Program.

Fort Custer Training Center is a 7,577-acre site located in the south central portion of Michigan, immediately adjacent to the southwestern boundary of the city of Battle Creek, in Kalamazoo County and along the western edge of Calhoun County. The facilities included in this PA are the cantonment area, which consists of 125 acres, and about 3,800 acres that are available for field training. The cantonment area includes 112 buildings for administrative offices, barracks, motor pools, classrooms, repair training facilities, and support facilities and also includes ranges for subcaliber weapons. The environmentally significant operations associated with the property are (1) storage of hazardous materials and hazardous waste, (2) storage and dispensing of fuel, (3) washing of vehicles and equipment, and (4) weapons training ranges that may have accumulated lead.

Initial construction of Camp Custer began in July 1917, and the camp was augmented and renamed Fort Custer in August 1940. Fort Custer reached about 14,000 acres during World War II. Fort Custer Training Center (renamed in 1985) was established in 1966 when the Michigan Army National Guard (Michigan Department of Military Affairs) acquired 7,577 acres of land and buildings declared excess by the U.S. Department of the Army. The remaining 6,423 acres were transferred to the State of Michigan Department of Natural Resources for the formation of the Fort Custer State Recreation Area, to the Veterans Administration for the Veterans National Cemetery and for the Veterans Administration Hospital, and to the city of Battle Creek for

an industrial park. The most environmentally sensitive areas are located along the Kalamazoo River; and historically, the most intensive uses of the installation, which occurred during World War I and World War II, took place along Dickman Road, the river, and the railroad tracks, which are not a part of Fort Custer Training Center. Fort Custer Training Center obtains its drinking water from the city of Battle Creek and is connected to the Battle Creek sanitary sewer system. The training center has never had a landfill or fire pit. All asbestos has been removed from Fort Custer, and all underground storage tanks have been replaced with new double-walled tanks with continuous monitoring systems. Surrounding businesses and institutions obtain their drinking water from the city of Battle Creek, which has its wells 5-6 mi from Fort Custer. The closest private water well is 1.75 mi north of Fort Custer, and the nearest residence is 1.5 mi east of the facility. Hence, Fort Custer Training Center is well insulated from impacting the surrounding environment.

The review of both historical and current practices at the property indicated that the Fort Custer Training Center property poses a small potential risk to human health or the environment, although Argonne's reviewers noted several areas of concern resulting from historical operations. Until one year ago, the grease pits and washrack for the unit training equipment site (UTES) drained directly into a pond and swamp east of the site. Secondly, the ranges for weapons training have been in use for some 75 years and may have accumulated lead. An approximation was made of the potential amount of lead shot lying within the soils of the firing ranges at Fort Custer. Available information indicates that between 1917 and 1992, approximately 1,117,000 individuals were trained at Fort Custer. During training exercises, 50% of these individuals expended 60 rounds each of rifle ammunition, 10% expended 75 rounds each of machine-gun ammunition, and 7% expended 60 rounds each of pistol ammunition. Therefore, approximately 33,510,000 rounds of rifle ammunition, 8,377,500 rounds of machine-gun ammunition, and 4,691,400 rounds of pistol ammunition are potentially lying in the soils of the small-arms firing ranges. The assumption was also made that 1% of all post-1940 trainees expended 10 rounds each of artillery, grenade, and other ordnance on the ranges. The potential volume of this ordnance in the soils of the ranges is 102,700 rounds. Because the impact areas contain swamp or marsh areas and groundwater recharge areas, some potential exists for lead to migrate to groundwater aquifers.

1 Introduction

This document is a report of the preliminary assessment (PA) conducted by Argonne National Laboratory at the Michigan Army National Guard (MIARNG) property known as Fort Custer Training Center, located in Augusta, Michigan, immediately adjacent to the town of Battle Creek in south central Michigan.

1.1 Authority for the Preliminary Assessment

The National Guard Bureau, Army Directorate, has engaged Argonne to perform PAs of selected Army National Guard (ARNG) properties. These assessments are being done in a manner consistent with both the Department of Defense Installation Restoration Program (IRP) and the U.S. Environmental Protection Agency's (EPA's) Potential Hazardous Waste Site Preliminary Assessment Guidance. Preliminary assessments of ARNG 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 (P.L. 99-499).

1.2 Objectives

This PA report is based on existing information from the MIARNG 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 with the EPA's PA Scoresheets (September 1991).

1.3 Procedures

The PA began with a review of ARNG files located at the offices of the MIARNG Department of Military Affairs in Lansing, Michigan, during the week of May 17-21, 1993. Site visits were conducted on May 18 and May 22, 1993, to obtain additional information through direct observation and interviews with personnel familiar with the property and its operations. Other relevant information was obtained on May 19 and 21, 1993, from the Michigan Department of Natural Resources. Visits were also made to the towns of Augusta, Bedford, Springfield, and Galesburg and to the cities of Kalamazoo and Battle Creek, Michigan, to obtain information on housing, resident populations, and water supply sources.

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 use. Section 3 identifies and characterizes the ESOs at the site. Section 4 discusses 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 where further action may be required, and suggests how such actions can be accomplished. Section 7 lists pertinent materials reviewed. The Appendix contains interview information and lists the Argonne investigators.

2 Property Characterization

2.1 General Property Information

Fort Custer Training Center is located in Augusta, Michigan, immediately adjacent to the southwestern boundary of the city of Battle Creek, approximately 100 mi west of Detroit and 150 mi northeast of Chicago. The 7,577-acre property is bounded on the north and east by an industrial park for the city of Battle Creek, the Veterans Administration Hospital, and the Veterans National Cemetery; on the west by the 1,200-acre Fort Custer State Park and the Kalamazoo River; and on the south by Interstate 94. The training center consists of five major areas: the cantonment area, the individual and crew-served weapons and subcaliber ranges, the bivouac and maneuver training areas, the regional training site maintenance (RTSM), and the unit training equipment site (UTES). Figure 1 shows the general location of Fort Custer Training Center, and Table 1 lists pertinent information about it.

The MIARNG operates Fort Custer as an annual training site for the Michigan National Guard and other regional National Guard and reserve force units. Fort Custer Training Center also serves as host to the Michigan Military Academy and the Michigan State Police dog-training facility. Lansing Community College operates a truck driver training school at Fort Custer. Fort Custer Training Center has 35 full-time military personnel, 5 state personnel, and 9 seasonal staff at the site. During training periods, the number of personnel may increase to 2,500 persons.

2.2 Description of Facilities

Fort Custer Training Center contains approximately 7,577 acres, of which 3,800 acres is available for field training exercises (MIARNG 1987). About 75% of the site is forested, and about 65% remains undeveloped and provides natural habitat for many species of wildlife and vegetation. Approximately 125 acres is used for the cantonment area, which consists of 112 buildings, including ammo bunkers, range support structures, and buildings on the training courses. Figure 2 identifies the existing boundary of Fort Custer Training Center and the adjacent property, and Figure 3 details the cantonment area.

FIGURE 1 General Location of Fort Custer Training Center (Source: MIARNG 1987)

TABLE 1 Identifying Information for Fort Custer Training Center

Property address	Fort Custer Training Center 2501 26th St. Augusta, MI 49012-9205
Property location	
Latitude	42° 20' N
Longitude	85° 17' W
Section	1, 12, 13, 14, 15, 16, 21, 22, 23, 24 and 6, 7, 18, 19
Township and range	T1S, T2S, R9W and T2S, R8W
FISP ^a installation number	26035
Installation commander	Col. Injasoulia
Types of facilities	UTES RTSM Subcaliber ranges for individual and crew-served weapons Michigan Military Academy Lansing Community College Truck Driving School Michigan State Police Dog Training School
License information	Federally owned; licensed to the Michigan Department of Military Affairs; RCRA: MID981948128
Principal contact	CW4 Jerry D. Russel, Facilities Manager (616) 731-4383; Fax (616) 731-5312

^a Facility Inventory and Stationing Plan.

2.2.1 Unit Training Equipment Site

The UTES facility, which is located along the northeastern boundary of the cantonment area on Utes Road, consists of two buildings (4465 and 4464) that are approximately 25 ft × 200 ft (5,000 ft²) each. The UTES area contains the hazardous waste storage building for Fort Custer Training Center and a parking area for tracked vehicles. All buildings and the parking area are fenced. Although Building 4464 is currently used for storage of general stores, it contains a grease pit and has historically been used for vehicle maintenance. Building 4465, which contains the administrative UTES office and repair bays, has a grease pit, battery room, paint storage room, and wash area. All drainage in and around the UTES buildings flows to oil/water separators before being discharged either into the Battle Creek sanitary sewer system or to surface water drainage. The UTES area is adjacent to Buildings 4463, 4462, and 4461, which are used

FIGURE 2 Fort Custer Training Center and Surrounding Area

FIGURE 3 Detail of Cantonment Area of Fort Custer Training Center, Showing Locations of ESOs

for unit storage and general storage for the entire facility. All of these buildings are of World War II vintage and were constructed as mule barns. The UTES area also contains a large parking area for tracked vehicles and mobile fuel trucks and the hazardous waste storage facility for Fort Custer. The parking area has been paved with crushed rock and gravel and graded so that surface water flows to the east to an oil/water separator and discharges into a swamp and wetlands area to the east.

The UTES and RTSM provide facilities for maintenance of numerous tanks, trucks, personnel carriers, tractors, tankers, cranes, graders, and other equipment. Almost all of the equipment has been or can be maintained at either the UTES or the RTSM, depending upon availability of shop space and personnel. A list of equipment at Fort Custer Training Center is shown in Table 2. This table indicates where repairs are usually made. Operations performed in and around Building 4465 include general maintenance and vehicle washings. Maintenance activities include fluid changes (i.e., oil, transmission fluid, and antifreeze); filter changes (i.e., gas, oil, air, and transmission filters); brake repair; lubrication, grease, and repair of axles and drivetrains; engine repair and cleaning; body repair; welding; and minor spot painting. The grease pit in Building 4465 and drains adjacent to the building flow to an oil/water separator on the north end of the building, and this separator connects to the city of Battle Creek sanitary sewer system. The battery room located in the south end of Building 4465, between the service bays and the paint storage room, has concrete block walls and a concrete floor. A drain in the battery room, which had discharged into the storm runoff system, has been sealed. The paint storage area located in the south end of Building 4465 is of similar construction; however, in the past, this drain was open and drained into the swamp to the east. Also in the past, standard operating procedure was to pour neutralized acid directly into this drain.

The UTES is a full-time facility manned by MIARNG personnel. Minor quantities of hazardous materials, such as lubricating oils and solvents used for maintenance activities, are brought into the work area as required. These materials are stored in the hazardous materials storage building or in storage areas adjacent to the work bays. The hazardous waste storage building located adjacent to the UTES is a new closed shed with secondary containment. Table 3 lists the hazardous materials typically present in the UTES building as inventoried from the shipping manifests and spill contingency plan. The UTES uses the services of Safety-Kleen Corp. and has substantially reduced the amounts of solvents and other hazardous materials stored at the facility.

TABLE 2 Fort Custer Equipment Inventory: June 1993 (Equipment Sorted by Unit)

Vehicle Type	Model	Quantity	Unit	Repairs at:
Carrier, personnel	M113A2	3	70th TNG Div	UTES
Recreational vehicle, light	M578	1	70th TNG Div	UTES
Truck, work	M936A2	1	A-142 Engr	UTES
Truck, cargo	M54A2	1	A-142 Engr	UTES
Truck, cargo	M923	2	A-142 Engr	UTES
Truck, tractor	M916A1	7	A-142 Engr	UTES
Truck, tractor	M123AC	3	A-142 Engr	UTES
Truck, tanker	M49A2C	1	A-142 Engr	UTES
Truck, dump	M51A2W/W	1	A-142 Engr	UTES
Truck, dump	M51A2	6	A-142 Engr	UTES
Truck, cargo	M35A2	6	A-142 Engr	UTES
Truck, cargo	M1008A1	4	A-142 Engr	UTES
Truck, cargo	M1008	2	A-142 Engr	UTES
Truck, utility	M1009	4	A-142 Engr	UTES
Crane, truck mounted	M320T	1	A-142 Engr	UTES
Truck, cargo	M925W/W	1	A-142 Engr	UTES
Scraper	621B	4	A-142 Engr	UTES
Grader	130G	3	A-142 Engr	UTES
Tractor, ft	D7GW/R	3	A-142 Engr	UTES
Tractor, ft	D7GW/W	2	A-142 Engr	UTES
Loader, scoop	MW24C	2	A-142 Engr	UTES
Tractor, S.E.E.	Flu 419	2	A-142 Engr	UTES
Contact truck	ORD	1	A-142 Engr	UTES
Tank, QBT FT	M60A3TTS	12	A-246 Armor	UTES
Truck, cargo	M882	1	FCTC	UTES
Van, carryall	Ram 250	1	FCTC	UTES
Truck, dump	INT S1600	2	FCTC	UTES
Truck, S&P	INT S1700	1	FCTC	UTES
Truck, S&P	Ford F600	1	FCTC	UTES
Truck, fire	M45A2	1	FCTC	UTES
Truck, delivery	Commercial	4	FCTC	UTES
Tractor, whl ind	JD410	1	FCTC	UTES
Loader, scoop	MW24	1	FCTC	UTES
Truck, telephone maintenance	D200	1	FCTC	UTES
Truck, ambulance	M977	1	FCTC	UTES
Carrier CP	M577A2	3	HHC-246 Armor	UTES
Carrier, personnel	M113A2	5	HHC-246 Armor	UTES
IMP tow vehicle	M901A1	1	HHC-246 Armor	UTES
Recreational vehicle, light	M578	1	HHC-246 Armor	UTES
Truck, carryall	C20	1	UTES	UTES

TABLE 2 (Cont.)

Vehicle Type	Model	Quantity	Unit	Repairs at:
<i>Federal equipment</i>				
Tractor, mowers	Various	2	FCTC	UTES
Tractor, garden	Various	4	FCTC	UTES
Truck, cargo	M1028	1	FCTC	UTES
Truck, cargo	M882	1	FCTC	UTES
Truck, carryall	4 x 4; 9 passenger	1	FCTC	UTES
Truck, fire	Brush	1	FCTC	UTES
Truck, maintenance	Utility, 4 x 2	1	FCTC	UTES
Truck, multi-stop	Van	3	FCTC	UTES
Van, delivery	Chevy, 1979	1	FCTC	UTES
<i>State equipment</i>				
Bus	Passenger	1	FCTC	UTES
Tractor	Mowers	3	FCTC	UTES
Tractor	Garden	4	FCTC	UTES
Truck	Pickup, 1/2 ton	1	FCTC	UTES
Truck	Pickup, 3/4 ton	1	FCTC	UTES
Truck	Dump	1	FCTC	UTES
Loader, scoop	MW24	1	RTSM	RTSM
Bus	INT; 44 passenger	1	RTSM	RTSM
Grader	130G	1	RTSM	RTSM
Recreational vehicle, light	M57B	3	RTSM	RTSM
Recreational vehicle, medium	M88A1	1	RTSM	RTSM
Scraper	621B	1	RTSM	RTSM
Truck, utility	M99B	2	RTSM	RTSM
Truck, cargo	M880	1	RTSM	RTSM
Truck, cargo	M35A2	1	RTSM	RTSM
Truck, forklift	6,000 lb	1	RTSM	RTSM
Truck, forklift	4,000 lb	1	RTSM	RTSM
Van, carryall	B150	1	RTSM	RTSM
Truck, shop van	M109A1	2	RTSM	RTSM
Truck, work	M816	1	RTSM	RTSM
Truck, work	M543A2	1	RTSM	RTSM
Truck, csg	M890	1	RTSM	RTSM
Truck, work	M816	1	RTSM	RTSM

TABLE 3 UTES/RTSM Workplace Chemical List

Trade Name/Nomenclature	Supply No.	Amount Stored	Location ^a
Acid, sulfuric	6810-00-893-8138	15 gal	B/R
Cleaners			
Alcohol, denatured	6810-00-201-0907	5 gal	O/S
Cleaner, glass	7930-00-664-6910	Bottle	T/R
Cleaner, compound	6850-00-148-7161	Cartons	T/R
Inhibitors			
Deicer	6850-00-060-5312	Drum	W/S
Deicer	6850-00-753-5061	5 gal	O/S
Lubricants			
FRH	9150-00-111-6256	Quarts	O/S
Antifreeze	6850-00-181-7940	55 gal	W/S
Coating, solid film	9150-00-260-2534	Cartons	P/S
Dextron 2	9150-00-657-4959	5 gal	O/S
Engine oil 15W-40	9150-00-186-2772	55 gal	W/S
Penetrating oil	9150-00-529-7518	Cartons	P/S
10 W	9150-00-191-2772	55 gal	W/S; O/S
PLM	9150-00-231-2356	5 gal	O/S
OHA	9150-00-252-6383	Quarts	O/S
Slyde	9150-00-823-7860	Cartons	T/R
Spray	9150-00-823-7860	Cartons	P/S
Paints			
Enamel, camouflage sand	8010-00-111-7888	Gallons	P/S
Enamel, field drab	8010-00-111-7493	Gallons	P/S
Enamel, earth brown	8010-00-111-7998	Gallons	P/S
Enamel, earth red	8010-00-111-8003	Gallons	P/S
Enamel, sand	8010-00-111-8336	Gallons	P/S
Enamel, black	8010-00-111-8356	Gallons	P/S
Enamel, gloss green	8010-00-115-7984	Gallons	P/S
Enamel, red (spray)	8010-00-141-2952	Cartons	P/S
Enamel, nonslip	5610-00-141-7839	Gallons	P/S
Enamel, white (spray)	8010-00-290-6983	Cartons	P/S
Enamel, gloss black (spray)	8010-00-290-6984	Cartons	P/S
Enamel, flat black (spray)	8010-00-297-0547	Cartons	P/S
Enamel, primer	8010-00-515-2208	Gallons	P/S
Enamel, gloss yellow (spray)	8010-00-527-2045M	Cartons	P/S
Enamel, gloss black (spray)	8010-00-527-2050	Gallons	P/S
Enamel, orange	8010-00-584-3148	Cartons	P/S
Enamel, green (spray)	8010-00-584-3154	Cartons	P/S
Enamel, olive drab	8010-00-616-4009	Gallons	P/S
Enamel, gloss red	8010-00-616-7486	Gallons	P/S

TABLE 3 (Cont.)

Trade Name/Nomenclature	Supply No.	Amount Stored	Location ^a
Enamel, primer (spray)	8010-00-816-9181	Cartons	P/S
Enamel, nonslip	5610-00-641-0427	Gallons	P/S
Enamel, gloss white (spray)	8010-00-664-4761	Cartons	P/S
Enamel, aluminum	8010-00-664-7468	Quarts	P/S
Enamel, yellow (spray)	8010-00-852-9033	Cartons	P/S
Corrosion preventative	8030-00-134-6513	Cartons	P/S
Lacquer, clear	8010-00-515-2487	Gallons	P/S
Rust inhibitor	8010-00-292-1127	Gallons	P/S
Rust inhibitor	8010-00-297-2105	Gallons	P/S
Thinner, dope, lacquer	8010-00-160-5787	Gallons	P/S
Thinner, paint	8010-00-181-8079	5 gal	P/S
Thinner, remover	8010-00-160-5799	Quarts	P/S

^a Location codes are as follows: B/R, battery room, south end of Building 4465; O/S, oil shed, storage area for flammable materials in south end of Building 4465; P/S, paint storage, storage area for flammable materials in south end of Building 4465; T/R, toolroom; and W/S, waste storage, hazardous materials storage building in UTES parking area.

Equipment refueling is conducted at the bulk fuel loading area south of the motor pools on Harmonia Road in the central cantonment area or at the RTSM. The bulk fuel loading area has two tanks (diesel and gasoline), which are continuously monitored and have not shown any leakage.

2.2.2 Regional Training Site Maintenance

The RTSM facility is located in Building 3000, along the western boundary of the cantonment area at the corner of Wayne Road and 30th Street. The building consists of about 25,000 ft² of administrative offices, classrooms, tool storage, and five service bays. The RTSM also contains nearly 22,500 ft² of paved parking area to the south and north of the building and a paved wash area to the east. The entire facility is fenced. The RTSM has a new double-walled waste oil tank located on the south side of the building and a new double-walled diesel tank on the north side of the building. Both tanks have interstitial monitoring with audio alarms. These tanks were installed in 1989 and have not leaked. Observation wells were placed next to the tanks when they were installed; in the unlikely event that a spill would occur, samples could be taken immediately.

Operations performed in and around Building 3000 include general maintenance, vehicle washings, and substantial instructional maintenance on the full complement of equipment at Fort Custer Training Center. Maintenance activities include fluid changes (i.e., oil, transmission fluid, and antifreeze); filter changes (i.e., gas, oil, air, and transmission filters); brake repair; lubrication, grease, and repair of axles and drivetrains; engine repair and cleaning; body repair; welding; and minor spot painting. Components used for classroom instruction are drained dry before being removed from the service bays. Some of the components in the classrooms have never had fluids in them.

Floor drains in the RTSM flow to a sand filter that connects to the city of Battle Creek sanitary sewer system. Other hazardous materials are stored in well-marked, sealed storage cabinets for flammable materials. The facility has well-marked spill-control cabinets and emergency medical equipment surrounding the work bays. The facility contains no stationary hydraulic lift equipment or hydraulic door openers.

2.2.3 Michigan Military Academy

The Michigan Military Academy conducts an officer candidate school and a noncommissioned officer (NCO) school. The NCO school includes a basic NCO course, an advanced NCO course, and a primary leadership development course. The training site provides a wide variety of facilities to support the units training on the site. The academy uses the barracks and other facilities available at Fort Custer as needed to achieve their mandated readiness goals.

2.2.4 Lansing Community College Truck Driving School

Lansing Community College Truck Driving School (LCCTDS) has a parking area at the corner of Armstrong and Harmonia Roads and a maintenance shop in Building 2437. Surplus nonhazardous materials are stored in Building 2436. The parking area has a small bulk oil shed. The LCCTDS keeps as many as 25 tractors and single and double trailers for students to practice driving and parking skills on and around Fort Custer.

2.2.5 Housing

Housing, administrative, supply, and dining facilities dating from World War II are available for approximately 2,500 troops at Fort Custer. The housing facilities include barracks for enlisted men and women, officers' quarters, and recreational facilities. Eleven buildings (Buildings 2414, 2434, 2508, 2537, 2608, 2614, 2621, 2630, 2642, 2701, and 2721) have mess halls to accommodate 2,500 persons training at Fort Custer on a typical weekend. Only one barracks building is used exclusively by women (Building 2717). All other barracks are used for men or women, depending upon the particular unit's training needs.

2.2.3 Training Ranges

Fort Custer Training Center is a major training site for National Guard units located in Michigan, Ohio, Indiana, and Illinois and serves as a support center for reserve force units. The mission of the training center is to accommodate 2,500 military personnel for training activities. The center contains a facility for military operations on urbanized terrain (MOUT), a leadership reaction course, an urban defense/underground trainer, and a gas-chamber training building. The site provides limited annual training for a battalion-sized unit during a two-week period. Recent historical usage indicates about 144,000 man-days of on-site training plus about 26,000 man-days of usage by full-time site personnel.

The training center provides ranges for all individual and crew-served weapons that may be safely fired on the designated ranges. The firing ranges are located south of Range Road and north of Reese Road. Each of the firing ranges is bermed and isolated from other activities. The impact areas and safety fans south of the firing ranges cover about one-quarter (approximately 2,000 acres) of Fort Custer Training Center. In addition to the cantonment area and ranges, Fort Custer Training Center has nonfiring maneuver areas of approximately 3,800 acres, which are available for infantry, armor, mechanized infantry, artillery, engineer, signal, medical, and other troop units concurrent with weapons firing.

2.3 Property History

Fort Custer was one of 16 large camps built during World War I for recruit training. Construction of permanent facilities began in July 1917, and by the end of that year, the post

(called Camp Custer at that time) consisted of 2,000 structures for 36,000 soldiers. The post had its own water and sanitary sewer systems, paved streets, and post hospital, laundry, and bakery. As a base for postwar demobilization, 100,000 men were processed out from Camp Custer following the 1918 armistice. Between 1920 and 1940, Camp Custer was in constant use by the various Reserve Officers' Training Corps (ROTC) and the old Civilian Military Training Corps.

In August 1940, General George C. Marshall, Army Chief of Staff, transmitted orders from the Secretary of the Army making the area a permanent military installation, and Camp Custer was officially renamed Fort Custer. The Army acquired an additional 6,166 acres and began to build new facilities because the World War I structures and utility systems had deteriorated beyond repair. Fort Custer reached almost 14,000 acres in size and was used for the organization and training of the 5th Infantry Division and the equipping of the 94th Infantry Division. The facility also served as a processing center for German prisoners of war.

From 1945 through 1953, Fort Custer became a convalescent center for World War II veterans. The Korean War brought about a brief flurry of activity, but in 1953, the installation was made an inactive base as far as training of army troops was concerned. Reserve forces, including the Army Reserve, Michigan National Guard, and area college ROTC units, continued to train at Fort Custer.

The Fort Custer Training Center, renamed in 1985, was established in 1966 when the MIARNG (Michigan Department of Military Affairs) acquired approximately 7,577 acres of land and buildings that had been declared excess by the U.S. Department of the Army. The purpose of this acquisition was to establish a training site for units of the MIARNG and other reserve training forces within southern Michigan and northern Ohio, Indiana, and Illinois.

2.4 Permitting Status

Fort Custer Training Center is federal property licensed to the Michigan Department of Military Affairs and is not required to operate under any special use permits. The facility is a small-quantity generator of hazardous waste with an identification number in accordance with the Resource Conservation and Recovery Act (RCRA). Fort Custer complies with the RCRA, Michigan Act 64, and other applicable statutes and regulations. Wastes are manifested and disposed of through the U.S. Property and Fiscal Office in Lansing, Michigan, to the Defense Reutilization and Marketing Service at Selfridge Air National Guard Base, Mount Clemens.

Michigan. Solvent wastes are recycled through private contractors (Safety-Kleen Corp. or Stoddard & Sons).

2.5 Surrounding Environment and Land Use

2.5.1 Demographics and Land Use

Fort Custer Training Center is located in the south central portion of Michigan adjacent to the southwestern boundary of the town of Battle Creek. Calhoun and Kalamazoo counties have populations of approximately 135,982 and 223,411, respectively (1990 census) (U.S. Department of Commerce 1992). The city of Battle Creek has a population of 53,540 (40% of Calhoun County). Calhoun County has 55,619 housing units, a per capita income of \$12,729, and a median household income of \$27,476. About 14% of Calhoun County residents have incomes below the poverty line. The city of Kalamazoo has a population of 80,277 (36% of Kalamazoo County). Kalamazoo County has 88,955 housing units, a per capita income of \$14,548, and a median household income of \$31,060. About 13% of Kalamazoo County residents have incomes below the poverty line.

Both counties have significant numbers of civilian veteran residents (16,084 and 22,107 in Calhoun and Kalamazoo counties, respectively). About one-quarter of these veterans are over the age of 65 years. Adding active-duty military, reserve, and National Guard personnel to this total illustrates the importance of the military to the area's economy. Much of both counties is agricultural. Both counties have substantial food processing and manufacturing activities. Battle Creek is the headquarters and cereal processing center for Kellogg Corp.

2.5.2 Climate

The climate of Kalamazoo and Calhoun counties is noticeably influenced by Lake Michigan. Generally, from September to March, the lake temperature is higher than the land temperature and from April to August lower than the land temperature. In the summer, the cooler temperatures reduce cloud formation and precipitation, which results in cooler temperatures on the surrounding land. In the winter, the warmer lake increases cloud formation and precipitation and moderates overall land temperatures. Prevailing westerly winds bring increased cloudiness during

the fall and winter months, which moderates temperatures. The mean annual temperature at Fort Custer is 48°F, with a variance of 128°F from maximum and minimum recorded temperatures. On average, only seven days per year will have temperatures below 0°F. The average frost-free period is 154 days, running from May 8 to October 9.

Precipitation near Fort Custer averages about 34 in./yr, with about 20 in. occurring during the May-October growing season. Average annual snowfall is about 44 in., and about 63 days each year have snow of 1 in. or more on the ground. The climate in the area surrounding Fort Custer is moderated by the Great Lakes, with a long growing season and sufficient precipitation for growing a wide variety of grains, fruit, and field crops.

2.5.3 Surface Water and Physiography

The surface features of Fort Custer and of Kalamazoo and Calhoun counties were formed through the complex action of glaciers, resulting in the formation of four distinct features: moraines, till plains, outwash plains, and ponded areas. The topography varies from relatively level terrain in the cantonment area to slopes and hills in the southern portion of the maneuver areas along the I-94 corridor. Terrain varies from 830 to 1,000 ft above mean sea level. Fort Custer is located in the Great Lakes section of the Central Lowland physiographic province. The general topography of this province can be characterized as irregular rolling hills that have been dissected by meandering streams and rivers. The topography is marked by the presence of numerous remnants of glacial outwash material forming elongate northeast-southwest ridges. These ridges are generally separated by low, wet, swampy valleys.

Two principal soil types have been identified in the Fort Custer Training Center: the Osthemo-Coloma-Kalamazoo and Osthemo-Kalamazoo-Glendora, which are generally categorized as well and moderately drained soils. The Osthemo-Coloma-Kalamazoo soil type consists of undulating to steep, well-drained or somewhat excessively drained soils that have a sandy subsoil or a loamy and sandy subsoil formed by outwash and sandy moraine deposits. The Osthemo-Kalamazoo-Glendora soil type consists of nearly level to undulating well-drained or very poorly drained soils that have a sandy subsoil or a loamy and sandy subsoil formed in glacial outwash and sandy alluvium. These two soil types include a diverse range of moisture content and capacity, permeability, drainage, and stability. The soils include loams, sandy loams, loamy sand, and muck. In general, soil in the training areas is undisturbed except around roads, bivouac areas, ranges, and the impact area. In some areas, significant soil erosion has occurred where traffic has

turned off the major areas into the maneuver areas. Almost all of the soils in the cantonment area have been disturbed by previous agricultural and construction activity.

Surface water is plentiful in the Fort Custer area. The site is bordered on the north and west by the Kalamazoo River. The areas to the south are characterized by interconnected streams and wetlands that are tributary to the Portage River. The area to the east of the site contains wetlands associated with the Kalamazoo River Valley, as well as wetlands associated with an unnamed creek that is tributary to the Kalamazoo River. To facilitate flood control, a network of open ditches, infiltration impoundments, and underground storm sewers has been installed throughout the area. These alterations divert surface runoff from developed areas to the adjacent swamps and lakes.

Situated at the extreme northern perimeter of the facility, the cantonment area occupies the lowest land elevation at Fort Custer. Prior to development, the cantonment had an average topographic change of 3 ft. South of the cantonment area, sporadic and continuous portions of the Harts Lake, Eagle Lake, and Kalamazoo River tributaries have been designated as wetlands on the National Wetlands Inventory (draft) map (U.S. Department of the Interior 1991).

Surface water runoff from most of Fort Custer's vintage billeting and developed area along Dickman Road discharges into a sewer main that accesses both the Battle Creek and the Kalamazoo sewer systems. A second storm-sewer main parallels Wayne Road from 29th Street to 25th Street and accepts water from the central portion of the cantonment barracks area. This system discharges water to a 3.5-acre groundwater infiltration basin bordered by McMahon Road, Harmonia Road, Muir Road, and 26th Street. Another discharge point bordered by 25th and 26th streets, lying between Dickman and Wayne roads, receives runoff from both the eastern portion of the Wayne Road central cantonment system and the entire eastern portion of the barracks cantonment area. Two secondary storm-sewer lines are noted on sheet 5 (of 10) of the Department of Military Affairs storm-sewer engineering blueprint dated August 1979 (MIARNG 1979). Both of these sewer lines service the runoff from the southeastern portion of the cantonment area. One is a 30-in. line which shows no discharge point, while the other egresses the site to the east, showing no destination. Since the 30-in. line is connected to a 12-in. line to the north, it appears that the 30-in. line discharges to the south somewhere southwest of the intersection of Armstrong and Harmonia roads, near the east entrance to the fuel point access road.

Storm water runoff from the UTES compound is captured by subsurface catch basins located between the buildings and within the graded gravel staging area. Water is then collected by underground conduit and deposited into an oil/water separator before being discharged, through a

10-in. 700-ft-long clay pipe, to a wetlands east of the UTES site. Storm water runoff from the refueling point is captured by two surface grates and accompanying catch basins before being carried, through a 75-ft conduit, north to an open field. Runoff from the main entrance area of the RTSM compound is by overland flow. Water from the concrete and gravel maintenance apron discharges to a 75-ft $\times$ 100-ft infiltration basin adjacent to the access road. Water from in front of the personnel parking area and walkway entrance flows to a separate 75-ft $\times$ 100-ft basin adjacent to the access road. Water from the concrete washrack on the north side of the building flows into an oil/water separator and then into the sewer system. Storm water from the remaining areas of the RTSM flows downgradient to nondeveloped basinal infiltration areas adjacent to the complex. Runoff from the LCCTDS facility runs along gradient to the two infiltration basins immediately north and to low vegetated areas to the south and west of the site. Storm water that accumulates in the firing range areas is diverted by surface grading to infiltration impoundments located at the southeast corners of each range section.

Fort Custer has one lake, Whitman Lake, on the facility. Harts Lake is on the east border of Fort Custer and is owned by the city of Battle Creek. Eagle, Lawler, and Whitford lakes are west of Fort Custer, located in the Fort Custer State Recreation Area. Some areas within Fort Custer are marked as wetlands or swamps on the U.S. Geological Survey (USGS 1985) topographic map of the Battle Creek, Michigan, quadrangle. Most of these wetlands are within the impact areas of the ranges and drain to Whitman Lake. The Kalamazoo River is about 1 mi from the northern and western boundaries of Fort Custer.

2.5.4 Groundwater and Hydrogeology

Geology. The Central Lowlands province is composed of an unconsolidated Pleistocene (Allegheny?) glacial veneer overlying a greater than 12,000-ft sequence of Paleozoic sedimentary rocks. This sequence rests upon a floor of ancient Precambrian rock. The sedimentary rocks were formed by the deposition of marine sediments from overlying seas and by sediments eroding from surrounding highlands. This depositional regime was interspersed with periods of volcanic and intrusive activity. During the accumulation of the sedimentary layers, the underlying rocks subsided, forming a bowl-shaped basin with each successive layer out from the center increasing in age. Fort Custer is located in the southwestern part of the basin, where the Coldwater shale of Mississippian age forms the bedrock. The unit is approximately 500 ft thick in the area and dips generally to the northeast toward the center of the basin. This shale is overlaid by the Marshall Formation, a fine- to medium-grained sandstone.

The interval of time from the close of the Paleozoic Era to the beginning of glaciation was primarily one of erosion. During this time, major streams flowed from the southeast to the northwest, forming preglacial valleys while cutting down into the sedimentary strata. During the Pleistocene Epoch, as the glaciers advanced, they carried rock material from surfaces they encountered. At the end of the glacial period, the ice deposited the rock material as glacial till and drift. Since the end of the Pleistocene Epoch, the rock material has undergone erosion and redistribution. As a result, the accumulated thicknesses of the glacial material can range from several feet to in excess of 500 ft in the pre-Pleistocene erosional valleys (Deutsch et al. 1960). Figure 4 is a generalized correlation chart describing the regional Pleistocene through Paleozoic stratigraphic section.

Regional Groundwater. Deposits of unconsolidated glacial drift constitute the principal aquifer in the region. The aquifer is composed of unsorted silty, bouldery gravel (till), as well as beds and lenses of poorly sorted stratified gravel, sand, and silt (drift). Till is the result of direct deposition from glacial ice, whereas drift is formed through deposition by meltwater streams flowing from the glacial ice. After deposition, the gravels were reworked by streams and rivers and covered with finer sediments.

The most prolific glacial aquifers are associated with extensive coarse and thick sequences of drift accumulated as channels and outwash plains by meltwater. Typically, this material contains permeable beds of sands and gravel that are hydraulically connected. Although these aquifers can produce extensive amounts of water, their areal extent may be limited by changes in glacial drift characteristics that produce hydrologic boundaries. Typically, the variation in characteristics is the result of sorting and stratification, which can occur both horizontally and vertically. In the Fort Custer region, four general units (an upper aquifer, an intervening aquiclude, a lower layer, and a basal aquiclude) have been recognized. Saturated thicknesses may range from 0 to 160 ft in each of the more permeable zones. Wells located in regions of high porosity and permeability may have transmissivity values of as much as 190,000 gal of water per day per foot of saturated thickness. Table 4 lists values of permeability for various media in the Fort Custer region.

Local Groundwater. Within a 4-mi radius of Fort Custer, numerous wells are drilled that supply drinking water. No drinking water wells are located within the boundaries of Fort

FIGURE 4 Generalized Stratigraphic Chart for the Fort Custer Area

Custer Training Center, and the facility obtains its drinking water from the city of Battle Creek. The city of Battle Creek obtains its entire water supply from two well fields. The primary well field consists of 24 wells located within the city limits near North Columbia Avenue, adjacent to the Kalamazoo River. The second well field consists of five wells near Bellery Road and 20th Street. The manager of the Battle Creek waterworks, David Rich (1993), indicated that the combined system pumped approximately 12 million gal/day in 1992. In 1988, the North Columbia Avenue well field was placed on the National Priorities List for trichloroethane and vinyl chloride contamination, which was traced to an unoccupied local manufacturing site adjacent to the Kalamazoo River. As a result of the contamination, the city installed an air stripping system. All of the Battle Creek water wells are located 5-6 mi east of Fort Custer Training Center.

The town of Augusta, Michigan, supplies water to 927 residents from its two public wells, which were completed in glacial material in 1958 and are 80-110 ft deep. Both wells are 12-in. screened wells pumping about 350 gal/min. No other public water wells are known to exist within a 4-mi radius of Fort Custer Training Center.

Approximately 3,899 individuals use wells within a 4-mi radius of Fort Custer Training Center. This information is based on a count of the number of residences within the 4-mi radius of the training center using USGS topographic maps with housing units depicted, multiplied by the 1.8 persons per household provided by the Bedford Township Assessor's Office (Cooper 1993). The calculation also includes an estimate of persons using wells in portions of the Springfield, Michigan, community area, as well as residents of the town of Augusta (927) using

TABLE 4 Permeability Values of Media Found in the Fort Custer Area

Material	Permeability (gal/d/ft ²)
Clay and silt	0-100
Very fine sand	100-200
Fine sand	200-400
Fine to medium sand	400-500
Medium sand	500-600
Medium to coarse sand	600-700
Coarse sand	700-800
Very coarse sand	800-1,000
Sand and gravel	1,000-2,500
Gravel	2,500-5,000
Till	20-500

Source: Allen (1972, p. 10).

both public and private wells. The numbers of individuals using wells estimated from USGS maps (USGS 1985) were as follows:

0-1/4-mi radius = 0

0-1/2-mi radius = 0

1/2-1-mi radius = 0

1-2-mi radius = 101

2-3-mi radius = 1,351

3-4-mi radius = 1,520

Approximately 1,225 private water wells are located within a 4-mi radius of Fort Custer Training Center. Specific information concerning individual wells is unavailable. Information provided by John O'Brien (1993), Calhoun County Water Utilities Manager, indicates that the wells are completed in either in the Marshall Formation or the glacial material (80-110 ft deep) but not both.

Recharge to aquifers is derived from infiltration of precipitation and from infiltration of surface water. Estimates of recharge in the region including portions of the Fort Custer site ranged from 4 to 13 in./yr. Natural discharge from the aquifer is primarily to rivers, streams, and swamps and through evapotranspiration.

The quality of the water in the region is considered good and is usable for domestic, commercial, and industrial purposes. The chemical constituents that comprise most of the dissolved solids in the area are calcium (Ca^{++}), magnesium (Mg^{++}), sodium (Na^+), bicarbonate (HCO_3^-), sulfate (SO_4^{--}), and chloride (Cl^-). Iron is also present but in minor amounts (0-2.1 mg/L). Concentrations of dissolved constituents typically are as follows: calcium (36-160 mg/L), magnesium (11-41 mg/L), sodium (3.0-29 mg/L), bicarbonate (194-384 mg/L), sulfate (1.6-230 mg/L), and chloride (1.5-58 mg/L) (Allen 1972).

The secondary regional groundwater aquifer is the sandstone sequence of the Paleozoic Marshall Formation. The unit is typically a fine- to medium-grained, blue-gray, calcareous sandstone. Although the formation has few inherent aquifer characteristics, it can develop significant porosity and permeability through numerous interconnected fractures. Transmissivities can be as high as 5,000 gal/min, with saturated thicknesses approaching 150 ft (Rich 1993).

2.5.5 Sensitive Environments

The Kalamazoo River is located about 1 mi from the northern and western boundaries of Fort Custer. The meandering river has a wide, shallow stream bed with many slow-moving pools. The Kalamazoo River has wide wetlands and swampy areas extending from both sides of the stream bed. Along the northwestern boundary of Fort Custer Training Center is the Fort Custer State Recreation Area, which has three lakes: Eagle, Lawler, and Whitford. These lakes and associated wetlands along the river provide substantial habitat for migratory waterfowl and other species. The only known endangered species in the area is the Indiana bat.

3 Environmentally Significant Operations

The PA team from Argonne identified four ESOs at Fort Custer Training Center: (1) storage of hazardous materials and hazardous waste, (2) storage and dispensing of fuel, (3) washing of vehicles and equipment, and (4) weapons training ranges that may have accumulated lead. The ESOs at Fort Custer Training Center are shown on Figure 3.

3.1 Storage of Hazardous Materials and Hazardous Waste

The past and present maintenance activities performed at the UTES (Building 4465) and the RTSM (Building 3000) require the use of hazardous materials and the subsequent generation of hazardous waste. Locations for storage of hazardous materials and hazardous waste at the RTSM have the potential for migration of contaminants if a release of the materials in storage were to occur. Containment is not provided for hazardous waste stored in drums in the RTSM in the southeast corner of Building 3000. New (unused) product is stored in designated storage areas within the RTSM. Spills that may occur in these areas are contained while cleanup proceeds; however, if a release from one or more of the drums in the waste storage area were to occur, the hazardous materials would flow to the perimeter floor drains, bypassing the clogged sand traps, and flow into the sanitary sewer system for the city of Battle Creek. A private contractor transports all accumulated waste storage drums (with manifest) to the U.S. Property and Fiscal Office in Lansing, Michigan, and from there to the Defense Reutilization and Marketing Service at Selfridge Air National Guard Base, Mt. Clemens, Michigan. Neither the historical disposal methods nor the past waste accumulation practices are known, but both are expected to have had more potential for contamination.

3.2 Storage and Dispensing of Fuel

Refueling operations occur at the Fort Custer Training Center at two designated fuel storage and dispensing locations and via mobile tanker. The bulk fuel loading area located immediately south of the motor pools has two 10,000-gal double-walled storage tanks, one containing diesel fuel and the other gasoline. Continuous testing of the tanks for tightness and a review of the records of the leak detection system confirmed the integrity of the underground storage tank (UST) systems. The potential exists for contaminant migration through surface runoff following accidental spills during vehicle or UST refueling operations. In addition, releases of fuel or oil

from vehicles parked in the paved parking areas at the UTES, the RTSM, and the motor pool and in the unpaved area around the RTSM could be transported via surface runoff.

The RTSM has two new double-walled, audio-alarmed USTs: one 10,000-gal diesel tank and one 1,000-gal waste oil tank. Continuous testing for tightness of the tanks confirmed the integrity of the UST systems. The potential exists for contaminant migration through surface runoff following accidental spills during vehicle or UST refueling operations. Historically, both the UTES and RTSM refueling activities have involved USTs and similar methods of dispensing. The current methods (noted previously) indicate a mechanism by which past activities could have had environmental impact.

3.3 Washing of Vehicles and Equipment

Vehicles are washed at the UTES and the RTSM. Because of the location of the grease rack and wash area around the UTES, virtually all waste wash water or hazardous materials spills at the UTES flow to one of two oil/water separators. Hence, there appears to be limited potential for wastewater to migrate away from existing drainage. Although the RTSM has a designated wash area on the east side of Building 3000, with drainage that flows to a sand trap, vehicles are washed and steam cleaned on the northern edge of the building, and waste wash water flows to a surface impoundment between Building 3000 and Wayne Road. Furthermore, even if the existing wash area were being used, the sand trap is currently plugged, and the system does not contain an oil/water separator to isolate contaminants. The current practices indicate the presence of a past mechanism for potential contamination. This potential is especially evident at the wash and steam areas on the northern edge of the RTSM.

3.4 Weapons Training Ranges

The weapons training ranges and impact areas at Fort Custer Training Center have been in use for about 75 years. Although a recommendation exists that the use of lead be minimized, it is currently being used. The extent of its historical use and the concentrations of lead that may exist in berms and other land and surface features are not known.

4 Known and Suspected Releases

4.1 Releases to Groundwater

The firing ranges at Fort Custer Training Center have been in use since World War II. Over a period of 75 years, some potential exists for the ranges to have accumulated lead. The extent of these accumulations is not known; however, the ranges and impact areas have some wetlands and swamp areas that are groundwater recharge areas. Hence, some potential exists for lead to migrate to groundwater supplies.

4.2 Releases to Surface Water

Historically, the UTES grease pit and wash area drained directly into a swamp area to the east. An inspection of the vegetation and surface features surrounding the drainage revealed that the vegetation did not appear stressed and, in fact, looked robust. Although the interior and exterior drains in the UTES area now flow to one of two oil/water separators before being discharged, the historical configuration suggests that additional investigation may be warranted.

4.3 Releases to Soil

The Fort Custer Training Center has never had the occasion to file a spill report; however, during our visit to Building 3000, the RTSM, we observed a dark, oily substance that smelled like diesel fuel covering an area of about 300 ft² along the northern fenced boundary of the facility a few feet from the concrete apron that surrounds the structure. Similar staining (36 ft²) was found behind the LCCTDS staging area. Approximately 1,500 ft³ of stained soil was removed when the original oil/water separator and associated piping were removed and replaced with the oil/water separation system at the UTES.

Fort Custer Training Center has all new storage tanks with continuous monitoring systems and controls for dispensing fuels. Refueling areas are paved with concrete (no curbs) or crushed stone. No fuel stains were observed around the fuel pumps at the RTSM or the bulk fuel loading area. No other significant oil stains were observed at the UTES parking area, the motor pools, or the RTSM.

Field training exercises that include lay down, inflation, and dispensing of fuel from fuel bladders are practiced with potable water instead of diesel fuel or gasoline. Hence, no releases to soil caused by refueling, training exercises, or vehicular accidents are known.

4.4 Releases to Air

The Fort Custer Training Center is located in the south central Michigan Interstate Air Quality Control Region, one of eight such districts statewide. Emissions from vehicles and space heaters are the principal source of air emissions resulting from current and historical operations. Some fugitive dust is generated from training exercises. All old storage tanks have been removed, and new tanks have been installed that are equipped with vapor retention systems. An asbestos abatement program was conducted at Fort Custer in 1980, and all asbestos has been removed. No releases to air are known.

4.5 Other Releases

Fort Custer Training Center obtains its drinking water from the city of Battle Creek and is connected to the Battle Creek sanitary sewer system. The training center has never had a landfill or fire pit. All asbestos has been removed from Fort Custer, and all USTs have been replaced with new double-walled tanks with continuous monitoring systems. Hence, the facility is well insulated from impacting the surrounding environment. No other releases are known or suspected.

5 Human and Environmental Receptors

5.1 Groundwater

Groundwater is the source of potable water in the vicinity of Fort Custer Training Center. Although wells are not registered beyond the corporate limits of Battle Creek, several private drinking water wells are located within a 4-mi radius of the facility. The town of Augusta obtains its municipal water supplies from wells drilled within the 4-mi radius and downstream from Fort Custer. Groundwater recharge is via precipitation. Rain falling on the surface of the land either runs off into surface streams, infiltrates the soil, or evaporates into the atmosphere. The water that infiltrates the soil is either retained by the soil and subsequently returned to the atmosphere by the transpiration of plants or migrates downward under the force of gravity through the soil and weathered rock to recharge the groundwater system. The amount of water added to the groundwater system as recharge is approximately equal to the amount of water discharged as outflow, thus maintaining the base flow of surface streams.

5.2 Surface Water

Harts Lake, Eagle Lake, and Whitman Lake and surrounding wetlands and swampy areas are the potential primary recipients of contamination released either as a result of current or past operations at Fort Custer Training Center. Virtually all of the surface drainage from Fort Custer Training Center flows toward these areas; however, drainage from the UTES and the RTSM flows to water treatment facilities or directly into the sanitary sewer system for the city of Battle Creek.

5.3 Soil

Access to the Fort Custer Training Center is restricted to MIARNG personnel and escorted visitors. Workers in areas of surface soil contamination within the cantonment area, such as hazardous waste storage areas, are appropriately trained with regard to potential hazards. The entire facility is fenced and in good repair. The UTES and the RTSM have additional 10-ft chain-link fencing to isolate potential contamination from migration beyond fenced areas. The Fort Custer Training Center is open to the public for an annual deer hunt, but no known potential waste sites exist beyond these fenced areas, and access and exposure by the public are highly unlikely.

5.4 Air

Site personnel are exposed to minor releases of contamination to the air during regular vehicle operation and maintenance activities and training exercises. Dust masks or filters are used when appropriate (e.g., during welding, sanding, or painting) to reduce the level of exposure. Exposure of the off-site population to MIARNG contamination via air is highly unlikely.

6 Preliminary Assessment Findings and Conclusions

6.1 Summary of Preliminary Assessment Findings

The Fort Custer Training Center is located in Augusta, Michigan, immediately adjacent to the southwestern boundary of the city of Battle Creek. The primary ESOs associated with the property are (1) storage of hazardous materials and hazardous waste, (2) storage and dispensing of fuel, (3) washing of vehicles and equipment, and (4) weapons training ranges that may have accumulated lead. This PA found no significant threats to the human and natural environments at Fort Custer. The facility appears to be in excellent condition from an environmental standpoint, and current practices and record-keeping procedures are satisfactory.

6.2 Recommendations for Further Action

The primary objective of the PA is to identify and evaluate ESOs that would result in either (1) immediate action, (2) site investigation, or (3) no further PA/IRP action. Generally, the available information indicates that the Fort Custer Training Center presents a low potential risk to human health and the environment; however, on the basis of the information made available to Argonne, several areas deserve further consideration to ensure protection for the local community and the environment. Argonne recommends that the Michigan Department of Military Affairs should consider limited soil sampling to confirm that drainage from the UTES grease pits and wash areas has not adversely impacted the environment in the swamp area to the east of the UTES. Argonne also recommends that the Michigan Department of Military Affairs should consider limited sampling of both soil and surface water in the impact and range areas to confirm that accumulations of lead are below statutory levels set by the EPA and the state of Michigan.

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Appendix:
Interview Information

Appendix:

Interview Information

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