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**UNITED STATES ARMY
ENVIRONMENTAL HYGIENE
AGENCY**

ABERDEEN PROVING GROUND, MD 21010-5422

INTERIM FINAL REPORT
HAZARDOUS WASTE MANAGEMENT CONSULTATION NO. 37-26-0190-89
EVALUATION OF SOLID WASTE MANAGEMENT UNITS
FORT RILEY, KANSAS
9-13 MAY 1988

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422



REPLY TO
ATTENTION OF

29 SEP 1989

HSHB-ME-SE (40)

MEMORANDUM FOR Commander in Chief, Forces Command, ATTN: FCEN-RDO, Fort
Gillem, Forest Park, GA 30305-6000

SUBJECT: Interim Final Report, Hazardous Waste Management Consultation
No. 37-26-0190-89, Evaluation of Solid Waste Management Units, Fort Riley,
Kansas, 9-13 May 1988

EXECUTIVE SUMMARY

The purpose and a summary of the major conclusions and recommendations of
the enclosed report follow:

a. Purpose. The Forces Command requested assistance of the U.S. Army
Environmental Hygiene Agency to identify, describe, and evaluate Solid
Waste Management Units (SWMU's) at Fort Riley (FTRI). The information
generated from this study will aid the installation in identifying those
units that require environmental sampling or remedial action and assist in
bringing the units into compliance with Section 3004(U) of the Resource
Conservation and Recovery Act (RCRA).

b. Conclusions. Several of the sites at FTRI require environmental
sampling or remedial action. However, some of the work is in progress by
contracted environmental consultants/engineers. The remediation projects
at FTRI are exemplary and will help bring FTRI into compliance with State
and Federal regulations.

c. Recommendations.

(1) We recommend the following to ensure regulatory compliance:
Include this report with your RCRA Part B permit renewal application for
review by State and Region VII U.S. Environmental Protection Agency (EPA)
regulatory authorities. Perform the environmental sampling or remedial
action in Table 4 at SWMU's FTRI-001, 002, 003, 007, 008, 009, 010, 011,
012, 013, and 030. Coordinate with the State of Kansas and the EPA Region
VII for a visual site inspection of the identified sites.

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

(2) To ensure good environmental practices, we recommend remedial work identified in Appendix D for the SWMU's FTRI-001 and FTRI-017.

FOR THE COMMANDER:



PAUL R. THIES
LTC, MS
Chief, Waste Disposal Engineering
Division

Encl

CF:

HQDA(SGPS-PSP) (wo/encl)

HQDQ(ENVR-E) (w/encl)

DA, USAEHSC, ATTN: CEHSC-F (w/encl)

CINC, FORSCOM, ATTN: FCMD-PC (4 cy) (w/encl)

Cdr, HSC, ATTN: HSCL-P (w/encl)

Cdr, Ft Riley, ATTN: DEH (2 cy) (w/encl)

Cdr, MEDDAC, Ft Riley, ATTN: PVNTMED Svc (2 cy) (w/encl)

Cdr, FAMC, ATTN: PVNMTED Svc (w/encl)

Cdr, USATHAMA, ATTN: CETHA-TE (w/encl)

Cdr, USATHAMA, ATTN: CETHA-RM(TIC) (2 cy) (w/encl)

Cdr, USAEHA-W (w/encl)



DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-6422



REPLY TO
ATTENTION OF

HSHB-ME-SE

INTERIM FINAL REPORT
HAZARDOUS WASTE MANAGEMENT CONSULTATION NO. 37-26-0190-89
EVALUATION OF SOLID WASTE MANAGEMENT UNITS
FORT RILEY, KANSAS
9-13 MAY 1988

1. REFERENCES. See Appendix A for a list of references cited in this study.
2. AUTHORITY. Memorandum, FORSCOM, FCEN-FDE, 12 June 1987, subject: FY 88 Mission Services-FORSCOM.
3. PURPOSE. To investigate potential sources of environmental contamination including Solid Waste Management Units (SWMU's) identified by the installation. To identify those units which will require environmental sampling to confirm the existence or absence of any release.
4. GENERAL.
 - a. Abbreviations and Definitions. See Appendix B for a list of abbreviations and definitions of terms used in this report.
 - b. Background.
 - (1) Location and Size. The Fort Riley Military Reservation consists of the Main Post, Camp Funston, Camp Forsyth, Custer Hill, Irvin U.S. Army Community Hospital, Camp Whiteside, and Marshall Army Airfield (MAAF). Fort Riley is approximately 2 miles east of Junction City, Kansas, and 14 miles west of Manhattan, home of the Kansas State University. Some parts of the military reservation lie in Geary and Riley counties. The reservation presently covers a land area of over 100,000 acres. Refer to Figure 1 for a location map.
 - (2) Mission. The principle mission of Fort Riley is to provide support to the 1st Infantry Division (Mechanized), nondivisional units, and tenant activities assigned to the post. The mission of the 1st Infantry Division is to deploy troops to Europe in support of the North Atlantic Treaty Organization (NATO). Training at Fort Riley in support of this mission includes field maneuvers, tank and artillery weapons fire, and aircraft (primarily helicopter) flights. Logistical and administrative support are also provided to Irwin U.S. Army Community Hospital, Third ROTC Region Headquarters, and MAAF. The U.S. Army Reserve and Army National Guard units also train onpost.

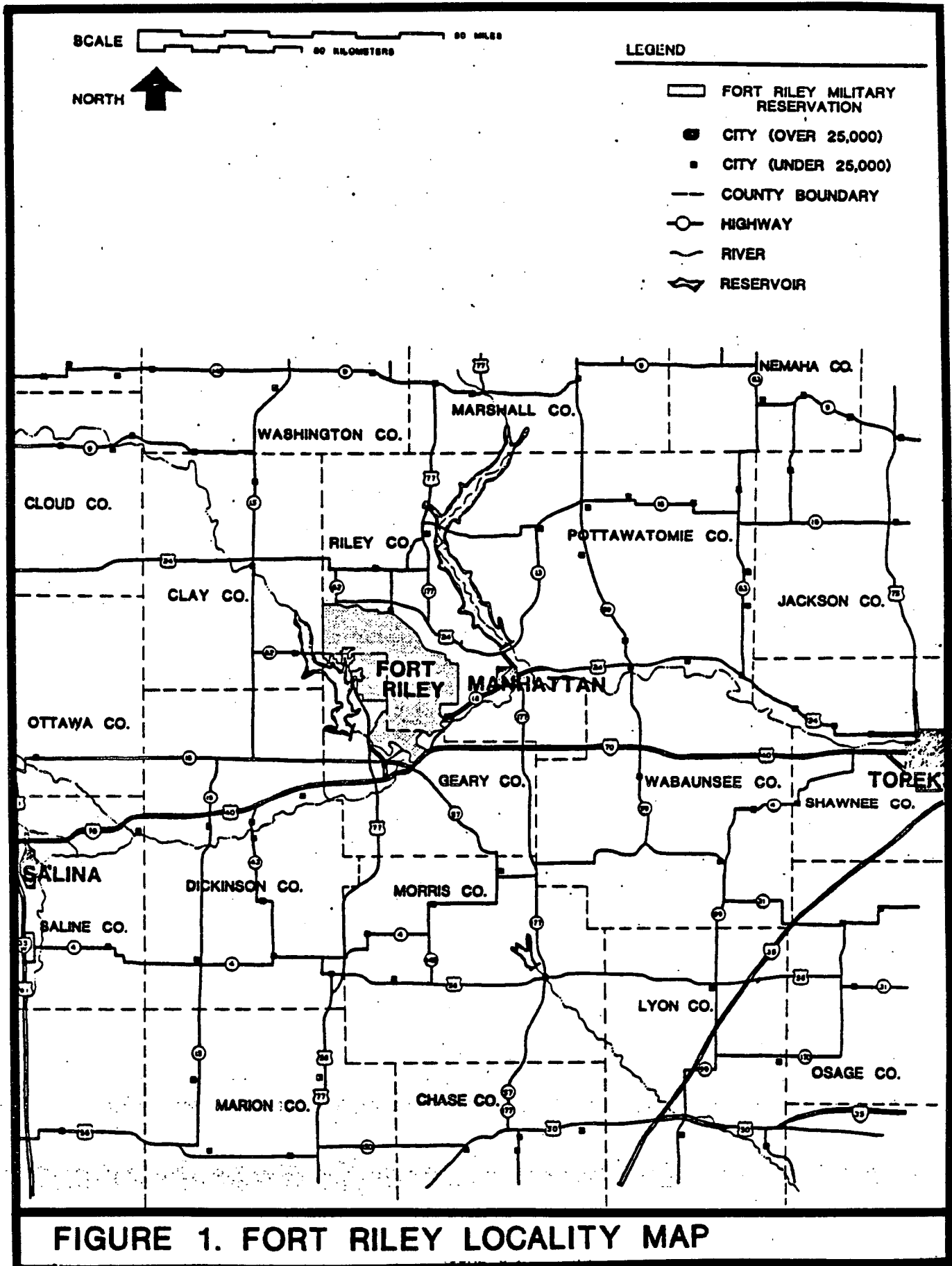


FIGURE 1. FORT RILEY LOCALITY MAP

c. Personnel Contacted.

(1) Mr. Hardcastle conducted an entrance briefing with Mr. Larry Ness, Chief, Environmental Office, and Mr. Charles Harris and Mr. Darrel Wilson of the Directorate of Engineering and Housing (DEH).

(2) Mr. Hardcastle conducted an exit briefing with Mr. Harry Orbinson, Chief of Operations, DEH, and Mr. Larry Ness, Mr. Darrel Wilson, Mr. Charles Harris, and Mr. Greg Sinton of DEH. Also in attendance was Mr. Joseph Cothorn of the Defense Reutilization and Marketing Office (DRMO).

(3) Additional personnel contacted are include in Appendix C.

(4) Appendix D describes each SWMU in detail; Appendix E is a list of Underground Storage Tanks; Appendix F is a list of selected Material Safety Data Sheets (MSDS); and Appendix H is a list of wastes handled by the DRMO.

d. Regulatory Considerations. The Resource Conservation and Recovery Act (RCRA), Hazardous and Solid Waste Amendments (HSWA) of 1984, requires that Part B permits issued after 8 November 1984 identify corrective action at any SWMU that releases hazardous constituents or hazardous waste (HW) to the environment. The requirement applies to all SWMU's regardless of the date waste disposal or handling occurred. Fort Riley must complete the HSWA part of the requirements for the previously submitted Part B permit application for a long term hazardous waste (HW) storage facility. The facilities on the RCRA Part A and Part B permit applications are FTRI-006 and FTRI-009.

e. Consultation Methodology. The information gathering and decision making process associated with this consultation was developed based on several key documents. These documents included the RCRA Facility Assessment Guide, the U.S. Environmental Protection Agency (EPA) National RCRA Corrective Action Strategy document, the final rule of 1 December 1987 (FR 45788) and those documents listed in Appendix A. Through the use and review of these documents, and in conjunction with an onsite visit, the survey team identified those activities classified as SWMU's. Sites requiring further action in terms of the RCRA facility assessment were based on information gathered onsite and through the document review.

5. FINDINGS AND DISCUSSION.

a. Engineering Geology.

(1) Physiography and Topography.

(a) Fort Riley lies within the physiographic province generally called the Osage Plains section of the Central Lowlands. This area is bordered by the Great Plains to the west and the Ozark Plateau to the east. The elevation ranges from 312 to 416 meters (1,025 to 1,365 feet) above mean sea level. The area comprising Fort Riley is best described as

"scarped" (steepsloped) plains. Resistant rock layers form east/southeast facing escarpments (a steep slope or long cliff), which are part of an older erosional plain that is now being cut (reference 9).

(b) The Post is divided into three geomorphological units. First, the high uplands or prairies consists of alternating layers of flat-lying to gently dipping limestone and shale of Permian Age. Local relief ranges from 50 to 73 meters (164 to 240 feet). The second unit is the alluvial bottom lands of wide meandering floodplains and associated terraces. There are also alluvial bottom lands associated with the smaller creeks and streams which cut the first unit. Local relief ranges from 7.6 to 18.3 meters (25 to 60 feet). The third unit is the broken, hilly-to-steep country composed of alternating limestones and shales. This unit extends from the uplands downward to the valley floors and river terraces (reference 9).

(c) The "uplands" unit is almost always covered with various shale units which overlie the escarpment-forming limestones. The cutting action of streams on the thick shale units sculptured much of the area into a rolling plateau (reference 9).

(2) Climate. The location of Fort Riley, near the geographical center of the United States, offers a variety in weather found in an inland locality far from the modifying influence of the ocean. Both the summer and winter seasons can show wide departure from average conditions. During the spring and fall seasons, numerous days of fair weather are interspersed with short intervals of stormy weather. Winds are generally light and predominately originate from the north and south. However, this part of the country is prone to the formation of tornadoes. Annual precipitation averages 33 inches, with approximately 70 percent of it normally falling during the 6 crop-growing months. Temperatures range from a monthly mean of 28.1 °F in January to 79.0 °F in July, with an annual mean temperature of 55 °F. Seasonal snowfall, which occurs primarily between December and March, averages 22 inches.

(3) Surface Hydrology.

(a) The major rivers in the region are the Republican, Smoky Hill, Big Blue, and Kansas rivers (Figure 2). The Republican River is west of Fort Riley, and is impounded by Milford Dam. The discharge flows in a southeasterly direction to a point northeast of Junction City, where it joins the Smoky Hill River to form the Kansas River. The Kansas River then flows in an easterly direction to Kansas City where it enters the Missouri River. The Big Blue River is northeast of Fort Riley and is impounded by Tuttle Creek Dam. It discharges in a southeasterly direction to a point east of Manhattan, where it joins the Kansas River. Numerous perennial and intermittent streams which originate on or flow through the installation, eventually discharge into one of these rivers (reference 4).

(b) High water periods occur from the last of February through the first part of June. Lowest river stages range from late October through January.

(c) Numerous surface water impoundments exist on the installation, many of which were formerly farm ponds. Some are oxbow lakes which were formed when the Kansas River changed course. Figure 2 depicts the approximate locations of these surface water features.

(4) Surficial Geology.

(a) Overlying the bedrock are alluvial deposits and windblown loess of Pleistocene and Recent age. The windblown loess is the oldest of the unconsolidated deposits. The loess is composed of approximately 15 percent fine sand and 85 percent silt and clay material. The alluvial deposits underlying the southern section of Fort Riley are part of the flood plain deposits of the Republican and Kansas rivers. The alluvium near the surface consists of silt, clay, and very fine sand. At greater depths, coarser sand and gravel predominate (reference 9, Figure 3).

(b) Soils found at Fort Riley are divided in three categories: River floodplain soils, windblown silt and loess, and weathered limestone and shale. The river floodplain areas and the underlying bedrock are covered by Recent alluvial deposits. These soils consist of silty, sandy loam with fairly good drainage characteristics. Soils in the upland regions consist of soils from windblown silt and loess and soils from weathering of limestone and shale deposits. Both types of soil in the upland region consist of fine-grained silts and clays. These soils have been removed in many Fort Riley upland areas forming bedrock escarpments along primary and secondary streams (reference 12).

(5) Subsurface Geology. The principal exposed Permian strata are the Winfield, Doyle, Barneston, Matfield, and Wreford Formations of the Chase Group. Distinct members of alternating limestones and shales of variable thickness occur within each formation. The Kansas River has cut down into the underlying Council Grove Group, which consists of the Speiser, Funston, Blue Rapids, Cruse, Easy Creek, Bader, and Stearns Formations. These formations also consist of alternating limestone and shale members that are not exposed at the surface in the Fort Riley area, but are present in the subsurface underlying the river alluvium (reference 9, Figure 4).

(6) Structure and Siesmicity. Rock layers dip gently in a northwest direction and are beveled by an erosional plain sloping eastward. Fort Riley is classified in the Damaging Effects Category on the Modified Mercalli scale. According to a seismic risk study performed in 1969, damage potential is considered moderate. Since 1867 two earthquakes with epicenters in the Manhattan, Kansas area had Modified Mercalli intensities of VII. Potential hazards include landslides and liquefaction of river valley sands (reference 9).

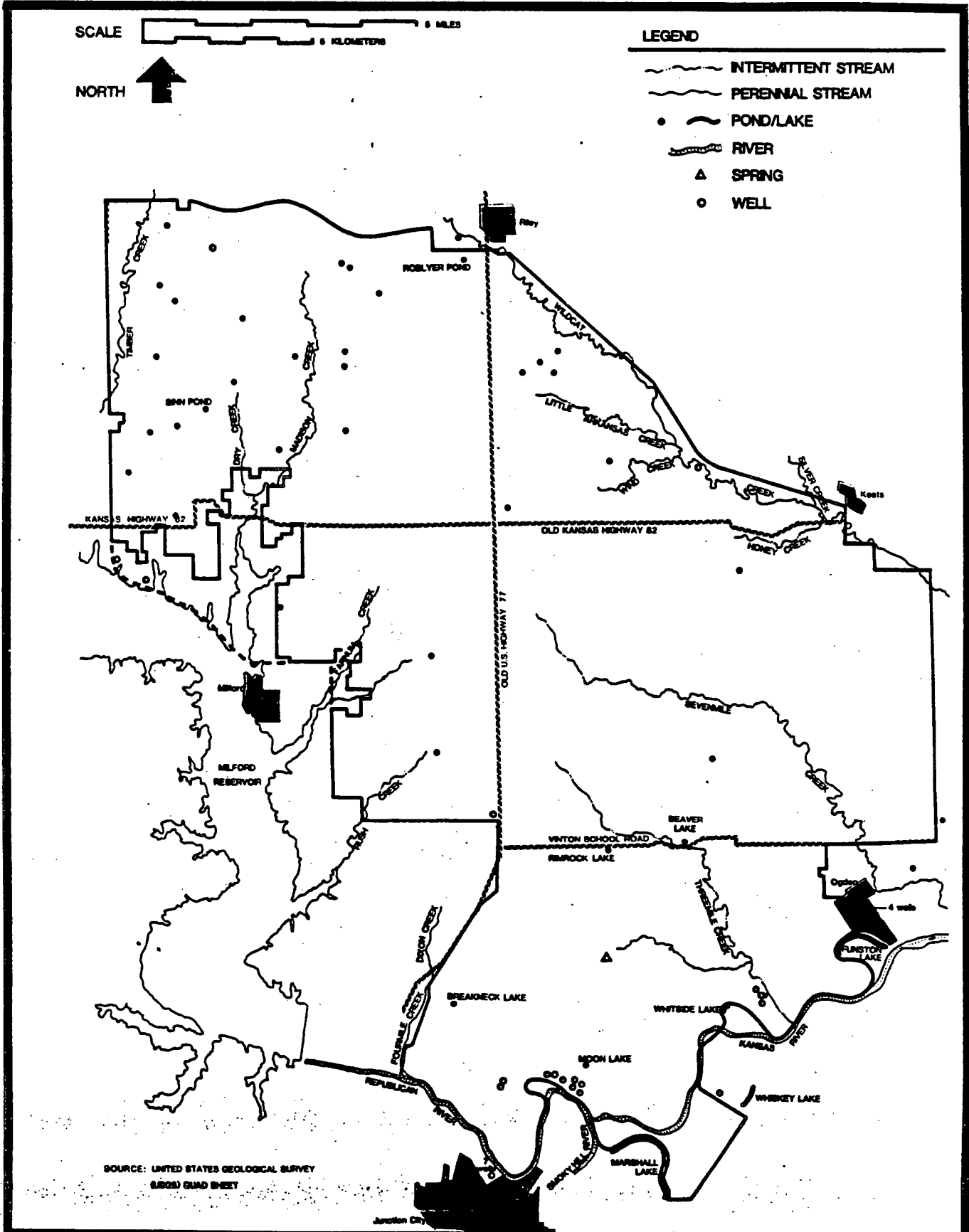


FIGURE 2. SURFACE DRAINAGE FOR FORT RILEY

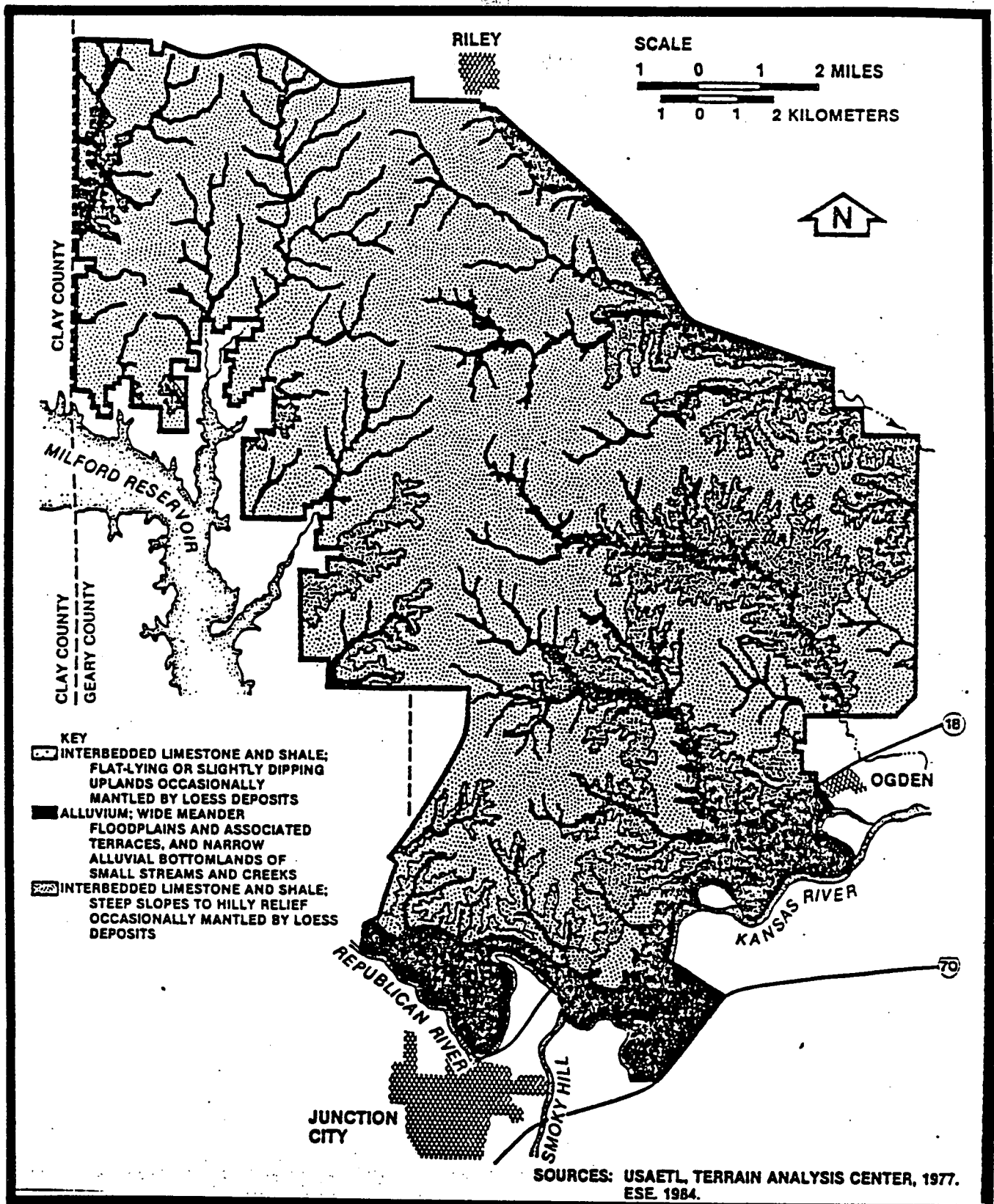
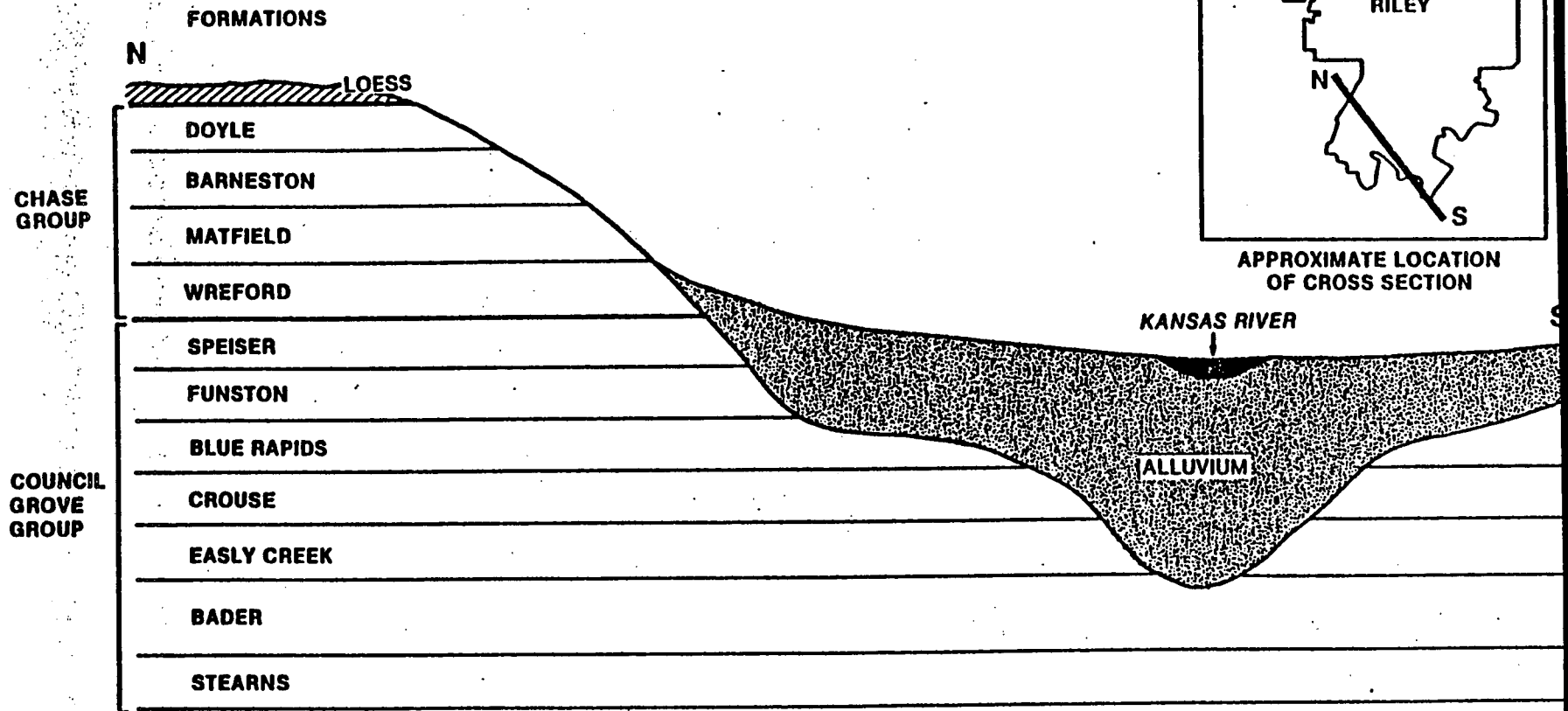


FIGURE 3. GEOLOGIC MAP OF FORT RILEY



NOTE: WINFIELD FORMATION DOES NOT OUTCROP ON FORT RILEY.

SOURCES: USAETL, TERRAIN ANALYSIS CENTER, 1977.
ESE, 1984.

FIGURE 4. GEOLOGIC CROSS SECTION FOR FORT RILEY

b. Hydrogeology.

(1) Ground water occurs in alluvial deposits of the major streams and rivers, in the porous surface deposits, and in the fissured near surface limestone of the upland. Large quantities of ground water exist in the alluvial deposits of the Republican, Smoky Hill, and Kansas River Valleys. Moderate quantities of ground water exists in the Fort Riley and Florence limestone formations, with water occurring in solution channels and joints.

Recharge of the alluvial aquifer occurs through direct infiltration of precipitation and from adjacent surface waterways (reference 4). If soil cover is thick enough, water in the bedrock also occurs perched on top of the local shale units. Bedrock wells supply adequate drinking water for moderate-scale agricultural activity.

(2) Fort Riley extracts its ground water through wells located in valley-fill deposits and in fissured limestone. Depth and presence of ground water varies depending on local physiographic, geologic, and hydrologic conditions (reference 9).

c. SWMU's with Releases to the Environment. Table 1 is a list of all SWMU's at Fort Riley. Table 2 is a list of SWMU's that have releases to the environment either currently, or based on historical information. The sites on Table 2 require RCRA Facility Assessment (RFA) or RCRA Facility Investigation (RFI) work to determine if a threat to human health or the environment exists. Work is currently progressing under the installation restoration contract. Table 3 is a summary of SWMU's with no release to the environment that require no further action. Table 4 is a list of SWMU's that require sampling to complete the requirements of the RCRA Facility Assessment (RFA).

d. Report Schedule.

(1) This is an interim final report. The installation should forward a copy of this report to EPA Region VII for review and comment. At the same time, arrange for a visual site inspection (VSI) at FTRI. Appendix I is an example letter to the EPA. The U.S. Army Environmental Hygiene Agency (USAEHA) sent Fort Riley a draft interim final report of all SWMU's during October 1988.

(2) After EPA reviews the manuscript and conducts a VSI at FTRI with the appropriate personnel, we will issue a final report.

6. CONCLUSIONS.

a. The SWMU's on Table 2 display evidence of release to the environment.

b. The sites on Table 3 do not require environmental sampling. These sites exhibit no evidence of release or such release is unidentifiable.

TABLE 1. SWMU's, FORT RILEY, KS

SWMU Site Number	SWMU	Site Type
FTRI-001	Active Sanitary Landfill and Lagoon	Landfill and Waste Treatment
FTRI-002	Active Construction Debris Landfill	Landfill
FTRI-003	Closed Sanitary Landfill	Landfill
FTRI-004	Abandoned Landfill (Mainpost)	Landfill
FTRI-005	Rubble Landfill	Open Dump
FTRI-006	Hazardous Waste Storage Facility (DRMO)	Container Storage/ Waste Treatment
FTRI-007	PCB Articles Storage Bldg No. 343	Container Storage
FTRI-008	PCB Articles Storage Bldg No. 348	Container Storage
FTRI-009	OB/OD Ground (Active)	Waste Treatment
FTRI-010	Underground Storage Tanks (Camp Funston; pesticide)	Waste Storage
FTRI-011	Underground Storage Tanks (Camp Funston; waste oil)	Waste Storage
FTRI-012	Waste Fuel Storage Facility (Camp Funston)	Waste Storage
FTRI-013	Abandoned VOC Tanks	Waste Storage
FTRI-014	Incinerator (Irwin U.S. Army Community Hospital)	Incineration
FTRI-015	Underground Storage Tanks (Post Waste Oil)	Waste Storage
FTRI-016	Waste Oil Tank (3rd Battalion, 37th Armor Regiment)	Waste Storage

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SWMU Site Number	SWMU	Site Type
FTRI-017	Waste Oil Tank (4th Battalion, 37 Armor Regiment)	Waste Storage
FTRI-018	Fire Fighting Training Area (New)	Fire Training Area
FTRI-019	Fire Fighting Training Area (Old)	Waste Treatment
FTRI-020	Central Vehicle Wash Facility (Custer Hill)	Wastewater Treatment Unit
FTRI-021	Vehicle Wash Facility (Old)	Wastewater Treatment Unit
FTRI-022	Inactive Sewage Treatment Plant (Camp Funston)	Wastewater Treatment Unit
FTRI-023	Custer Hill Sewage Treatment Plant	Wastewater Treatment Unit
FTRI-024	Forsyth Sewage Treatment Plant	Wastewater Treatment Unit
FTRI-025	Mainpost Sewage Treatment Plant	Wastewater Treatment Unit
FTRI-026	Multipurpose Range Complex (MPRC) Wastewater Lagoons	Wastewater Treatment Unit
FTRI-027	Former Dry Cleaning Plant Bldg No. 109	Waste Disposal
FTRI-028	Fire Fighting Training Area (OLD) Camp Funston	Fire Training Area
FTRI-029	Incinerator, Camp Funston (Inactive)	Incineration
FTRI-030	Pesticide Storage Bldg No. 348	Pesticide Storage/ Mixing

TABLE 2. SWMU'S WITH KNOWN OR SUSPECTED RELEASES TO THE ENVIRONMENT

SWMU Site/ FTRI No.	Location	Type of Release
FTRI-001	Active Sanitary Landfill	Leachate
FTRI-002	Construction Debris Landfill (North of Camp Whiteside)	Airborne Particulates
FTRI-003	Closed Sanitary Landfill (Camp Funston)	Ground Water: Volatile Organic Compounds and Heavy Metals
FTRI-007	PCB Articles Storage, Bldg 343	PCBs
FTRI-008	PCB Articles Storage, Bldg 348	PCBs
FTRI-009	74th Active OB/OD Ground	Suspected Explosives and/or Heavy Metals
FTRI-010	Underground Storage Tanks (Pesticide Storage)	Suspected Pesticides and/ VOC's
FTRI-011	Waste Oil Underground Storage (Camp Funston)	Waste Oil
FTRI-013	Abandoned VOC Tanks (North of Irwin U.S. Army Community Hospital)	Volatile Gases
FTRI-017	Waste Oil Storage Tank, (4th Battalion, 37th Armor Regiment)	Waste Oil
FTRI-027	Former Dry Cleaning Plant Bldg No. 109	Perchloroethylene
FTRI-030	Pesticide Storage Bldg No. 348	Pesticide Storage/ Mixing

TABLE 3. SWMU'S WITH NO EVIDENCE OF RELEASE TO THE ENVIRONMENT

SWMU Site Number	SWMU Name
FTRI-004	Abandoned Landfill, Mainpost
FTRI-005	Rubble Landfill
FTRI-006	Hazardous Waste Storage Facility
FTRI-010	Underground Storage Tanks, Camp Funston (Pesticide)
FTRI-012	Waste Fuel Storage Facility, Camp Funston
FTRI-014	Incinerator, Irwin U.S. Army Community Hospital
FTRI-015	Underground Storage Tanks, Waste Oil
FTRI-016	Waste Oil Tank, 3rd Battalion, 37th Armor Regiment
FTRI-018	Fire Fighting Training Area (New)
FTRI-019	Fire Fighting Training Treatment Area (Old)
FTRI-020	Central Vehicle Wash Facility (Mainpost) C4
FTRI-021	Vehicle Wash Facility (Old) C4
FTRI-022	Inactive Sewage Treatment Plant, Camp Funston
FTRI-023	Custer Hill Sewage
FTRI-024	Forsyth Sewage Treatment Plant
FTRI-025	Mainpost Sewage Treatment Plant
FTRI-026	Multipurpose Range Complex (MPRC)
FTRI-028	Fire Fighting Training Area (OLD) Camp Funston
FTRI-029	Incinerator, Camp Funston (Inactive)

c. The SWMU's on Table 4 require environmental sampling.

7. RECOMMENDATIONS.

a. To ensure regulatory compliance, we recommend the following:

(1) Include this report with your Part B permit application for review by State and EPA region regulatory authorities (40 CFR 264.101 and 270.14).

(2) Coordinate with the State of Kansas and EPA Region VII for a VSI of the identified sites (40 CFR 264.101 and 270.14).

(3) FTRI-001. Sample leachate and implement a soil sampling and analysis plan. Analyze for parameters in Appendix G (40 CFR 264.101 and 270.14).

(4) FTRI-002. Sample soil and surface water, and analyze for parameters in Appendix G (40 CFR 264.101, 270.14 and 257).

(5) FTRI-003. Sample the in-place monitoring wells and analyze for parameters in Appendix G (40 CFR 264.101 and 270.14).

(6) FTRI-007. Develop a sampling plan to determine the extent of PCB contamination (40 CFR 761).

(7) FTRI-008. Develop a sampling plan to determine the extent of PCB contamination (40 CFR 761).

(8) FTRI-009. Implement soil sampling and analysis plan. Perform reactivity testing. Analyze soil samples for explosives. Sample surface water and ground water and analyze for the parameters in Appendix G (40 CFR 261, 264.101 and 270.14).

(9) FTRI-010. Sample soil and analyze for pesticides/volatile organic compounds when the tanks are removed (40 CFR 264.101 and 270.14).

(10) FTRI-011. Develop a soil sampling and analysis plan to identify contamination. Use parameters in Appendix G for chemical analysis (40 CFR 264.101 and 270.14).

(11) FTRI-012. Sample and analyze waste oil for characteristics of HW and EP toxic metals IAW 40 CFR 261. Also analyze for flash point, total metals and totals halogens.

(12) FTRI-013. Remove tanks. Sample soils in area for volatile and semivolatile organics and EP Toxicity (heavy metals) (40 CFR 264.101 and 270.14).

TABLE 4. RECOMMENDATIONS FOR SAMPLING OF THE SWMU'S REQUIRING FURTHER ACTION

SWMU Site Number	Proposed Environmental Sampling
FTRI-001	Sample leachate and implement a soil sampling and analysis plan. Analyze for parameters in Appendix G.
FTRI-002	Sample soil/surface water and analyze for parameters in Appendix G.
FTRI-003	Sample the in-place monitoring wells and analyze for parameters in Appendix G.
FTRI-007	Develop a sampling plan to determine the extent of PCB contamination.
FTRI-008	Develop a sampling plan to determine the extent of PCB contamination.
FTRI-009	Implement soil sampling and analysis plan. Perform heavy metals analysis. Analyze soil samples for explosives. Sample surface water and ground water and analyze for the parameters in Appendix G.
FTRI-010	Sample soil and analyze for pesticides/volatile organic compounds when tanks are removed.
FTRI-011	Develop a soil sampling and analysis plan to identify contamination. Use parameters in Appendix G for chemical analysis.
FTRI-012	Sample and analyze waste oil for characteristics of HW and EP Toxicity IAW 40 CFR 261. Also analyze for flash point, total metals and total halogens.
FTRI-013	Remove tanks. Sample soils in area for volatile and semivolatile organics and EP Toxicity (heavy metals).
FTRI-030	Implement a soil sampling and analysis plan. Analyze soil for pesticides, herbicides and PCBs.

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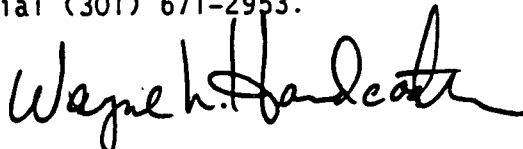
(13) FTRI-030. Implement a soil sampling and analyses plan. Analyze for pesticides, herbicides and PCBs (40 CFR 264.101 and 270.14).

b. To ensure sound environmental engineering practice, we recommend the following:

(1) FTRI-001. Regrade the north face of the landfill so that leachate is controlled.


(2) FTRI-017. Cleanup waste oil spillage and provide adequate containment for spills. Completely dispense all waste oil in waste oil tank and clean all spillage immediately with sorbent material.

8. TECHNICAL ASSISTANCE. Refer questions concerning this consultation to Mr. Wayne L. Hardcastle or Chief, Waste Disposal Engineering Division, this Agency, AUTOVON 584-2024 or commercial (301) 671-2953.



WAYNE L. HARDCASTLE
Environmental Scientist
Waste Disposal Engineering Division

APPROVED:



STEPHEN L. KISTNER, P.E.
Program Manager
Hazardous Waste Management

APPENDIX A

REFERENCES

1. Title 40 Code of Federal Regulations (CFR), 1988 rev, Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices.
2. Title 40, CFR, 1988 rev, Part 260, Hazardous Waste Management System: General.
3. Title 40, CFR, 1988 rev, Part 261, Identification and Listing of Hazardous Waste.
4. Title 40, CFR, 1988 rev, Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
5. Title 40, CFR, 1988 rev, Part 265, Interim Status for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
6. Title 40, CFR, 1987 rev, Part 270, EPA Administered Permit Programs: The Hazardous Waste Permit Program.
7. Title 40, CFR, 1988 rev, Part 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.
8. Letter, USAEHA, HSHB-ES-E/WP, 17 December 1984, subject: Hazardous Waste Management Survey No. 37-26-0388-85, Fort Riley, Kansas, 20-24 August 1984.
9. Letter, USAEHA, HSHB-ME-WM, 24 December 1986, subject: Preliminary Report, Environmental Operation Review No. 32-24-1375-87, Fort Riley, Kansas, 27 October - 7 November 1986.
10. Letter, USAEHA, HSHB-ME-SG, 18 February 1988, subject: Ground-water Monitoring Results for Fort Riley, Kansas.
11. Letter, USAEHA, HSHB-ME-SH, 7 August 1986, subject: Report for Samples Submitted for Analysis, Fort Riley, Kansas.
12. Installation Assessment of the Headquarters, 1st Infantry Division and Fort Riley, Kansas, Report No. 341, Environmental Science and Engineering, Inc., prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland, December 1984.
13. Candidate Environmental Impact Statement, Fort Riley, Kansas, DA Headquarters, Forces Command, June 1981.

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14. Fort Riley, Terrain Analysis, December 1977, U.S. Army Engineer Laboratories, Fort Belvoir, Virginia.

15. Laboratory Report, DAKF-19-87-N 2304 and 316-251-9416 Fort Riley Project, Harry Keith and Sons, Coffeyville, Kansas, 16 March 1987.

16. Operation and Maintenance Manual for Washrack Water Pollution Abatement, Phase III, Central Vehicle Wash Facility, FY 80 - MCA, Project No. 269-30, Fort Riley Kansas, U.S. Army Corps of Engineers, Kansas City, Missouri, July 1986.

17. Fire Training Pit Plan, DEH, Fort Riley, Kansas, 1987.

APPENDIX B

ABBREVIATIONS AND DEFINITIONS

AR	Army Regulation
AVGAS	Aviation Gasoline
BOD	Biochemical oxygen demand
cm/s	Centimeters per second
CFR	Code of Federal Regulations
DEH	Directorate of Engineering and Housing
disposal	The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste into or on land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters (as defined in 40 CFR 260.10)
DOL	Directorate of Logistics
DRMO	Defense Reutilization and Marketing Office
EOD	Explosive Ordnance Detachment
EPA	U.S. Environmental Protection Agency
EP Toxicity	A hazardous waste characteristic defined in 40 CFR 261.24
FR	Federal Register
HSWA	Hazardous and Solid Waste Amendments of 1984
HW	Hazardous waste - a hazardous waste as defined in 40 CFR 261.3
HWM	Hazardous waste management
IAW	In accordance with
Ignitability	A hazardous waste characteristic defined in 40 CFR 261.3
Incineration	A method of thermal treatment of general, infectious, or pathological waste

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kg	Kilogram
KS	Kansas
m.	Meter
MAAF	Marshall Army Airfield
MOGAS	Motor gasoline
MPRC	Multipurpose Range Complex
NPDES	National Pollutant Discharge Elimination System
OB	Open burning
OD	Open detonation
OSHA	Occupations Safety and Health Administration
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene
pH	Measure of the acidity and basicity of an aqueous solution ranging from 0-14 standard units
POL	Petroleum, oils, and lubricants
RCRA	Resource Conservation and Recovery Act
Reactivity	A hazardous waste characteristic defined in 40 CFR 261.23
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SLF	Permitted sanitary landfill - A landfill that has State or Federal approval to operate and is operated in a manner that protects health and the environment. Waste is compacted and covered with earth daily; scavenging is strictly prohibited; and it is not an attractant to vermin (as defined in AR 40-5, Glossary, Section II)
solid waste	Solid waste as defined in 40 CFR 260.10
SWMU	Solid waste management unit
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency

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TNT	Trinitrotoluene
USAEHA	U.S. Army Environmental Hygiene Agency
VOC	Volatile organic compound
VSI	Visual Site Inspection

APPENDIX C
PERSONNEL CONTACTED

Mr. Charles Harris, Environmental Coordinator, DEH.
Mr. Darrel Wilson, Environmental Officer, DEH.
Mr. Joseph Cothern, Environmental Protection Specialist, DRMO.
Mr. Ernie Leithoff, Material Sorter and Classifier, DRMO.
SSGT Edmundo Mercado, Supervisor, Construction Debris Landfill.
Ms. Martha Culver, Landfill Attendant, Custer Hill Active Sanitary Landfill.
Mr. Ronald Lincoln, Chief of Housekeeping, Irwin U.S. Army Community Hospital.
Mr. Robert Hoover, Custer Sewage Treatment Plant.
Mr. Ralph Pray, Assistant Chief of Operations, DOL, Bldg 8100.
Mr. Herman Strafuss, Chief of Operations, DOL, Bldg 8100.
Mr. Arden Budden, Forman, Mainpost Sewage Treatment Plant.
Mr. Robert Hoover, Lab Science Technician, Custer Sewage Treatment Plant.
1LT Steck, 3rd Battalion, 37th Armor Regiment, Maintenance Facility.

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APPENDIX D

DESCRIPTION OF SOLID WASTE MANAGEMENT UNITS

FTRI-001. Map No. 1.

a. Unit Name. Sanitary Landfill (Active) (Custer Hill).

b. Unit Characteristics.

(1) Unit Type. Sanitary Landfill.

(2) General Dimensions. Design Features. The landfill is a trench type surrounded by a chain link fence. Individual trenches measure approximately 15 meters wide, 5 meters deep, and 76 meters long. Within the boundaries of the landfill is a kitchen grease lagoon and an open burning area. The grease lagoon was rebuilt in 1984 to increase its size twofold. The old lagoon was 20 meters by 15 meters wide and 3 meters in depth.

(3) Approximate Dates of Usage. 1982 - Present.

(4) Operating Practices. The landfill is operated under Kansas State Permit No. 365. A dozer compacts the trash and applies 6 inches of cover daily. The grease lagoon has not been pumped out for 2 years and the open burning area has not been used for 1 year. The landfill is controlled by a gate and an attendant during the operating hours of 0730 to 1600.

(5) Present Condition and Status. The survey team observed leachate emanating from the north side of the landfill, outside the security fence northward several hundred feet into the immediate environment. The leachate appeared as a dark reddish liquid and colored the soil dark red in a drainage channel. The geometry of the cells facing northward allows for greater release of leachate through the eroded landfill wall. Also observed was an excessive amount of windblown trash. The site is active and permitted (Permit No. 365).

c. Waste Characteristics.

(1) Specific Wastes Disposed. Residential and commercial solid waste, and kitchen grease. Waste mercury from broken laboratory instruments, disposed prior to 1982. Small amounts of asbestos.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. It is possible that the leachate could eventually migrate to the local aquifer.

(4) Toxicological Characteristics. Unknown.

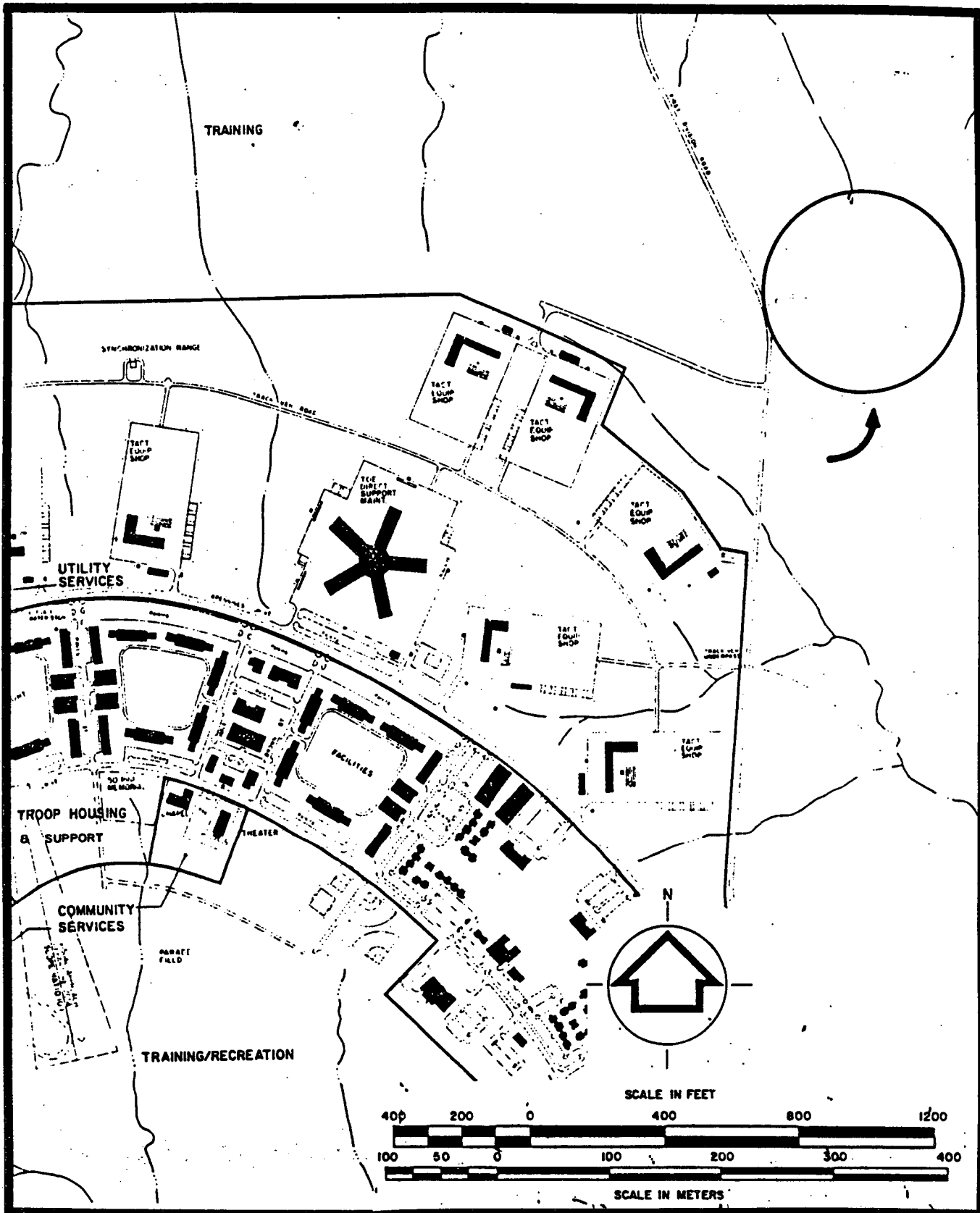
d. Migration Pathways. Soil, ground water, surface water and air.

e. Evidence of Release. The survey team observed leachate at the north side of the landfill. The leachate consisted of a rust colored liquid which drained from the landfill itself, through several hundred feet of gullies outside the landfill perimeter. Operations of the kitchen grease biodegradation lagoon for dining facility waste grease are unlikely to effect ground-water quality. The grease is suspended on top of the water in the clay-lined lagoon. An eroded northern slope of the landfill enhances the potential for release of leachate.

f. Exposure Potential. There is a moderate risk of ground-water contamination from leachate. Depth to ground water in this area is 200 to 300 feet. The landfill is in a location where the permeability of the soils range from 8×10^{-5} cm/s to 10^{-8} cm/s. These soils minimize migration of leachate produced by the landfill if properly managed. However, the solution channels and joints of the Florence limestone formations establish a pathway for ground-water contamination. This site is upgradient from drinking water wells.

g. Recommendations for Sampling. Sample and analyze leachate, soil and surface water. Ground-water monitoring may be necessary, based on the results of leachate and soil test analyses. Sample water in downgradient wells. Topographic regrading of the north face of the landfill can minimize leachate migration.

h. References. 9, 13, 14.



FTRI-001, MAP 1: ACTIVE SANITARY LANDFILL

FTRI-002. Map No. 2.

a. Unit Name. Construction Debris Landfill (Active) (North of Camp Whiteside).

b. Unit Characteristics.

(1) Unit Type. Landfill.

(2) General Dimensions. Design Features. The landfill is in an abandoned limestone quarry north of Camp Whiteside. The site is an area fill encompassing approximately 5 acres.

(3) Approximate Dates of Usage. 1980 - Present.

(4) Operating Practices. An attendant is on duty during the hours 0800 to 1530 Monday through Friday. A sign is posted listing acceptable and nonacceptable wastes (acceptable wastes include unrecyclable building materials, rubble, masonry, lumber, metal, pavement, earth, and products containing rubber, vinyl, plastic, paper, and fiberglass). Two entrances (no gates available) open the landfill to personnel; however, the landfill is not secure to unauthorized dumping and scavaging after the attendant's duty hours. A dozer compacts and covers the waste once per week. Burning is not authorized. Nonburnable and burnable materials are segregated.

(5) Present Condition and Status. The landfill is poorly managed and requires the implementation of better management practices. The survey team observed several small fires on the working face. The team observed unauthorized wastes such as putrescibles, tree branches, appliances, drums, cardboard, scrap metal and metal drums. The site is permitted by Kansas State Permit No. 366. Title 40, CFR, Part 257, paragraph 3-7 defines this site as an "open dump."

c. Waste Characteristics.

(1) Specific Wastes Disposed. Construction debris (wood, concrete, asphalt, soil, brick, shingles, floor tile) and the unauthorized material mentioned in paragraph b5 above.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Possible leachate.

(4) Toxicological Characteristics. Unknown.

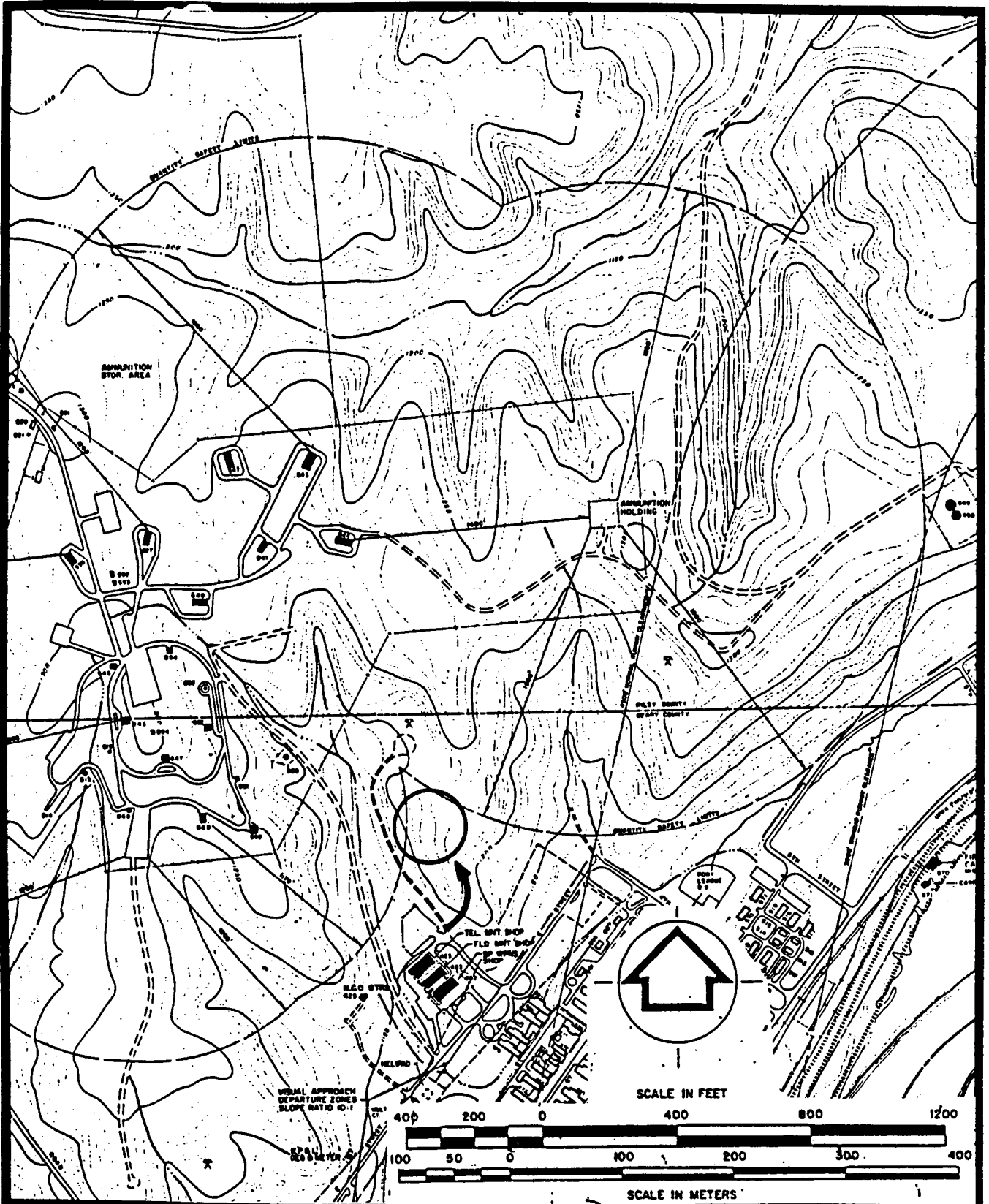
d. Migration Pathways. Soil, ground water, surface water, and air.

e. Evidence of Release. Airborne emissions from open burning. Windblown debris.

f. Exposure Potential. There is a potentially high exposure for environmental contamination due to emissions to air from open burning. Runoff could affect an intermittent stream west of the landfill. Ground water in this upland area is 200 to 300 feet deep.

g. Recommendations for Sampling. Sample and analyze soil and surface water. Ground-water monitoring may be necessary, based on the results of soil and water test analysis.

h. References. 8, Darrel Wilson.



**FTRI-002, MAP 2: ACTIVE CONSTRUCTION DEBRIS
LANDFILL**

FTRI-003. Map No. 3.

a. Unit Name. Closed Sanitary Landfill (Southwest of Camp Funston near the Kansas River).

b. Unit Characteristics.

(1) Unit Type. Sanitary Landfill.

(2) General Dimensions. Design Features. A 200 acre trench type landfill.

(3) Approximate Dates of Usage. 1950 - 1981.

(4) Operating Practices. Trench and fill.

(5) Present Condition and Status. This closed landfill is well vegetated by native grass including western wheat grass, kentucky blue grass, and various forbs. Samples from six ground-water monitoring wells exhibited elevated concentrations of metals and an increased number of volatile organic compounds (VOC's). Refer to Annex FTRI-003 for analytical results of ground-water monitoring (reference 8).

c. Waste Characteristics.

(1) Specific Wastes Disposed. All types of solid waste including waste solvents.

(2) Physical and Chemical Characteristics. Refer to MSDS for compounds listed in reference 8.

(3) Migration and Dispersal Characteristics. Leachate formation to ground water and surface water.

(4) Toxicological Characteristics. Refer to MSDS for compounds listed in reference 8.

d. Migration Pathways. Soil, air, ground and surface water. The direction of ground-water flow is toward the Kansas River. There is a potential for the release of methane to the atmosphere.

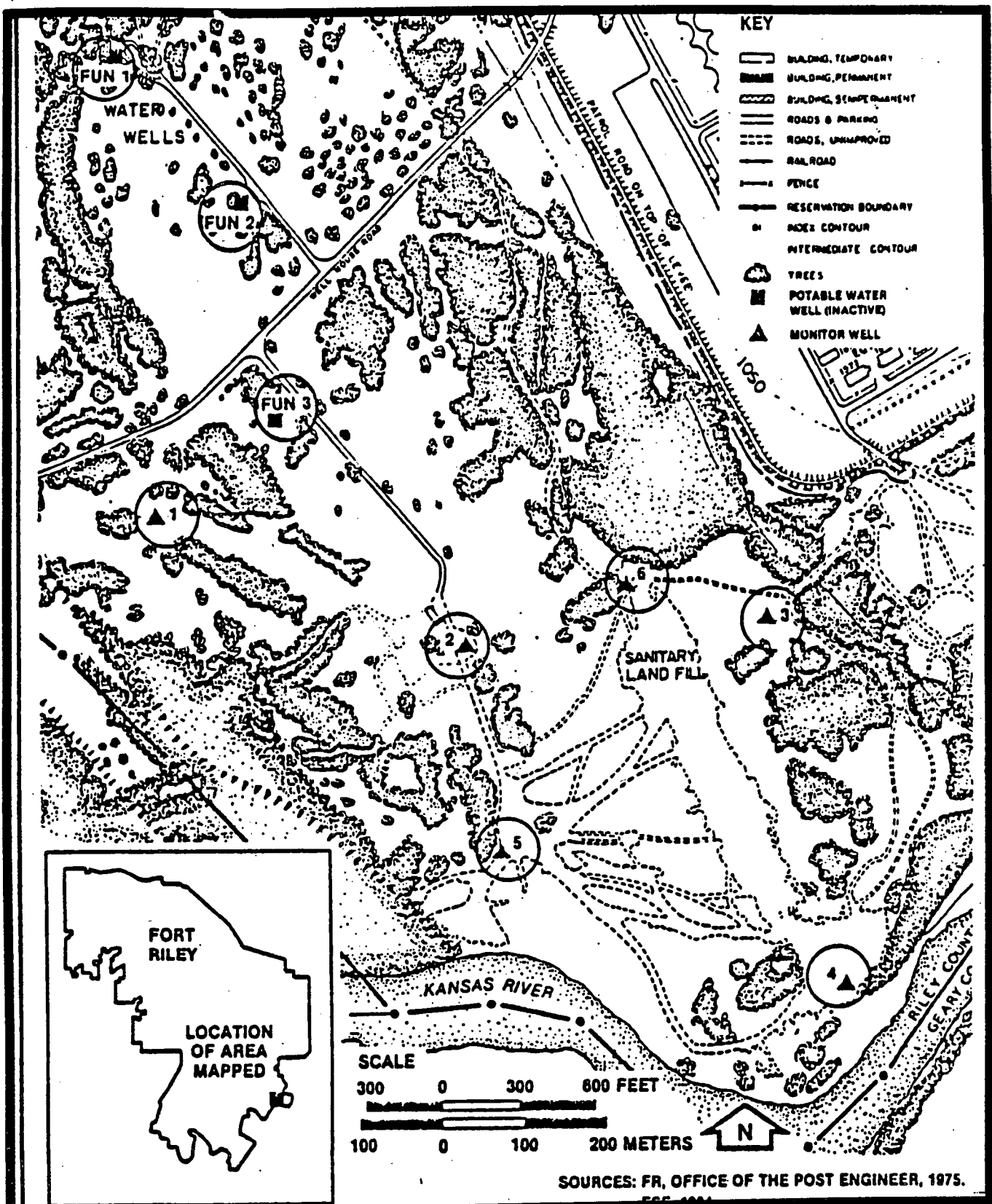
e. Evidence of Release. Heavy metals and VOC's.

f. Exposure Potential. There is a low potential for exposure to the Kansas River by the migration of contaminated ground water; however, the base flow of the Kansas River should sufficiently dilute releases from the landfill. It should be noted that no potable wells are in the area, thus minimizing the threat to local water supplies.

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g. Recommendations for Sampling. Sample the monitoring wells that are now in place and analyze for heavy metals, volatile organics, acid and base/neutral extractable organics, total dissolved solids, specific conductance, chlorides, nitrate/nitrite, sulfate, fluoride and pH.

h. References. 8, Darrel Wilson.





DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422



REPLY TO
ATTENTION OF

HSHB-ME-SG

18 FEB 1988

MEMORANDUM FOR: Commander, Fort Riley, ATTN: AFZN-FE-E,
Fort Riley, KS 66502-5000

SUBJECT: Ground-water Monitoring Results for Fort Riley, KS

1. Ground-water samples were collected for chemical analysis on 26 October 1987 from six monitoring wells near the Camp Funston Landfill at Fort Riley, KS. The sampling and analysis were performed in response to regulatory requirements of the State of Kansas. Analytical results show that concentrations of several metals were elevated, and also indicate an increased number of volatile organic compounds (VOCs) detected. These results should be submitted to the Kansas Department of Health and Environment as has been requested.
2. Enclosure 1 is a table reporting the ground-water quality data for the Camp Funston Landfill well samples. Enclosure 2 is a list of the volatile organic compounds analyzed and the corresponding detection limits. A discussion of volatile organic results may be found in paragraph 4. Sample collection and field measurements were performed by installation personnel. All other results were determined by this Agency's laboratory or a laboratory under contract to this Agency. These data represent the second semiannual results for 1987; the first set of 1987 data was reported in reference 6b. Parameter concentrations are compared with National Primary Drinking Water Regulation (NPDWR) standards or National Secondary Drinking Water Regulation criteria where applicable. Concentrations which exceed these standards or criteria are noted on Enclosure 1.
3. Results are very consistent with those reported previously. Concentrations of arsenic (well sample 3) and barium (well sample 2) slightly exceed the NPDWR standard, as has been the case in past sampling periods. No other NPDWR standards were exceeded. Levels of iron, manganese, and total dissolved solids (TDS) were also high for all well samples. In general, samples from well 2 showed the highest degradation; however, this well does not appear to be downgradient of the sanitary landfill. Ground water in the vicinity of the landfill is of a highly mineralized nature, as shown by the high TDS, alkalinity, and hardness. This can be attributed to the weathering of limestone formations prevalent in the area.
4. Samples were also analyzed for the volatile organic priority pollutants listed in Enclosure 2. In addition to the two VOCs detected previously (vinyl chloride and trans-1,2-Dichloroethene)

23 FEB 1988

HS HB-ME-SG

SUBJECT: Ground-water Monitoring Results for Fort Riley, KS

(reference 6c), trichloroethene, benzene, and ethylbenzene were detected in this sampling period. The table lists the VOCs detected and contains the EPA standard, where applicable. These results indicate that the wastes buried in the landfill (reported to include waste solvents) are affecting the local ground water quality. Ground-water elevation data appear to indicate that the direction of flow is toward the Kansas River; however, it is believed that the gradient may be reversed during times of high river stages. Although levels of vinyl chloride and benzene exceed the Maximum Contaminant Levels set for drinking water, it should be noted that there are no potable wells in the area, and therefore, no threat exists to local water supplies.

Table. Volatile Organic Compounds Detected (ug/L)
 Camp Funston Landfill, Fort Riley
 Samples Collected 26 October 1987

Parameter	Well Sample No.				EPA Standard ¹	
	1	2	3	6	MCL	MCLG
trans-1,2-Dichloroethene	4.			7.		
Trichloroethene	7.	6.	3.	3.		
Vinyl chloride		20.		19.	2.	
Benzene		10.			5.	
Ethylbenzene		8.				680.

¹ USEPA Maximum Contaminant Levels and Maximum Contaminant Level Goals Under the Safe Drinking Water Act.

5. Questions regarding these data may be referred to Ms. Patricia Rippey or Mrs. Beth Martin, this Agency, AUTOVON 584-2024.

6. Reference:

a. Letter, Office of the Chief of Engineers, DAEN-ZCE, 23 June 1986, subject: Modification of the US Army Ground-water Monitoring Program.

b. Memorandum, this Agency, HSHB-ME-SG, 10 December 1987, SAB.

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HSHB-ME-SG

SUBJECT: Ground-water Monitoring Results for Fort Riley, KS

c. Letter, this Agency, HSHB-ME-SG, 2 April 1987, SAB.

FOR THE COMMANDER:

2 Encl



PAUL R. THIES
LTC, MS
Chief, Waste Disposal Engineering
Division

CF (w/encls):
CINC, FORSCOM, ATTN: FCMD-PC
CINC, FORSCOM, ATTN: FCEN-FED

RUN DATE: 05 FEB 88

INSTALLATION: FT RILEY, KS

SITE: CAMP FUNSTON LANDFILL

SAMPLING SITES RESULTS

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	1	2	3	4	5	6
WATER									
LEVELS (A)	26 OCT 87		FT	1034.3	1033.6	1033.9	1032.2	1032.5	1033.5
ARSENIC	26 OCT 87	.005	MGL	ND	.012	.054*	.015	.010	.023
BARIUM	26 OCT 87	.05	MGL	.29	2.31*	.44	.73	.26	.68
CADMIUM	26 OCT 87	.500	UGL	ND	ND	ND	ND	ND	ND
CHROMIUM	26 OCT 87	.020	MGL	ND	ND	ND	ND	ND	ND
FLUORIDE	26 OCT 87	.1	MGL	.3	.4	.3	.3	.3	.2
LEAD	26 OCT 87	.001	MGL	ND	.001	ND	ND	ND	ND
MERCURY	26 OCT 87	.500	UGL	.500	.500	.500	.500	.500	ND
NO2+NO3 AS N	26 OCT 87	.05	MGL	ND	ND	ND	ND	ND	ND
SELENIUM	26 OCT 87	.001	MGL	ND	ND	ND	ND	ND	ND
SILVER	26 OCT 87	.020	MGL	ND	ND	ND	ND	ND	ND
TURBIDITY	26 OCT 87	1.	NTU	210.	1100.	7800.	790.	440.	1300.
CHLORIDE	26 OCT 87	1.0	MGL	118.0.	124.0	155.0	170.0	64.0	110.0
IRON	26 OCT 87	.02	MGL	4.69#	43.10#	14.90#	26.10#	14.30#	27.90#
MANGANESE	26 OCT 87	.001	MGL	1.550#	2.390#	1.480#	1.950#	1.960#	3.000#
SODIUM	26 OCT 87	1.	MGL	77.	70.	88.	127.	60.	74.
SULFATE	26 OCT 87	2.0	MGL	115.0	39.0	110.0	86.0	240.0	50.0
COND(FIELD)	26 OCT 87	1.	UMC	1250.	2299.	1500.	1600.	1300.	1300.
COND(FIELD)	26 OCT 87	1.	UMC	1275.	2299.	1500.	1575.	1400.	1300.
COND(FIELD)	26 OCT 87	1.	UMC	1275.	2299.	1525.	1600.	1400.	1200.
COND(FIELD)	26 OCT 87	1.	UMC	1275.	2299.	1450.	1600.	1075.	1300.
PH(FIELD)	26 OCT 87		PH	7.1	6.8	7.1	6.9	7.0	7.1
PH(FIELD)	26 OCT 87		PH	7.1	6.9	7.2	6.9	7.0	7.0
PH(FIELD)	26 OCT 87		PH	7.1	6.9	7.1	6.9	7.0	7.0
PH(FIELD)	26 OCT 87		PH	7.1	6.8	7.1	6.9	7.0	7.0
SPEC COND	26 OCT 87	1.	UMC	900.	1500.	1500.	1320.	1200.	1220.
SPEC COND	26 OCT 87	1.	UMC	900.	1500.	1090.	1090.	1200.	1220.
SPEC COND	26 OCT 87	1.	UMC	920.	900.	1100.	1300.	1200.	1220.
SPEC COND	26 OCT 87	1.	UMC	900.	1500.	1090.	1300.	1220.	1240.
TOC	26 OCT 87	.1	MGL	2.8	19.0	4.0		6.2	8.6
TOC	26 OCT 87	.1	MGL	2.7	18.0	4.1		6.2	8.7
TOC	26 OCT 87	.1	MGL	2.7	18.0	4.1		6.0	8.7
TOC	26 OCT 87	.1	MGL	2.9	19.0	4.3		6.2	8.8
TOX	25 OCT 87	.010	MGL	.030	.100	.040	.080	.030	.070
TOX	26 OCT 87	.010	MGL	.040	.100	.030	.070	.030	.070
TOX	26 OCT 87	.010	MGL	.030	.100	.030	.070	.030	.070
TOX	26 OCT 87	.010	MGL	.030	.090	.040	.080	.040	.070
COD	26 OCT 87	25.	MGL	530.	114.	67.	80.	57.	60.
TDS	26 OCT 87	1.	MGL	690.#	1039.#	710.#	990.#	986.#	952.#
TOTAL ALK	26 OCT 87	2.	MGL	310.	968.	400.	608.	540.	580.

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1111

RUN DATE: 05 FEB 88

INSTALLATION: FT RILEY, KS

SITE: CAMP FUNSTON LANDFILL

SAMPLING SITES
RESULTS

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	1	2	3	4	5	6
HARDNESS	26 OCT 87	2.	MGL	467.	1075.	568.	732.	762.	740.
PHOSPHATE-P	26 OCT 87	.02	MGL	.09	.20	.10	.39	.19	.43
COPPER	26 OCT 87	.010	MGL	.019	ND	ND	.002	ND	ND
ZINC	26 OCT 87	.02	MGL	ND	.03	ND	ND	ND	ND
POTASSIUM	26 OCT 87	.10	MGL	12.70	19.10	8.51	9.39	20.70	13.80
CALCIUM	26 OCT 87	.1	MGL	124.0	333.0	163.0	277.0	247.0	235.0
SILICA	26 OCT 87	.20	MGL	16.90	23.70	18.10	25.80	18.50	23.10

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RUN DATE: 05 FEB 88

INSTALLATION: FT RILEY, KS

SITE: CAMP FUNSTON LANDFILL

LEGEND

NOTES: ALL METALS AND OTHER PARAMETERS WHERE APPROPRIATE ARE ON A DISSOLVED (FILTERED) BASIS UNLESS OTHERWISE NOTED. DETECTION LIMITS SHOWN ARE NORMAL LEVELS; ACTUAL LIMITS MAY VARY IN ENVIRONMENTAL SAMPLES. ANALYTICAL RESULTS ARE ACCURATE TO EITHER 2 OR 3 SIGNIFICANT FIGURES.

- A VALUES SHOWN ARE FOR WATER LEVEL ELEVATION ABOVE A REFERENCE DATUM
- B UPGRADIENT SITE
- * VALUE EXCEEDS A NATIONAL INTERIM PRIMARY DRINKING WATER REGULATION STANDARD
- # VALUE EXCEEDS A NATIONAL SECONDARY DRINKING WATER REGULATION CRITERIA

MGL - MILLIGRAMS/LITER
HGL - MICROGRAMS/LITER
PCL - PICOCURIES/LITER
UMC - MICROMHDS/CENTIMETER
NTU - NEPHELOMETRIC TURBIDITY UNITS
TON - THRESHOLD ODOR NUMBER
TDN - TASTE DILUTION INDEX NUMBER
CU - COLOR UNITS
PHM - PER 100 MILLILITERS

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VOLATILE ORGANIC COMPOUNDS

Compound	Detection Limit (ug/L)
2-Chloroethylvinyl ether	3.
Chloromethane	3.
Bromomethane	3.
Vinyl chloride	3.
Chloroethane	3.
Methylene chloride	3.
1,1-Dichloroethene	3.
1,1-Dichloroethane	3.
trans-1,2-Dichloroethene	3.
Chloroform	3.
1,2-Dichloroethane	3.
1,1,1-Trichloroethane	3.
Carbon tetrachloride	3.
Dichlorobromomethane	3.
1,2-Dichloropropane	3.
trans-1,3-Dichloropropene	3.
Trichloroethene	3.
Benzene	3.
cis-1,3-Dichloropropene	3.
1,1,2-Trichloroethane	3.
Dibromochloromethane	3.
Bromoform	3.
Tetrachloroethene	3.
1,1,2,2,-Tetrachloroethane	3.
Toluene	3.
Chlorobenzene	3.
Ethylbenzene	3.
Fluorotrichloromethane	3.

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FTRI-004. Map No. 4.

a. Unit Name. Landfill, Mainpost (Closed).

b. Unit Characteristics.

(1) Unit Type. Open Dump.

(2) General Dimensions. Design Features. The size of this site is not known. The site was used as an open surface disposal area.

(3) Approximate Dates of Usage. 1880's - 1920's.

(4) Operating Practices. Surface dumping of waste materials.

(5) Present Condition and Status. The site is completely vegetated by cottonwood, ash and annual grasses. There were no signs of subsidence. Mounding was present.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Leather, glass, and ashes.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. None.

(4) Toxicological Characteristics. Unknown.

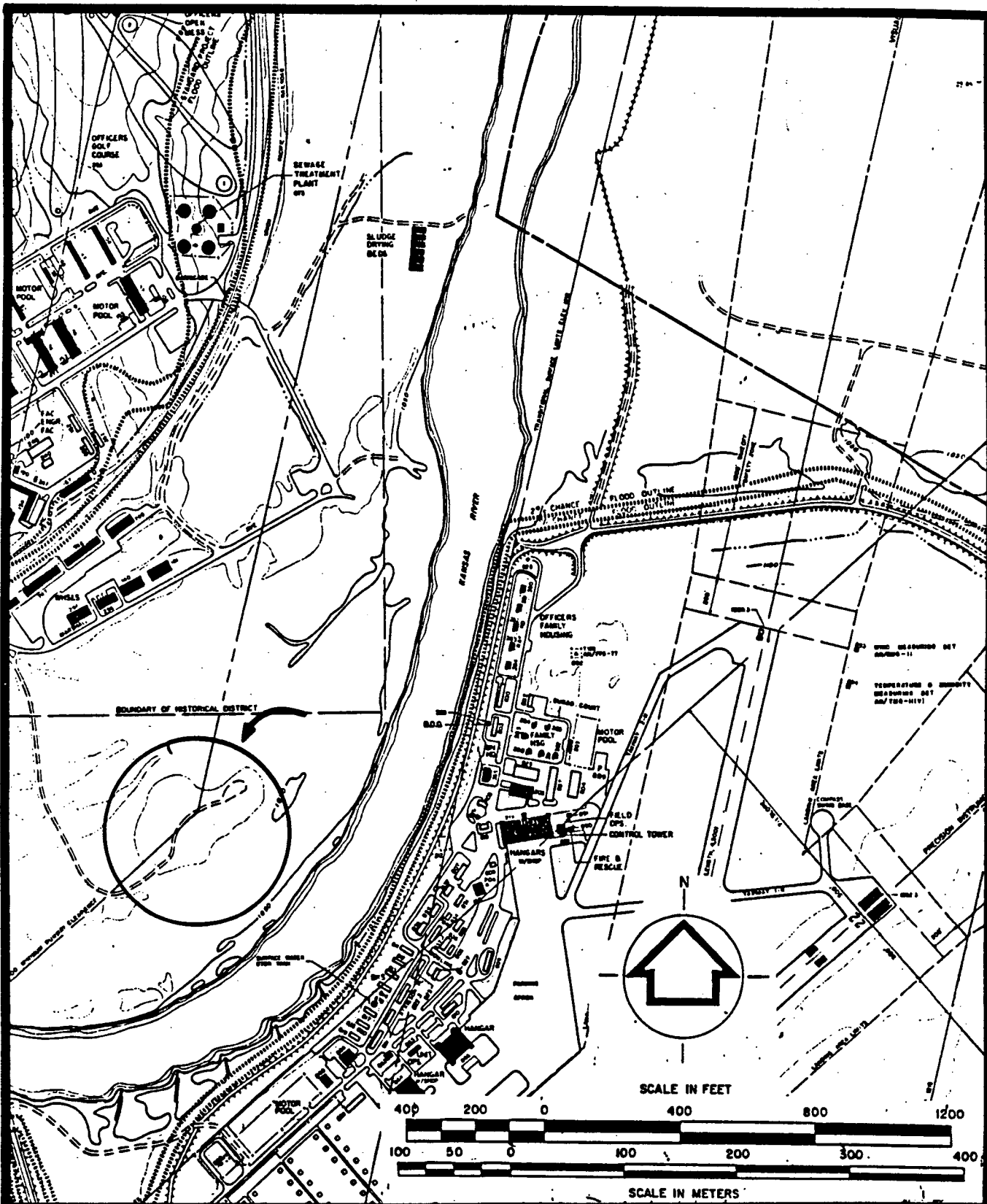
d. Migration Pathways. Soil, surface water and ground water. The site is 200 feet from the Kansas River and the depth to ground water is approximately 20 feet.

e. Evidence of Release. None.

f. Exposure Potential. The exposure potential is low due to the nature of the wastes involved and the age of this site.

g. Recommendations for Sampling. None.

h. References. 13, Darrel Wilson.



FTRI-004, MAP 4: ABANDONED LANDFILL MAIN POST

FTRI-005. Map No. 5.

a. Unit Name. Landfill (Rubble), Custer Hill.

b. Unit Characteristics.

(1) Unit Type. Landfill. (Surface disposal of road construction debris disposal characterizes this site as an open dump.)

(2) General Dimensions. Design Features. The site size is approximately 1/4 acre. The waste material is deposited on the natural land surface.

(3) Approximate Dates of Usage. The operating life of this site was a 6-month period during 1980-1981.

(4) Operating Practices. Surface disposal of road material, concrete and blacktop.

(5) Present Condition and Status. The waste materials were exposed. This site is officially closed; however, the survey team observed no cover material. Natural weeds and annual grasses covered the surface.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Road wastes, concrete, blacktop and wire.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. None.

(4) Toxicological Characteristics. Unknown.

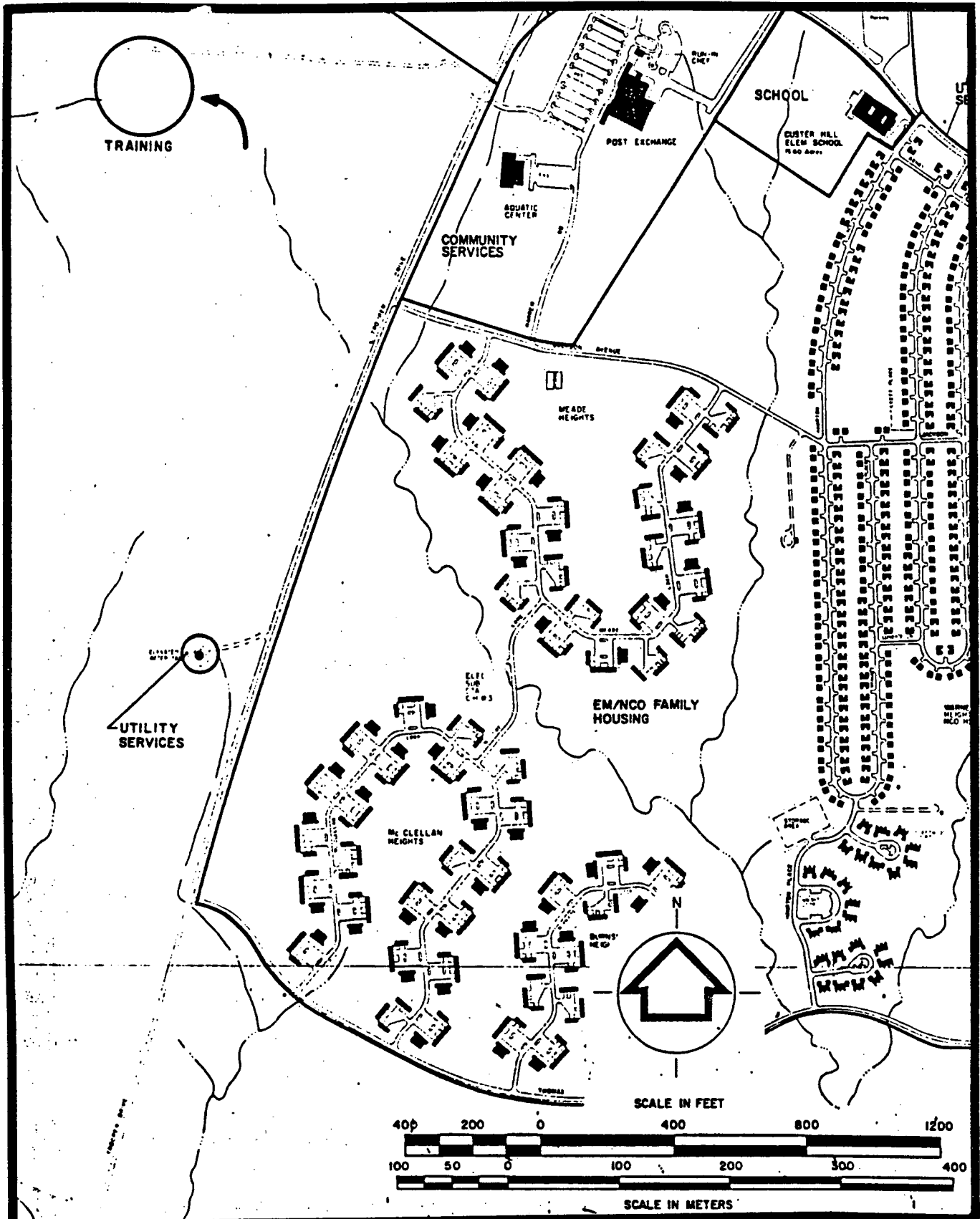
d. Migration Pathways. Soil, surface and ground water.

e. Evidence of Release. None.

f. Exposure Potential. The exposure potential is low due to the nature of the wastes involved.

g. Recommendations for Sampling. None. Remove waste materials from this site and dispose in accordance with State and Federal regulations.

h. Reference. Darrel Wilson.



FTRI-005, MAP 5: LANDFILL, CUSTER HILL (RUBBLE)

FTRI-006. Map No. 6.

a. Unit Name. Hazardous Waste Storage Facility (DRMO).

b. Unit Characteristics.

(1) Unit Type. Container Storage and Waste Storage Yard. Waste treatment for silver recovery.

(2) General Dimensions. Design Features. The facility stored hazardous waste in two 16 feet by 18 feet buildings (Bldg Nos. 1952 and 1953). Each building had three bermed concrete floors and metal roofs. The floors were bermed with concrete for segregation of hazardous waste. The storage yard is concrete and blacktop.

(3) Approximate Dates of Usage. 1984 - Present.

(4) Operating Practices. This facility provides storage for hazardous wastes generated at Fort Riley. The installation has submitted this facility in the RCRA Part B permit application.

(5) Present Condition and Status. The overall condition of the facility was very good. There were no signs of spillage, deteriorated containers, or improper container storage. At the time of this investigation, the facility contained a relatively small quantity of hazardous waste. These wastes include waste paint thinner and filters located in Bldg 1952. In Bldg 1953, corrosives and toxics included sulfuric acid, lithium sulfur dioxide, mercury, and magnesium batteries. The majority of waste in Bldg 1953 was 34 15-gallon containers of sulfuric acid (UN2796). Other wastes observed were a small quantity of photographic waste (Sodium Thiosulfate), and 200 gallons of DS-2. Silver is recovered onsite from waste photographic hypo solution. This facility is active and is permitted under RCRA Interim Status by the State of Kansas.

c. Waste Characteristics.

(1) Specific Wastes Disposed. See paragraph b5 above for specific wastes stored during the site visit and Appendix H for a list of controlled wastes the facility accepts.

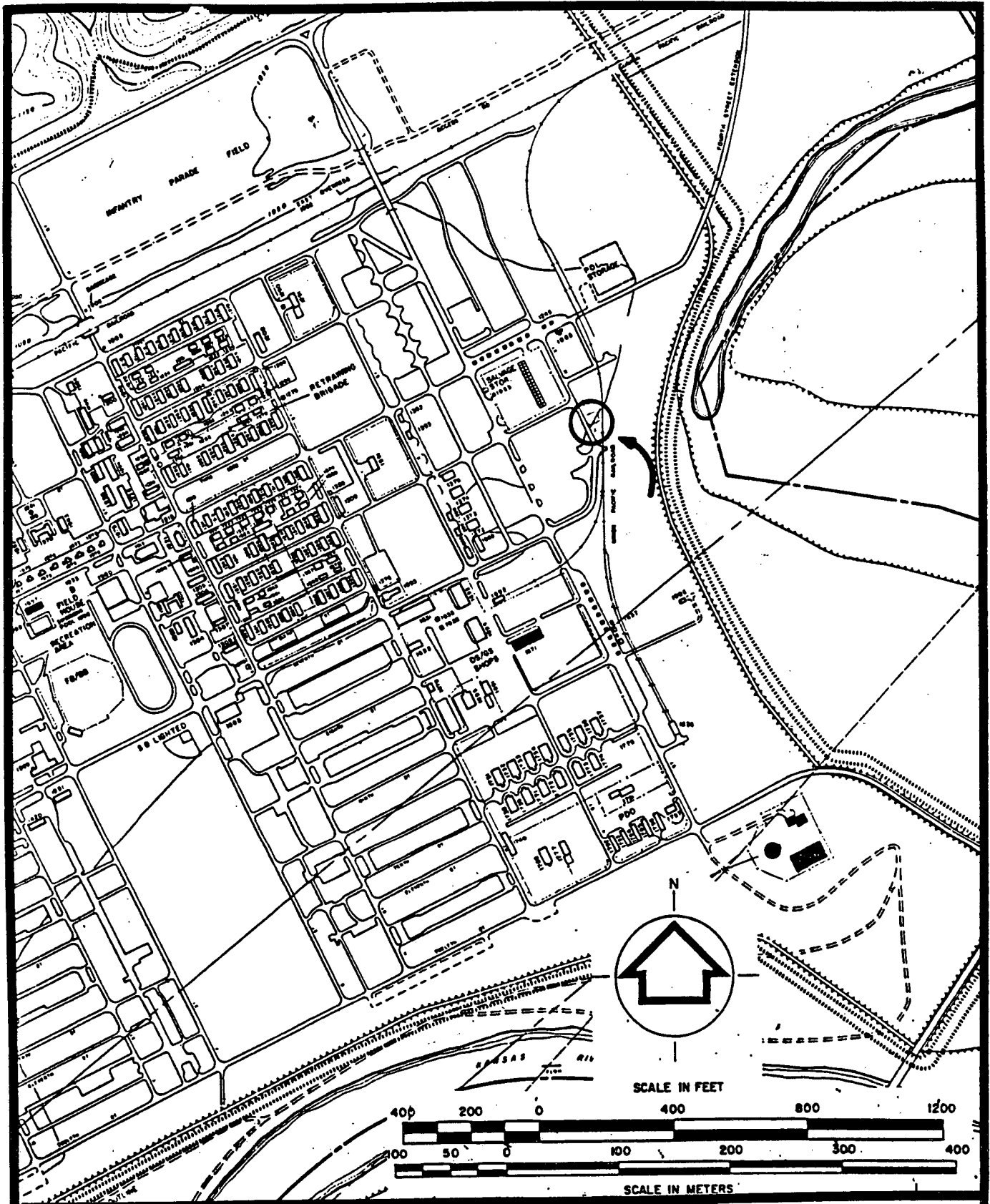
(2) Physical and Chemical Characteristics. The listed compounds are liquids in containers except the batteries and silver.

(3) Migration and Dispersal Characteristics. None, due to containment facilities.

(4) Toxicological Characteristics. Refer to MSDS in Appendix F.

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- d. Migration Pathways. Soil, air, surface and ground water.
- e. Evidence of Release. None.
- f. Exposure Potential. There is a low potential for exposure at this site because of the good management practices performed and proper containment design.
- g. Recommendations for Sampling. Continue to operate this storage area in accordance with the Interim Status standards in 40 CFR 265.
- h. References. 5, 13, 15, Joseph Cothorn.



FTRI-006, MAP 6: HAZARDOUS WASTE STORAGE FACILITY (DRMO)

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FTRI-007. Map No. 7.

a. Unit Name. PCB Articles Storage, Bldg No. 343 Mainpost, DEH Area.

b. Unit Characteristics.

(1) Unit Type. PCB Articles Storage Building.

(2) General Dimensions. Design Features. This building has a 25 foot by 40 foot cement floor. The building has a metal roof and is open faced.

(3) Approximate Dates of Usage. March 1988 - Present.

(4) Operating Practices. Temporary storage for PCB items awaiting disposal through DRMO.

(5) Present Condition and Status. There are currently two transformers containing $50 < 500$ ppm PCBs placed in individual drip pans. The articles are well contained. Previous leakage of PCB-contaminated fluid is scheduled for cleanup by a contractor or DEH personnel.

c. Waste Characteristics.

(1) Specific Wastes Disposed. PCB-contaminated fluid $50 \leq 500$ ppm.

(2) Physical and Chemical Characteristics. PCB-contaminated dielectric fluid.

(3) Migration and Dispersal Characteristics. Spills or leaks.

(4) Toxicological Characteristics. Polychlorinated biphenyls are suspected cancer causing chemicals in humans.

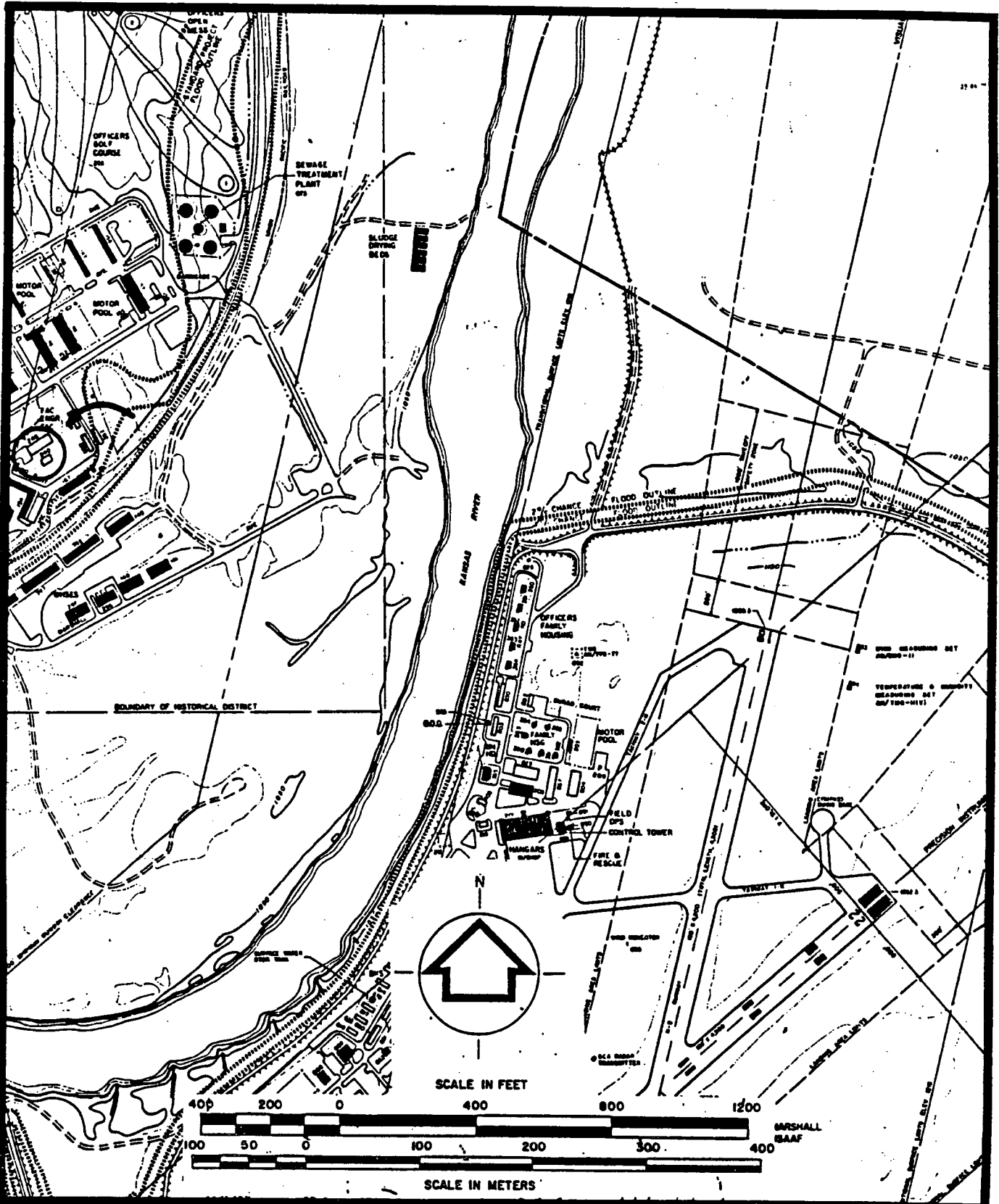
d. Migration Pathways. Air and potentially surface and ground water.

e. Evidence of Release. There is evidence of release of an oily substance on the containment concrete floor and drip pan.

f. Exposure Potential. The exposure potential is low due to the containment of the concrete floor and roofed building; however, the open face of the building could present migration of contaminants through run-on or runoff during periods of extreme precipitation.

g. Recommendations for Sampling. Develop a sampling plan to determine the extent of PCB and heavy metal contamination in and adjacent to the storage building. Remedial actions will depend on results of sample analysis and should be coordinated with the State of Kansas. Store PCB transformers and capacitors in accordance with requirements set forth in 40 CFR 761.65.

h. References. 12, Darrel Wilson.



FTRI-007, MAP 7: PCB ARTICLES STORAGE BUILDING NO. 343

FTRI-008. Map No. 8.

a. Unit Name. PCB Articles Storage Bldg No. 348.

b. Unit Characteristics.

(1) Unit Type. Container Storage.

(2) General Dimensions. Design Features. Two CONEXES (6 foot by 8 foot) and an area 25 feet by 30 feet consisting of gravel having a slope of approximately 3 percent.

(3) Approximate Dates of Usage. 1985 - Present.

(4) Operating Practices. Bldg No. 348 is used for temporary storage for PCB items, prior to transfer through DRMO.

(5) Present Condition and Status. Polychlorinated biphenyl items were not properly contained. There was some leakage to the gravel surface. There were three CONEX boxes, three transformers, seven capacitors, one circuit breaker and a bag of rags.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Electrical equipment: PCB-contaminated >50 ppm. One bag of PCB-contaminated rags.

(2) Physical and Chemical Characteristics. PCB-contaminated dielectric fluid.

(3) Migration and Dispersal Characteristics. Polychlorinated biphenyls have the potential to migrate into shallow surface deposits, and if mixed with solvent material could potentially migrate into shallow ground water.

(4) Toxicological Characteristics. Polychlorinated biphenyls are suspected cancer causing chemicals in humans.

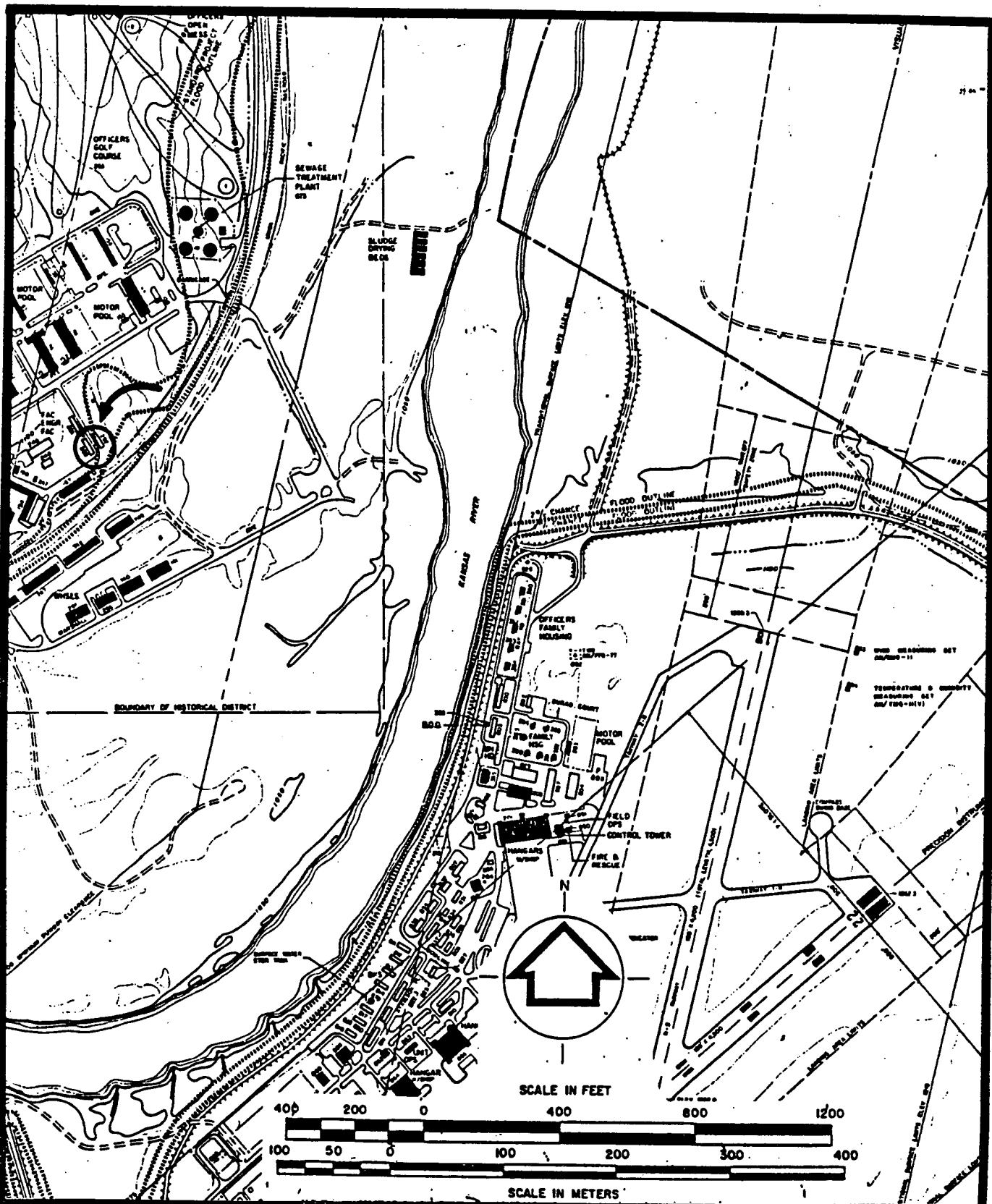
d. Migration Pathways. Soil, ground water and air.

e. Evidence of Release. There is evidence of an oily substance on the gravel surface.

f. Exposure Potential. The exposure potential is moderate due to migration of the degraded gravel surface the articles are placed on. This environment is also dusty, contributing to airborne contamination.

g. Recommendations for Sampling. Develop a sampling plan to determine the extent of PCB heavy metal contamination adjacent to the storage building. Remedial actions will depend on results of sample analysis. Store PCB transformer items and articles in accordance with requirements set forth in 40 CFR 761.65.

h. References. 12, Darrel Wilson.



**FTRI-008, MAP 8: PCB ARTICLES STORAGE
BUILDING NO. 348**

FTRI-009. Map No. 9.

a. Unit Name. 74th Active OB/OD Ground, Range 16.

b. Unit Characteristics.

(1) Unit Type. Active OB/OD Ground: Waste Treatment.

(2) General Dimensions. Design Features. Eight pits ranging from approximately 10 feet by 10 feet to 20 feet by 20 feet and 10 feet deep for larger pits.

(3) Approximate Dates of Usage. 1941 - Present.

(4) Operating Practices. Open burning and open detonation of waste ordnance, performed as needed. The installation burns unserviceable ammunition in a blowhole (without burn pans) until all propellant and fuel is completely burned.

(5) Present Condition and Status. The ongoing operations are well maintained. During 1985, 26,921 pounds of unexploded ordnance were processed. Fort Riley's Part A permit lists this operation as thermal treatment.

c. Waste Characteristics. According to the HW Definition (40 CFR 261), residue from HW treatment are, themselves, considered to be hazardous by characteristic of reactivity until proven otherwise. Since the original explosive wastes treated are hazardous by characteristic of reactivity, the residues must also be considered reactive until proven otherwise [40 CFR 261.3(c)(2)].

(1) Specific Wastes Disposed. Small caliber ammunition and large caliber high explosive ammunition.

(2) Physical and Chemical Characteristics. Unknown without analysis of the waste, soil and water.

(3) Migration and Dispersal Characteristics. Contaminants could leach from the soil to ground or surface water. Once in the ground water, the chemicals are not readily diluted. Explosives will migrate and disperse in surface deposits depending on the solubility of the waste.

(4) Toxicological Characteristics. Unknown without analysis of the waste.

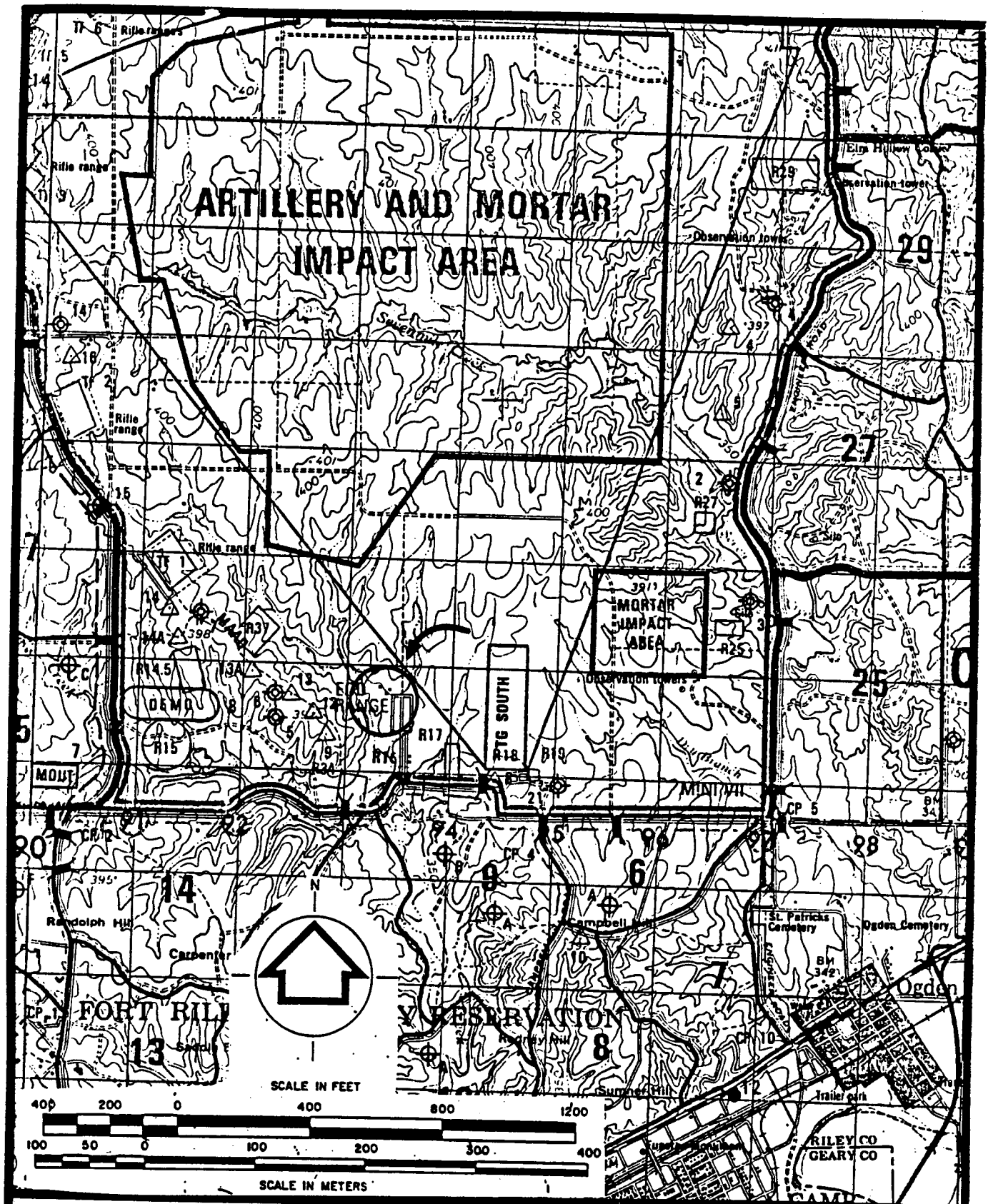
d. Migration Pathways. Soil, ground water and air. Surface water during flow of an intermittent stream (6 months per year).

e. Evidence of Release. Explosives were burned directly on the ground which could produce organic and heavy metal contamination. The extent of any contamination will not be known without testing.

f. Exposure Potential. Moderate. The primary soils are clay offering slow ground-water migration, and surface water is seasonal. Depth to ground water is 10 feet deep during January and 30 feet deep during July. There was no containment to prevent the wastes from being incorporated into the soil. There is the potential for inhalation and skin contact of windblown explosive particulates.

g. Recommendations for Sampling. Implement a soil sampling and analysis plan and collect soil samples from the open trench. Perform metals analysis for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Test soil samples for total explosives (i.e., HMX, RDX, 2,4,6-TNT, 2,6-DNT, 2,4-DNT and TNB). Sample surface water during flow and ground water for constituents listed above. Periodically analyze ash for extractable organics and the characteristic of EP Toxicity (heavy metals) as defined in 40 CFR 261.24, and for explosive residues.

h. References. 13, 17, Darrel Wilson.



**FTRI-009, MAP 9: OPEN BURING/OPEN
DETONATION GROUND (ACTIVE)**

FTRI-010. Map No. 10.

a. Unit Name. Underground Storage Tanks (Camp Funston; Pesticide).

b. Unit Characteristics.

(1) Unit Type. Waste Storage.

(2) General Dimensions. Design Features. Four 4,000-gallon steel tanks at an abandoned petroleum, oil and lubricant (POL) station. The dimensions of each tank are approximately 7 feet in diameter and 14 feet long. Each tank has a 3 1/2 inch diameter stand pipe extended from the tank to the ground level (concrete pavement). The bottom of the tanks are approximately 8.5 feet below the paved grade.

(3) Approximate Dates of Usage. The installation used the tanks for gasoline from 1950 to 1972. Beginning in 1976, Fort Riley stored herbicide in the tanks.

(4) Operating Practices. Herbicide was dispensed from 1976 until the early 1980's. Today the tanks are secured and locked.

(5) Present Condition and Status. The U.S. Army Corps of Engineers is developing a cleanup plan through a contractor to remove the tanks and their contents. No leak testing has been performed.

c. Waste Characteristics.

(1) Specific Wastes Disposed. 2,4,5-T, and herbicide 2,4-Dichlorophenoxyacetic acid (2,4-D) water emulsion, mixed with some hydrocarbons. Residual gasoline from previous tank storage.

(2) Physical and Chemical Characteristics. Unknown without sample analysis.

(3) Migration and Dispersal Characteristics. Spills or leaks.

(4) Toxicological Characteristics. Unknown without sample analysis.

d. Migration Pathways. Soil and ground water.

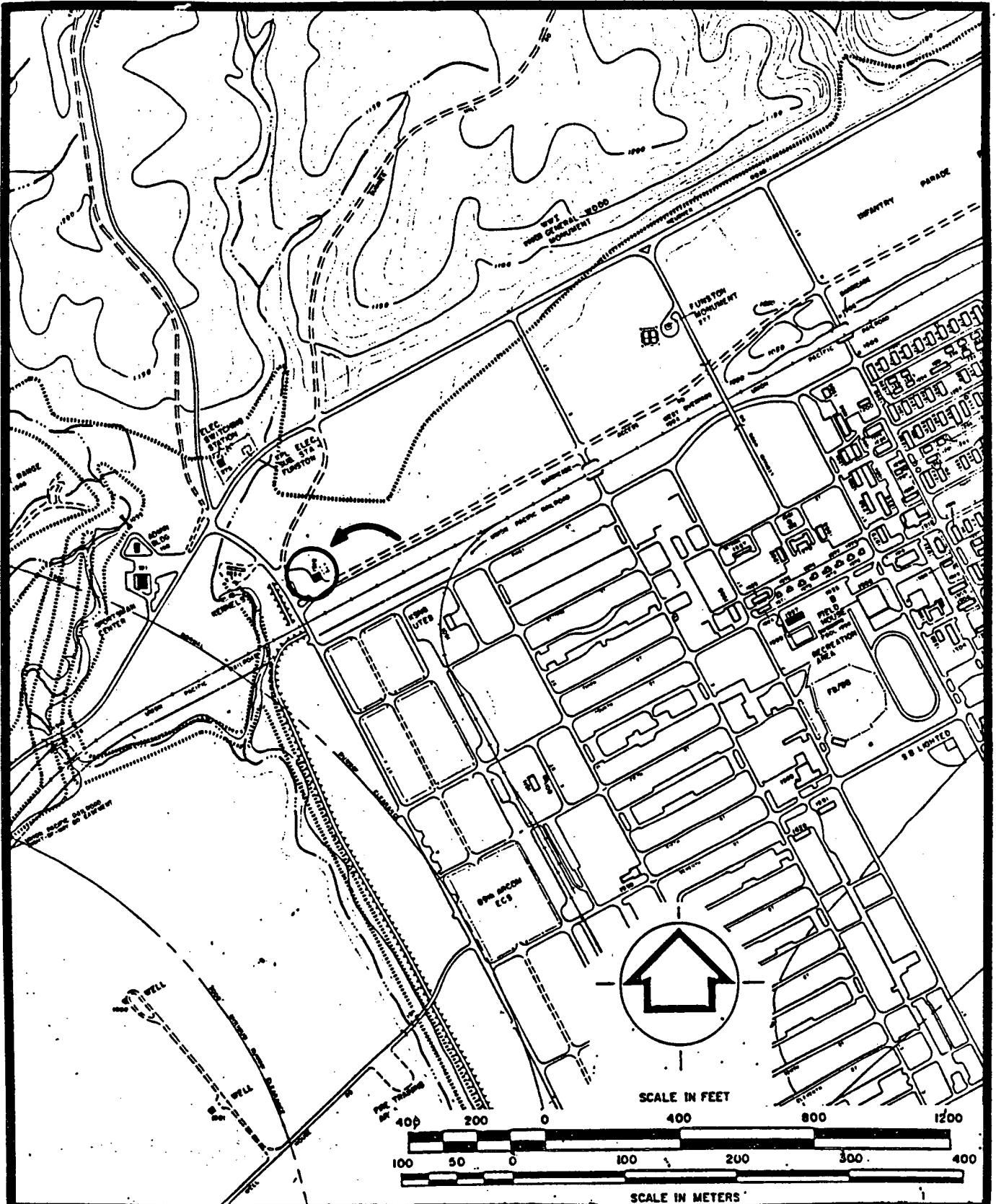
e. Evidence of Release. None known. The installation reports that the tank liquid level is stable.

f. Exposure Potential. Moderate exposure potential to ground water and soil. Release potential is governed by possible leakage and dispensing management. Ground water is 15 feet below the surface.

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g. Recommendations for Sampling. Upon removal of the tanks, sample soil and analyze for pesticides; volatile organic compounds; 2,4-D; 2,4,5-T; 2,4-Dichlorophenol; 2,4,6-Trichlorophenol; dioxins and furans. Removal and disposal of contaminated soil will be based on the results of the analysis.

h. References. 13, 16, Charles Harris.



**FTRI-010, MAP 10: UNDERGROUND STORAGE TANKS
(CAMP FUNSTON, PESTICIDE)**

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FTRI-011. Map No. 11.

a. Unit Name. Underground Storage Tanks (Camp Funston; Waste Oil)
South of DRMO between L and 9th Streets.

b. Unit Characteristics.

(1) Unit Type. Waste Storage, Underground Tanks.

(2) General Dimensions. Design Features. Seven 1,250-gallon
tanks, underground.

(3) Approximate Dates of Usage. 1941 - 1945.

(4) Operating Practices. During 1941-1945 the tanks stored diesel
fuel and gasoline. During 1987 the tanks stored waste oil.

(5) Present Condition and Status. The installation has a program
to remove all the tanks. All seven tanks are empty. The survey team
observed spillage adjacent to the tanks.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Diesel fuel and waste oil.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Spillage can migrate
to ground water through the soil.

(4) Toxicological Characteristics. Unknown.

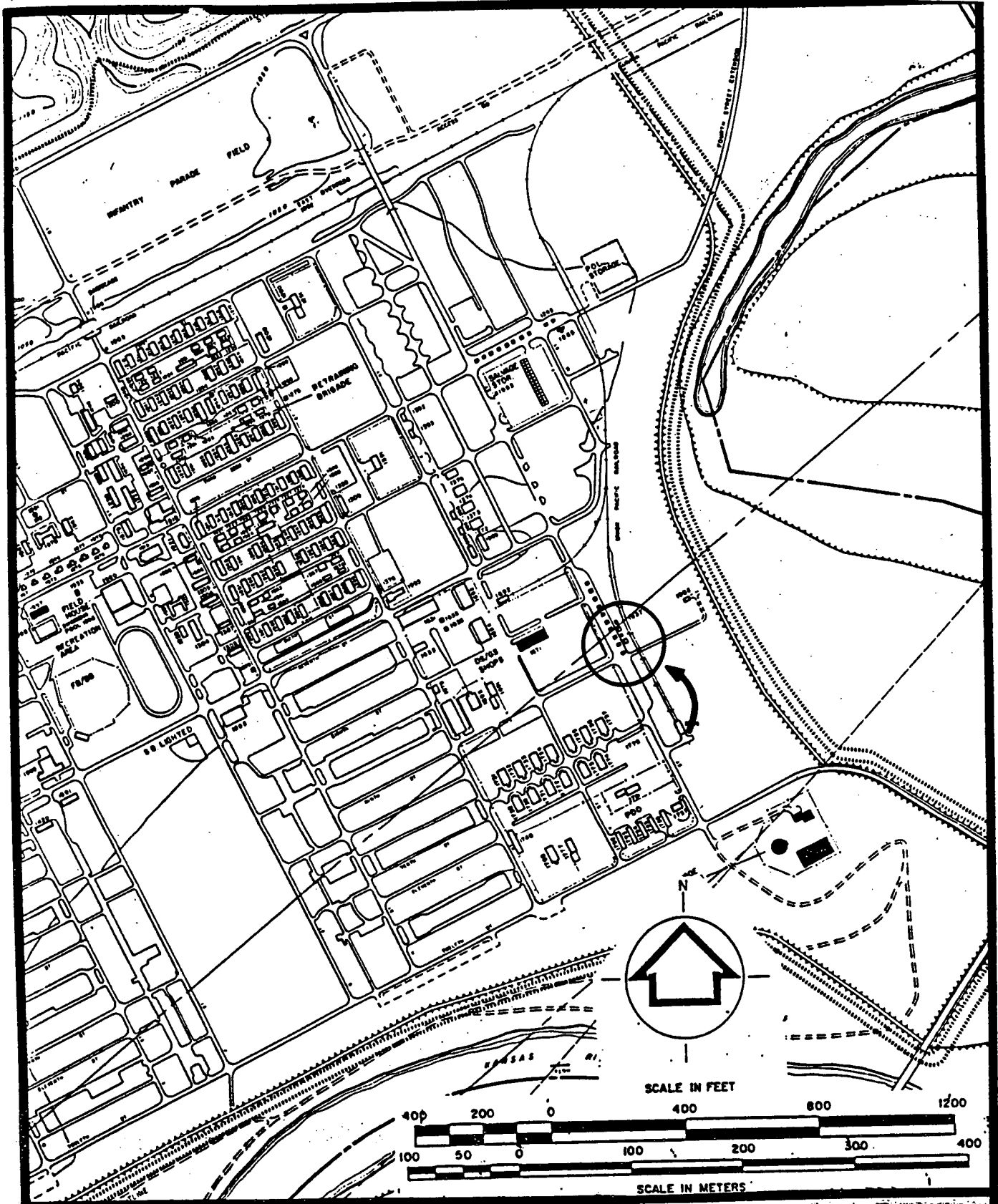
d. Migration Pathways. Soil and ground water. Oxbow Lake is 1/4 mile
from the tanks.

e. Evidence of Release. The survey team observed spillage of oil at
four locations from pumping operations.

f. Exposure Potential. There is a moderate exposure potential due to
the depth to ground water of approximately 30 feet and the unknown
disposition of the waste oil.

g. Recommendations for Sampling. Develop a soil sampling and analysis
plan to identify the extent of contamination. Use parameters in Appendix G
for chemical analysis.

h. Reference. Darrel Wilson.



**FTRI-011, MAP 11: UNDERGROUND STORAGE TANKS
(CAMP FUNSTON, PESTICIDE)**

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May 1986

FTRI-012. Map No. 12.

a. Unit Name. Waste Fuel Storage Facility (Camp Funston).

b. Unit Characteristics.

(1) Unit Type. Waste Fuel/Oil Storage.

(2) General Dimensions. Design Features. Concrete pad 50 feet by 80 feet, chained fenced with a gate, no berm.

(3) Approximate Dates of Usage. January 1988 - Present.

(4) Operating Practices. Temporary storage of palatized 55-gallon drums of waste fuels and oils. Drums are sold through DRMO to a successful bidder.

(5) Present Condition and Status. The facility is operating and is in good condition. This site has no concrete berm for spill containment. However, an earthen berm is situated around three sides of the facility.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Waste fuels including JP-4 and waste oil from MAAF; diesel and MOGAS from motor pools.

(2) Physical and Chemical Characteristics. Refer to MSDS, Appendix F.

(3) Migration and Dispersal Characteristics. None.

(4) Toxicological Characteristics. Refer to MSDS, Appendix F.

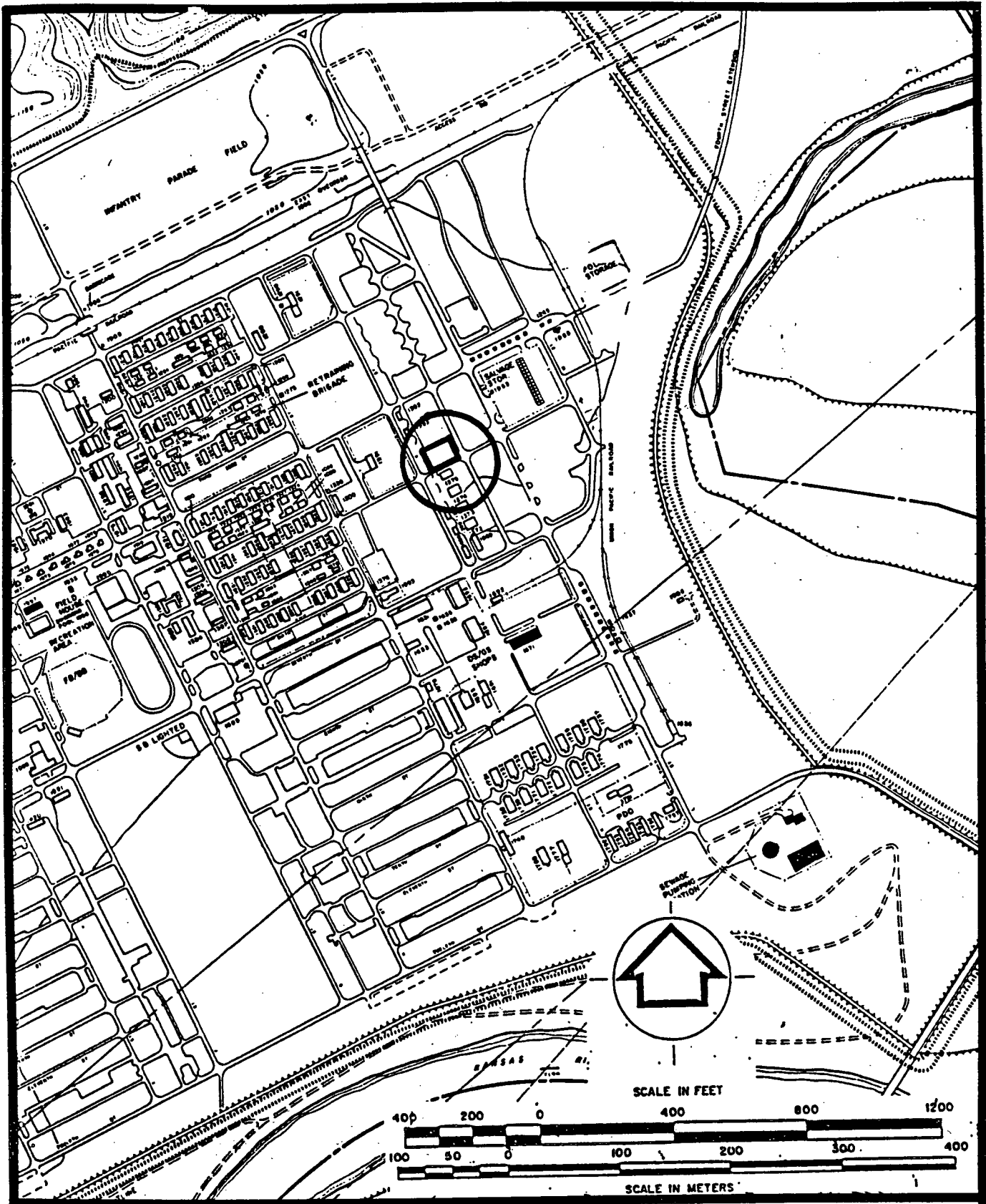
d. Migration Pathways. None.

e. Evidence of Release. None.

f. Exposure Potential. Low. This facility is well managed, Potential spills are not expected to reach the surrounding soils or ground water.

g. Recommendations for Sampling. Sample and analyze the waste oil for characteristics of HW and EP toxic metals in accordance with 40 CFR 261. Also test for flash point, total metals and total halogens.

h. References. 3, Darrel Wilson.



**FTRI-012, MAP 12: WASTE FUEL STORAGE FACILITY
(CAMP FUNSTON)**

FTRI-013. Map No. 13.

a. Unit Name. Abandoned VOC Tanks (1/2 Mile North of Irwin U.S. Army Community Hospital).

b. Unit Characteristics.

(1) Unit Type. Waste Storage.

(2) General Dimensions. Design Features. There are two 650-gallon World War I era tanks. Each tank is steel riveted, 3 feet in diameter and 11 feet long. A short 2-inch diameter stand pipe with a gate valve is on top of each tank. The tanks are covered with approximately 5 inches of soil. The tanks were exposed at the middle sections and east ends.

(3) Approximate Dates of Usage. Estimated 1920's for fuel storage.

(4) Operating Practices. 1920's for fuel storage to support a gravity flow fuel operation for quarrying. The installation stored solvent in tanks during WWII. The solvent storage operating practices are not known.

(5) Present Condition and Status. The tanks are in a deteriorated state having open stand pipes. A strong odor is present. Each tank contains about 100 gallons of material.

c. Waste Characteristics.

(1) Specific Wastes Disposed. The tanks contain primarily tetrahydrothiophene and benzene, toluene, ethylbenzene and xylene at >10,000 ppm.

(2) Physical and Chemical Characteristics. Tetrahydrothiophene has a flash point of 55 °F. There is a strong pungent odor emitted from the tanks due to the sulfur content.

(3) Migration and Dispersal Characteristics. Unknown.

(4) Toxicological Characteristics. See MSDS's in Appendix F.

d. Migration Pathways. Soil, ground water and air.

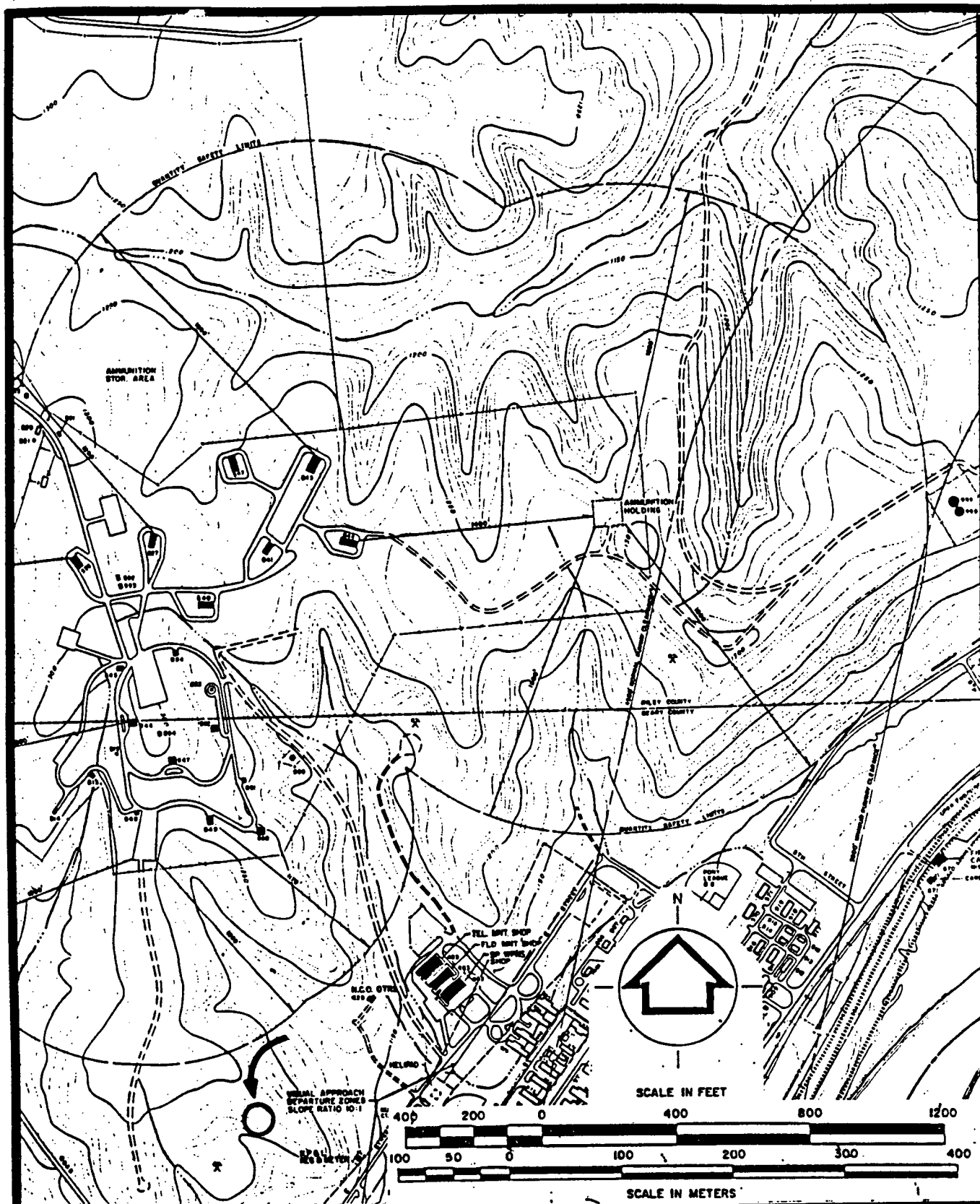
e. Evidence of Release. Evidence of releases to air. The survey team observed strong odors emanating from the VOC tanks.

f. Exposure Potential. There is a high potential for exposure from the contents of these tanks due to their deteriorated state, open bungs and unknown disposition of the liquid contained.

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g. Recommendations for Sampling. Revolve the tanks. Sample and analyze the tank liquid and soil beneath and surrounding the tanks for VOC's and EP toxic metals. Ground-water monitoring may be necessary based on the results of the soil test analysis.

h. References. 16, Charles Harris.



FTRI-013, MAP 13: ABANDONED VOC TANKS

FTRI-014. Map No. 14.

a. Unit Name. Incinerator (Irwin U.S. Army Community Hospital).

b. Unit Characteristics.

(1) Unit Type. Incinerator CONTRO Inc. No. 824, Gas Fired.

(2) General Dimensions. Design Features. Double chamber, primary and secondary. Burn ratio: 750 °F for loading to 1,800 °F for burning. Capacity: 112 cubic feet.

(3) Approximate Dates of Usage. 1978 - Present.

(4) Operating Practices. Eight-hour daytime shift begins 0730, burning 15 minutes for each 25 pound load. Burn class is 1, 2, 3, 4.

(5) Present Condition and Status. Operating. This unit will be upgraded by a Ventomatic Incinerator capable of 1,600 °F to 2,100 °F temperatures. Its attributes are thicker refractor walls, cleaner and hotter burn and more efficient burning time. The stack will be extended another 15 feet. OSHA standards are being implemented.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Body parts and fluid including HIV infectious waste, yellow bag infectious waste, sharps (needles) and plastic tubings. The implements are first autoclaved prior to disposal.

(2) Physical and Chemical Characteristics. Solid and liquid hospital waste including infectious waste.

(3) Migration and Dispersal Characteristics. Airborne particulates and gases.

(4) Toxicological Characteristics. Unknown.

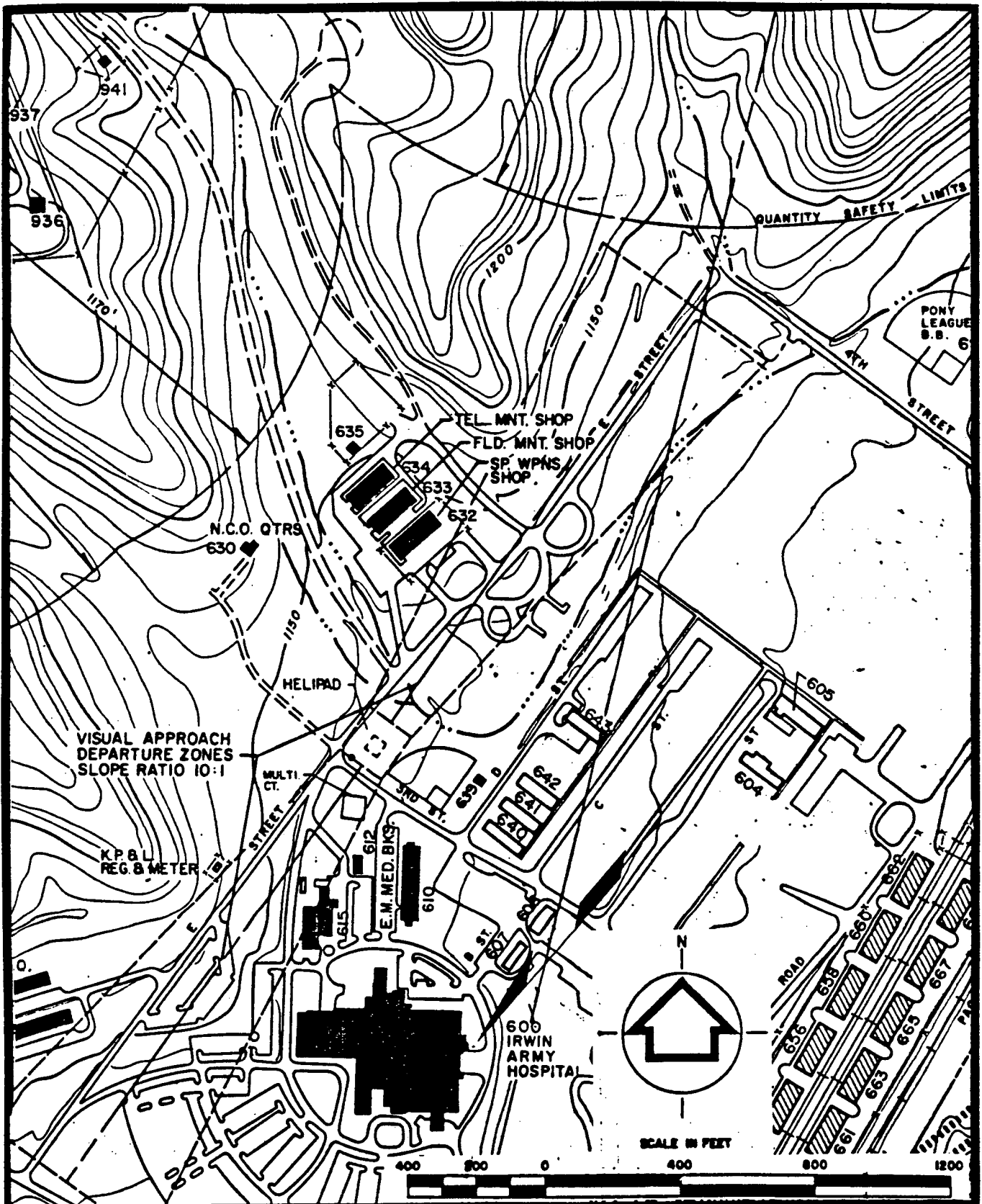
d. Migration Pathways. Air.

e. Evidence of Release. None.

f. Exposure Potential. Given the confined and well managed operation of this incinerator, there is a low potential for exposure to the environment or personnel.

g. Recommendations for Sampling. None.

h. References. 13, Darrel Wilson.



FTRI-014, MAP 14: INCINERATOR (IRWIN U.S. ARMY HOSPITAL)

FTRI-015. Map Nos. 15A-E.

a. Unit Name. Waste Oil Underground Storage Tanks.

b. Unit Characteristics.

(1) Unit Type. Waste Oil Storage, Underground.

(2) General Dimensions. Design Features. There are 60 waste oil underground storage tanks in the Installation system (Appendix E). The tanks range from 500 to 12,000 gallon capacity and are made of fiberglass or steel.

(3) Approximate Dates of Usage. Current.

(4) Operating Practices. Units generating waste oil inform DEH for pickup. The designated contractor, Central Kansas Crude Company of Iuka, Kansas, collects the waste oil directly from the storage tanks for recycling. The waste oil is then recycled.

(5) Present Condition and Status. Most of the tanks were in use at the time of this survey. The tanks are reported to be in good condition and have no record of leaks.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Waste motor oil.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Leaks or spills.

(4) Toxicological Characteristics. Unknown.

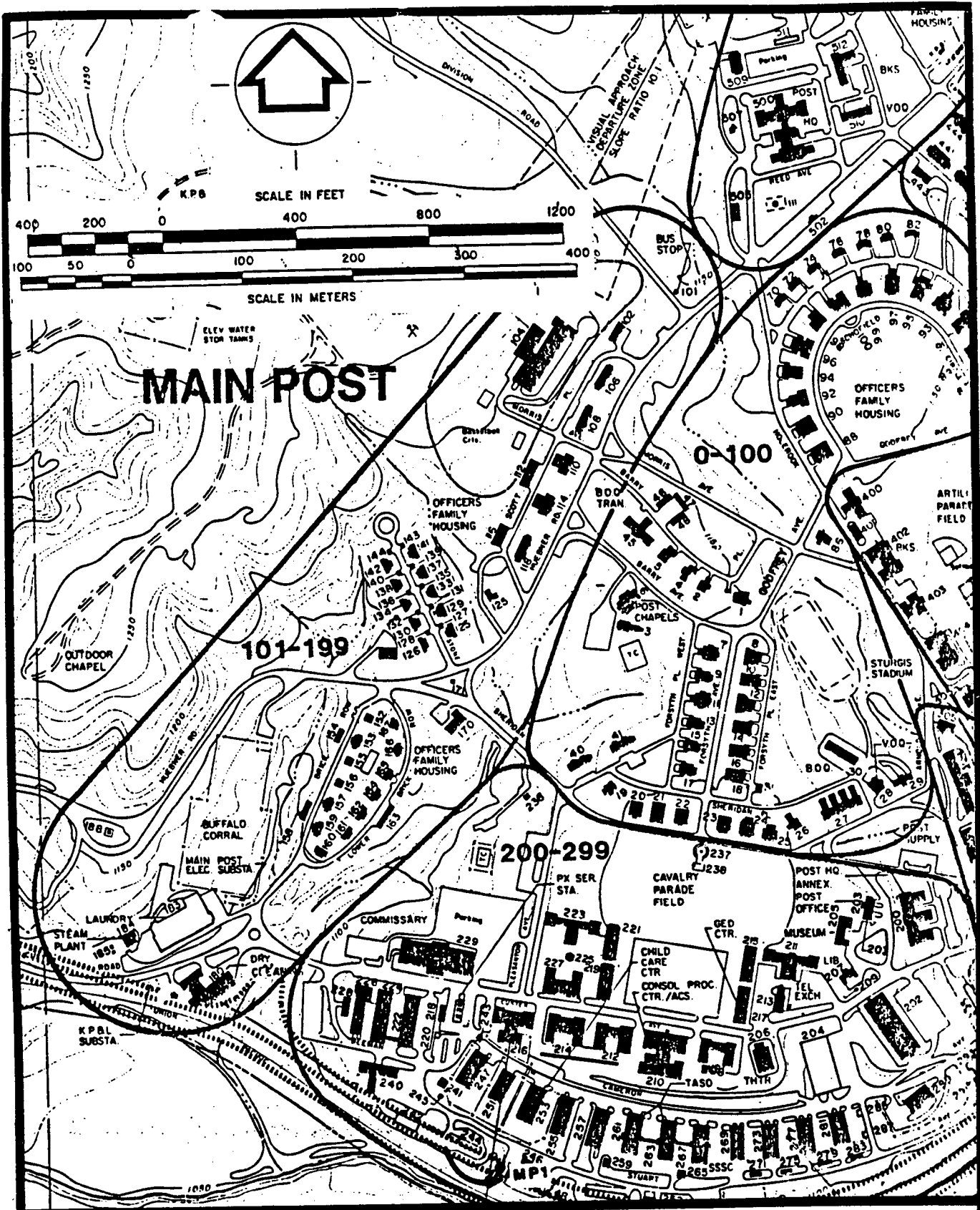
d. Migration Pathways. None, unless the tank leaked to the soil and ground water.

e. Evidence of Release. None.

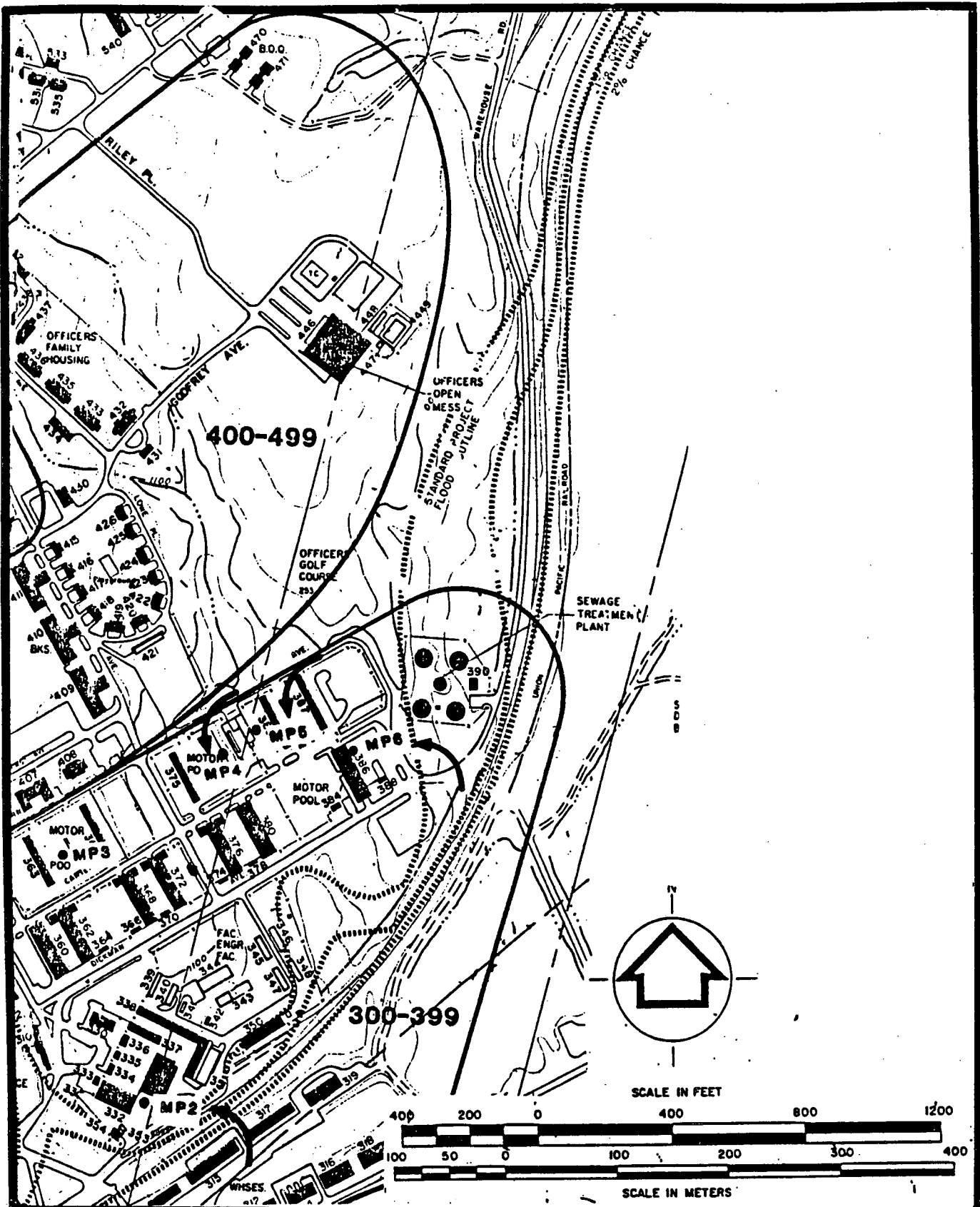
f. Exposure Potential. Low. Should a leak occur, oil could migrate through the soil to the ground water and float on the water table interface.

g. Recommendations for Sampling. None.

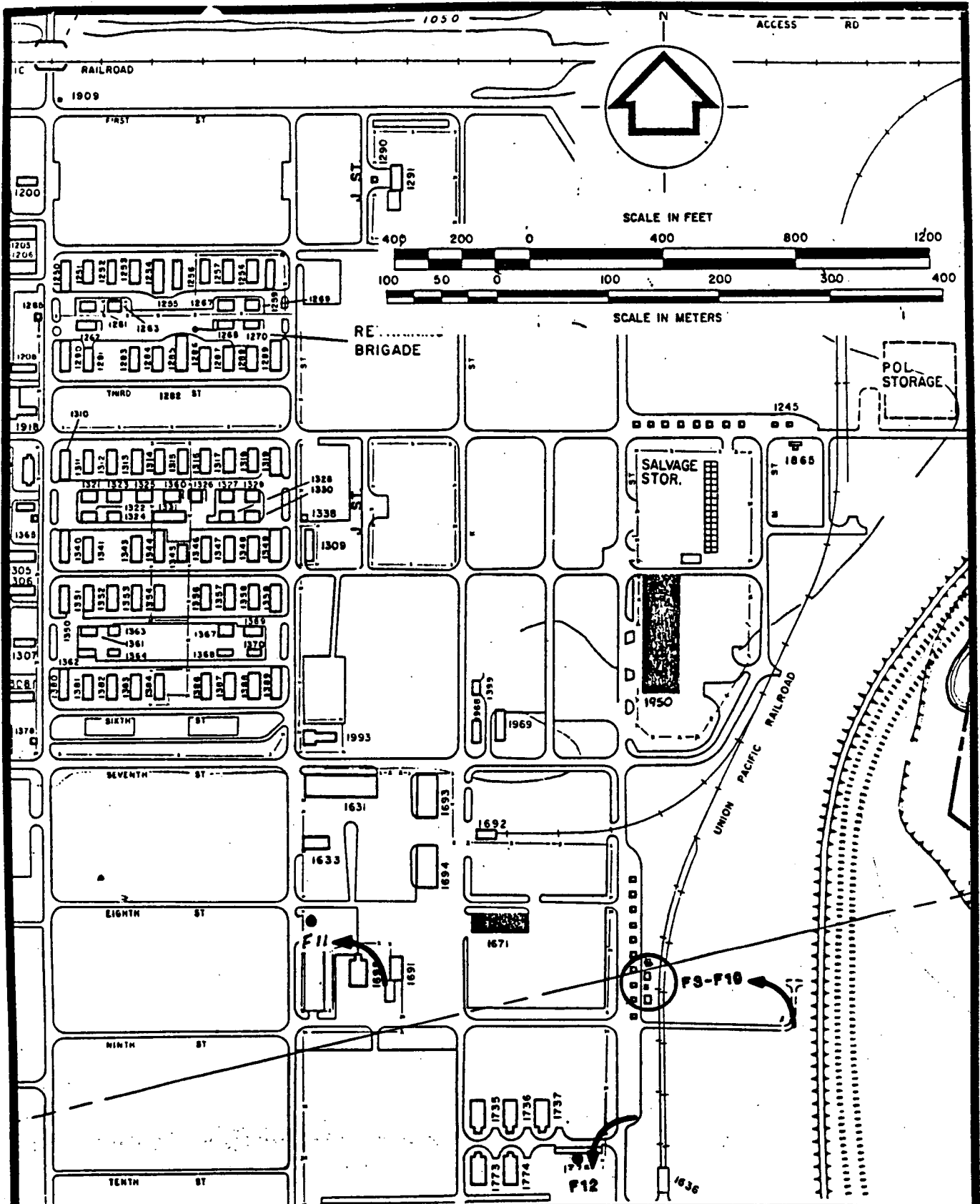
h. Reference. Darrel Wilson.



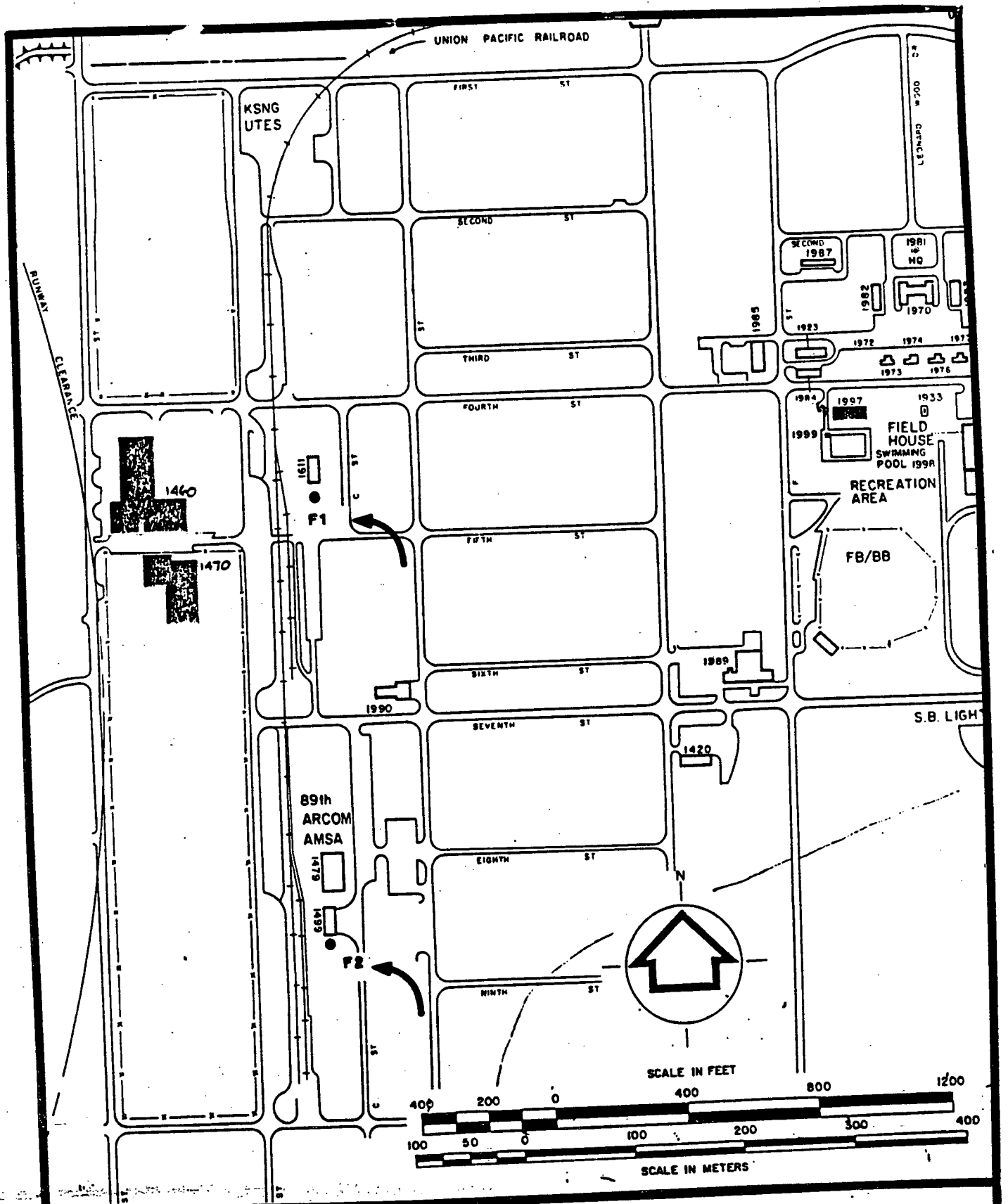
FTRI-015, MAP 15A: MAIN POST UNDERGROUND STORAGE TANKS (WASTE OIL)



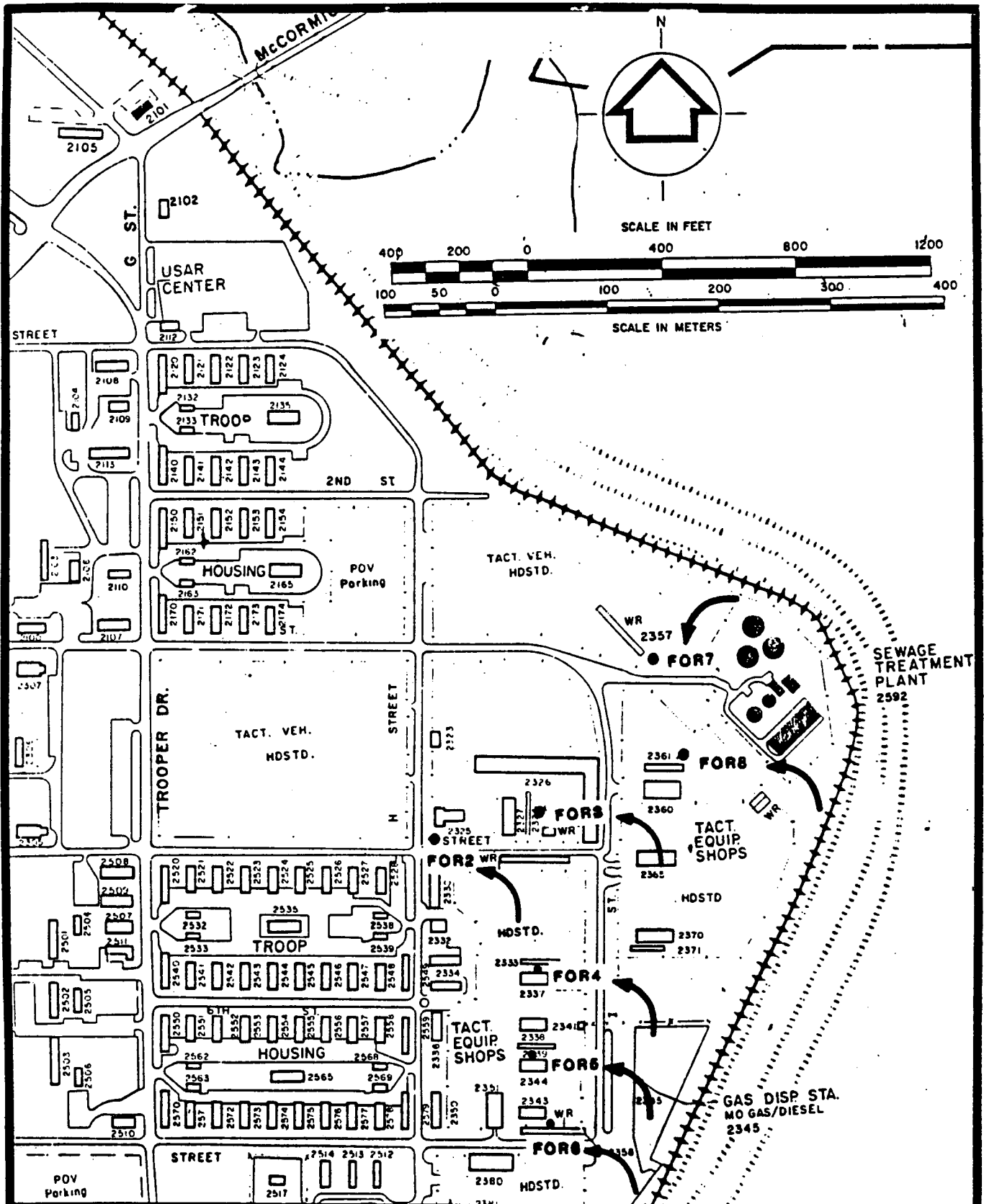
FTRI-015, MAP 15A: MAIN POST UNDERGROUND STORAGE TANKS (WASTE OIL)



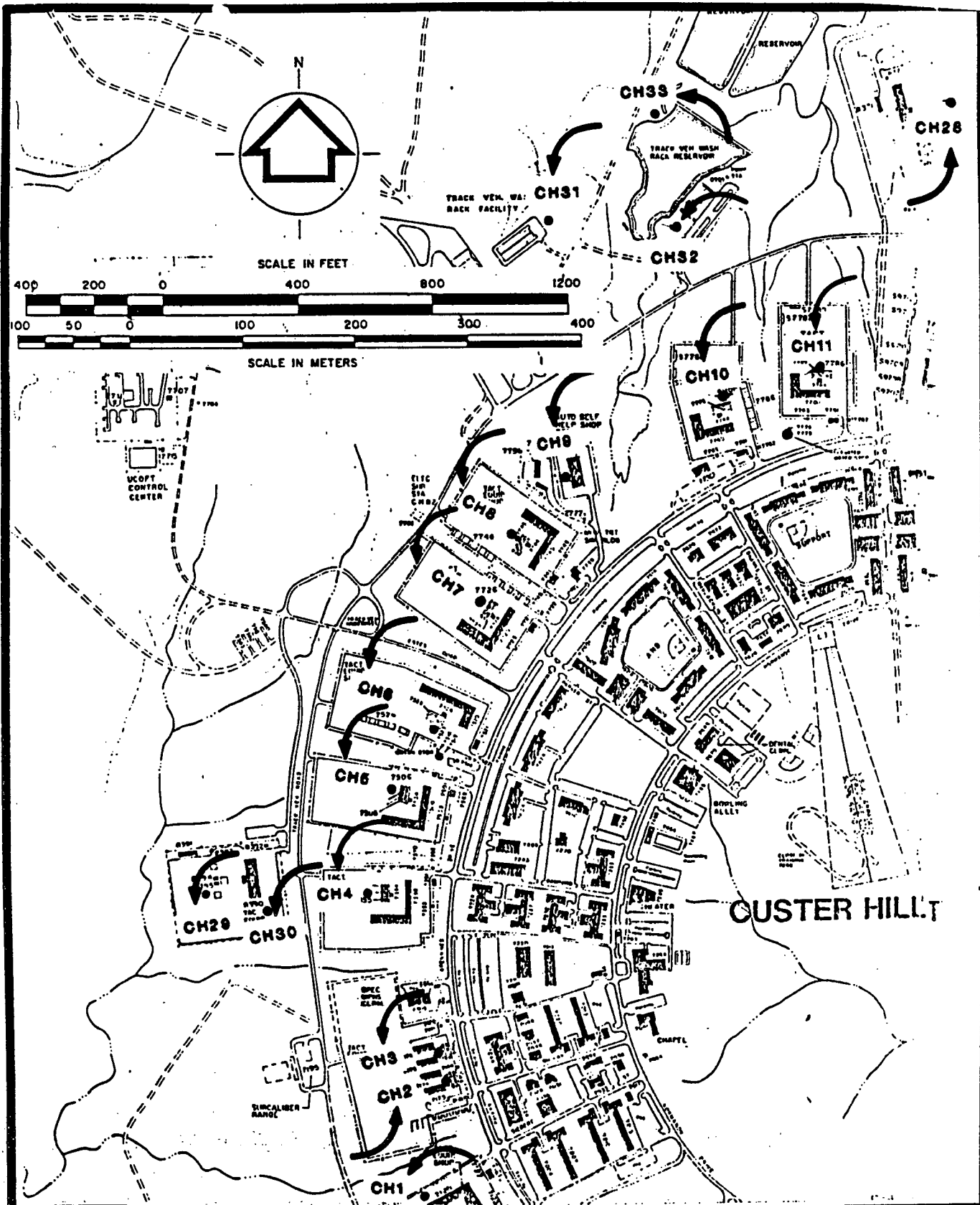
FTRI-015, MAP 15B: CAMP FUNSTON UNDERGROUND STORAGE TANKS (WASTE OIL)



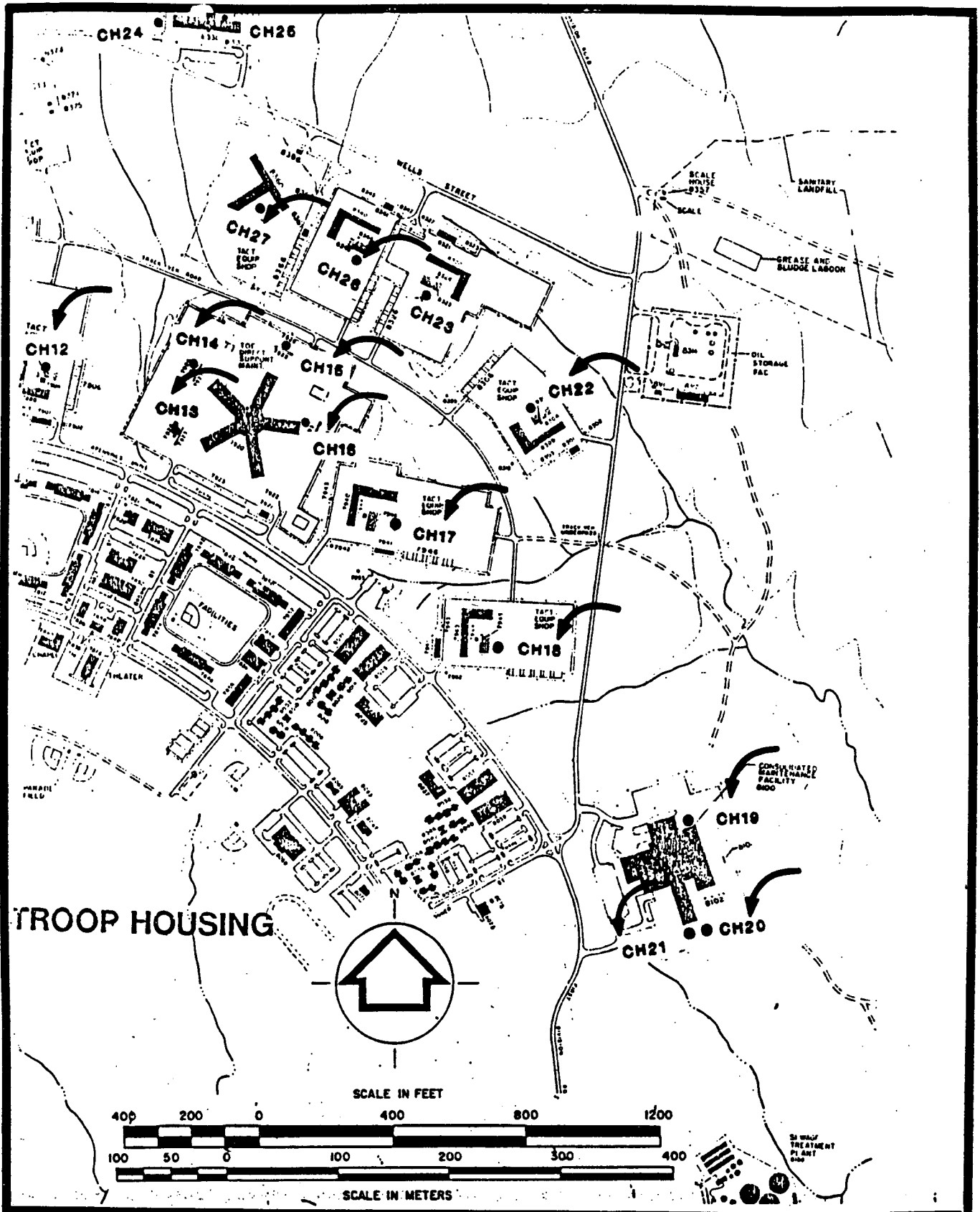
FTRI-015, MAP 15B: CAMP FUNSTON UNDERGROUND STORAGE TANKS (WASTE OIL)



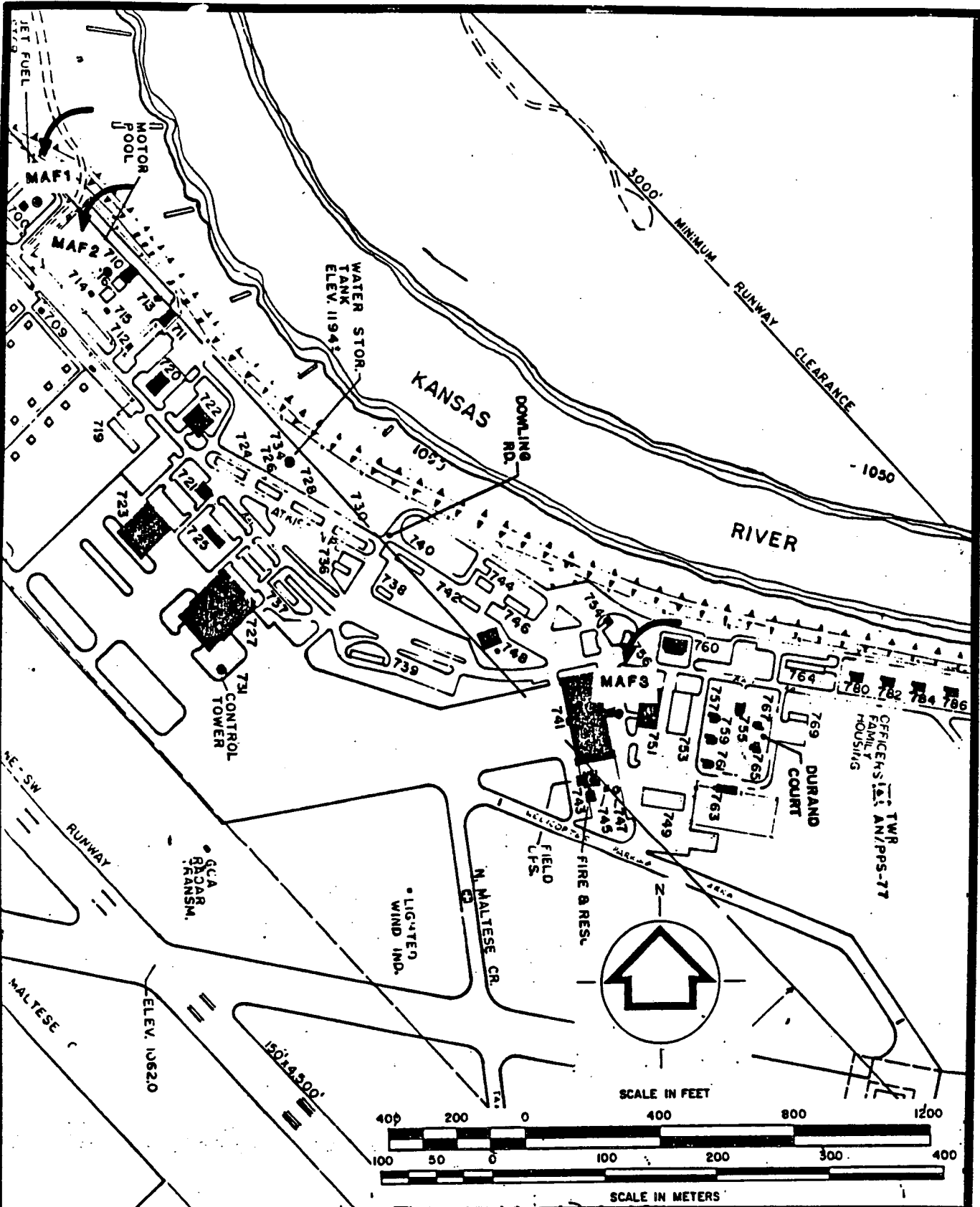
FTRI-015, MAP 15C: CAMP FORSYTH UNDERGROUND STORAGE TANKS (WASTE OIL)



FTRI-015, MAP 15D: CUSTER HILL UNDERGROUND STORAGE TANKS (WASTE OIL)



FTRI-015, MAP 15D: CUSTER HILL UNDERGROUND STORAGE TANKS (WASTE OIL)



FTRI-015, MAP 15E: MARSHALL ARMY AIRFIELD UNDERGROUND STORAGE TANKS (WASTE OIL)

FTRI-016. Map No. 16.

a. Unit Name. Waste Oil Storage Tank, 3d Battalion, 37th Armor Regiment.

b. Unit Characteristics.

(1) Unit Type. Waste Oil Storage Tank (Aboveground).

(2) General Dimensions. Design Features. One, 400-gallon tank placed in a truck bed, surrounded by gravel and dry clean sweep material.

(3) Approximate Dates of Usage. Current.

(4) Operating Practices. Tank is filled by the contents of 15-gallon cans dumped into top hole. The tank is emptied by the Central Kansas Crude Co. for recycling of the waste oil.

(5) Present Condition and Status. During the site visit this tank was well maintained with no visual signs of leakage.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Waste motor oil.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Leaks or spills.

(4) Toxicological Characteristics. Unknown.

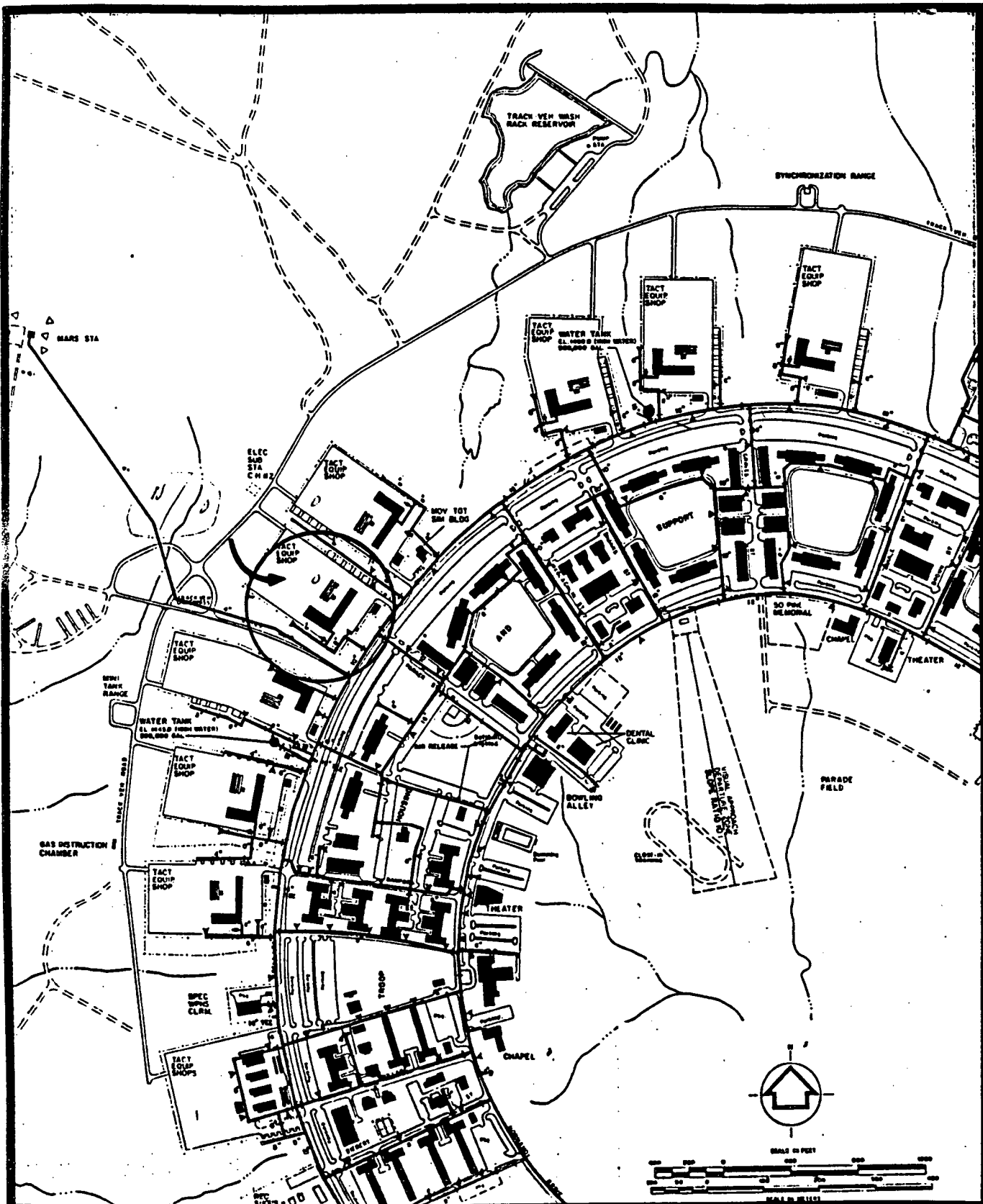
d. Migration Pathways. It is unlikely that the operations of this waste oil tank would cause material migration to the environment. The integrity of containment structures is well designed.

e. Evidence of Release. None.

f. Exposure Potential. This site exhibits a low potential for exposure to the environment. The waste oil is well contained and is located on an impermeable surfaced lot.

g. Recommendations for Sampling. None.

h. Reference. Darrel Wilson.



**FTRI-016, MAP 16: WASTE OIL TANK BLDG. 7740
(3RD BATTALION, 37TH ARMOR
REGIMENT)**

FTRI-017. Map No. 17.

a. Unit Name. Waste Oil Storage Tank, 4th Battalion, 37th Armor Regiment.

b. Unit Characteristics.

(1) Unit Type. Waste Oil Storage Tank, (Aboveground).

(2) General Dimensions. Design Features. One 400-gallon tank set on pallets over concrete. This tank is a converted water tank.

(3) Approximate Dates of Usage. October 1987 - Present.

(4) Operating Practices. Waste motor oil is placed into this tank from motor service operations.

(5) Present Condition and Status. This operation was not well maintained. Waste oil in an open 55-gallon drum approximately 12 inches full was placed immediately adjacent to the storage tank. The survey team observed spilled oil in the vicinity of the storage tank. Dry sweep was available.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Waste oil as follows: 10W, 30W, and 50W motor oil, and Gear Oil 90.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Spilled oil could migrate into nearby storm drain if not contained rapidly.

(4) Toxicological Characteristics. Unknown.

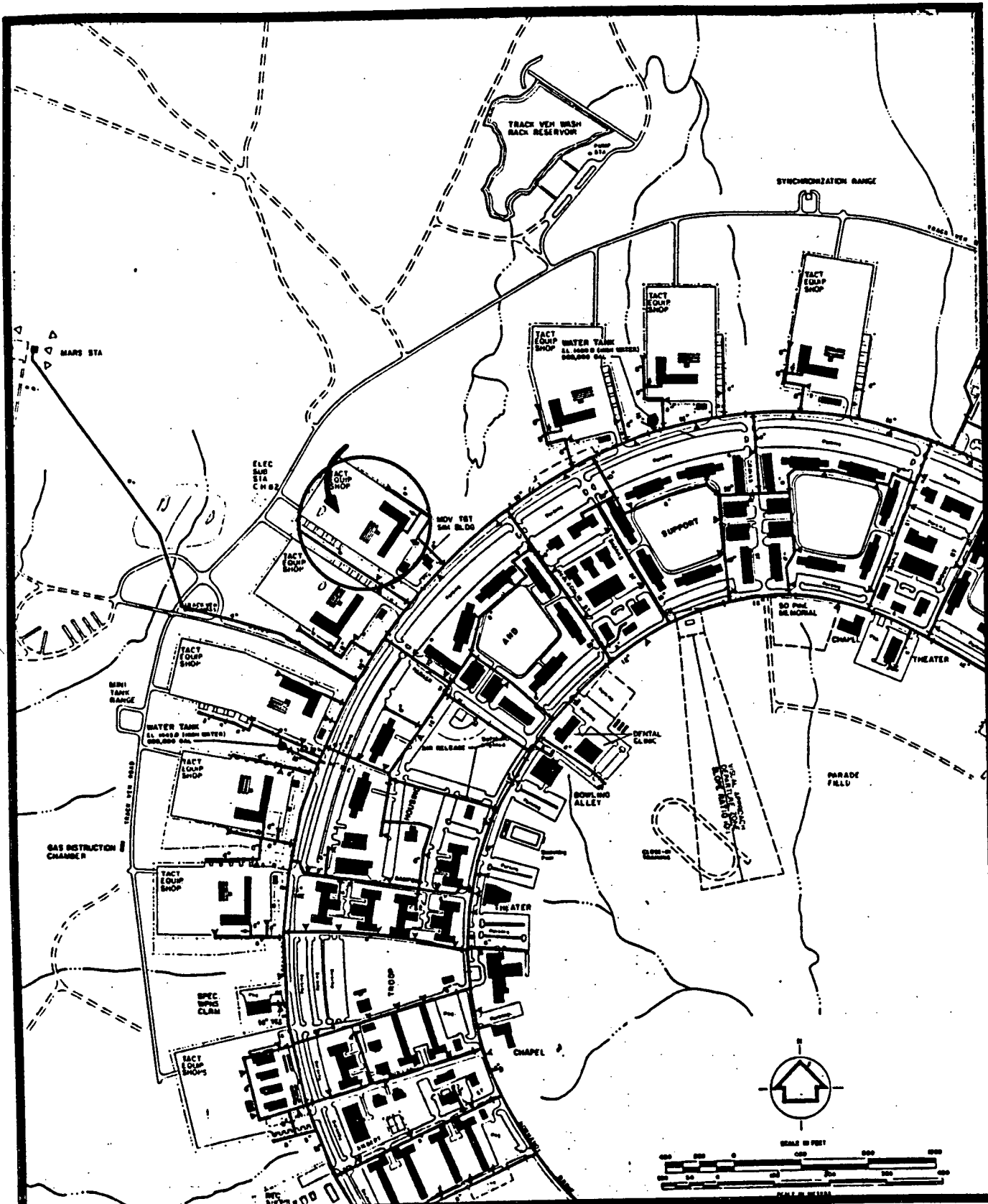
d. Migration Pathways. This waste oil could enter the storm water drainage system.

e. Evidence of Release. There was evidence of waste oil spillage in the immediate vicinity of the storage tank.

f. Exposure Potential. There is a low to moderate potential for exposure to surface or ground water due to the central location of the unit on a concrete pad. There is a potential for surface water exposure through the storm drain.

g. Recommendations for Sampling. Dispense all waste oil upon arrival at the storage tank and cleanup all spilled liquid with the available sorbent material. Provide an impermeable berm which can contain the entire contents of the tank.

h. Reference. Darrel Wilson.



**FTRI-017, MAP 17: WASTE OIL TANK BLDG. 7720
(4TH BATTALION, 37TH ARMOR
REGIMENT)**

FTRI-018. Map No. 18.

a. Unit Name. Fire Fighting Training Area (New) Adjacent to MAAF.

b. Unit Characteristics.

(1) Unit Type. Fire Fighting Training Area.

(2) General Dimensions. Design Features. This new facility is approximately 75 feet by 75 feet consisting of a sloping 8-foot monolithic pour cement pad having a 6-foot concrete berm. The unit drains to an oil/water separator and then to a sanitary sewer line for discharge of the treated effluent. The burn pad is surrounded by crushed aggregate paving.

(3) Approximate Dates of Usage. March 1988 (tested). This unit is not currently in operation.

(4) Operating Practices. The installation will ignite and extinguish POL in this burn pit for training purposes. Oil and water will be separated automatically at the facility.

(5) Present Condition and Status. The unit is in excellent condition. The burn pit and supporting facilities are operational; however, training has not yet commenced.

c. Waste Characteristics.

(1) Specific Wastes Disposed. New product JP-4 and its combustion byproducts.

(2) Physical and Chemical Characteristics. JP-4 is 65 percent gasoline and 35 percent light petroleum distillate (kerosene), having a flash point of -10 °F.

(3) Migration and Dispersal Characteristics. Gaseous byproducts of JP-4.

(4) Toxicological Characteristics. Refer to MSDS, Appendix F.

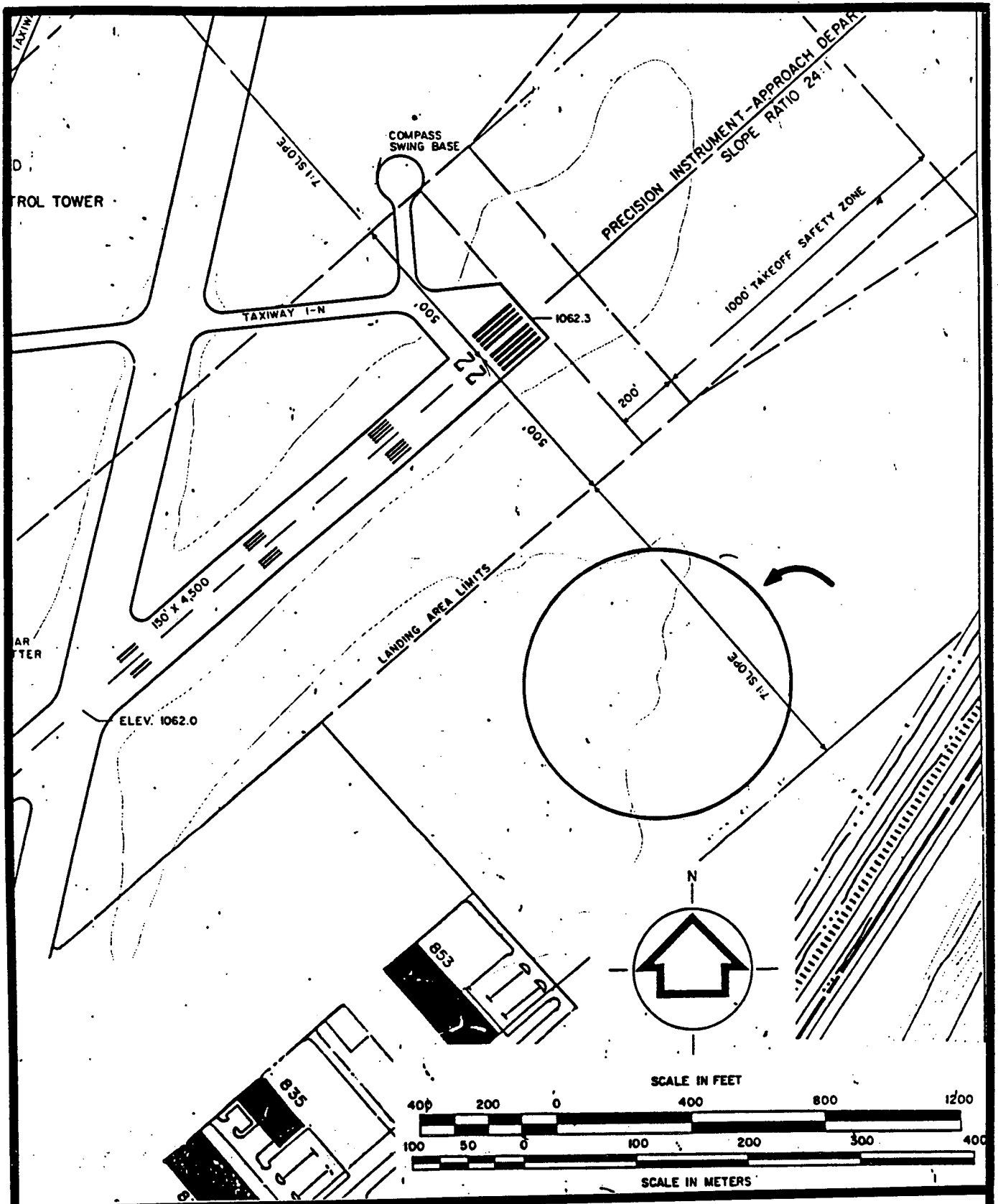
d. Migration Pathways. Ground water, the Kansas River and the atmosphere. It is unlikely waste would migrate into the environment due to the integrity of containment structures.

e. Evidence of Release. None.

f. Exposure Potential. There is a low potential for exposure provided the training unit is properly operated. Containment for fuel and collection for drainage is adequate.

g. Recommendations for Sampling. None.

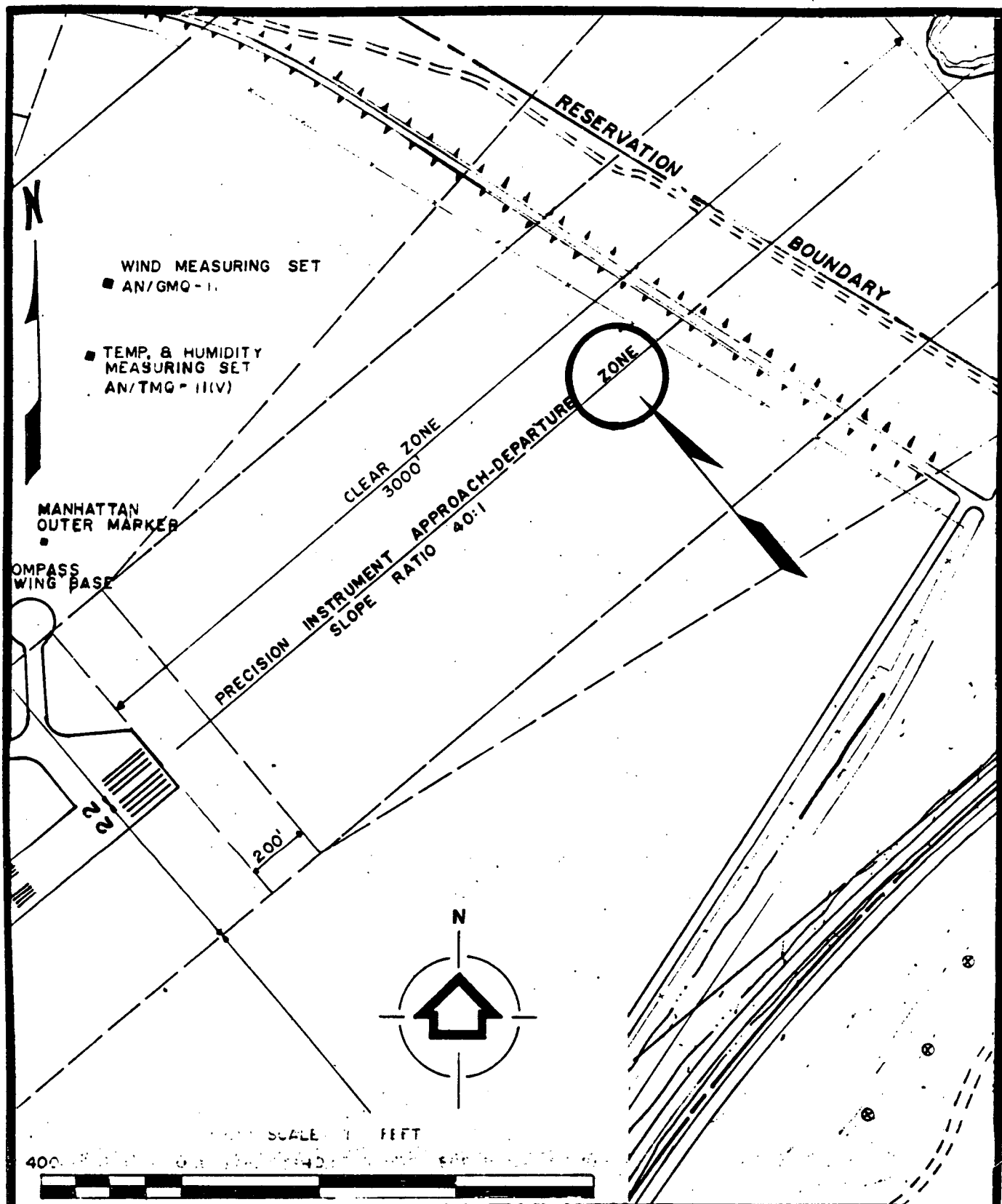
h. References. 11, Charles Harris.



FTRI-018, MAP 18: FIREFIGHTING TRAINING AREA (NEW)

FTRI-019. Map No. 19.

- a. Unit Name. Fire Fighting Training Pit (Old) Adjacent to MAAF.
- b. Unit Characteristics.
 - (1) Unit Type. Fire Training Area.
 - (2) General Dimensions. Design Features. This unit is approximately 200 feet by 200 feet. The area consists of soil and crushed rock. This site is covered by mowed grass.
 - (3) Approximate Dates of Usage. 1960's - 1984.
 - (4) Operating Practices. The fire department conducted burning of JP-4, diesel, oil, MOGAS and other fuels as donated for training purposes.
 - (5) Present Condition and Status. The site is inactive. It is vegetated by grasses and there are no signs of operations.
- c. Waste Characteristics.
 - (1) Specific Wastes Disposed. JP-4, diesel, oil and MOGAS.
 - (2) Physical and Chemical Characteristics. Refer to MSDS, Appendix F.
 - (3) Migration and Dispersal Characteristics. Fuels which were spilled on the soil probably migrated into the subsurface. There are no wells around the facility to determine the depth to the ground-water table or water quality.
 - (4) Toxicological Characteristics. Refer to MSDS, Appendix F.
- d. Migration Pathways. Surface and ground water.
- e. Evidence of Release. The Fort Riley Environmental Office tested the soil surrounding the fire training area, and no contamination was found.
- f. Exposure Potential. There is a low to moderate exposure potential to the environment from this site. This is due to the proximity of surface water and ground water such as the Kansas River, a drainage ditch adjacent to the site and shallow alluvium over water table conditions. Any contaminant migration from this site is unlikely to affect personnel since potable water supply wells are upgradient.
- g. Recommendations for Sampling. None.
- h. References. 13, Charles Harris.



FTRI-019, MAP 19: FIREFIGHTING TRAINING AREA (OLD)

FTRI-020. Map No. 20.

a. Unit Name. Central Vehicle Wash Facility Wastewater Treatment Lagoon System.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Unit.

(2) General Dimensions. Design Features. The combined surface area of the Reservoir and the four cells is approximately 32 acres having 75 million gallons of storage capacity. The reservoir has a surface area of 6 acres at a depth of 10 feet and has a storage capacity of 21.4 million gallons.

(3) Approximate Dates of Usage. 1986 - Present.

(4) Operating Practices. Wastewater from the Post Wash Facilities enter the Lagoon System at Lagoon Cell No. 1 after the sedimentation of solids and the removal of oil and grease. Other wastewater from the tactical equipment shops enters the Reservoir which overflows into Lagoon Cell No. 2. Lagoon Cell No. 1 then overflows into Lagoon Cell No. 3. Finally, the settled water enters Lagoon Cell No. 4 where it is recycled as wash water. An emergency spillway allows the discharge of water into a drainage ditch outside the lagoon system. The spillway is activated should water levels exceed a predetermined maximum.

(5) Present Condition and Status. This operation is ongoing and is in good condition.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Treated Wastewater from Vehicle Wash Facilities

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Unknown.

(4) Toxicological Characteristics. Unknown.

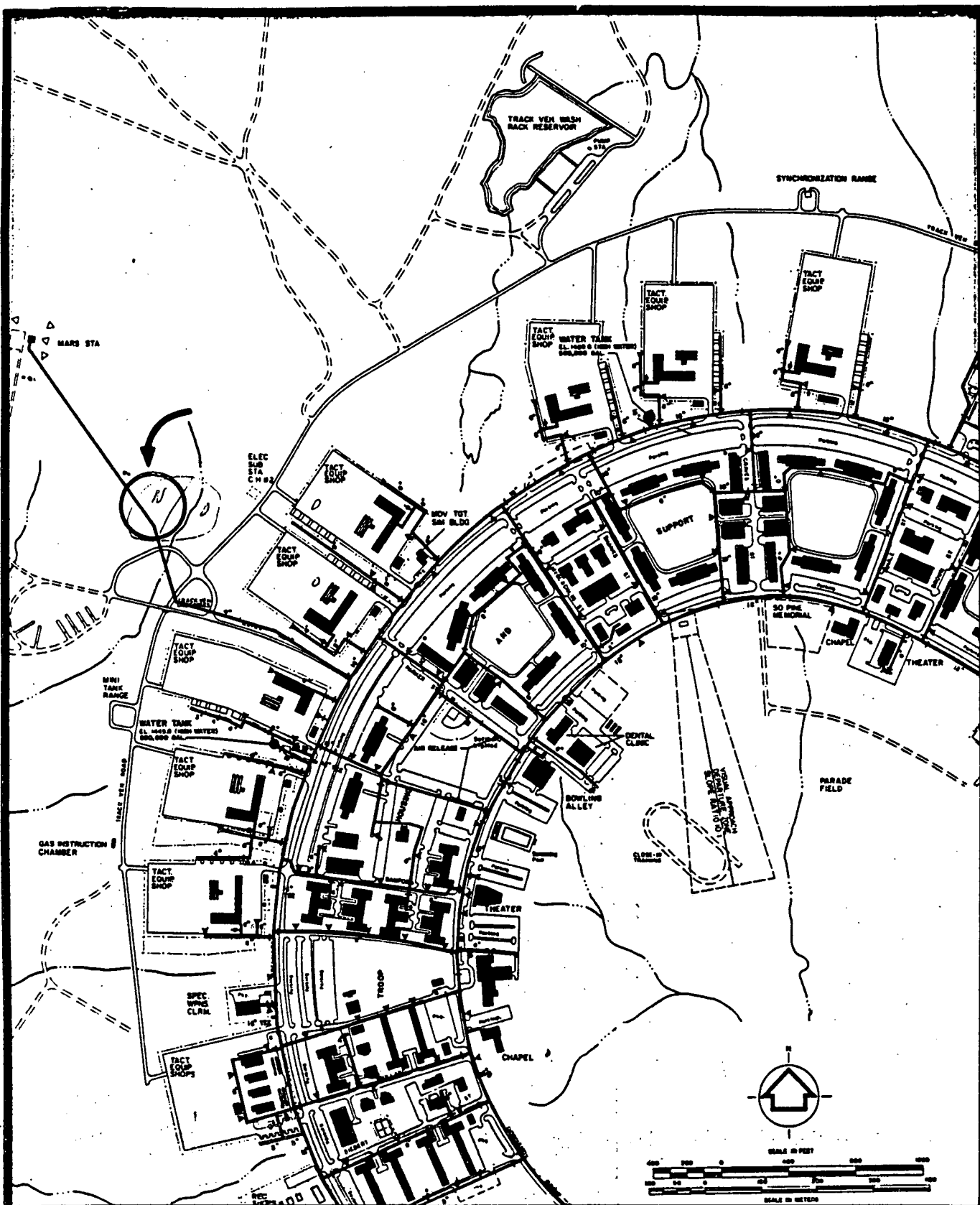
d. Migration Pathways. Ground water.

e. Evidence of Release. None.

f. Exposure Potential. The exposure potential is low due to the efficiency of oil/water separator devices located at the lagoon.

g. Recommendations for Sampling. None.

h. Reference. Charles Harris.



**FTRI-020, MAP 20: CENTRAL VEHICLE WASH FACILITY
(CUSTER HILL)**

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

FTRI-021. Map No. 21.

a. Unit Name. Wastewater Recycling Lagoon, Old Vehicle Wash Facility.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Lagoon.

(2) General Dimensions. Design Features. The lagoon is unlined. This lagoon is on a 1-acre site. There is one oil skimmer at the lagoon.

(3) Approximate Dates of Usage. 1982 - Present.

(4) Operating Practices. Vehicle wash water enters this lagoon after sediments are settled out at the motor pool concrete wash basin. Oil is separated at the lagoon via an oil skimmer. A contractor collects the waste oil as it is accumulated adjacent to the lagoon.

(5) Present Condition and Status. This facility is in good condition.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Treated vehicle wash rack wastewater.

(2) Physical and Chemical Characteristics. The wastewater is primarily water having small quantities of POL.

(3) Migration and Dispersal Characteristics. The discharged vehicle wash water could enter the soil. The effluent could potentially migrate to the ground water.

(4) Toxicological Characteristics. Unknown.

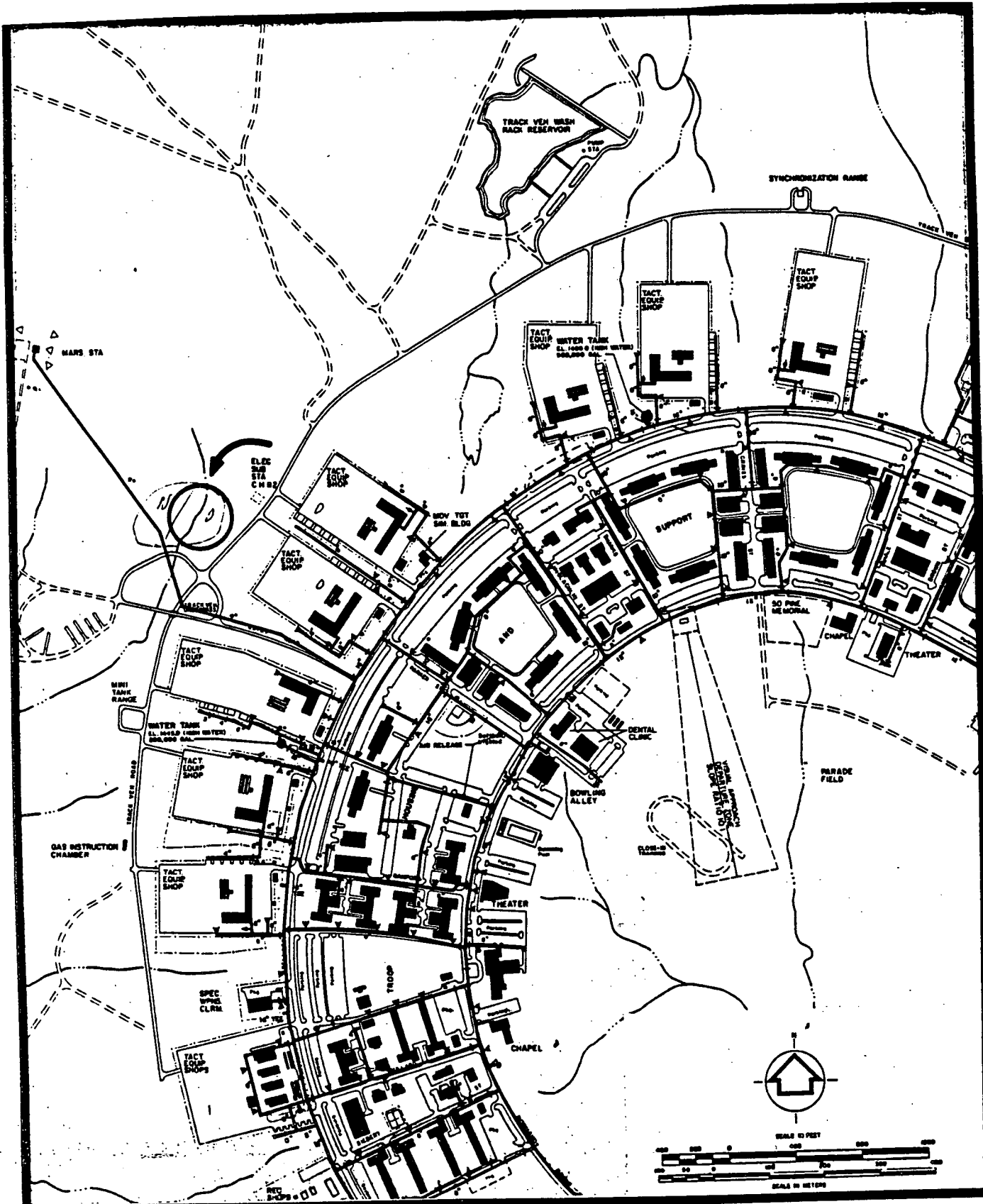
d. Migration Pathways. Ground water.

e. Evidence of Release. None.

f. Exposure Potential. There is a low exposure potential due to the efficiency of the oil/water separator devices located at the lagoon.

g. Recommendations for Sampling. None.

h. Reference. Charles Harris.



FTRI-021, MAP 21: VEHICLE WASH FACILITY (OLD)

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

FTRI-022. Map No. 22.

a. Unit Name. Camp Funston Inactive Wastewater Treatment Plant.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Unit.

(2) General Dimensions. Design Features. This facility is on a 3-acre site. The capacity is 1-3 million gallons per day. There is one anaerobic sludge digester and three sludge drying beds.

(3) Approximate Dates of Usage. Starting operation date is not known. The installation deactivated the plant in 1968.

(4) Operating Practices. A "wet well" pumps sewage to the Main Post sewage treatment plant.

(5) Present Condition and Status. This facility is inactive except for a "wet well" which pumps sewage to the Main Post sewage plant.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Sanitary sewage and storm water infiltration.

(2) Physical and Chemical Characteristics. N/A.

(3) Migration and Dispersal Characteristics. N/A.

(4) Toxicological Characteristics. N/A.

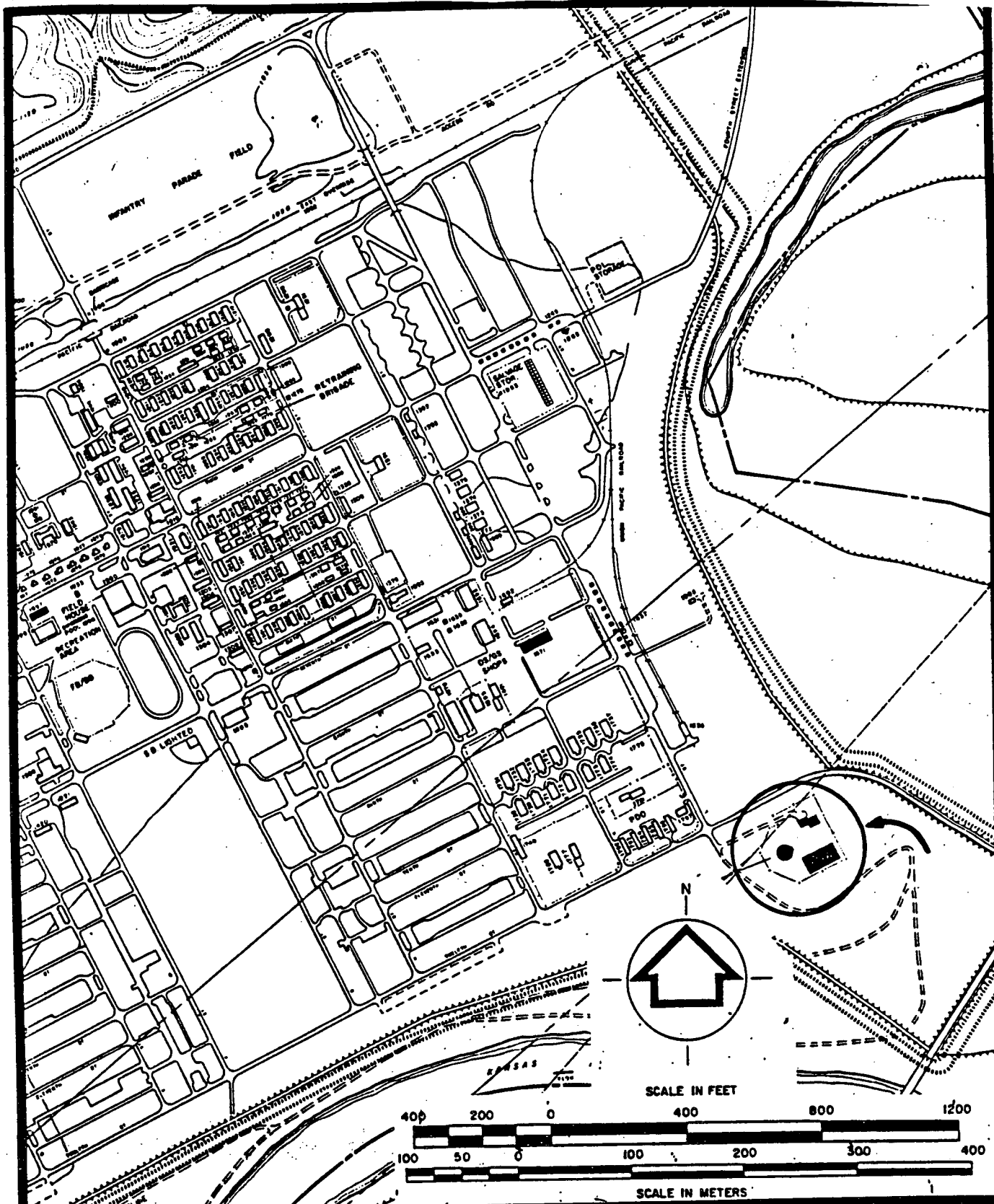
d. Migration Pathways. N/A.

e. Evidence of Release. N/A.

f. Exposure Potential. N/A.

g. Recommendations for Sampling. None.

h. Reference. Charles Harris.



**FTRI-022, MAP 22: CAMP FUNSTON SEWAGE
TREATMENT PLANT (INACTIVE)**

FTRI-023. Map No. 23.

a. Unit Name. Custer Hill Wastewater Treatment Unit.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Unit.

(2) General Dimensions. Design Features. This plant has 1 anaerobic digester, 3 trickling filters and 16 sludge drying beds. The plant capacity is 1.5 million gallons per day. The sludge drying beds are concrete. One sludge overflow lagoon is adjacent to 16 sludge drying beds.

(3) Approximate Dates of Usage. 1950's - Present.

(4) Operating Practices. Permitted, treated effluent is discharged to Four Mile Creek. The sludge overflow lagoon is used approximately every 2 years for partially digested sludge. The DEH personnel collects the treated sludge for disposal at the Custer Hill sanitary landfill. A contractor collects the grease and floatables from the primary clarifiers.

(5) Present Condition and Status. This plant operates under Kansas Permit No. F-KS97-6013. The condition of the plant is good. During the site visit 12 of the 16 sludge drying beds had sludge in them. There has been no violations of EPA standards during the last 4 years.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Sanitary sewage and storm water.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. None, due to the integrity of containment structures.

(4) Toxicological Characteristics. Unknown.

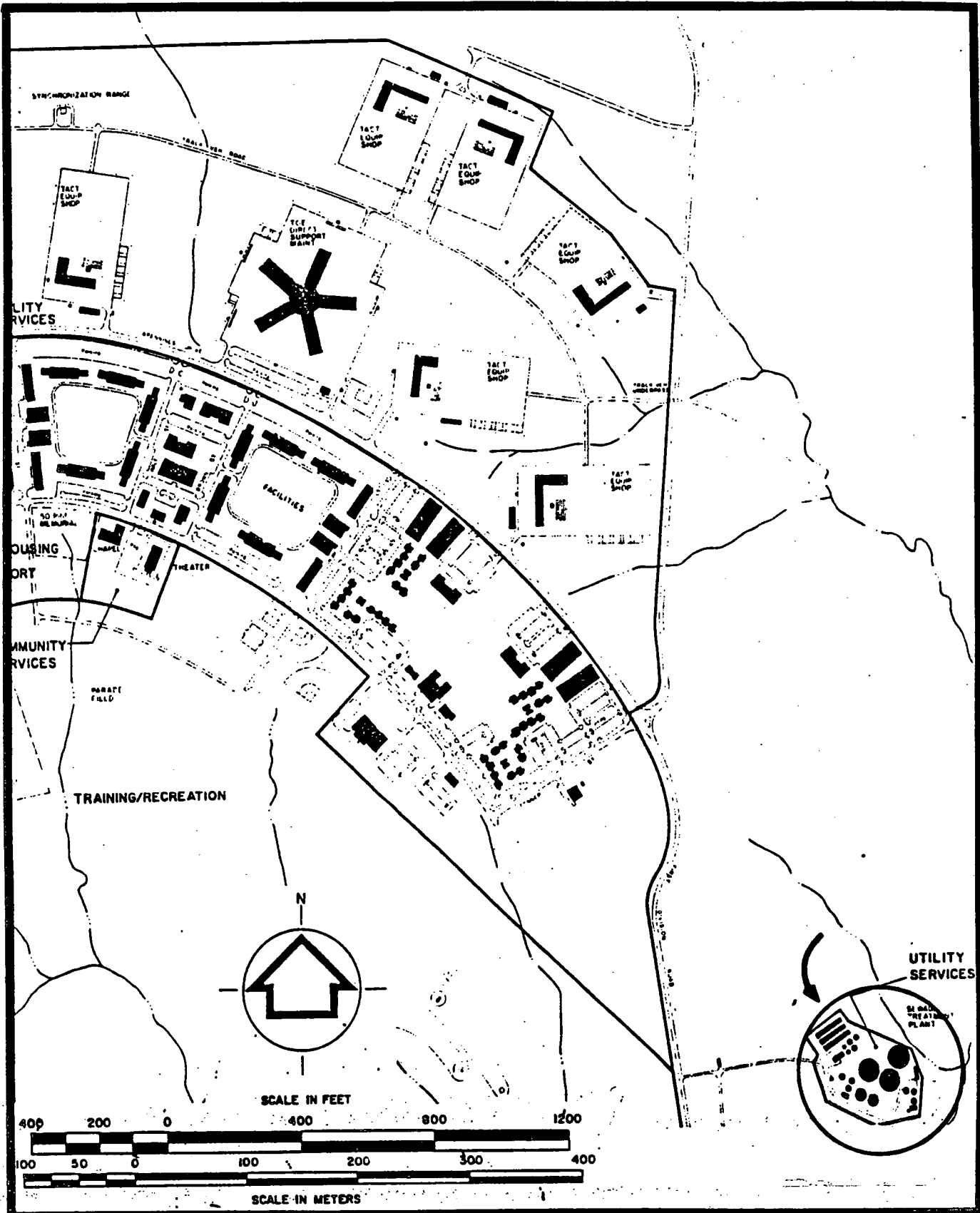
d. Migration Pathways. Surface water and ground water.

e. Evidence of Release. None.

f. Exposure Potential. Low, due to the integrity of containment systems and treatment of the domestic effluent.

g. Recommendations for Sampling. None.

h. Reference. Darrel Wilson.



FTRI-023 MAP 23: CUSTER HILL SEWAGE TREATMENT PLANT

FTRI-024. Map No. 24.

a. Unit Name. Forsyth Sewage Treatment Plant.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Unit.

(2) General Dimensions. Design Features. The Forsyth treatment facility consists of an influent pump station, a primary clarifier, 2 trickling filters, 2 final clarifiers, two-stage anaerobic digesters and 12 sludge drying beds. The facility management constructed a temporary sludge drying pond while the digester was under repair. The permanent sludge drying beds are concrete lined.

(3) Approximate Dates of Usage. 1945 - Present.

(4) Operating Practices. The flow from the end of May through August is generally 0.6 to 0.7 million gallons per day (mgd), while the winter flow drops as low as 0.25 mgd. The average annual flow is approximately 0.45 mgd. Sludge is presently disposed of by pumping it into a temporary pond while reconditioning of a digester continues. Under normal conditions, sludge is pumped into the 12 drying beds at the plant.

(5) Present Condition and Status. The plant is currently under repairs for its anaerobic digesters. Sludge is diverted to a temporary pond for drying.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Sanitary sewage and storm water.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. None, due to the integrity of the containment structures.

(4) Toxicological Characteristics. Unknown.

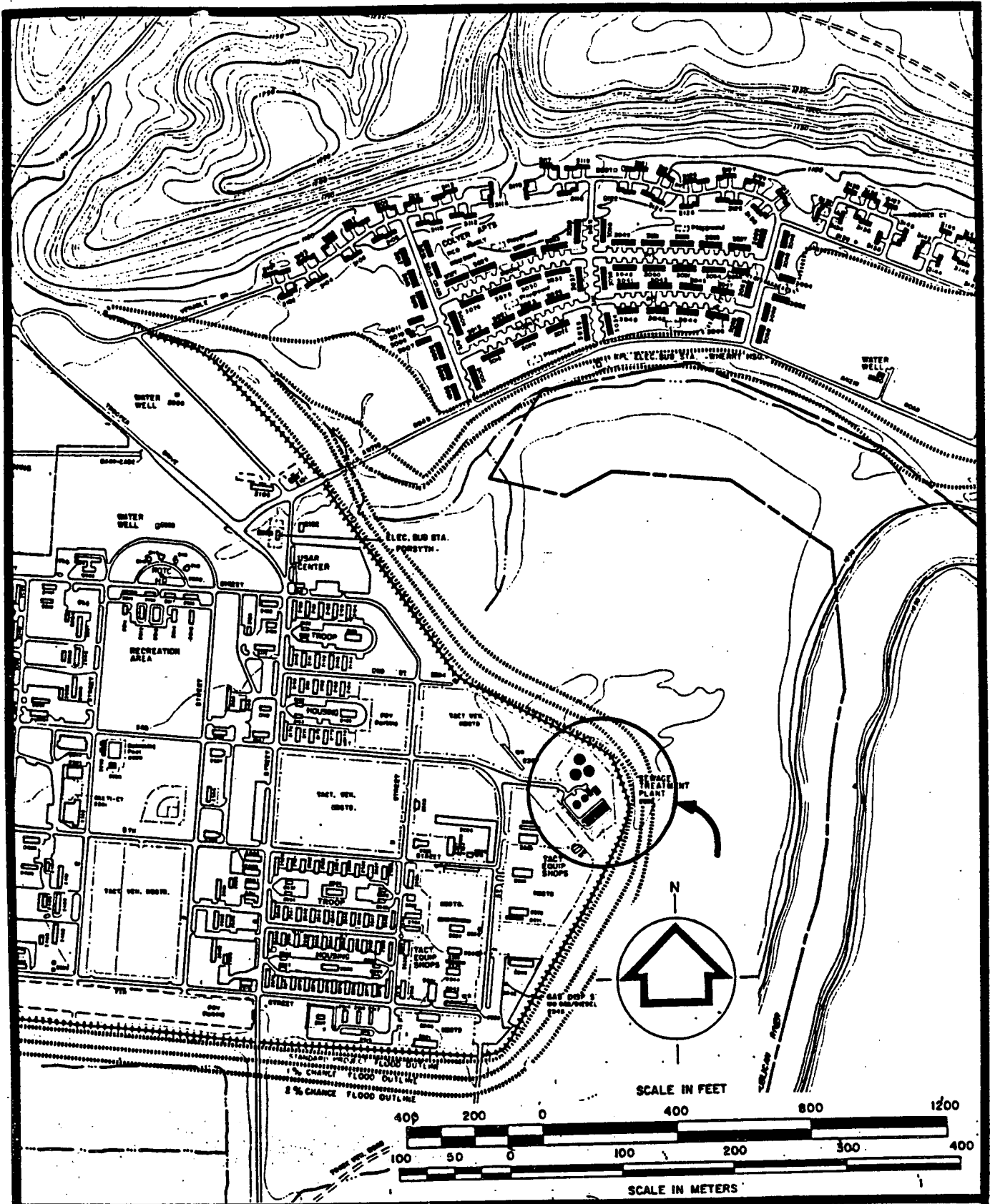
d. Migration Pathways. Ground water and surface water.

e. Evidence of Release. None.

f. Exposure Potential. There is a low potential for releases due to the integrity of containment systems and treatment of the domestic effluent. During maintenance operations, the integrity of these systems must be maintained and monitored carefully. Otherwise, the potential for releases to the environment will increase.

g. Recommendations for Sampling. None.

h. Reference. Darrel Wilson.



FTRI-024, MAP 24: CAMP FORSYTH SEWAGE TREATMENT PLANT

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

FTRI-025. Map No. 25.

a. Unit Name. Main Post Sewage Treatment Plant.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment Unit.

(2) General Dimensions. Design Features. The Main Post treatment facility consists of an influent pump station, a primary clarifier, a two-stage trickling filter, two tow recirculation pump stations, an anaerobic digester and sludge drying beds. There are six sand/gravel sludge drying beds which are sloped and lined with bentonite. The beds are sloped for drainage back to the system.

(3) Approximate Dates of Usage. 1945 - Present.

(4) Operating Practices. The plant operates with an average flow of approximately 600,000 gallons per day and is receiving sewage from the Main Post, MAAF, Camp Whiteside and Camp Funston. Most of the sewage received is normal domestic sewage with industrial waste from MAAF being pretreated at an industrial treatment plant. The treated effluent is discharged by underground pipe to the Kansas River, 1/2 mile to the south. Dried sludge is disposed of in the active sanitary landfill on post.

(5) Present Condition and Status. The sludge drying beds are in a deteriorated condition. Otherwise, the plant is in good condition. The plant performs testing for ammonia, pH, BOD and total suspended solids to satisfy NPDES Permit requirements.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Sanitary sewage, storm water and pretreated industrial wastewater.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Heavy metals do not migrate rapidly in soils unless under acidic conditions.

(4) Toxicological Characteristics. Unknown.

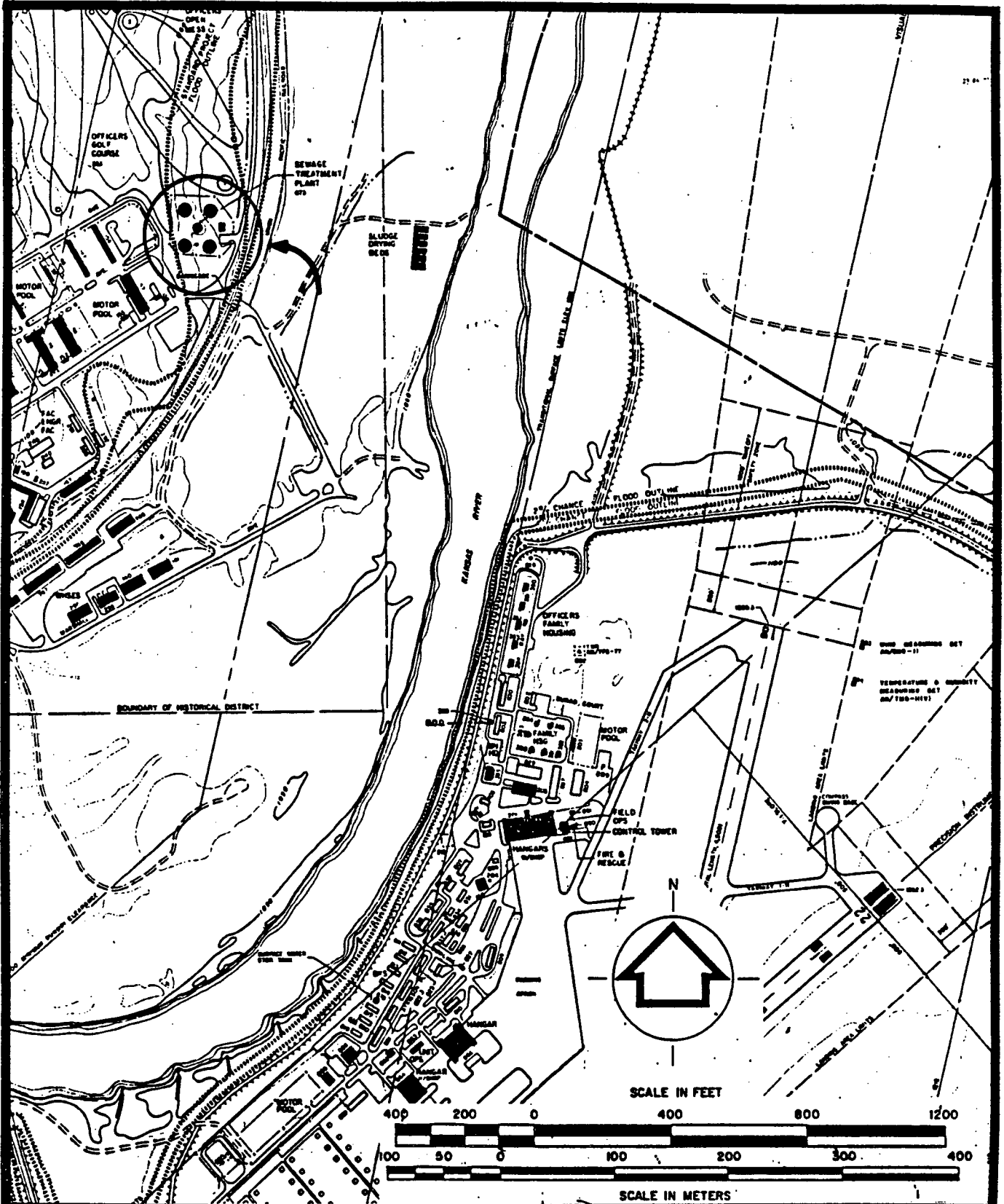
d. Migration Pathways. Surface water and ground water. At the location of the sludge drying beds the depth to ground water is 15 feet.

e. Evidence of Release. None.

f. Exposure Potential. There is a low potential for releases due to the integrity of containment systems and treatment of the domestic effluent.

g. Recommendations for Sampling. None.

h. Reference. Darrel Wilson.



FTRI-025, MAP 25: MAINPOST SEWAGE TREATMENT PLANT

FTRI-026. Map No. 26.

a. Unit Name. Multi-Purpose Range Complex Waste water Treatment Lagoons.

b. Unit Characteristics.

(1) Unit Type. Wastewater Treatment, Evaporation Ponds.

(2) General Dimensions. Design Features. The facility has three wastewater treatment lagoons which are lined with clay.

(3) Approximate Dates of Usage. 1987 - Present.

(4) Operating Practices. Untreated wastewater is discharged directly to the evaporation lagoons. The untreated wastewater flows to the lower evaporation ponds via gravity as the solids are settled out.

(5) Present Condition and Status. The lagoons are in good condition. The survey team observed water in the first lagoon only. At this lagoon there was a freeboard of approximately 10 feet.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Domestic wastewater.

(2) Physical and Chemical Characteristics. Unknown.

(3) Migration and Dispersal Characteristics. Wastewater may leak from the pond and migrate to the ground water.

(4) Toxicological Characteristics. Unknown.

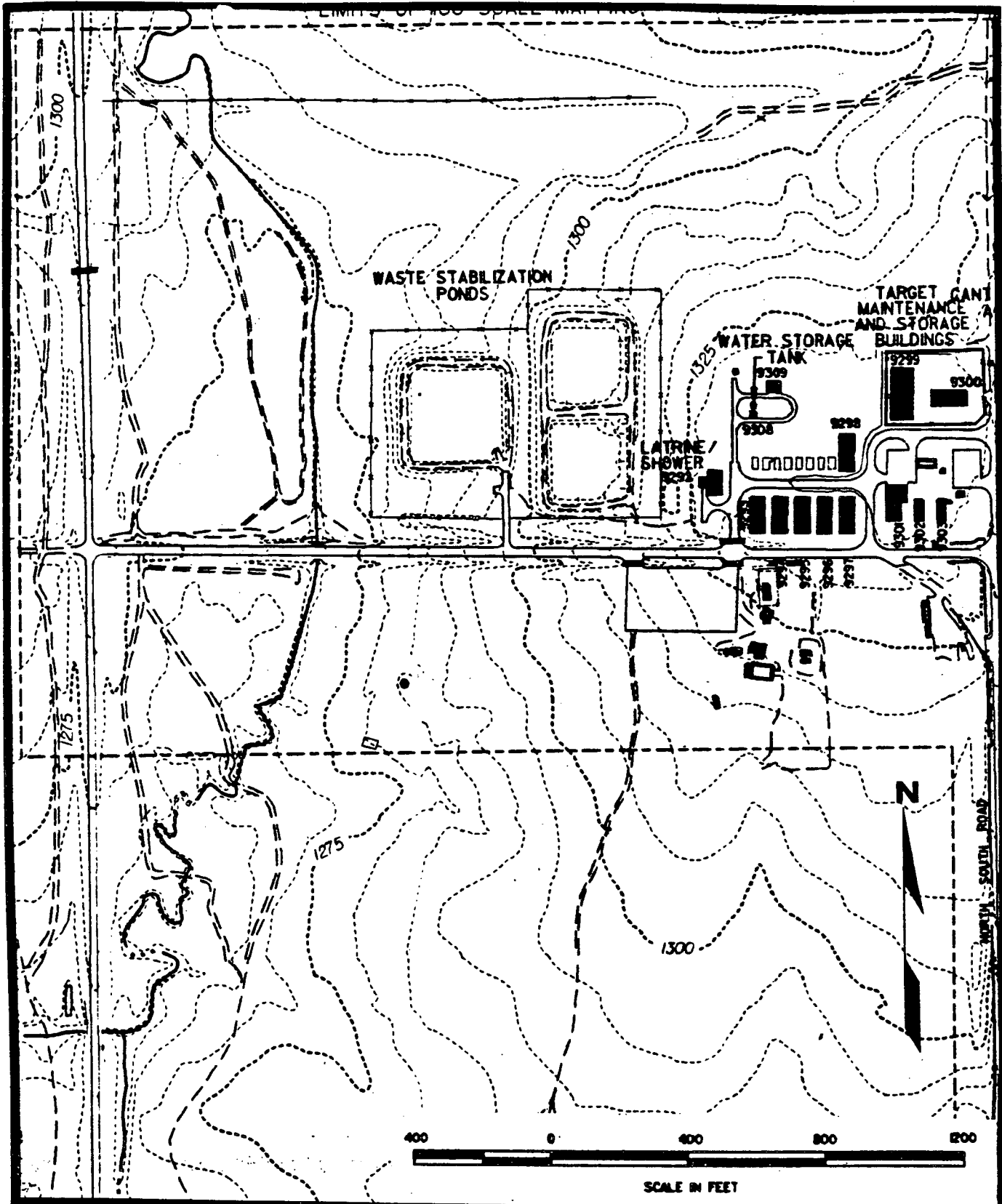
d. Migration Pathways. Ground water and surface water. An intermittent stream is approximately 100 feet from No. 3 lower lagoon. Depth to ground water is 250 feet to 275 feet and no drinking water wells are downgradient of the facility.

e. Evidence of Release. None.

f. Exposure Potential. There is a low potential for releases due to the integrity of containment systems and treatment of the domestic effluent.

g. Recommendations for Sampling. None.

h. Reference. Charles Harris.



FTRI-026, MAP 26: MULTIPURPOSE RANGE COMPLEX (MPRC) WASTEWATER LAGOONS

FTRI-027. Map No. 27.

a. Unit Name. Dry Cleaning Plant, Former Building No. 109 (new Building No. 180) (Inactive).

b. Unit Characteristics.

(1) Unit Type. Surface Disposal Area.

(2) General Dimensions. Design Features. The dimensions of Building No. 109 are not known.

(3) Approximate Dates of Usage. 1950 - 1983.

(4) Operating Practices. The plant generated a still residue consisting of soil and tetrachloroethylene [perchloroethylene (PCE)] solvent at a rate of approximately 80 liters per month. This residue was reportedly disposed of by pouring it on the ground behind the building. Perchloroethylene still bottoms are a listed RCRA hazardous waste.

(5) Present Condition and Status. The dry cleaning plant was closed in 1983. During June 1986, USAEHA analyzed two soil samples for the solvent PCE used during dry cleaning operations at Building 109. No PCE was detected in either of the two samples (detection limit was 0.02 ppm). The USAEHA used a gas chromatograph for the analysis.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Tetrachloroethylene (PCE).

(2) Physical and Chemical Characteristics. Refer to MSDS, Appendix F.

(3) Migration and Dispersal Characteristics. Perchloroethylene is considered a persistent compound when introduced to the environment.

(4) Toxicological Characteristics. See MSDS in Appendix F.

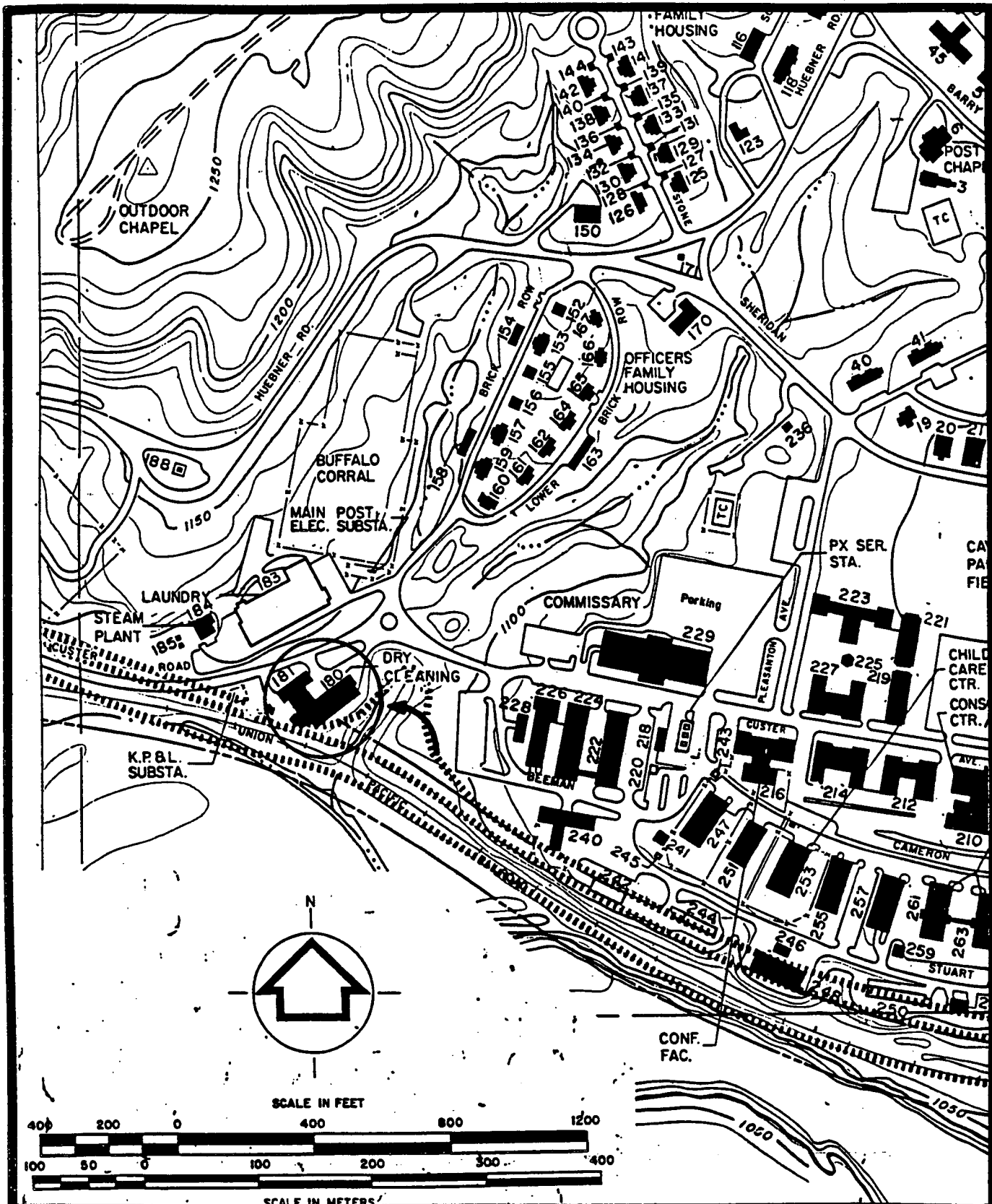
d. Migration Pathways. Air, ground water and surface water.

e. Evidence of Release. Reportedly, the vegetation and soil surrounding the building revealed no signs of systematic spilling of dry cleaning solvent or sludge.

f. Exposure Potential. There is a low potential for a release to the environment from this site due to the small quantities of solvent in the sludge (no PCE detected in soil samples), and the age of the site.

g. Recommendations for Sampling. None. The USAEHA sampled soil at this site and found no evidence of the solvent PCE.

h. References. 9, Charles Harris.



**FTRI-027, MAP 27: FORMER DRY CLEANING
PLANT BUILDING 109
(NEW BUILDING NO. 180)**

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

FTRI-028. Map No. 28.

a. Unit Name. Fire Fighting Training Pit (Old), Camp Funston.

b. Unit Characteristics.

(1) Unit Type. Waste Treatment.

(2) General Dimensions. Design Features. This unit is approximately 150 feet by 250 feet.

(3) Approximate Dates of Usage. 1950's - 1982.

(4) Operating Practices. The fire department conducted burning of JP-4, diesel, oil, MOGAS and other fuels as donated for training purposes.

(5) Present Condition and Status. The site is inactive. It is vegetated by grasses and there are no signs of operations.

c. Waste Characteristics.

(1) Specific Wastes Disposed. JP-4, diesel, oil, and MOGAS.

(2) Physical and Chemical Characteristics. Refer to MSDS, Appendix F.

(3) Migration and Dispersal Characteristics. Fuels which were spilled on the soil have probably migrated into the subsurface. Depth to ground water is approximately 25 feet.

(4) Toxicological Characteristics. See MSDS in Appendix F.

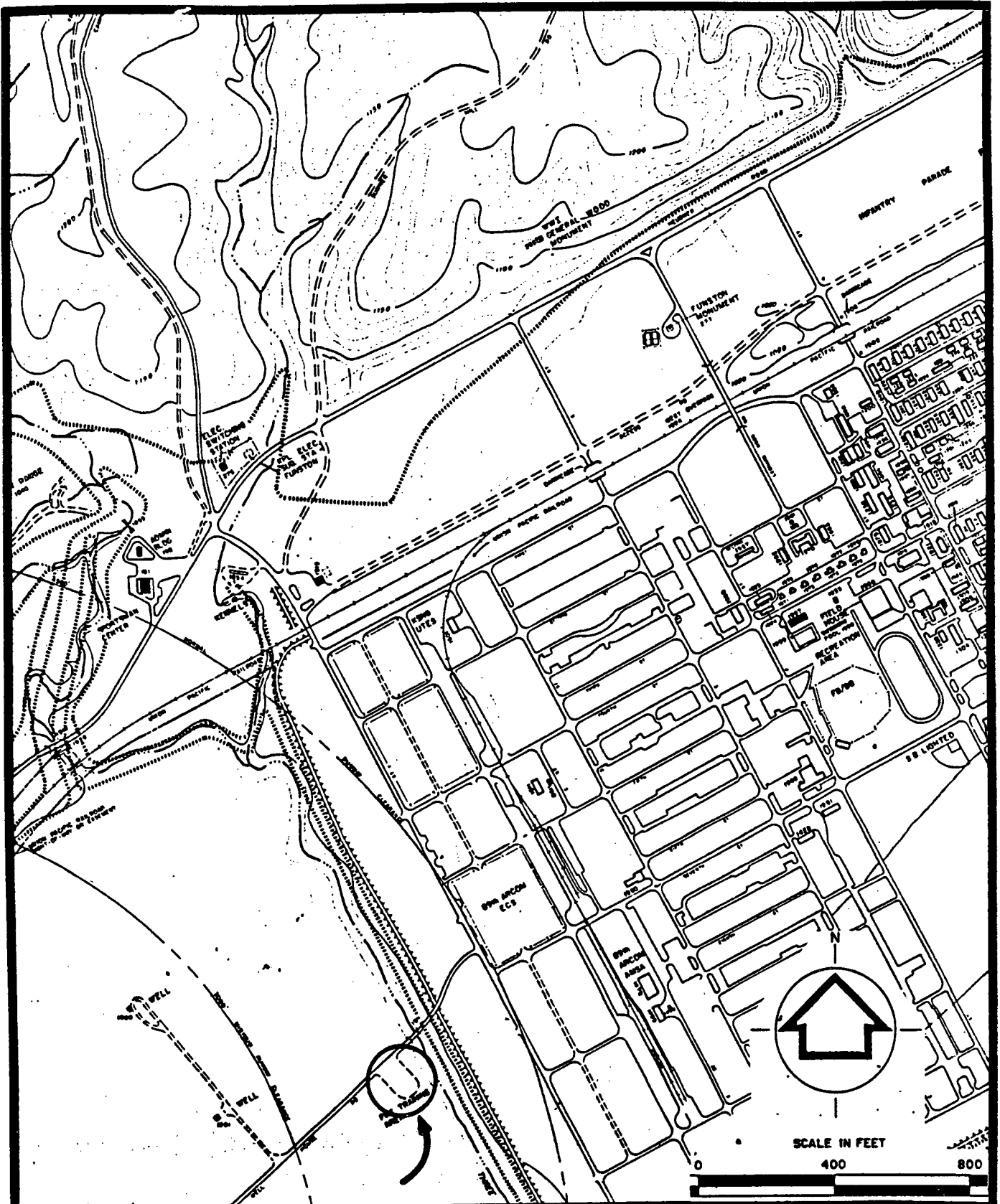
d. Migration Pathways. Surface and ground water.

e. Evidence of Release. None.

f. Exposure Potential. There is a low exposure potential. The installation reports that during 1982 soil was removed for disposal to a 6-inch depth. Migration from this site is unlikely to affect personnel since potable water supply wells are upgradient.

g. Recommendations for Sampling. None.

h. References: 13, Charles Harris.



**FTRI-028, MAP 028: FIREFIGHTING TRAINING AREA
(OLD) FUNSTON**

FTRI-029. Map No. 29.

a. Unit Name. Incinerator, Camp Funston (Inactive).

b. Unit Characteristics.

(1) Unit Type. Waste Treatment, Refuse Incinerator.

(2) General Dimensions. Design Features. Possible masonry and metal burning chamber. No property records exist to identify features.

(3) Approximate Dates of Usage. 1910's and 1920's.

(4) Operating Practices. Fort Riley personnel burned combustible refuse from an area of Camp Funston developed during World War I. Ash may have been buried in an area surrounding the incinerator.

(5) Present Condition and Status. Unknown. The Kansas River flood of 1950 may have altered the site extensively. Fort Riley sold the property on which the incinerator is thought to have been located in 1986.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Reportedly, inert solid waste.

(2) Physical and Chemical Characteristics. Inert solid waste.

(3) Toxicological Characteristics. N/A.

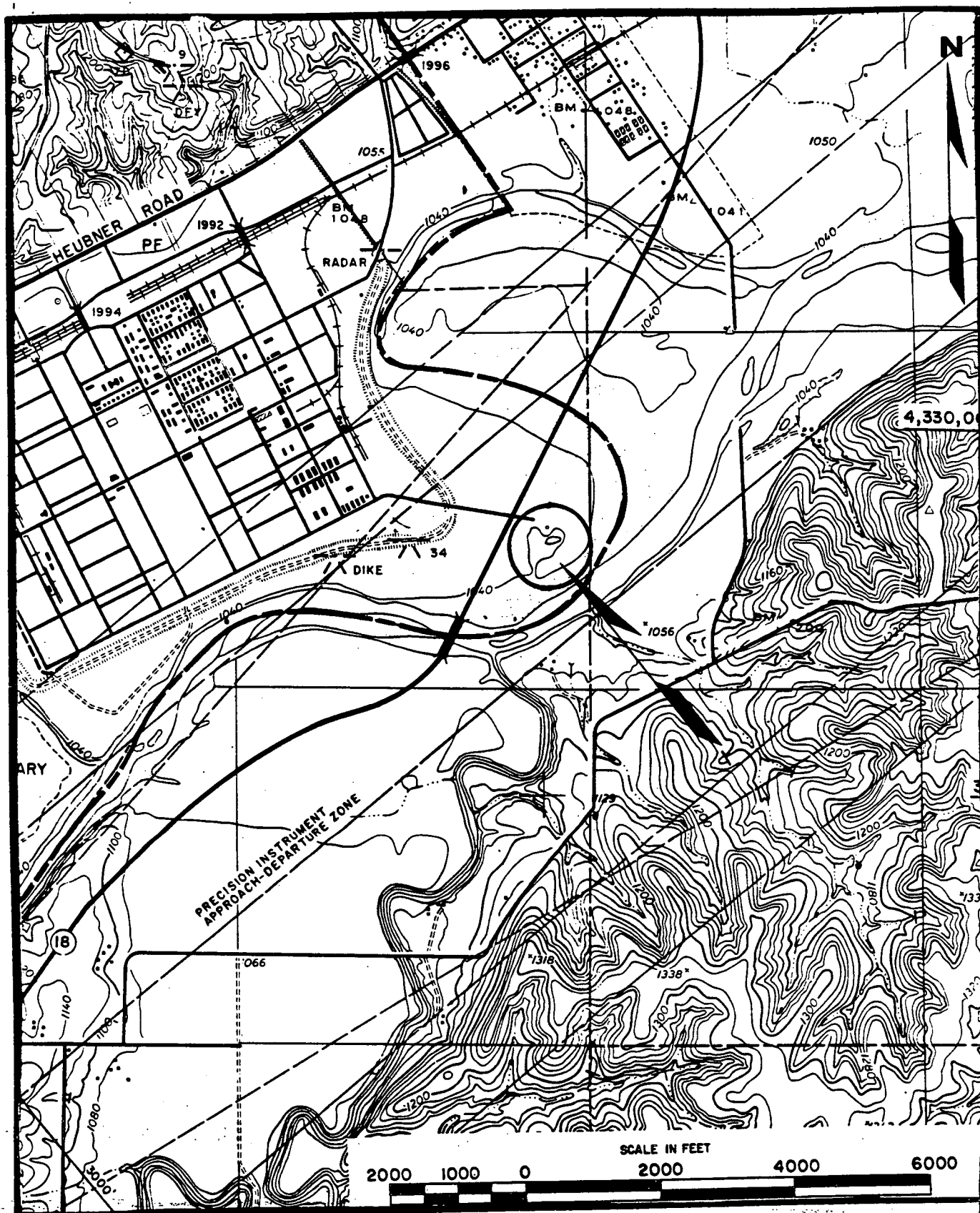
d. Migration Pathways. Soil, surface water, ground water, and air.

e. Evidence of Release. None.

f. Exposure Potential. Low, due to age, alteration of site, and inert character of waste incinerated.

g. Recommendations for Sampling. None.

h. References. Charles Harris.



**FTRI-029 MAP 029 INCINERATOR CAMP FUNSTON
INACTIVE**

FTRI-030. Map No. 30.

a. Unit Name. Pesticide Storage/Mixing, Building No. 348.

b. Unit Characteristics.

(1) Unit Type. Pesticide Mixing/Storage.

(2) General Dimensions. Design Features. The storage and operating area is a 30 feet by 50 feet segment of a 30 feet by 125 feet building. The building has a masonry floor, a metal frame, sheet metal sides, and a wooden roof. The building inside, was renovated to conform to current pesticide operating standards 5 years ago.

(3) Approximate Dates of Usage. 1950's to Present.

(4) Operating Practices. Storage and mixing of pesticides.

(5) Present Condition and Status. The storage and mixing of pesticides is current. Sampling performed by Fort Riley and analyzed by USAEHA (Pesticide Monitoring Study No. 17-44-1356-88, Pesticide Residue Sampling in the Vicinity of a Pesticide Storage Site, Fort Riley, Kansas, May 1986) revealed pesticide contamination in drainage channel sediments adjacent to Pesticide Storage Building No. 348.

c. Waste Characteristics.

(1) Specific Wastes Disposed. Suspected Pesticides.

(2) Physical and Chemical Characteristics. Unknown without sample analysis.

(3) Toxicological Characteristics. Unknown without sample analysis.

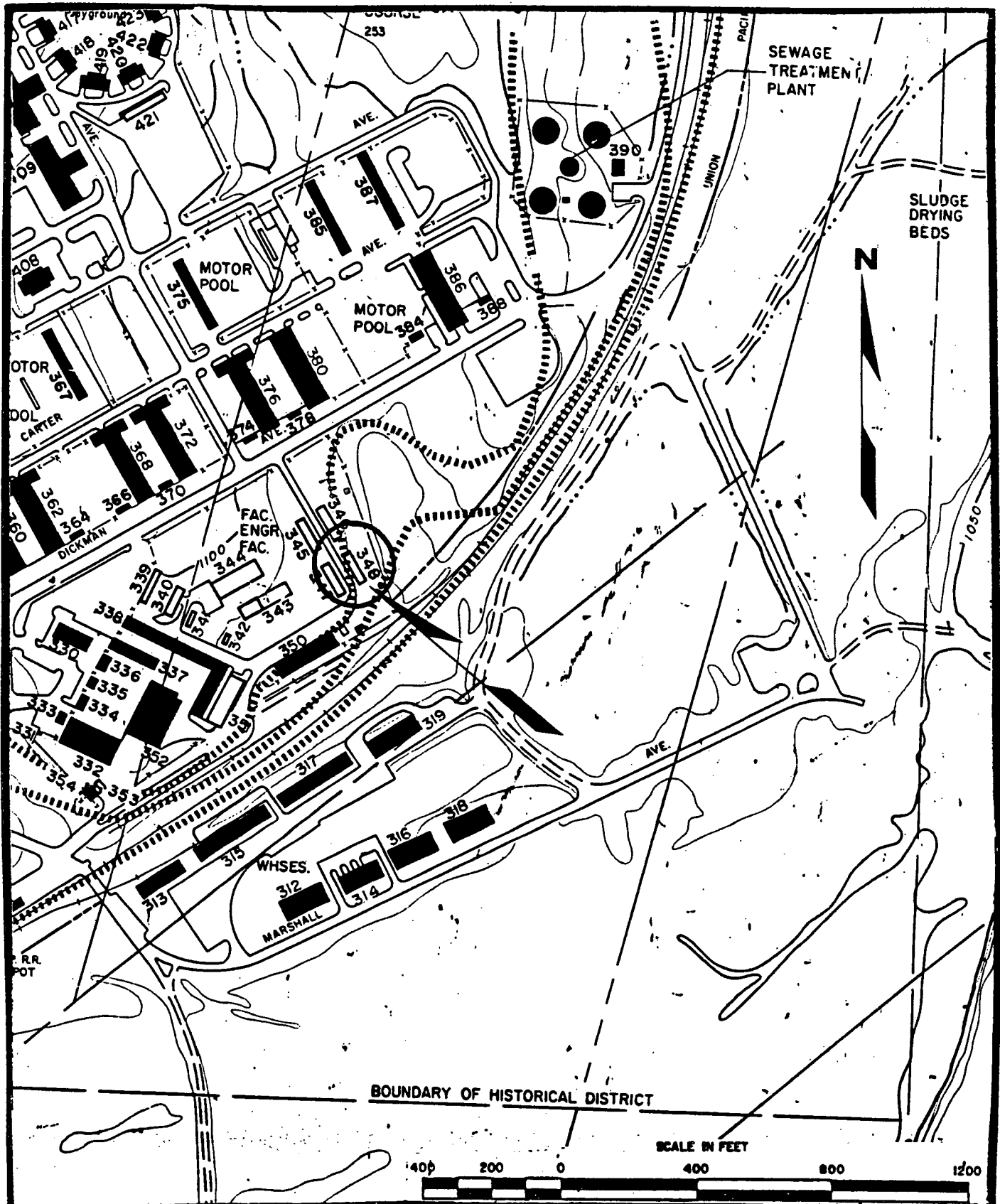
d. Migration Pathways. Soil, surface water, ground water, and air.

e. Evidence of Release. Sampling performed by Fort Riley and analyzed by USAEHA (Pesticide Monitoring Study No. 17-44-1356-88, Pesticide Residue Sampling in the Vicinity of a Pesticide Storage Site, Fort Riley, Kansas, May 1986) revealed contamination in drainage channel sediments adjacent to Pesticide Storage Building No. 348.

f. Exposure Potential. Moderate. There is a likelihood that soils adjacent to the pesticide storage building are contaminated with pesticides. The exposure to troops, however, is not significant since this area of the Mainpost is removed and downgradient from potable drinking water wells.

g. Recommendations for Sampling. Implement a soil sampling and analysis plan. Analyze for pesticides, herbicides and PCBs.

h. References. Charles Harris.



**FTRI-030, MAP 030: PESTICIDE STORAGE
BLDG. No. 348**

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

APPENDIX F
MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



No. 316

BENZENE
(Revision D)
Issued: November 1978
Revised: April 1988

25

SECTION 1. MATERIAL IDENTIFICATION

Material Name: BENZENE

Description (Origin/Uses): Used in the manufacture of medicinal chemicals, dyes, linoleum, airplane dopes, varnishes, and lacquers; and as a solvent for waxes, resins, and oils.

Other Designations: Benzol; Phene; Phenylhydride; C₆H₆; NIOSH RTECS No. CY1400000;
CAS No. 0071-43-2

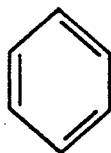
Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS	
H 2	
F 3	R 1
R 0	I 4
PPG*	S 2
*Sec sect. 8	K 4



SECTION 2. INGREDIENTS AND HAZARDS

Benzene, CAS No. 0071-43-2



*See NIOSH, RTECS, for additional data with references to irritative, mutagenic, tumorigenic, and reproductive effects.

%

Ca 100

EXPOSURE LIMITS

OSHA PEL
8-Hr TWA: 1 ppm
15-Min Ceiling: 5 ppm
Action Level: 0.5 ppm

ACGIH TLV, 1987-88
TLV-TWA: 10 ppm, 30 mg/m³

Toxicity Data*
Human, Inhalation, LC₅₀: 2000 ppm/5 Min
Human, Oral, TD₅₀: 130 mg/kg
Human, Inhalation, TC₅₀: 210 ppm

SECTION 3. PHYSICAL DATA

Boiling Point: 176°F (80°C)
Melting Point: 42°F (5.5°C)
Vapor Pressure: 75 Torrs at 68°F (20°C)
Vapor Density (Air = 1): >1

Water Solubility (%): Slight
% Volatile by Volume: 100
Molecular Weight: 78 Grams/Mole
Specific Gravity (H₂O = 1): 0.87865 at 68°F (20°C)

Appearance and Odor: A colorless liquid; characteristic aromatic odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
12°F (-11.1°C) CC	928°F (498°C)	% by Volume	1.3%	7.1%

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to put out benzene fires. Water may be ineffective as an extinguishing agent because it can scatter and spread the fire. Use water to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene vapor is heavier than air and can collect in low-lying areas such as sumps or wells. Eliminate all sources of ignition there to prevent a dangerous flashback to the original liquid benzene. Danger: Explosive and flammable benzene vapor-air mixtures can easily form at room temperature; always use this material in a way that minimizes dispersion of its vapor into general work areas.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Benzene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Hazardous chemical reactions involving benzene and the following materials are reported in Genium reference 84: bromine pentafluoride, chlorine, chlorine trifluoride, chromic anhydride, nitryl perchlorate, oxygen, ozone, perchlorates, perchloryl fluoride and aluminum chloride, permanganates and sulfuric acid, potassium peroxide, silver perchlorate, and sodium peroxide.

Conditions to Avoid: Avoid all exposure to sources of ignition and to incompatible chemicals.

Hazardous Products of Decomposition: Toxic gases like carbon monoxide (CO) may be produced during benzene fires.

SECTION 6. HEALTH HAZARD INFORMATION

Benzene is listed as a suspected human carcinogen by the ACGIH.

Summary of Risks: Prolonged skin contact with benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. Continued exposure can cause collapse, bronchitis, and pneumonia. The most important health hazards are cancer (leukemia), bone marrow effects, and injuries to the blood-forming tissue from chronic low-level exposure.

Medical Conditions Aggravated by Long-Term Exposure: Ailments of the heart, lungs, liver, kidneys, blood, and central nervous system (CNS) may be worsened by exposure. Administer preplacement and periodic medical exams emphasizing these organs' functions and reassign workers who test positive. **Target Organs:** Blood, CNS, bone marrow, eyes, and upper respiratory tract (URT). **Primary Entry:** Skin contact, inhalation. **Acute Effects:** Dizziness, mental dullness, nausea, headache, fatigue, and giddiness. **Chronic Effects:** Possible cancer (leukemia).

FIRST AID

Eyes: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.

Skin: Immediately wash the affected area with soap and water.

Inhalation: Remove the exposed person to fresh air; restore and/or support his or her breathing as needed.

Ingestion: Never give anything by mouth to someone who is unconscious or convulsing. Do not induce vomiting because of the possibility of aspiration.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Cleanup personnel need protection against contact with and inhalation of vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.

Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations for disposal. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U019

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg)

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow the eye- and face-protection guidelines in 29 CFR 1910.133. **Respirator:** Wear a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. For emergency or nonroutine use (e.g., cleaning reactor vessels or storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., to prevent any possibility of skin contact with this suspected human carcinogen. **Ventilation:** Install and operate general and local ventilation systems powerful enough to maintain airborne levels of benzene below the OSHA PEL standard cited in section 2.

Safety Stations: Make eyewash stations, washing facilities, and safety showers available in use and handling areas. **Contaminated**

Equipment: Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale benzene vapor!

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store benzene in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals.

Special Handling/Storage: Protect containers from physical damage. Electrically ground and bond all metal containers used in shipping or transferring operations. Follow all parts of 29 CFR 1910.1028.

Engineering Controls: All engineering systems (production, transportation, etc.) must be of maximum explosion-proof design (non-sparking, electrically grounded and bonded, etc.)

Comments: If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if it is absolutely essential.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Benzene

DOT Class: Flammable Liquid

DOT Label: Flammable Liquid

DOT ID No. UN1114

IMO Label: Flammable Liquid

IMO Class: 3.2

References: 1, 2, 12, 73, 84-94, 100, 103.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

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Prepared by PJ Igoe, BS

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MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

PHONE: (518) 385-4085

DIAL COMM 8*235-4085



No. 385

ETHYL BENZENE

Date August 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: ETHYL BENZENE

OTHER DESIGNATIONS: Phenylethane, Ethylbenzol, $C_2H_5C_6H_5$, CAS# 000 100 414

MANUFACTURER: Available from several suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Ethyl Benzene

%

ca 100

HAZARD DATA

8-hr TWA 100 ppm*

*Current OSHA permissible exposure level. A Standard was proposed by OSHA in October 1975 which includes an action level of 50 ppm, and detailed requirements of monitoring, medical surveillance, employee training, etc., when exposure exceeds 50 ppm. It has not yet issued as a legal requirement.

Human, inhalation
TCLo 100 ppm for
8 hr (irritation)
Rat, Oral LD50
3500 mg/kg

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C --	136	Specific gravity 20/4C -----	0.867
Vapor pressure at 25.9 C, mm Hg -	10	Volatiles. % -----	ca 100
Vapor density (Air=1) -----	3.66	Evaporation rate (BuAc=1) -----	<1
Water solubility at 20 C Wt. % -	0.015	Melting point, deg C -----	-95
		Molecular weight -----	106.16

Appearance & Odor: Clear, colorless liquid with an aromatic hydrocarbon odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
59 F (15 C) (closed cup)	810 F (432 C)	Volume %	1.0	6.7

Extinguishing media: Carbon dioxide, dry chemical or "alcohol" foam. A water spray may be ineffective to put out fire, but may be used to cool fire-exposed containers. A stream of water can spread fire of burning liquid.

This is a flammable liquid (OSHA Class IB) which can readily form explosive mixtures with air, especially when heated. Heavier-than-air vapors can flow along surfaces to reach distant ignition sources, and then flash back. Firefighters should use self-contained breathing equipment and eye protection to fight fires in enclosed places.

SECTION V. REACTIVITY DATA

This material is stable in storage in closed containers at room temperature. It does not polymerize.

This flammable material should be kept separated from oxidizing agents, strong acids and bases and ammonia. Thermal-oxidative degradation can produce toxic products, including carbon monoxide.

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SECTION VI. HEALTH HAZARD INFORMATION	TLV 100 ppm
<p>Excessive exposure to vapors will irritate the eyes and mucous membranes of the upper respiratory tract. Sustained high levels can produce headache, depression of the central nervous system, narcosis and coma.</p> <p>Liquid contact is irritating to the eyes and irritation and defatting to the skin, leading to dermatitis on prolonged or repeated exposures. Ingestion may lead to aspiration of liquid into the lungs. Small amounts of aspirated ethyl benzene cause extensive edema and hemorrhage of lung tissue. FIRST AID:</p> <p><u>Eye contact:</u> Wash eyes well with plenty of running water. Get medical help if irritation persists.</p> <p><u>Skin contact:</u> Wash exposed areas of skin. Promptly remove contaminated clothing.</p> <p><u>Inhalation:</u> Remove victim to fresh air. Restore breathing if necessary. Get medical help for serious exposure.</p> <p><u>Ingestion:</u> Get prompt medical help! (The danger of aspirating ethyl benzene into the lungs indicates medical direction before inducing vomiting.)</p>	
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES	
<p>Personnel involved in leak or spill control and clean-up must use protective equipment to avoid inhalation of vapors and contact with liquid. Eliminate ignition sources. Provide maximum explosion-proof ventilation.</p> <p>Pick-up spilled material for recovery or disposal. Absorb with sand, etc. for disposal in a sanitary landfill or with paper towels or cloths for burning. Water can be used to flush liquid away from sensitive areas to special catch basins or ground, <u>but not to sewer or surface water.</u></p> <p><u>DISPOSAL:</u> Scrap material can be burned in approved incinerators in accordance with Federal, State and local regulations.</p>	
SECTION VIII. SPECIAL PROTECTION INFORMATION	
<p>Provide explosion-proof general and local exhaust ventilation to meet TLV requirements. Approved respirators must be available for non-routine or emergency use. A full face respirator with organic vapor cartridge can be used up to 1000 ppm; a gas mask with organic vapor canister can be used up to 5000 ppm. A self-contained respirator is needed for high and unknown concentrations of vapor.</p> <p>Use impervious gloves and clothing and a face shield to prevent repeated or prolonged contact with the liquid. Where splashing is possible chemical goggles should be used. Clothing contaminated with ethyl benzene should be promptly removed and not reused until free of the contaminant.</p> <p>Exposures above the action level, liquid contact, or working where fire and explosion hazards exist may require instituting employee training, medical surveillance, vapor concentration monitoring, record keeping, etc. when the proposed standard issues.</p>	
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS	
<p>Store this material in tightly closed containers in cool, well-ventilated areas, away from oxidizing agents, heat and sources of ignition. Use non-sparking tools around this material. Containers must be electrically bonded and grounded for transfers of liquid. Use safety cans for small amounts. No Smoking! where this material is stored or used.</p> <p>Screen workers for history of kidney, liver, skin and lung problems which could give increased sensitivity and risk in ethyl benzene exposure.</p> <p>Avoid breathing of vapors and contact with liquid. Do not ingest. Chronic properties are not fully known; use with care.</p>	
DATA SOURCE(S) CODE: 2-9, 11, 12	APPROVALS: MIS, CRD <i>J. G. ...</i>
<p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p>	Industrial Hygiene and Safety <i>DeWitt</i> Corporate Medical Staff <i>G. F. Marten M.D.</i>

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MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305



No. 470

DIESEL FUEL OIL NO. 2-D

Date October 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: DIESEL FUEL OIL NO. 2-D
 DESCRIPTION: Mixture of petroleum hydrocarbons; a distillate oil of low sulfur content
 OTHER DESIGNATIONS: ASTM D975, CAS # 068 476 346
 MANUFACTURER: Available from many suppliers

SECTION II. INGREDIENTS AND HAZARDS

Diesel Fuel Oil No. 2-D
 Complex mixture of paraffinic, olefinic, naphthenic and aromatic hydrocarbons**
 Sulfur content
 Benzene***
 *Current OSHA standard and ACGIH (1981) TLV
 **Diesel fuels tend to be low in aromatics and high in paraffinics. A min. Cetane No. of 40 is required (ASTM D613).
 ***A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)

%	HAZARD DATA
>95	8-hr TWA 5mg/m ³ * (mineral oil mist)
<0.5	
<100 ppm	

SECTION III. PHYSICAL DATA

Boiling point range, deg F, ----- Ca 340-675 Specific gravity (H₂O=1) ---- <0.86
 Solubility in water ----- negligible Cloud point (wax), deg C --- Ca 0
 Viscosity at 40 C, cSt ----- 1.9-4.1

Appearance and Odor: Clear, bright liquid with a mild petroleum odor.

SECTION IV. FIRE AND EXPLOSION DATA

			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
125F min (PM)	>500F	% by volume	0.6	7.5

Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray. Use a water spray to cool fire exposed containers. Use a smothering technique for extinguishing fire of this combustible liquid. Do not use a forced water stream directly on oil fire as this will only scatter the fire. Material is a OSHA Class II combustible liquid. Firefighters should wear self-contained breathing apparatus and full protective clothing.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. Incompatible with strong oxidizing agents; heating greatly increases fire hazard. Thermal -oxidative degradation may yield various hydrocarbons and hydrocarbon derivatives (partial oxidation products), CO₂ and CO and SO₂.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 5 mg/m³ oil (mist) (See Sect II)

Inhalation of excessive concentrations of vapor or mist can be irritating to the respiratory passages and can cause the following symptoms: headache, dizziness, nausea, vomiting, and loss of coordination. Prolonged or repeated skin contact may cause irritation of the hair follicles and block the sebaceous glands. This produces a rash of acne pimples and spots, usually on the arms and legs. (Good personal hygiene will prevent this).

Chemical pneumonitis may result when ingestion occurs and oil is aspirated in the lungs.

FIRST AID:

Eye Contact: Flush thoroughly with running water for 15 min. including under eyelids.

Skin Contact: Remove contaminated clothing. Wipe excess oil off with a dry cloth. Wash affected area well with soap and water.

Inhalation: Remove to fresh air. Restore and/or support breathing as required.

Ingestion: Do not induce vomiting.

Seek medical assistance for further treatment, observation and support.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of leaks or spills. Remove sources of heat or ignition. Provide adequate ventilation. Clean-up personnel to use protection against liquid contact and vapor or mist inhalation. Contain spill by diking. Small spills can be contained by using absorbants, such as rags, straw, polyurethane foam, activated carbon, and sand. Clean up spills promptly to reduce fire or vapor hazards.

DISPOSAL: May be disposed of by a licensed waste disposal company, or by controlled incineration or burial in an approved landfill.

Follow Federal, State and Local regulations. Report large oil spills.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate ventilation where operating conditions (heating or spraying) may create excessive vapors or mists. Use explosion-proof equipment. Provide approved respiratory apparatus for nonroutine or emergency use. Use an approved filter & vapor respirator when vapor/mist concentrations are high. Wear protective rubber gloves and chemical safety glasses where contact with liquid or high mist conc. may occur. Additional suitable protective clothing may be required depending on working conditions. An eye-wash fountain and washing facilities to be readily available near handling and use areas.

Laundry soiled or contaminated clothing before reuse (at least weekly laundering of work clothes is recommended).

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from sources of open flame, heat, strong oxidizing agents, and ignition. Protect containers from physical damage. Use non sparking tools and explosion-proof electrical equipment. Prevent static electric sparks.

Avoid prolonged skin contact and breathing of vapors or mists.

No smoking in areas of use. Follow good hygienic practice in the use of this material.

Do not wear oil contaminated clothing. Do not put oily rags into pockets. Wash exposed skin areas several times a day with soap and warm water when working with this material.

DATA SOURCE(S) CODE: 1,6,7,12

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APPROVALS: MIS
CRD

Industrial Hygiene
and Safety

MEDICAL REVIEW: 21 October 1981

GENERAL  ELECTRIC

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305



No. 467

AUTOMOTIVE
GASOLINE, LEAD-FREE

Date October 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: AUTOMOTIVE GASOLINE, LEAD-FREE
DESCRIPTION: A volatile blend of hydrocarbons for automotive fuel
OTHER DESIGNATIONS: Petrol, CAS #008 006 619, ASTM D439
MANUFACTURER: Available from several suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Gasoline A hydrocarbon blend that can include normal and branched chain alkanes, cycloalkanes, alkenes, aromatics and other additives.** (Lead max 0.013 g/L, phosphorus max 0.0013 g/L, sulfur max 0.10 wt%. May contain benzene, <5%; see ASTM D3606). *ACGIH 1981 TLV (Intended Changes List). See also Am. Ind. Hyg. A. 39 110-117 (1978) **The composition of fuel is varied with altitude and seasonal requirements for a locality. The blend must meet antiknock requirements. (Antiknock Index min 85, ASTM D439.)	100	8-hr TWA 300 ppm or 900 mg/m ³ * Man Eye: 500 ppm/1H Moderate irritation Inhalation: TCLo 900 ppm/1H TFX:CNS

SECTION III. PHYSICAL DATA

Distillation at 1 atm, Initial, deg C >39 Specific gravity, 60/60 F - 0.72-0.76
50% distilled - 77-121 Melting point, deg C ----- -90.5-95.4
End point ----- <240 Evaporation rate ----- N/A
Vapor density (Air=1) ----- 3.0-4.0
Solubility in water ----- Insoluble

Appearance and Odor: A clear, mobile liquid with a characteristic odor which can be recognized at about 10 ppm in air. (Gasoline may be colored with dye.)

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
-45 F	536-853 F	% by volume	1.4	7.6

Extinguishing Media: Dry chemical, carbon dioxide, alcohol foam. Use of water may be ineffective to extinguish fire, but use water spray for cooling fire-exposed drums and tanks to prevent pressure rupture. It is a dangerous fire and explosion hazard when exposed to heat and flames. Vapors can flow along surfaces, reach distant ignition sources and flash back. Can react violently with oxidizing agents.
Firefighters should wear self-contained breathing apparatus and full protective clothing.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.
This is an OSHA Class IA flammable liquid. A mixture of gasoline vapors and air can be explosive. It is incompatible with oxidizing agents.
Thermal-oxidative degradation can yield carbon monoxide and partially oxidized hydrocarbons.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 300 ppm (See Sect. II)

Inhalation causes intense burning of the mucous membranes, throat and respiratory tract; overexposure to vapors can lead to bronchopneumonia. Inhalation of high conc. can cause fatal pulmonary edema. Repeated or prolonged skin exposure causes dermatitis. Can cause blistering of skin due to its defatting properties. Exposure to eyes can cause hyperemia of the conjunctiva.

Ingestion or excessive vapors can cause inebriation, drowsiness, blurred vision, vertigo, confusion, vomiting and cyanosis (2000 ppm produces mild anesthesia in 30 min, higher conc. are intoxicating in less time.) Aspiration after ingestion causes bronchitis, pneumonia, or edema which can be fatal.

FIRST AID:

Eye Contact: Flush thoroughly with running water for 15 min. including under eyelids.

Skin Contact: Remove contaminated clothing. Wash affected area with soap and water.

Inhalation: Remove to fresh air. Restore breathing and administer oxygen if needed.

Ingestion: Do not induce vomiting. Aspiration hazard. Contact physician.

Seek prompt medical assistance for further treatment, observation and support.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of leaks or spills. Remove sources of heat or ignition. Provide adequate ventilation. Clean-up personnel require protection against liquid contact and vapor inhalation. If a leak or spill has not ignited, use water spray to disperse vapors and to protect men attempting to stop the leakage. Contain spill. Do not allow to enter sewer or surface water. Add absorbent solid to small spills or residues and pick up for disposal.

DISPOSAL: Burn scrap material in an approved incinerator. Burn contaminated liquid by spraying into an incinerator. Follow Federal, State, and Local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Use general and local exhaust ventilation (explosion-proof) to keep vapors below the TLV requirements in the workplace. Respirators should be available for nonroutine or emergency use above the TLV.

Avoid eye contact by use of chemical safety goggles and/or full faceshield where splashing is possible. Wear protective clothing appropriate for the work situation to minimize skin contact such as rubber gloves and boots. Clothing to be changed daily and laundered.

Eyewash fountains, showers and washing facilities should be readily accessible. Provide suitable training to those handling and working with this material.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from sources of heat, ignition and strong oxidizing agents. Protect containers from physical damage.

Avoid direct sunlight. Storage must meet requirements of OSHA Class IA liquid. Outdoor or detached storage preferred. No smoking in areas of use. Prevent static electric sparks and use explosion-proof electrical services. (Must meet code.)

Avoid skin and eye contact. Avoid inhalation of vapors. Wear clean work clothing daily.

Indoor use of this material requires exhaust ventilation to remove vapors.

ICC Flammable Liquid, Red Label. LABEL: Flammable Liquid DOT I.D. No. UN 1203.

DOT Classification: FLAMMABLE LIQUID

DATA SOURCE(S) CODE: 2.4-9.34.37

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APPROVALS: MIS
CRD

Industrial Hygiene
and Safety

MEDICAL REVIEW: 14 November 1981

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305



No. 469

FUEL OIL NO. 2

Date October 1981

SECTION I. MATERIAL IDENTIFICATION			
MATERIAL NAME: FUEL OIL NO. 2 DESCRIPTION: Mixture of petroleum hydrocarbons; a distillate oil of low sulfur content. OTHER DESIGNATIONS: ASTM D396, GE Material D27B1A, CAS #068 476 302 MANUFACTURER: Available from many suppliers, including: AMOCO Oil Co. 200 East Randolph Drive Chicago, Illinois 60601			
SECTION II. INGREDIENTS AND HAZARDS		%	HAZARD DATA
Fuel Oil No. 2 Complex mixture of paraffinic, olefinic, naphthenic, and aromatic hydrocarbons Sulfur content Benzene** *Current OSHA standard and ACGIH (1981) TLV **A low benzene level reduces carcinogenic risk. Fuel oils are exempted under the benzene standard (29 CFR 1910.1028)		<0.5 <100 ppm	8-hr TWA 5 mg/m ³ (mineral oil mist)*
SECTION III. PHYSICAL DATA			
Boiling point range, deg F, ----- Ca 340-675		Specific gravity (H ₂ O=1) --- <0.876	
Solubility in water ----- negligible		Pour point, deg C ----- below -6	
Viscosity at 38 C, cSt ----- 2.0-3.6			
Appearance and Odor: Clear, bright liquid with a mild petroleum odor.			
SECTION IV. FIRE AND EXPLOSION DATA			LOWER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	UPPER
100F min (TCC)	257 C (495F)	% by volume	0.6 7.5
Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray. Use a water spray to cool fire exposed containers. Use a smothering technique for extinguishing fire of this combustible liquid. Do not use a forced water stream directly on oil fire as this will only scatter the fire. Material is an OSHA Class II combustible liquid. Firefighters should wear self-contained breathing apparatus and full protective clothing.			
SECTION V. REACTIVITY DATA			
This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. Incompatible with strong oxidizing agents; heating greatly increases fire hazard. Thermal-oxidative degradation may yield various hydrocarbons and hydrocarbon derivatives (partial oxidation products), CO ₂ and CO and SO ₂ .			

SECTION VI. HEALTH HAZARD INFORMATION	TLV 5 mg/m ³ oil (mist) (See Sect II)
<p>Inhalation of excessive concentrations of vapor or mist can be irritating to the respiratory passages and can cause the following symptoms: headache, dizziness, nausea, vomiting, and loss of coordination. Prolonged or repeated skin contact may cause irritation of the hair follicles and block the sebaceous glands. This produces a rash of acne pimples and spots, usually on the arms and legs. (Good personal hygiene will prevent this).</p> <p>Chemical pneumonitis may result when ingestion occurs and oil is aspirated in the lungs.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Flush thoroughly with running water for 15 min. including under eyelids.</p> <p><u>Skin Contact:</u> Remove contaminated clothing. Wipe excess oil off with a dry cloth. Wash affected area well with soap and water.</p> <p><u>Inhalation:</u> Remove to fresh air. Restore and/or support breathing as required.</p> <p><u>Ingestion:</u> Do not induce vomiting.</p> <p>Seek medical assistance for further treatment, observation and support.</p>	
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES	
<p>Notify safety personnel of leaks or spills. Remove sources of heat or ignition. Provide adequate ventilation. Clean-up personnel to use protection against liquid contact and vapor or mist inhalation. Contain spill by diking. Small spills can be contained by using absorbants, such as rags, straw, polyurethane foam, activated carbon, and sand. Clean up spills promptly to reduce fire or vapor hazards.</p> <p>DISPOSAL: May be disposed of by a licensed waste disposal company, or by controlled incineration or burial in an approved landfill.</p> <p>Follow Federal, State and Local regulations. Report large oil spills.</p>	
SECTION VIII. SPECIAL PROTECTION INFORMATION	
<p>Provide adequate ventilation where operating conditions (heating or spraying) may create excessive vapors or mists. Use explosion proof equipment. Provide approved respiratory apparatus for nonroutine or emergency use. Use an approved filter & vapor respirator when vapor/mist concentrations are high. Wear protective rubber gloves and chemical safety glasses where contact with liquid or high mist conc. may occur. Additional suitable protective clothing may be required depending on working conditions. An eye-wash fountain and washing facilities to be readily available near handling and use areas.</p> <p>Launder soiled or contaminated clothing before reuse (at least weekly laundering of work clothes is recommended).</p>	
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS	
<p>Store in closed containers in a cool, dry, well-ventilated area away from sources of open flame, heat, strong oxidizing agents, and ignition. Protect containers from physical damage. Use non sparking tools and explosion-proof electrical equipment. Prevent static electric sparks.</p> <p>Avoid prolonged skin contact and breathing of vapors or mists.</p> <p>No smoking in areas of use. Follow good hygienic practice in the use of this material. Do not wear oil contaminated clothing. Do not put oily rags into pockets. Wash exposed skin areas several times a day with soap and warm water when working with this material.</p> <p>DOT Classification: COMBUSTIBLE LIQUID</p>	
<p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p>	<p>DATA SOURCE(S) CODE: 1,6,7,12</p> <p>APPROVALS: MIS CRD <i>J. M. Nielsen</i></p> <p>Industrial Hygiene and Safety <i>JW 10-12-81</i></p> <p>MEDICAL REVIEW: 21 October 1981</p>

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MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

Phone: (518) 385-4085

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No. 313

PERCHLOROETHYLENE

Revision C

Date November 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: PERCHLOROETHYLENE

OTHER DESIGNATIONS: Perchloroethylene, Tetrachloroethylene, Ethylene Tetrachloride, $Cl_2C=CCl_2$, GE Material D5B84, CAS# 000 127 184

MANUFACTURER & TRADENAME: BLACO-PER (Baron-Blakeslee); PERCHLOR (PPG); PERK (Stauffer); PERCLEN (Diamond Shamrock)

SECTION II. INGREDIENTS AND HAZARDS

	x	HAZARD DATA
Perchloroethylene plus stabilizer* -----	ca 100	8-hr TWA 100 ppm** with 200 ppm Ceiling and 300 ppm 5 minute peak in any 3 hrs Rat, inhalation LCLo 4000 ppm/4 hrs

*Stablized material usually contains a small amount of amine and/or phenolic stabilizer. Stabilizers and levels used vary with the grade and the supplier.
**Current OSHA levels. ACGIH TLV (1978) is 100 ppm (skin). In 1976 NIOSH proposed a 10-hr TWA of 50 ppm with a 100 ppm ceiling (15 minute sample). NIOSH (1978) has warned of possible carcinogenicity based on animal tests.

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C) ----	250 (121)	Specific gravity 20/4°C ---	1.623
Vapor pressure at 22 C, mm Hg -----	15.8	Volatiles, % -----	ca 100
Vapor density (Air=1) -----	5.83	Evaporation rate (CCl ₄ =1) ..	0.27
Water solubility -----	Negligible	Molecular weight -----	165.83

Appearance & Odor: Colorless liquid with pleasant ethereal odor whose recognition threshold (100% of test panel, unfatigued) is 4.68 ppm in air.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
Not Combustible	None	N/A	N/A	N/A

Extinguishing Media: Use that which is suitable for the surrounding fire. Although not combustible, perchloroethylene can be hazardous in a fire situation because of vapor generation and from thermo-oxidative degradation at high temperature to phosgene (highly toxic) and hydrogen chloride (corrosive).

Firefighters should use self-contained breathing apparatus when this material is involved in a fire situation.

SECTION V. REACTIVITY DATA

Perchloroethylene is considered a stable compound under normal storage and handling conditions. However, vapor exposure to high temperature or electric arcs may cause decomposition to hydrogen chloride and phosgene (highly toxic).

Avoid mixing with caustic soda or potash. Do not allow hydrochloric acid build-up to occur in degreasing tanks (stabilizer exhausted).

Prolonged exposure to sunlight (UV) can degrade unstabilized material.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 100 ppm (skin) (See Sect II)

Perchloroethylene may cause dermatitis through prolonged or repeated skin contact with liquid and irritation, lachrymation, and burning sensation of the eyes by liquid or vapor contact. Loss of coordination, narcosis, tremors, abdominal cramps, irritation of the respiratory tract, and nausea may result from inhalation of excessive airborne concentrations. (600 ppm for 10 minutes may effect the central nervous system.) Very high exposures produce unconsciousness and even death.

FIRST AID:

Eye contact: Wash eyes with copious amounts of running water to relieve irritation.

Skin contact: Remove contaminated clothes. Wash exposed skin with soap and water.

Inhalation: Remove patient to fresh air; restore breathing if necessary. Promptly contact physician. Advise doctor not to administer adrenalin.

Ingestion: If taken internally, induce vomiting. Contact physician promptly; Advise doctor not to administer adrenalin.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Supply maximum ventilation. Confine spill to small area; do not allow run off into sewer. Those involved in clean-up need protection from liquid contact and vapor inhalation. Pick up spill on absorbent solid.

DISPOSAL: Place in covered container for disposal. Chlorinated solvents in large amounts should be burned in an approved incinerator with appropriate fume scrubbing. Also, consult licensed waste disposal company in your locality and consider recovery of perchloroethylene solvent by distillation. Scrap solvent and distillation residues must be handled as toxic waste. Follow Federal, State and local regulations for waste disposal.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Airborne levels should be kept below TLV levels by use of general ventilation and local exhaust ventilation. Provide floor level ventilation to remove these vapors.

For emergency and non-routine exposure above the TLV approved full facepiece respirators should be used - cartridge and canister types up to 500 ppm, and air-supplied or self-contained types above 500 ppm.

Neoprene, Viton, PVA or PVC coated gloves should be used to prevent skin exposure. Where splashing is possible, aprons and protective clothing may be indicated. Appropriate eye and face protection should be used. Where eye contamination is possible, an eye wash fountain should be readily available.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, dry, well-ventilated place in closed containers away from fire hazards. High temperature (700°C) or intense UV light can decompose perchloroethylene to toxic and corrosive materials. Smoking, open flame, welding, etc. should not be permitted in area of use or storage.

It is recommended that workers with blood pressure, heart, liver, kidney or pulmonary problems, with nervous system disorders, with excessive obesity, or with alcohol consumption problems should not work in proximity to this or other chlorinated solvents. One study has indicated possible teratogenic effects. NIOSH has recommended that this

material be handled as if it were a human carcinogen. (Current Intelligence Bulletin No. 20, 1978)

DATA SOURCE(S) CODE: 1-9, 12, 21

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APPROVALS: MIS, *J. M. Nielsen*
CRD

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MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

m
IS
SERVICES
INFORMATION

No. 26

MERCURY

Revision B

Date September 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: MERCURY

DESCRIPTION: A liquid, metallic element.

OTHER DESIGNATIONS: Quick Silver, GE Material B21Y4, CAS #007 439 976, Hg, Hydrargyrum

MANUFACTURER: Available from many sources.

SECTION II. INGREDIENTS AND HAZARDS

Mercury

*ACGIH (1981) TLV. Current OSHA standard is
0.1 mg/m³ ceiling level.

%

~100

HAZARD DATA

8-hr TWA 0.05 mg/m³*

Women, Inhalation
TDLo 150 ug/m³/46D
TFX: GI, CNS.

Human, Oral
LDLo 1429 mg/kg

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C	-- 356.6	Specific gravity (H ₂ O=1)	----- 13.5
Vapor press. at 20 C, mm Hg	---- 0.0012	Melting point, deg C	----- -38.9
at 126 C, mm Hg	---- 1	Atomic weight	----- 200.61
Water solubility	----- nil	Atomic number	----- 80

Appearance & Odor: A silvery, dense mobile liquid, no odor. (Vapor has no warning properties).

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

LOWER

UPPER

Noncombustible

Extinguishing Media: Select extinguishing media suitable for surrounding fire.

Mercury is nonflammable and nonexplosive in air.

When exposed to high temperature, mercury vaporizes to form extremely toxic fumes.

When this material is involved in a fire, firefighters need to use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

Mercury is a stable metallic element. It will react slowly with oxygen when heated, and it reacts with halogens; for example, at 200-300 C a flame forms when a jet of chlorine gas is directed over mercury.

Mercury dissolves (reacts) in oxidizing acids, such as nitric; but it does not dissolve in hydrochloric acid.

Boron phosphodiiodide will ignite in mercury vapor. The following can give explosive mixtures with mercury: acetylene, ammonia, chlorine dioxide, nitric acid plus ethanol, and methyl azide.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 0.05 mg/m³ (See Sect II).

Elemental Hg, liquid and vapor, is toxic due to its liquid solubility, lack of charge, and membrane permeability. Inhaled vapors (80%) diffuse rapidly through alveolar membranes into the blood and are systemically transported to body tissues, including the brain. Exposure to high conc. (>1.2 mg/m³) of vapors for brief periods can cause pneumonitis, chest pains, dyspnea, coughing; Later stomatitis, gingivitis, and salivation occur. Hg can be absorbed slowly through the skin. Chronic symptoms involve the CNS with tremors and various neuropsychiatric disturbances. The TLV would be exceeded if the contents of a small Hg clinical thermometer were dispersed in a closed 100' x 100' x 15' room. GI uptake of Hg is low (<5%).

FIRST AID:

- Eye Contact: Flush with running water for 15 min. including under the eyelids.
- Skin Contact: Remove contaminated clothing. Wash affected area with soap and water.
- Inhalation: Remove to fresh air. Restore and/or support breathing as needed. Administer O₂ for chem. pneumonitis.
- Ingestion: Gastric lavage with 5% solution of sodium formaldehyde sulfoxylate, followed by 2% NaHCO₃, and finally leave 250 cc of the sodium formaldehyde sulfoxylate in the stomach.

Seek medical assistance for further treatment, observation and support.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of leaks or spills. Provide adequate ventilation. Clean-up spills promptly. A suction bottle with a capillary tube for small amounts can be used. Vacuum cleaners may be used provided they have special mercury absorbent exhaust filters. Calcium polysulfide with excess sulfur can be sprinkled into cracks or other inaccessible places to convert mercury globules into the sulfide. Collect picked-up or scrapped mercury in tightly sealed containers for reclaim or for disposal. Do not discharge mercury down the drain!

DISPOSAL: Mercury should be salvaged for purification. Sell to a salvage company when large amounts are involved. Follow Federal, State, and local regulations.

EPA Hazardous Waste Number under RCRA is U151, 40CFR261.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate exhaust ventilation to meet TLV requirements in the workplace. Operations requiring an exposed Hg surface should reduce the temp. of Hg to limit vaporization and minimize vapor exposure by using a local exhaust.

Self-contained breathing apparatus can be used up to 5 mg/m³ with a full facepiece above 1 mg/m³. Positive pressure-type air supplied breathing equipment has been recommended above 5 mg/m³.

Avoid eye contact by use of chemical safety glasses. Wear rubber gloves and protective clothing appropriate for the work situation. Separate work and street clothing. Store work clothing in special lockers. Showers to be taken before changing to street clothes.

Provide preplacement and periodic medical exams for those regularly exposed to Hg, with emphasis directed to CNS, skin, lungs, liver, kidneys and G.I. tract.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed unbreakable containers (polyethylene) in a cool, dry, well-ventilated area away from sources of heat. Protect containers from physical damage.

Mercury evaporates very slowly. Spilled Hg forms many tiny globules that will evaporate faster than a single pool and can develop a significant concentration of vapors in an unventilated area. Such vapors can be poisonous, especially if breathed over a long period of time. Heated Hg evolves high levels of toxic vapors.

Avoid direct contact with mercury. Follow good hygienic and housekeeping practices. Construction of work area floors and counter surfaces to be smooth, nonporous. No eating or smoking in work areas.

DOT Classification: ORM-B

DATA SOURCE(S) CODE: 2-12, 16, 31, 37-40, 44

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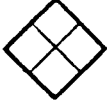
APPROVALS:	MIS CRD	<i>J.M. Nielsen</i>
	Industrial Hygiene and Safety	<i>JW 10-12-81</i>
MEDICAL REVIEW: 21 October 1981		



SECTION 1. MATERIAL IDENTIFICATION 20

MATERIAL NAME: SILVER
DESCRIPTION: Elemental metal.
OTHER DESIGNATIONS: Ag, Argentum, CAS #7440-22-4.
MANUFACTURER/SUPPLIER: Available from many suppliers.
COMMENTS: Photography products account for 30% of industrial consumption. Additional uses include electrical conductors, coins, silverware, and jewelry.

HMIS
 H:1
 F:0
 R:0
 PPE*
 *See sect. 8


 Not Found

SECTION 2. INGREDIENTS AND HAZARDS HAZARD DATA

	%	
Silver, Ag * Current (1985-86) ACGIH TLV for silver dust and fume. ** Current (1985-86) ACGIH TLV for soluble silver compounds and OSHA exposure limit.	99+	TWA 0.1 mg/m ³ * TWA 0.01 mg/m ³ ** ----- Rat, Implant, TD: 2570 mg/kg

SECTION 3. PHYSICAL DATA

Boiling Point ... 3833.6°F (2112°C) Vapor Pressure ... Not Found Water Solubility ... Insoluble Vapor Density (Air = 1) ... Not Found Evaporation Rate ... Not Found Appearance and odor: Ductile and malleable lustrous white metal.	Specific Gravity (H ₂ O = 1) ... 10.5 Melting Point ... 1763.4°F (961.9°C) Percent Volatile by Volume ... Not Found Molecular Weight ... 107.87
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SECTION 4. FIRE AND EXPLOSION DATA LOWER UPPER

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
Not Found	Not Found	Not Found	Not Applicable	Not Applicable

NFPA Classification: Noncombustible.

EXTINGUISHING MEDIA: Use proper extinguisher for surrounding fire.
UNUSUAL FIRE/EXPLOSION HAZARDS: None.
SPECIAL FIRE-FIGHTING PROCEDURES: None.

SECTION 5. REACTIVITY DATA

Silver is stable. Hazardous polymerization cannot occur.

CHEMICAL INCOMPATIBILITIES: Acetylene and silver form an insoluble, explosive acetylide. If silver is treated with nitric acid in the presence of ethyl alcohol, silver fulminate may be formed, which can be detonated. Ethylenimine forms explosive compounds with silver. Finely divided silver and hydrogen peroxide solutions may explode. This material is incompatible with oxalic and tartaric acid. Ammonia plus silver may form explosive compounds. Bromoazide explodes on contact with silver foil.

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SECTION 6. HEALTH HAZARD INFORMATION | TLV

Silver is not considered a carcinogen by the NTP, IARC, or OSHA.

SUMMARY OF RISKS: Silver has no known physiological function in man and will accumulate in most tissues. Chronic accumulation (threshold in excess of 1 gram) in the body can result in argyria, a permanent condition associated with widespread bluish pigmentation of the skin and conjunctiva. **TARGET ORGANS:** Generally, where contact occurs. **PRIMARY ENTRY:** Inhalation, long-term handling (causes particles to become embedded in skin), or absorption through sweat glands. **ACUTE EFFECTS** are associated with soluble silver compounds that may be caustic, causing local irritations or destruction of tissue, depending upon strength of solution. **CHRONIC EFFECTS:** Argyria may be a local or general effect, depending upon previous exposure. **FIRST AID:** **EYE CONTACT:** Flush with water for 15 minutes. Get medical attention.* **SKIN CONTACT:** Wash skin with soap and water. Argyria from long-term exposure is permanent and cannot be washed away. **INHALATION:** Remove victims to fresh air. **INGESTION:** Dilute with water. Get medical attention.*

* **GET MEDICAL ASSISTANCE** - In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid, if indicated.

COMMENTS: The original 0.01 mg/m³ TLV was established to prevent a lifetime body accumulation exceeding 1 gram, where argyria would become evident. Evaluation of 25 years of data has shown 0.01 mg/m³ to be too conservative; therefore, the ACGIH raised the TLV to 0.1 mg/m³.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Notify safety personnel; prevent entry into sewers or surface waters. Wear respirator where a dusting hazard is anticipated.

WASTE DISPOSAL: Reclaim or sell waste to a commercial reclaimer.

SECTION 8. SPECIAL PROTECTION INFORMATION

GOGGLES are not required unless metal is in the molten state.

GLOVES: Repeated handling may discolor the skin because of skin rubbing against the metal. Cotton gloves will prevent this cosmetic effect.

RESPIRATOR is required where metal dust or fumes are generated with inadequate exhaust ventilation. Air samples should be collected to quantify the exposure levels.

VENTILATION is required where air exposures exceed the TLV-TWAS.

OTHER: Reclamation of silver from photographic or X-ray film may involve cyanide compounds. Proper precautions must be taken when working with cyanide compounds. See Genium MSDS #13, Potassium Cyanide, for further information.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Silver is usually stored in locked cabinets or safes to prevent theft.

ENGINEERING CONTROLS: Exhaust ventilation where TLV-TWA is exceeded.

EPA Hazardous Substance Designation: 40 CFR 260

Data Source(s) Code: 2, 4, 6, 14, 59, 82, 84, NFC 1983. DW

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Approvals *JO. A. ... 11/86*

Indust. Hygiene/Safety *DW 10-86*

Medical Review *[Signature] OCT 86*

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.



No. 9

SULFURIC ACID,
CONCENTRATED

Revision A

Date October 1977

SECTION I. MATERIAL IDENTIFICATION			
MATERIAL NAME: SULFURIC ACID, CONCENTRATED OTHER DESIGNATIONS: Oil of Vitriol, Hydrogen Sulfate, H ₂ SO ₄ , GE Material D4A2, CAS# 007664939 DESCRIPTION: Material consists of about 93-98% H ₂ SO ₄ with water and traces of impurities. MANUFACTURER: Available from many suppliers.			
SECTION II. INGREDIENTS AND HAZARDS		%	HAZARD DATA
Hydrogen Sulfate (H ₂ SO ₄) Water * Material is obtained by the reaction of SO ₃ and water. Can contain low impurity levels, such as 0.02% max of iron as Fe. <u>Properties vary with H₂SO₄ content.</u>		93-98 Balance*	TLV 1 mg/m ³ for sulfuric acid
SECTION III. PHYSICAL DATA			
	<u>93.19% H₂SO₄</u>	<u>98.33% H₂SO₄</u>	<u>100% H₂SO₄</u>
Boiling point, 1 atm, deg C -----	ca 281	ca 338	ca 330 (dec)
Specific gravity (60/60 F) -----	1.8354	1.84	1.84
Deg. Baume -----	66	--	--
Volatiles, % at 340 C -----	ca 100	ca 100	ca 100
Melting point, deg C -----	ca -34	ca 3	10.4
Vapor press, mm Hg @ 100 F -----	ca 1	--	--
Water solubility: Completely miscible.			
Appearance & odor: Clear, colorless, oily liquid with no odor.			
SECTION IV. FIRE AND EXPLOSION DATA			LOWER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	UPPER
None - non-flammable	N/A	N/A	N/A
Even though sulfuric acid is non-flammable, it is hazardous when present in a fire area. Cool exterior of storage tanks of H ₂ SO ₄ with water to avoid rupture if exposed to fire. <u>Do not add water or other liquid to the acid!</u> The acid, especially when diluted with water, can react with metals to liberate flammable hydrogen gas. Sulfuric acid mists and vapors from a fire area are corrosive. Respiratory protection is required when these are present, and also protective clothing. (See also Reactivity Data, Section V.)			
SECTION V. REACTIVITY DATA			
Sulfuric acid is stable under normal conditions of use and storage. It does not undergo hazardous polymerization. It is a strong mineral acid reacting with bases and metals. The concentrated acid is a strong oxidizing agent and can cause ignition of combustible materials on contact. The concentrated acid is also a dehydrating agent, picking up moisture readily from the air or other materials. Much heat is generated when the concentrated acid is diluted in water. (Acid should always be added slowly to water. Water added to acid can cause boiling and uncontrolled splashing of the acid.) Sulfur oxides can result from decomposition and from oxidizing reactions of sulfuric acid.			

SECTION VI. HEALTH HAZARD INFORMATION

TLV 1 mg/m³

Concentrated sulfuric acid is a strong mineral acid, an oxidizing agent, and a dehydrating agent that is rapidly damaging to all human tissue with which it comes in contact. Ingestion may cause severe injury or death. Eye contact gives severe or permanent injury. Inhalation of mists can damage both the upper respiratory tract and the lungs.

FIRST AID:

Ingestion - Dilute acid immediately with large amounts of milk or water, then give milk of magnesia to neutralize. Do not induce vomiting; if it occurs spontaneously, continue to administer fluid. Obtain medical attention as soon as possible.

Eye contact - Immediately flush eyes with plenty of running water for at least 15 minutes (including under the eyelids). Speed in diluting and rinsing out acid with water is extremely important if permanent eye damage is to be avoided. Obtain medical help as soon as possible.

Skin contact - Immediately flush affected areas with water, removing contaminated clothing under the safety shower. Continue washing with water and get medical attention in all cases except those involving minor damage to small areas of skin.

Inhalation - Remove to fresh air. Restore breathing. Call a physician immediately.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Prevent contact with the acid. Minor leaks or spills can be diluted with plenty of water and neutralized with soda ash or lime. If water is not available, cover contaminated area with sand, ashes, or gravel and neutralize with soda ash or lime.

Major spills must be handled by a predetermined plan. Contact supplier for assistance in this planning and to meet local requirements and for disposing of large amounts.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Use general ventilation to keep well below 1 mg/m³ (TLV) and use respiratory equipment, such as self-contained breathing apparatus or an air-line served mask, for higher concentrations.

For eye protection use chemical safety goggles or face shield to avoid splashing acid into the eyes.

Use rubber gloves, rubber apron, rubber clothing, rubber suit, etc. to avoid contact of the acid with the body under use conditions.

Eye wash fountain and safety showers should be readily available where this material is handled or stored. Areas of use or storage should have a neutralizing agent, such as soda ash, readily available for emergencies.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Dilute sulfuric acid is highly corrosive to most metals especially below about 77% H₂SO₄. Avoid breathing mist or vapors. Avoid contact with skin or eyes. Do not ingest. Add acid slowly to water to dilute. Do not add water to concentrated acid.

Sulfuric acid received in carboys or drums should be stored in clean ventilated storage areas having acid resistant floors with good drainage. It should be stored away from reactive materials, chlorides, nitrates, carbides, metal powders, oxidizables, etc. Sulfuric acid received in glass bottles should be stored as for drums or carboys with additional precaution against breakage. Soda ash, sand or lime should be kept in same general area for emergency use.

APPROVED: 

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

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Material Safety Data Sheet

From Genium's Reference Collection
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 1145 Catalyn Street
 Schenectady, NY 12303-1836 USA
 (518) 377-8855



No. 50
 SULFUR DIOXIDE,
 ANHYDROUS
 (Revision B)
 Issued: June 1979
 Revised: March 1987

SECTION 1. MATERIAL IDENTIFICATION

22

MATERIAL NAME: SULFUR DIOXIDE, ANHYDROUS

DESCRIPTION/USES: A colorless gas shipped in cylinders or tanks as a liquid under its own vapor pressure. Also produced upon oxidation of sulfur or sulfur-containing materials.

OTHER DESIGNATIONS: Sulfur Dioxide; Sulfurous Acid, Anhydride; Sulfurous Oxide; SO₂; CAS #7446-09-5

MANUFACTURER/SUPPLIER: Virginia Chemicals, 801 Water Street, Portsmouth, VA 23704; Telephone: (804) 393-3100

HMIS
 H 2
 F 0
 R 0
 PPE*
 *See Sect. 8

R 1
 I 4
 S 2
 K --



SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

Sulfur Dioxide, CAS #7446-09-5

ca 99

8-hr. TWA: 5 ppm* or 12 mg/m³

Human, Inhalation, TCLo,
 3 ppm/5 Days: Pulmonary Effects

* Current OSHA PEL.
 ACGIH (1986-87) TLV is 2 ppm or 5 mg/m³.
 NIOSH 10-hour TWA is 0.5 ppm.

Human, Inhalation, LCLo:
 400 ppm/1 min.

SECTION 3. PHYSICAL DATA

Boiling Point @ 1 atm ... 14°F (-10°C)

Vapor Pressure @ 70°F ... 34.4 psig

Vapor Density (Air = 1) ... 2.26

Specific Gravity (0/4°C) ... 1.434

(Liquid under Pressure)

Percent Volatile by Volume ... 100%

Solubility in Water @ 1 atm, wt. %

@ 0°C ... 18.6

@ 20°C ... 10.2

@ 40°C ... 5.13

Freezing Point @ 1 atm ... -103.9°F (-75.5°C)

Molecular Weight ... 64.06

Appearance and odor: A colorless gas or liquid with an irritating, suffocating odor whose unfatigued threshold of recognition is 0.47 ppm in air (100% of the test panel); 3-5 ppm in air is detected by the normal worker.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
Not Found	Not Found	Not Found	Not Found	Not Found

EXTINGUISHING MEDIA: Use extinguishing media that is appropriate to the surrounding fire. This material is nonflammable. Water spray can be used to cool fire-exposed containers. SO₂ will form a corrosive acidic mist with water fog or steam. **UNUSUAL FIRE/EXPLOSION HAZARDS:** Containers may explode in the heat of a fire or may rupture and release irritating toxic sulfuric dioxide gas. **SPECIAL FIRE-FIGHTING PROCEDURES:** Fire fighters should wear fully protective clothing, eye protection, and self-contained breathing equipment when this material is involved in a fire. Move containers from the fire area. If gas is leaking, isolate area until the gas has dispersed.

SECTION 5. REACTIVITY DATA

Anhydrous sulfur dioxide is stable. Hazardous polymerization cannot occur.

This gas corrodes most metals in the presence of moisture. It reacts with water and steam. It reacts vigorously with strong alkalis and oxidizing agents and powdered alkali metals such as sodium or potassium.

Take the precaution to avoid exposing any part of a compressed-gas cylinder to temperatures above 125°F (51.6°C). Do not store this material in direct sunlight.

A hazardous product of decomposition of anhydrous sulfur dioxide is sulfur dioxide gas.

SECTION 6. HEALTH HAZARD INFORMATION

anhydrous sulfur dioxide is not listed as a carcinogen by the NTP, IARC, or OSHA. Inhaling more than 6 ppm of this material can immediately irritate the nose and throat and cause sneezing and coughing; inhaling more than 20 ppm can cause irritation and lacrimation (tearing of the eyes). Short-term exposures above 50 to 100 ppm can be dangerous, and those above 400 to 500 ppm are immediately life threatening. SO₂ affects the respiratory tract, causing bronchial irritation, difficulty in breathing, pulmonary edema, and, at high levels, possible respiratory paralysis. **TARGET ORGANS** are the upper respiratory system, skin, and lungs. **PRIMARY ENTRY** is by way of inhalation. **ACUTE EFFECTS** are noted in the respiratory tract and eyes (irritation). Contact with liquid sulfur dioxide may cause skin burns. **CHRONIC EFFECTS** (respiratory) are rhinitis, dryness of the throat, and cough. **FIRST AID: EYE CONTACT:** Flush eyes well, including under the eyelids, with running water for 15 minutes or more. Get medical help immediately.* **SKIN CONTACT:** Remove contaminated clothing under the shower. Wash exposed area well with copious water. Get medical help.* **INHALATION:** Remove victim to fresh air. Restore his breathing and/or have trained personnel administer oxygen as required. Keep him warm and at rest. Get medical help.* **INGESTION:** Get medical help.*

GET MEDICAL ASSISTANCE - In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Before using sulfur dioxide it is essential that proper emergency procedures be established and made known to all personnel involved with it. Notify safety personnel of a sulfur dioxide spill or leak. Keep nonessential personnel away. Stay upwind of the spill or leak and out of low-lying areas. Cleanup personnel need protection against inhalation of vapors and contact with liquid. Stop the leak if you can do so without risk. Detect small leaks by passing ammonia vapors over suspected leak areas. A dense white plume will form near the leak area. Absorb material in alkaline solutions of caustic soda (NaOH), hydrated lime (Ca(OH)₂), etc. Alkaline solutions need to be neutralized to inert sulfate salts before disposal. Follow Federal, state, and local regulations.

SECTION 8. SPECIAL PROTECTION INFORMATION

Chemical cartridge respirators approved for SO₂ are suitable when concentrations of sulfur dioxide are known to be below 20 ppm. Use a self-contained breathing apparatus (positive-pressure type) with a full facepiece for emergency or nonroutine use. Maintain sulfur dioxide concentrations below TLV limits. Use adequate local exhaust ventilation. Sulfur dioxide vapors are heavier than air, so place ventilation outlet at low levels on the floor. Wear protective clothing, rubber or vinyl gloves, and gas-tight safety goggles. Where danger of contact with liquid exists, wear rubber boots, a rubber suit, and face shield, etc., may be required. A chemical safety shower and an eyewash station must be readily available in areas of handling or use.

Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them.

Replacement and periodic examinations should emphasize pulmonary effects.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Keep containers of sulfur dioxide in a cool, dry, well-ventilated area of noncombustible construction. Protect them from physical damage.

Keep sulfur dioxide containers out of the sun and away from all direct sources of heat. Follow general practices for safe handling and storage of compressed-gas cylinders or tanks. **DO NOT STORE THEM IN CONFINED AREAS.**

Do not ship leaking SO₂ containers.

DOT Classification: Nonflammable Gas Label: Nonflammable Gas DOT ID No. UN1079

Material Source(s) Code: 1-12, 14, 17, 21, 31, 34, 38, 39, 42, 47, 48, 82, 84. CK

Statements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation makes no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Approvals	<i>[Signature]</i>
Indust. Hygiene/Safety	<i>[Signature]</i> 4/87
Medical Review	<i>[Signature]</i> 3/11/87

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Material Safety Data Sheet

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



No. 317
TOLUENE
(Revision D)

Issued: August 1979
Revised: April 1986

SECTION 1. MATERIAL IDENTIFICATION			20	
MATERIAL NAME: TOLUENE OTHER DESIGNATIONS: Methyl Benzene, Methyl Benzol, Phenylmethane, Toluol, C ₇ H ₈ , CAS #0108-88-3 MANUFACTURER/SUPPLIER: Available from many suppliers, including: Allied Corp., PO Box 2064R, Morristown, NJ 07960; Telephone: (201) 455-4400 Ashland Chemical Co., Industrial Chemicals & Solvents Div., PO Box 2219, Columbus, OH; Telephone: (614) 889-3844			HMIS H: 2 F: 3 R: 0 PPE* *See sect. 8	
			R 1 I 3 S 2 K 4	
SECTION 2. INGREDIENTS AND HAZARDS			HAZARD DATA	
Toluene * Current (1985-86) ACGIH TLV. The OSHA PEL is 200 ppm with an acceptable ceiling concentration of 300 ppm and an acceptable maximum peak of 500 ppm/10 minutes. ** Skin designation indicates that toluene can be absorbed through intact skin and contribute to overall exposure. *** Affects the mind.	ca 100	8-hr TLV: 100 ppm, or 375 mg/m ³ * (Skin)** Man, Inhalation, T _{CLo} : 100 ppm: Psychotropic*** Rat, Oral, LD ₅₀ : 5000 mg/kg Rat, Inhalation, LCLo: 4000 ppm/4 hrs. Rabbit, Skin, LD ₅₀ : 14 gm/kg Human, Eye: 300 ppm		
SECTION 3. PHYSICAL DATA				
Boiling Point ... 231°F (111°C) Vapor Pressure @ 20°C, mm Hg ... 22 Water Solubility @ 20°C, wt. % ... 0.05 Vapor Density (Air = 1) ... 3.14		Evaporation Rate (BuAc = 1) ... 2.24 Specific Gravity (H ₂ O = 1) ... 0.866 Melting Point ... -139°F (-95°C) Percent Volatile by Volume ... ca 100 Molecular Weight ... 92.15		
Appearance and odor: Clear, colorless liquid with a characteristic aromatic odor. The odor is detectable to most individuals in the range of 10 to 15 ppm. Because olfactory fatigue occurs rapidly upon exposure to toluene, odor is not a good warning property.				
SECTION 4. FIRE AND EXPLOSION DATA			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
40°F (4°C) CC	896°F (480°C)	% by Volume	1.27	7.1
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol foam. Do not use a solid stream of water because the stream will scatter and spread the fire. Use water spray to cool tanks/containers that are exposed to fire and to disperse vapors. UNUSUAL FIRE/EXPLOSION HAZARDS: This OSHA class IB flammable liquid is a dangerous fire hazard. It is a moderate fire hazard when exposed to oxidizers, heat, sparks, or open flame. Vapors are heavier than air and may travel a considerable distance to an ignition source and flash back. SPECIAL FIRE-FIGHTING PROCEDURES: Fire fighters should wear self-contained breathing apparatus with full facepiece operated in a positive-pressure mode when fighting fires involving toluene.				
SECTION 5. REACTIVITY DATA				
CHEMICAL INCOMPATIBILITIES: Toluene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material is incompatible with strong oxidizing agents, dinitrogen tetroxide, silver perchlorate, tetraniromethane, and uranium hexafluoride. Contact with these materials may cause fire or explosion. Nitric acid and toluene, especially in the presence of sulfuric acid, will produce nitrated compounds that are dangerously explosive.				
CONDITIONS TO AVOID: Avoid exposure to sparks, open flame, hot surfaces, and all sources of heat and ignition. Toluene will attack some forms of plastics, rubber, and coatings. Thermal decomposition or burning produces carbon dioxide and/or carbon monoxide.				

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SECTION 6. HEALTH HAZARD INFORMATION | TLV

Toluene is not considered a carcinogen by the NTP, IARC, or OSHA. **SUMMARY OF RISKS:** Vapors of toluene may cause irritation of the eyes, nose, upper respiratory tract, and skin. Exposure to 200 ppm for 8 hours causes mild fatigue, weakness, confusion, lacrimation (tearing) and paresthesia (a sensation of prickling, tingling, or creeping on the skin that has no objective cause). Exposure to higher concentrations may cause headache, nausea, dizziness, dilated pupils, and euphoria, and, in severe cases, may cause unconsciousness and death. The liquid is irritating to the eyes and skin. Contact with the eyes may cause transient corneal damage, conjunctival irritation, and burns if not promptly removed. Repeated and/or prolonged contact with the skin may cause drying and cracking. It may be absorbed through the skin in toxic amounts. Ingestion causes irritation of the gastrointestinal tract and may cause effects resembling those from inhalation of the vapor. Chronic overexposure to toluene may cause reversible kidney and liver injury. **FIRST AID: EYE CONTACT:** Immediately flush eyes, including under eyelids, with running water for at least 15 minutes. Get medical attention if irritation persists.* **SKIN CONTACT:** Immediately flush skin (for at least 15 minutes) while removing contaminated shoes and clothing. Wash exposed area with soap and water. Get medical attention if irritation persists or if a large area has been exposed.* **INHALATION:** Remove victim to fresh air. Restore and/or support breathing as required. Keep victim warm and quiet. Get medical help.* **INGESTION:** Give victim 1 to 2 glasses of water or milk. Contact a poison control center. Do not induce vomiting unless directed to do so. Transport victim to a medical facility. Never give anything by mouth to a person who is unconscious or convulsing. * **GET MEDICAL ASSISTANCE** = In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid, if indicated.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Limit access to spill area to necessary personnel only. Remove leaking containers to safe place if feasible. Cleanup personnel need protection against contact with liquid and inhalation of vapor (see sect. 8). **SPILL DISPOSAL:** Absorb small spills with paper towel or vermiculite. Contain large spills and collect if feasible, or absorb with vermiculite or sand. Place waste solvent or absorbent into closed containers for disposal using nonsparking equipment. Liquid can be flushed with water to an open holding area for handling. Do not flush to sewer, watershed, or waterway. **REMARKS:** Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Consider recovery by distillation. Contaminated absorbent can be buried in a sanitary landfill. Follow all Federal, state, and local regulations. TLV 96: 100-10 ppm. Toluene is designated as a hazardous waste by the EPA. The EPA (RCRA) HW No. is 111 (40 CFR 261). The reportable quantity (RQ) is 1000 lbs/454 kg (40 CFR 117).

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Ventilation fans and other electrical service must be nonsparking and have an explosion-proof design. Exhaust hoods should have a face velocity of at least 100 fpm (linear feet per minute) and be designed to capture heavy vapor. For emergency or nonroutine exposures where the TLV may be exceeded, use an organic chemical cartridge respirator if concentration is less than 200 ppm and an approved canister gas mask or self-contained breathing apparatus with full facepiece if concentration is greater than 200 ppm. Safety glasses or splash goggles should be worn in all work areas. Neoprene gloves, apron, face shield, boots, and other appropriate protective clothing and equipment should be available and worn as necessary to prevent skin and eye contact. Remove contaminated clothing immediately and do not wear it until it has been properly laundered.

Eyewash stations and safety showers should be readily available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store in a cool, dry, well-ventilated area away from oxidizing agents, heat, sparks, or open flame. Storage areas must meet OSHA requirements for class IB flammable liquids. Use metal safety cans for handling small amounts. Protect containers from physical damage. Use only with adequate ventilation. Avoid contact with eyes, skin, or clothing. Do not inhale or ingest. Use caution when handling this compound because it can be absorbed through intact skin in toxic amounts. **SPECIAL HANDLING/STORAGE:** Ground and bond metal containers and equipment to prevent static sparks when making transfers. Do not smoke in use or storage areas. Use nonsparking tools. **ENGINEERING CONTROLS:** Preplacement and periodic medical exams emphasizing the liver, kidneys, nervous system, lungs, heart, and blood should be provided. Workers exposed to concentrations greater than the action level (50 ppm) should be examined at least once a year. Use of alcohol can aggravate the toxic effects of toluene.

COMMENTS: Emptied containers contain product residues. Handle accordingly!
Toluene is designated as a hazardous substance by the EPA (40 CFR 116). DOT Classification: Flammable liquid. UN1294.
Data Source(s) Code: 1-9, 12, 16, 20, 21, 24, 26, 34, 81, 82. CR.

Judgements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Approvals *J.O. Rodriguez, 11/86.*

Indust. Hygiene/Safety *JW 10-86*

Medical Review *[Signature] Oct 86*

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

Phone: (518) 385-4085 DIAL COMM: 8*235-4085



No. 318

XYLENE
(mixed isomers)

Revision C

Date November 1980

SECTION I. MATERIAL IDENTIFICATION				
<p>MATERIAL NAME: XYLENE (mixed isomers) OTHER DESIGNATIONS: Xylol, Dimethylbenzene, C₆H₄(CH₃)₂; ASTM D843, D845 and D846; GE Material D5B9, CAS #001 330 207. MANUFACTURER: Available from many suppliers, including EXXON Company USA and Shell Chemical Company.</p>				
SECTION II. INGREDIENTS AND HAZARDS		*	HAZARD DATA	
<p>Xylene (o, m, p-isomers) Other C₇ to C₉ Hydrocarbons*</p> <p>*Material may contain ethylbenzene (8-hr TWA 100 ppm) and traces of toluene and C₉ aromatic and aliphatic hydrocarbons. Some commercial products may contain over 10% non-xylene hydrocarbons, mostly ethylbenzene. **Current OSHA standard and ACGIH (1980) TLV. NIOSH has proposed a 10-hr TWA of 100 ppm with a 200 ppm ceiling level (10 min. sample). STATUS: NCI bioassay for carcinogenesis study 9/78. TLV set to prevent irritant effects and CNS depression.</p>		<p>>90 <10</p>	<p>8-hr TWA 100 ppm (skin)** or 435 mg/m³ <u>Xylene Typical</u> Human, inhalation TLo-200 ppm (Irritation Effects) <hr/> Rat, oral LD₅₀ 4.3 g/kg <hr/> Human, oral LDLo 50 mg/kg</p>	
SECTION III. PHYSICAL DATA				
Boiling range, 1 atm, deg C	135-145*	Specific gravity (H ₂ O=1)	0.86-0.87	
Vapor pressure at 20 C, mm Hg	ca 6	Volatiles, %	ca 100	
Vapor density (Air=1)	3.7	Evaporation rate (BuAc=1)	0.6	
Solubility in water	Negligible	Molecular weight	106.18	
<p>Appearance & Odor: Light colored or colorless, mobile liquid with an aromatic odor. The recognition threshold (100% of test panel) is about 0.3 ppm in air (unfatigued) for xylene. *Wider and narrower boiling range materials are commercially available.</p>				
SECTION IV. FIRE AND EXPLOSION DATA			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
>77 F (TCC)	867 F	Volume %	1	7
<p>Extinguishing Media: Use dry chemical, foam, CO₂, and water fog or steam to provide a smothering effect on fire. A water stream can scatter flames. A spray of water may be used to cool fire-exposed containers. This flammable liquid is a dangerous fire hazard and a moderate explosion hazard when exposed to heat or flame. Heavier-than-air vapors can flow along surfaces to distant ignition sources and flash back. Firefighters should use self-contained breathing apparatus.</p>				
SECTION V. REACTIVITY DATA				
<p>This material is stable in closed containers at room temperature. It does not polymerize. It is flammable (OSHA Class IC liquid) and can form explosive mixtures with air. Keep away from sources of heat, sources of ignition and strong oxidizing agents. Thermal-oxidative degradation in air can produce toxic vapors and gases, including carbon monoxide and oxides of nitrogen.</p>				

SECTION VI. HEALTH HAZARD INFORMATION	TLV 100 ppm or 435 mg/m ³
<p>Inhalation of xylene at the TLV may cause mild irritation and dizziness in sensitive persons. Concentrations from 100-200 ppm may cause nausea, headache and depression. Vapor levels >200 ppm can have an anesthetic effect. Skin contact may produce mild irritation and skin defatting. Eye contact may cause burning and irritation. Ingestion of xylene may cause poisoning. One ounce or more may be fatal. Aspiration can be a hazard if this material is swallowed.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Irrigate with water for 15 minutes. Get medical attention!</p> <p><u>Skin Contact:</u> Wash with soap and water. Remove contaminated clothing promptly. Replace lost skin oils with approved lotions or creams.</p> <p><u>Inhalation:</u> Remove victim to fresh air. Restore breathing if required. Get medical attention if symptoms persist or if nausea or collapse has occurred.</p> <p><u>Ingestion:</u> Get medical attention immediately! Give white mineral oil demulcent and saline cathartic, but <u>do not</u> induce vomiting unless directed by a physician.</p> <p>Maintain observation of patient for possible delayed onset of pulmonary edema.</p>	
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES	
<p>Notify safety personnel. Remove all ignition sources. Provide adequate ventilation. Use vermiculite or sand to absorb spill; scrape up with nonsparking tools and place in a covered metal container. The absorbed material may be burned in an open pit, or placed in cardboard boxes and burned in an incinerator. Spilled liquid can be flushed away from sensitive locations with a water stream; flush to open area <u>not</u> to sewer!</p> <p>DISPOSAL: Scrap liquid may be atomized into an approved incinerator, or it may be disposed of via a licensed solvent disposal company. When large amounts are involved reclamation procedures may prove economical. Follow Federal, State, and Local regulations.</p> <p>Aquatic toxicity rating TLM 96: 100-10 ppm.</p>	
SECTION VIII. SPECIAL PROTECTION INFORMATION	
<p>Provide general ventilation and efficient exhaust ventilation (explosion-proof equipment to meet TLV requirements and to control heavier-than-air vapors. Use >100 lfm face velocity for exhaust hoods. Use approved organic vapor canister respirators for short periods of nonroutine work or emergency situations at up to 1000-2000 ppm and approved self-contained respirators for higher and unknown vapor levels. Full facepiece required. Buna-N rubber gloves and aprons should be worn to prevent contact of xylene with the skin. Safety glasses or goggles should be used for eye protection and eyewash stations should be readily accessible to use areas.</p> <p>Comprehensive preplacement and biennial medical examinations to be directed toward, but not limited to, liver, kidney, gastrointestinal disorders, skin irritation, and the central nervous system.</p>	
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS	
<p>Store in closed containers in a clean, cool, well-ventilated area, away from sources of heat, sources of ignition and strong oxidizing agents. Protect containers from physical damage. Bond and ground metal containers when transferring liquid. Use metal safety cans for small amounts. Use nonsparking tools for work in solvent areas. No Smoking in areas of use or storage.</p> <p>Prevent skin contact and remove contaminated clothing promptly. Avoid repeated or prolonged breathing of vapor. Do not ingest!</p>	
<p>DATA SOURCE(S) CODE: 1-12, 19-21, 23, 26, 31, 34, 37-39</p> <p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p>	<p>APPROVALS: MIS CRD <i>J.M. Nelson</i></p> <p>Industrial Hygiene and Safety <i>JW</i> 11-26-80</p> <p>MEDICAL REVIEW: December 5, 1980</p>

GENERAL  ELECTRIC

APPENDIX E

LISTING OF UNDERGROUND STORAGE TANKS

MAP LOCATION	CAPACITY	TANK STATUS	TANK MATERIAL
MP1	1000	IN USE	UNKNOWN
MP2	1000	IN USE	FIBERGLASS
MP3	1000	IN USE	FIBERGLASS
MP4	1000	IN USE	FIBERGLASS
MP5	1000	IN USE	FIBERGLASS
MP6	1000	IN USE	FIBERGLASS
MAF1	500	UNKNOWN	UNKNOWN
MAF2	2000	UNKNOWN	UNKNOWN
MAF3	1000	IN USE	FIBERGLASS
F1	1000	UNKNOWN	UNKNOWN
F2	1000	UNKNOWN	UNKNOWN
F3	1000	IN USE	FIBERGLASS
F4	12000	PERM. OUT/USE	STEEL
F5	12000	PERM OUT/USE	STEEL
F6	12000	PERM OUT/USE	STEEL
F7	12000	PERM OUT/USE	STEEL
F8	12000	PERM OUT/USE	STEEL
F9	12000	PERM OUT/USE	STEEL
F10	12000	PERM OUT/USE	STEEL
F11	1000	UNKNOWN	UNKNOWN
FDR1	1000	IN USE	FIBERGLASS
FDR2	1000	IN USE	FIBERGLASS
FDR3	1000	IN USE	FIBERGLASS
FDR4	1000	IN USE	FIBERGLASS
FDR5	1000	IN USE	FIBERGLASS
FDR6	1000	UNKNOWN	UNKNOWN
FDR7	1000	IN USE	FIBERGLASS
FDR8	1000	IN USE	FIBERGLASS
CH1	1000	IN USE	STEEL
CH2	1000	IN USE	FIBERGLASS
CH3	1000	IN USE	UNKNOWN
CH4	1000	IN USE	FIBERGLASS
CH5	1000	IN USE	FIBERGLASS
CH6	1000	IN USE	FIBERGLASS
CH7	4000	IN USE	FIBERGLASS
CH8	4000	IN USE	FIBERGLASS
CH9	1000	IN USE	UNKNOWN
CH10	1000	IN USE	FIBERGLASS
CH11	1000	IN USE	FIBERGLASS
CH12	1000	IN USE	FIBERGLASS
CH13	1000	IN USE	FIBERGLASS
CH14	1000	IN USE	FIBERGLASS
CH15	1000	IN USE	FIBERGLASS
CH16	1000	IN USE	FIBERGLASS
CH17	1000	IN USE	FIBERGLASS
CH18	1000	IN USE	FIBERGLASS
CH19	4000	IN USE	UNKNOWN
CH20	4000	IN USE	UNKNOWN
CH21	4000	IN USE	UNKNOWN
CH22	1000	IN USE	FIBERGLASS
CH23	1000	IN USE	FIBERGLASS
CH25	1000	IN USE	UNKNOWN
CH26	1000	IN USE	FIBERGLASS
CH27	1000	IN USE	FIBERGLASS
CH28	6000	NEW	FIBERGLASS
CH29	2000	IN USE	UNKNOWN
CH30	6000	IN USE	UNKNOWN
CH31	1000	IN USE	UNKNOWN
CH32	1000	IN USE	UNKNOWN
CH33	1000	IN USE	UNKNOWN
RC1	1000	IN USE	FIBERGLASS

APPENDIX G

CHEMICAL ANALYSIS FOR WATER AND SOIL SAMPLES

1. ANALYSES FOR WATER SAMPLES.

a. Compounds.

Volatile Organic Compounds
Barium
Cadmium
Chromium
Nitrate/Nitrite
Chlorides
Total Dissolved Solids

b. Explosive Compounds.

TNT
2,4-DNT
2,6-DNT
RDX
HMX
Tetryl
Trinitrobenzene

2. ANALYSES FOR SOIL SAMPLES.

a. Explosive Compounds.

TNT
2,4-DNT
2,6-DNT
RDX
HMX
Tetryl

b. Extraction Procedure Toxicity - Metals.

Arsenic	Lead
Barium	Mercury
Cadmium	Selenium
Chromium	Silver

c. Other Parameters.

Total Nitrogen

Interim Final Rpt, Hazardous Waste Management Consultation
No. 37-26-0190-89, Ft Riley, KS, 9-13 May 88

APPENDIX H

LIST OF HAZARDOUS WASTE ACCEPTED BY DRMO

**CONTROLLED INDUSTRIAL WASTE
GENERATOR'S LISTING**

This is a listing of all Controlled Industrial Wastes reported to the Oklahoma State Department of Health, Industrial Waste Division as being generated and disposed of by the Business/Plant named below, as of the date specified. This is not a permit and does not constitute authorization of any particular disposal practice, method, or site.

Disposal Plan Number: 81101 amending plan approved: December 11, 1987

has been assigned, as of: February 29, 1988, EPA ID :KS6214020756

Business/Plant Name: DRMO FT. RILEY

Mailing Address: ; BLDG 1950 P.O. BOX 2490; FT. RILEY, KS 66442

Plant Address/Location: BLDG 1950; FT RILEY, KS 66442

Person in Charge of Facility: JOSEPH COTHERN

Facility Contact: JOSEPH COTHERN

Phone No. 913-239-6202

STATE WASTE CODE	FEDERAL WASTE CODE	CHARACTERISTIC	DESCRIPTION	TRANS-PORTER	RECEIVING FACILITY
020100		CORROSIVE	BATTERY ACID	2004	SD47002
030410		CAUSTIC	DECONTAMINATING AGENT DS-2	2004	SD47002
164621	U228	TOXIC	TRICHLOROETHYLENE	2004	RR72001
621504	D002	TOXIC	FERRIC CHLORIDE	2004	SD47002
655608	D003 D011	SENSITIZER	LABPACK-OXIDIZER	2004	SD47002
695613		UNCLASSIFIED	BLEACHING POWDER	2004	SD47002
695614		UNCLASSIFIED	LABPACK-POISON	2004	SD47002
725606		CORROSIVE	LABPACK-CORROSIVE	2004	SD47002
764100		TOXIC	PAPER FILTERS CONTAM/PAINT	2004	SD47002
795701		UNCLASSIFIED	EMPTY CONTAINERS	2004	SD47002
103307		FLAMMABLE	WASTE MOTOR OIL & ALCOHOL	2004	RR72001

104000		FLAMMABLE	PAINT THINNER/PAINT RESIDUE	2004	RR72001
664723		TOXIC	DRY STORAGE BATTERIES	2004	SD47002
720108	D002	CORROSIVE	STORAGE BATTERIES	2004	SD47002
705609	D001	FLAMMABLE	LABPACK-FLAMMABLE	2004	SD47002
765613		TOXIC	LABPACK-ORM-A	2004	SD47002
120101		CORROSIVE	HYDROCHLORIC ACID)	2004	SD47002
164601	F001	TOXIC	TETRACHLOROETHYLENE	2004	RR72001
795002		UNCLASSIFIED	SPILL RESIDUE	2004	SD47002
664100	D008	TOXIC	DRIED PAINT	2004	SD47002
165811	F005	TOXIC	TOLUENE	2004	RR72001
104614	D001	FLAMMABLE	CONTAMINATED PD680	2004	RR72001
104623	D001	FLAMMABLE	NAPTHA SOLVENT	2004	RR72001
693306	N/A	UNCLASSIFIED	GREASE	2004	SD47002
104104	D001	FLAMMABLE	CONTAMINATED PAINT	2004	RR72001
694108		UNCLASSIFIED	PAPER FILTERS CONT. W/PAINT	2004	SD47002
130400	D002	CAUSTIC	DECONTAMINATING AGENT DS-2	2004	SD47002
665614		TOXIC	LAB PACK ORM-E	2004	SD47002
120115	D002	CORROSIVE	HYDROCHLORIC ACID	2004	SD47002
565612	U151	TOXIC	MERCURY LAB-PACK	2004	SD47002

COMMENTS:

COPY TO USPCI-SPECIAL SERVICES, USPCI CORPORATE, FT. RILEY, LONE MOUNTAIN

**STATE REMARKS:
WASTE
CODE**

164621 RECYCLE
795701 CORRECTED CODE 3/30/87
103307 RECYCLE