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INSTALLATION RESTORATION PROGRAM

AD-A231 872

DECISION DOCUMENTS FOR SEVEN SITES

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FORBES FIELD AIR NATIONAL GUARD BASE
TOPEKA, KANSAS

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**Decision Documents for Seven Sites
Forbes Field Air National Guard Base
Topeka, Kansas**

January 1990

Prepared for

**National Guard Bureau
Andrews Air Force Base, Maryland 20331**

and

**Hazardous Waste Remedial Action Program
Oak Ridge, Tennessee 37831**

Prepared by

**Oak Ridge National Laboratory
Grand Junction, Colorado Office
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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ABBREVIATIONS AND ACRONYMS

| | |
|-------------------------|--|
| AREFG | Air Refueling Group |
| base | Forbes Field Air National Guard Base |
| cm/s | centimeter per second |
| DDE | (p,p-DDE) dichlorodiphenyldichloroethylene |
| DoD | Department of Defense |
| DDT | (p,p-DDT and o,p-DDT) dichlorodiphenyltrichloroethane |
| ft/d | feet per day |
| HARM | Hazard Assessment Rating Methodology |
| HAZWRAP | Hazardous Waste Remedial Action Program |
| HMTC | Hazardous Materials Technical Center |
| IRP | National Guard Bureau's Installation Restoration Program |
| JP-4 | Jet propulsion fuel number four |
| KDHE | Kansas Department of Health and Environment |
| KSANG | Kansas Air National Guard |
| NGB | National Guard Bureau |
| ORNL | Oak Ridge National Laboratory |
| ORNL/CAT | Oak Ridge National Laboratory/Chemical Assessment Team |
| RI/FS | Remedial Investigation/Feasibility Study |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TPHC | Total Petroleum Hydrocarbons |
| $\mu\text{g}/\text{kg}$ | micrograms per kilogram |
| $\mu\text{g}/\text{L}$ | micrograms per liter |

EXECUTIVE SUMMARY

The Phase I (Preliminary Assessment) records search prepared for Forbes Field Air National Guard Base (ANGB) identified seven sites as potentially contaminated. During 1988, Oak Ridge National Laboratory conducted a remedial investigation at the base to determine the extent of contamination from the identified sites. Results of that investigation show that although jet fuel contamination exists in the subsurface at most of the sites, contaminant migration is confined by the tight clay soils. The water table aquifer is discontinuous under the base and has very low hydraulic conductivity. The Risk Assessment, as part of the remedial investigation, identified no adverse effects from the contamination. Therefore, decision documents have been prepared to document that no further action will be taken to characterize or remediate the sites. These documents also specify an agreement between the National Guard Bureau and the Kansas Department of Health and Environment wherein the Guard will collect water samples in each of the years from 1990 to 1994. These samples are intended to provide final evidence that jet fuel from the sites is not migrating.

In combination, the decision documents for the seven sites and the Memorandum of Understanding represent the National Guard Bureau's Record of Decision for the Remedial Investigation/Feasibility Study at Forbes Field Air National Guard Base. The decision documents describe the Bureau's rationale for the actions taken. The Memorandum of Understanding between the Air National Guard and the Kansas Department of Health and Environment constitutes the formal, legally binding agreement covering monitoring and reporting requirements, remedial activities, and abandonment of existing on-site monitoring wells, which are not included in the specified monitoring program.

May 17, 1990

ADDENDUM COMMENTS
for
Decision Documents for Seven Sites
Forbes Field ANGB KS
dated
January 1990

A Memorandum of Understanding (MOU) was signed in November 1989 between the KDHE and the NGB. Included in the MOU is an agreement to conduct periodic monitoring of the groundwater and surface water. The four monitoring wells (MW026, MW002, MW015, and MW025A) and the surface water sampling point in the drainage ditch are downgradient of the identified areas of contamination and are intended to monitor the contamination found at the site as a whole. The following points give a brief account of the monitoring locations associated with the specific investigation sites.

- (1) MW026 is in close proximity and downgradient of the contamination at Site 1 in the tank farm area.
- (2) MW015 is in close proximity and downgradient of the Site 5 area.
- (3) MW025, MW002, and the drainage ditch sampling point are downgradient of the Site 6 area.
- (4) MW025, MW002, and the drainage ditch sampling point are downgradient of the Site 7 area.
- (5) MW015 is in close proximity and downgradient of the Site 8 area.
- (6) MW025 and the drainage ditch sampling point are downgradient of the Site 9 area.

If contaminants are detected in the monitoring samples at any stage of the monitoring plan, NGB and KDHE will meet to decide a further course of action.

1. INTRODUCTION

1.1 PURPOSE

The purpose of these decision documents is to provide the rationale as to why no further action will be taken to characterize or remediate the seven sites at Forbes Field Air National Guard Base (base). The decision documents also provide the rationale for periodic monitoring of surface water and groundwater at the base.

1.2 BACKGROUND

The Department of Defense (DoD) has developed a program to evaluate suspected problems associated with past hazardous waste disposal and spill sites at DoD facilities. This program, known as the Installation Restoration Program (IRP), is managed by the Hazardous Waste Remedial Action Program (HAZWRAP) Support Contractor Office operated by Martin Marietta Energy Systems, Inc., under the auspices of the National Guard Bureau (NGB). HAZWRAP enlisted the aid of the Oak Ridge National Laboratory/Chemical Assessment Team (ORNL/CAT) to conduct the Remedial Investigation/Feasibility Study at Forbes Field Air National Guard Base at Topeka, Kansas. The Phase I records search of the base was conducted by the Hazardous Materials Technical Center (HMTc) (HMTc 1986).

Forbes Field Air National Guard Base occupies 180 acres in the northeastern corner of the former Forbes Field Air Force Base. The base lies approximately 2.5 miles south of Topeka, Kansas, on a relatively flat, topographically elevated plain (Fig. 1.1).

Roy F. Weston, Inc., performed a groundwater contamination study at Forbes Field ANGB in 1984 at the request of the U.S. Occupational and Environmental Health Laboratory. Weston recommended detailed studies of certain areas of the base and more extensive sampling. HMTc was retained in December 1985 to conduct the IRP Phase I (Preliminary Assessment) Records Search. The records search involved review of base records, personnel interviews, and on-site studies to identify potential sources of contamination and specific sites where contamination is likely.

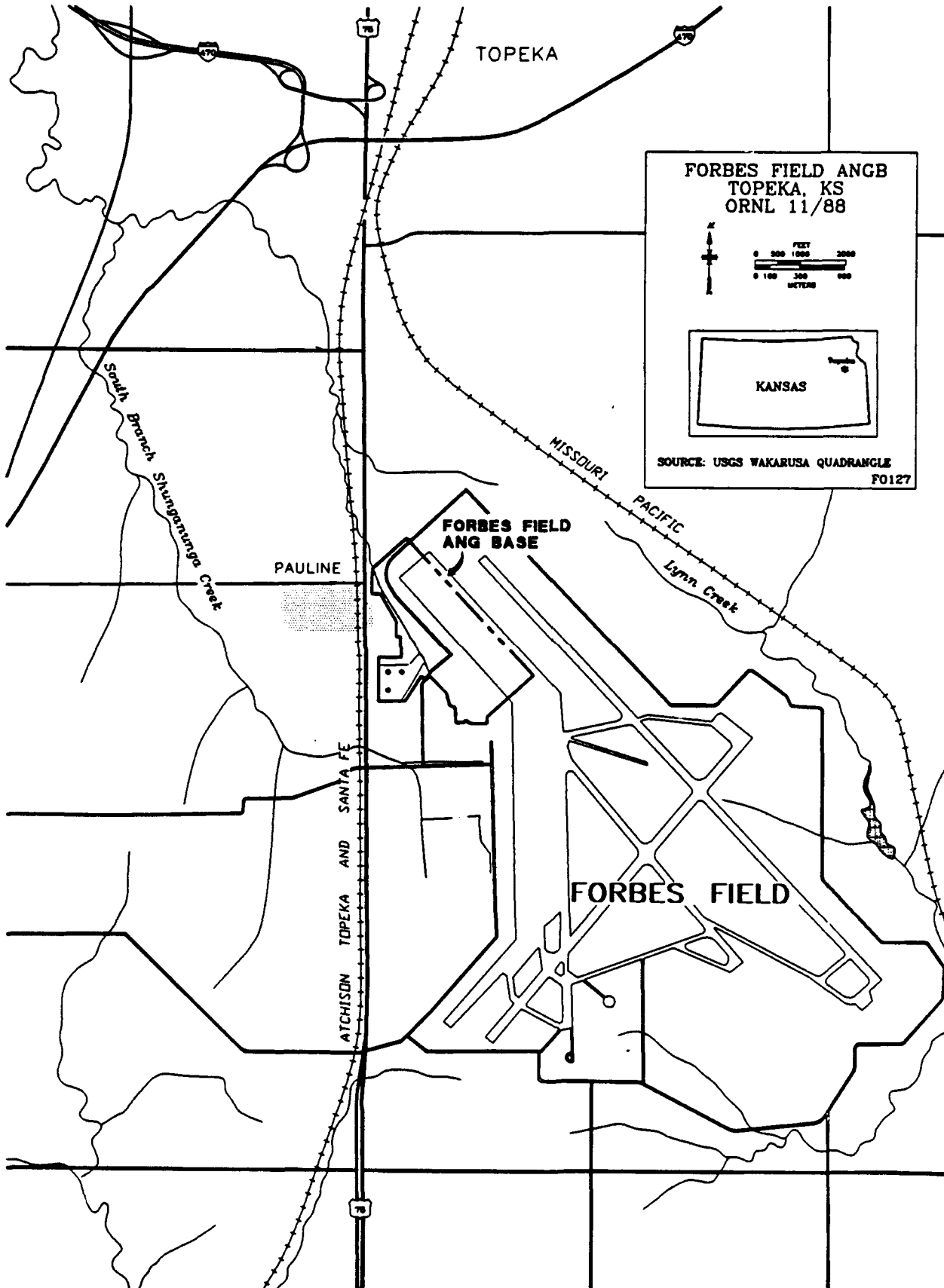


Fig. 1.1. Location map of Forbes Field ANGB.

The records search report, issued in June 1986, found ten potentially contaminated sites. On the basis of information collected during the Phase I site evaluations, including use of the Hazard Assessment Rating Methodology (HARM) process, HMTIC determined that four sites did not have a contaminant migration problem. The following six sites required further study (Fig. 1.2):

- Site 1 - JP-4 bulk storage facility (tank farm)
- Site 5 - Area adjacent to pumphouse E, building 671
- Site 6 - Surface drainage ditch and storm sewer outflow
- Site 7 - Area adjacent to refueling hydrant, located on refueling apron at lateral 3
- Site 8 - Area adjacent to refueling hydrant, located on refueling apron at lateral 7
- Site 9 - Area adjacent to refueling hydrant, located on refueling apron at lateral 8

The 1984 study indicated subsurface contamination at Sites 5, 7, 8, and 9. Samples collected by base personnel showed evidence of contamination at Site 6. The Weston discovery of contamination in a well upgradient of all the known sites suggested that contamination was entering the base from an off-base source. HMTIC identified this area as the "southeastern corner of Forbes Field ANGB property" and recommended that the area be studied. All of the sites involved in the study were contaminated by spills or disposals of JP-4 jet fuel. Figure 1.2 shows features of the base and the seven sites of potential contamination.

During 1988, ORNL/CAT installed 26 alluvial monitoring wells and 3 bedrock wells (coreholes). Figure 1.2 also shows the location of the monitoring wells drilled during the ORNL/CAT and Weston field investigations. A soil-gas study was conducted concurrently with the drilling program. Soil-gas results were used to place several of the monitoring wells in order to optimize the chances of intercepting a contaminant plume. The results were also useful in determining the presence of JP-4 components in the trenches of the refueling laterals located beneath the asphalt and concrete of the aircraft refueling ramp.

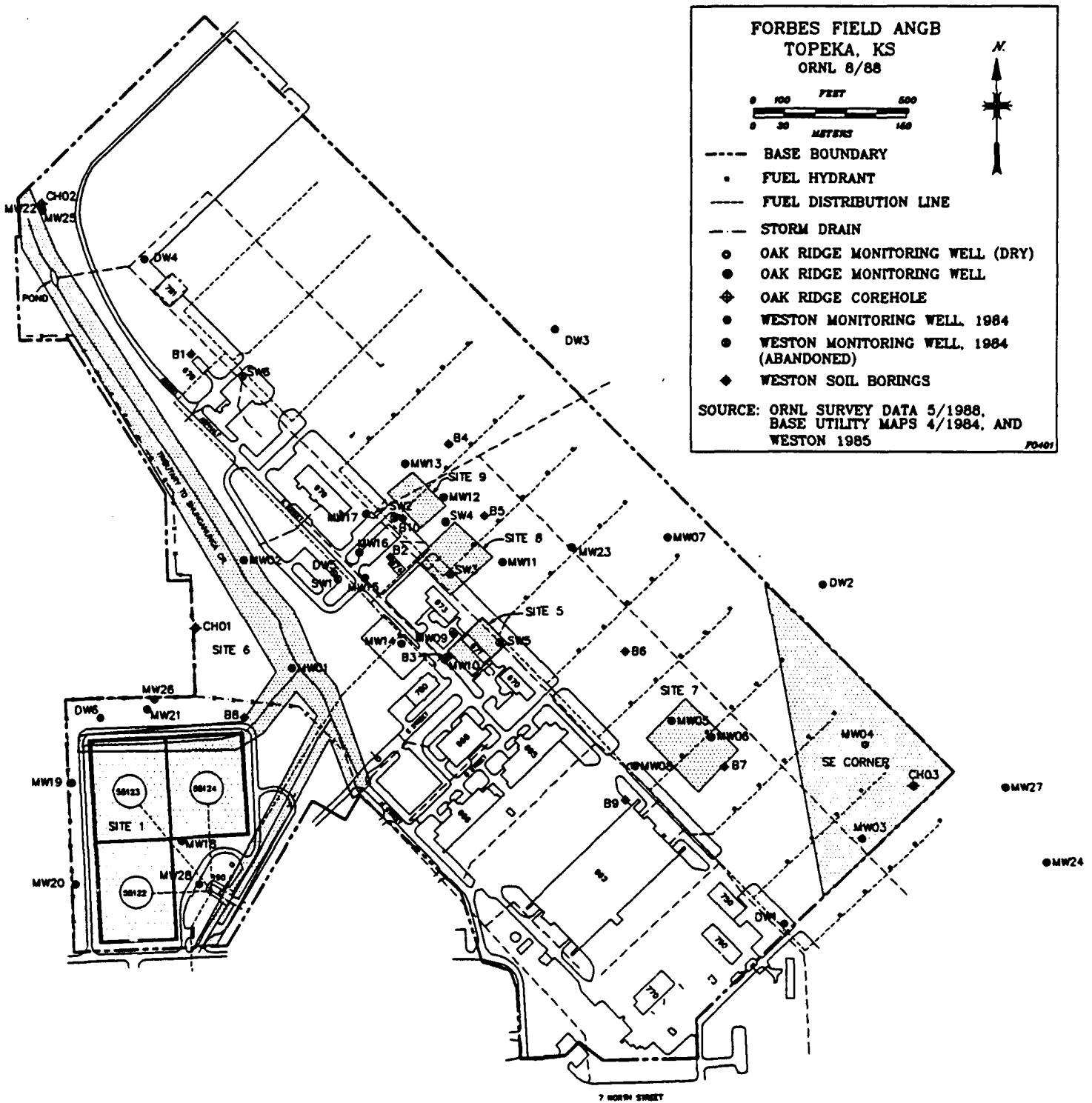


Fig. 1.2. Sites of potential contamination and monitoring wells.

The monitoring wells were used to determine the site lithology, characterize contamination in the soil, determine the extent of groundwater contamination, and conduct hydraulic testing useful for predicting contaminant migration. The coreholes were used to determine the bedrock lithology, the extent of groundwater contamination, and conduct hydraulic testing to locate aquifers. Sediment samples and surface water samples were collected from the drainage ditch to characterize contamination and determine if contamination was being transported in the ditch.

Section 2 of this report discusses the physical characteristics of the base as determined from the site characterization. Sections 3 through 9 represent decision summaries for the seven sites recommended for no further action. Each of the summaries is authorized by the signature of the National Guard Bureau representative.

Detailed results of the remedial investigation are available in the remedial investigation report written by ORNL/CAT (ORNL 1989).

2. GENERAL

2.1 HISTORY

Forbes Field Air Force Base was opened in 1942 as the Topeka Army Air Corps Base. The base's mission was to provide operational training of heavy bombardment crews. At the end of World War II, the base was closed and the hangars used for grain storage (Weston 1985).

From 1948 to 1949 the base was reopened for use by reconnaissance and geodetic survey wings of the Army Air Corps. The base was renamed the Forbes Field Air Base during that time.

Forbes Field Air Base was reopened in 1951 with the mission of training bomber crews. In 1954, the Forbes Field Air Base and all existing facilities were transferred to the U.S. Air Force, and the installation was officially designated Forbes Field Air Force Base. Forbes Field Air Force Base was closed in 1973, at which time the Kansas Air National Guard (KSANG) 190th Air Refueling Group (190th AREFG) became the only remaining activity on base.

The portion of the Air Force Base now occupied by KSANG was built between 1954 and 1959. The 190th AREFG maintains jet fueling and storage facilities. The storage facilities consist of three aboveground storage tanks on the west side of the base and 26 underground storage tanks near the three pumphouses at the west edge of the aircraft parking apron.

Operation of the 190th AREFG includes aircraft retrofitting; aircraft maintenance; ground vehicle maintenance; petroleum, oil, and lubricant management and distribution; and fire department training (HMTTC 1986). These operations involve such activities as corrosion control, nondestructive inspection, fuel cell maintenance, engine maintenance, and pneudraulics. These activities generate varying quantities of waste oils, recovered fuels, spent cleaners, strippers, and solvents. The Defense Reutilization and Marketing Office is responsible for disposal of these hazardous materials.

2.2 GEOLOGY

2.2.1 Surface Geology

Surface geology in the vicinity of the base consists of glacial clays and silts with lesser amounts of sands and gravel. During the Kansan Glaciation, large ice sheets migrated southward across Kansas and terminated along a southeasterly trending line extending from Shunganunga Creek, through the village of Pauline, and along Lynn Creek to the Wakarusa River. As the glaciers retreated, sediment-laden meltwaters deposited glacial material over much of the area north of the Kansas River southward to the Wakarusa River. On the flat upland areas between the drainages, large amounts of glaciolacustrine clays and silts were deposited. Loess material was no doubt incorporated into these deposits. The sediments vary from a thin veneer to 25 ft (Johnson and Adkison 1967).

Field investigation by ORNL/CAT showed the surface lithology to be consistent with the above description. The unconsolidated material is composed of tight glacial silty-clays with widespread sand stringers and limestone and chert gravels. The sediments are glaciolacustrine in origin, having been deposited evenly over the weathered claystone bedrock. The sediments range from 16.5 ft near the southeast corner of the base to 5.5 ft in the northwest corner (ORNL 1989).

The weathered bedrock zone is typical since the bedding planes and original lithologies of the bedrock are intact and fossils are easily identifiable. The weathered bedrock was exposed to the surface prior to the period of glaciation which deposited the glacial drift material.

Just southeast of the base, two monitoring wells drilled to investigate upgradient water quality (Fig. 1.2) discovered considerably thicker sediments (25 ft in MW027 and 43 ft in MW024). At 38 ft in MW024, a 5.5-ft, medium grained, well sorted sand was found overlying the sandstone bedrock. MW027 revealed this same sand at 23 ft, although the sand had thinned to approximately 8 in. These thicker sediments and the basal channel sand found overlying the bedrock in MW024 and MW027 can best be explained as a pre-existing paleo-channel which had scoured the bedrock before any glacial sediments were deposited.

Forbes Field ANGB is situated just to the west of a northeast-southwest trending drainage divide. Drainage to the northwest is

towards Shunganunga Creek. Drainage to the southeast is towards Lynn Creek and the Wakarusa River. The thinner deposits found near the northwest corner of the base are the result of more severe erosional patterns associated with a steeper topographic gradient towards Shunganunga Creek. The thicker, less eroded sediments encountered in the southeast corner are due to a more gentle topographic relief.

2.2.2 Bedrock Geology

Shawnee County lies east of the axis of the Forest City Basin, a structural basin east of the Nemaha uplift (Lee 1954). Bedrock units underlying the base strike N20E to N30E and dip northwest at 20 to 40 ft/mile, interrupted by minor folds trending northwest. There is no evidence in literature indicating significant regional fracturing. Locally, however, certain limestone units (the Church member of the Howard Limestone and the DuBois member of the Topeka Limestone) have been described as vertically jointed. Figure 2.1 shows a contour map of the bedrock surface underlying the base.

Formations underlying the base are part of the Pennsylvanian Wabaunsee and Shawnee Groups. The formations within these groups exhibit the transgressive-regressive sedimentation characteristic of cyclothems in which largely nonmarine sandy shales with coals alternate with sandstones, marine shales, and limestones (Heckel 1978). Of the Wabaunsee Group, the Howard Limestone and Severy Shale formations were encountered in the three coreholes.

The Howard Limestone is the bedrock unit under most of the base. The Nodaway Coal is the basal unit of the Howard Limestone. The Nodaway Coal was encountered in the bedrock in the southeast corner of the base and in the weathered bedrock near the center of the base. Therefore, the Nodaway Coal subcrops at the competent/weathered bedrock contact in a roughly south to north band across the base. This subcrop terminates near the south end of the base where the weathered bedrock surface rises following the topography.

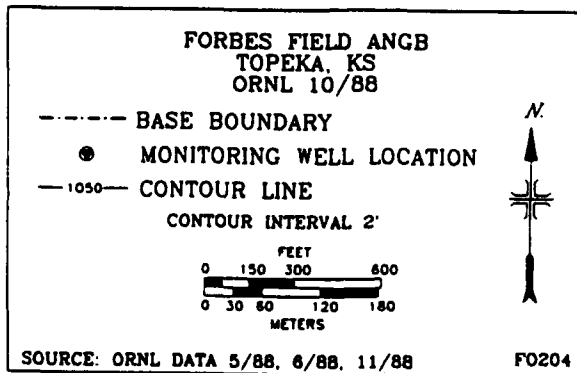
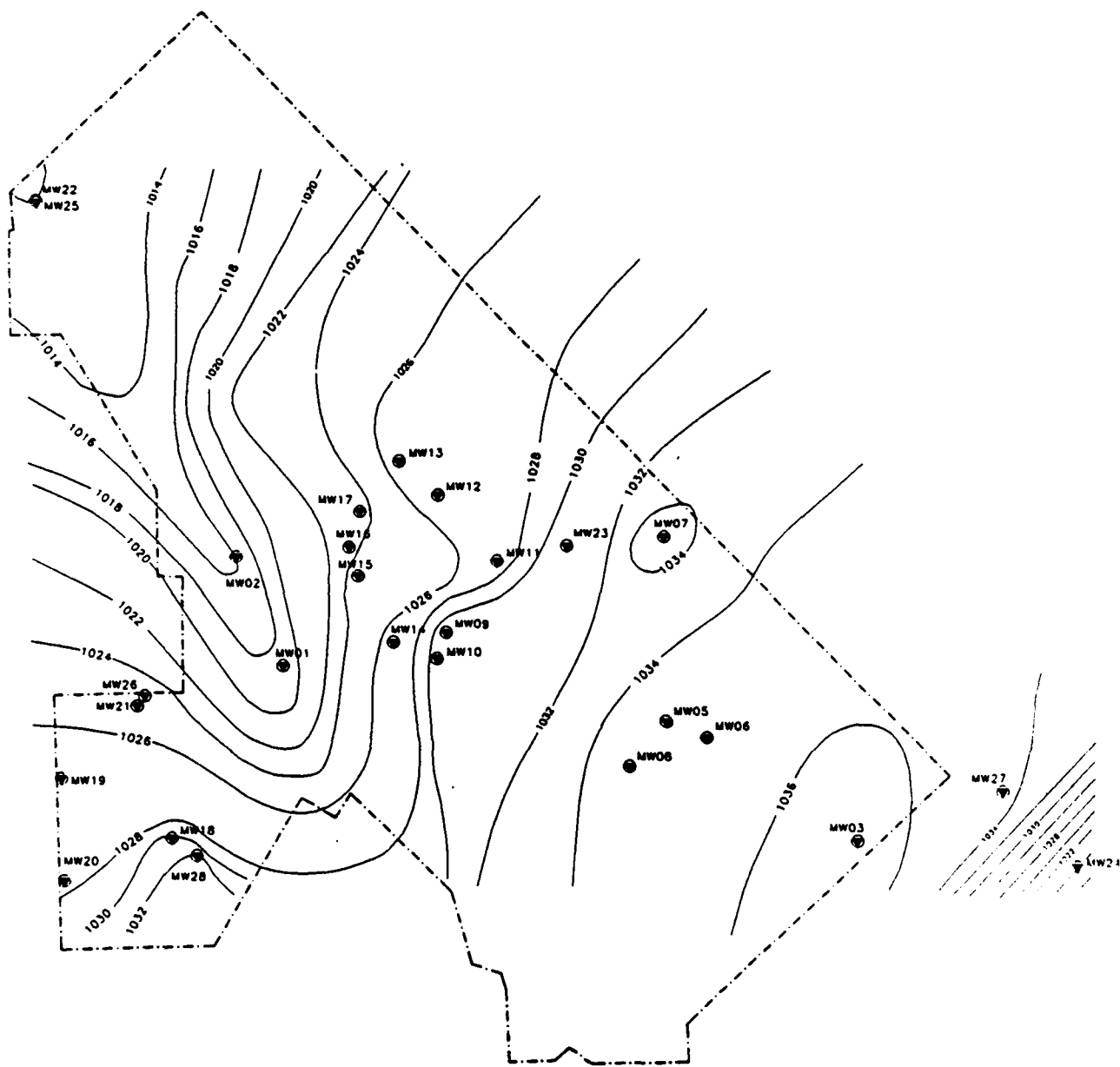


Fig. 2.1. Contour map of the weathered bedrock surface.

2.3 HYDROLOGY

2.3.1 Surface Hydrology

All surface runoff from potentially contaminated sites at the base drain into the unnamed tributary to the South Branch of Shunganunga Creek (drainage ditch)(Fig. 1.2). Due to the tight clay soils and large expanse of asphalt and concrete, most precipitation drains off of the base. Surface runoff occurs dominantly as sheet flow due to the relatively flat topography, and either directly discharges to the drainage ditch or is routed through storm sewers to the ditch.

U.S. Geological Survey gaging stations north of the base indicate past periods of no flow in the South Branch of Shunganunga Creek. During the field investigation, however, water was always observed flowing in the ditch, even during the summer months when the area was experiencing a severe drought. The water observed flowing in the ditch is base flow because the ditch is a discharge point for groundwater underlying the base.

Although the maximum amount of 24-h precipitation recorded at Topeka was 8.08 in., the flood potential at the site is negligible because it is located on a topographic high in the upper portion of the drainage basin. Sheet flow would not become channelized until the water collected in creek channels, which are predominantly off-site.

2.3.2 Groundwater Hydrology

Two water-bearing units at the base capable of transmitting contaminants off-site are the unconsolidated material overlying the competent bedrock and the Nodaway Coal member of the Howard Limestone. The unconsolidated material is comprised of silty-clay glacial drift and a weathered bedrock zone. The Nodaway Coal is a 1.5 to 2 ft thick, sub-bituminous coal interbedded with numerous gray and yellow-brown claystones.

In the unconsolidated material, groundwater generally flows northwest across the site as illustrated by the potentiometric maps (Fig. 2.2). Recharge to the aquifer occurs from precipitation in areas

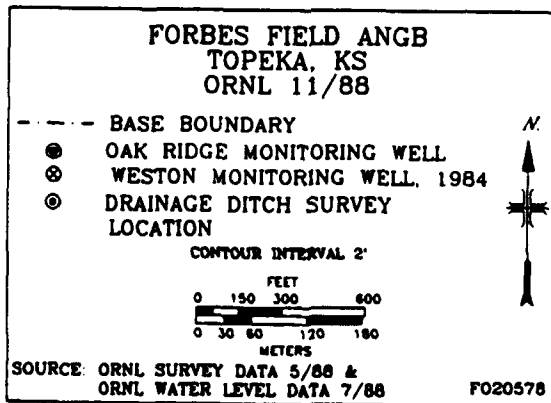
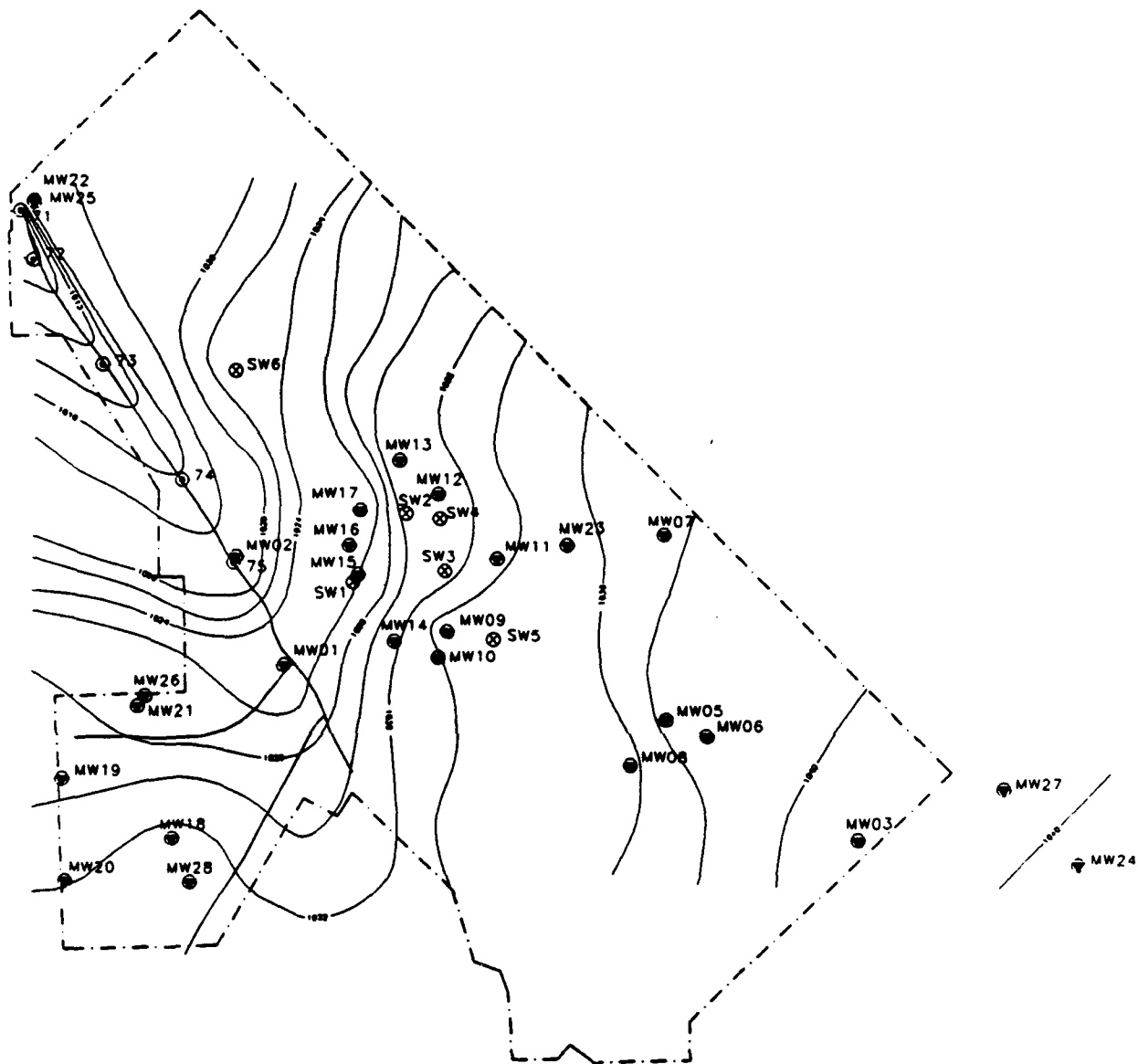


Fig. 2.2. Potentiometric map of the unconsolidated aquifer water levels measured in July 1988.

where asphalt and concrete do not cover the ground. The groundwater discharges to the drainage ditch. A portion of this discharge comes from the Nodaway Coal which discharges water into the weathered bedrock directly upgradient of the ditch.

The water table lies about 10 ft below the surface under most of the base, but is as shallow as 2 ft and as deep as 24 ft. The unconsolidated aquifer is heterogeneous and discontinuous. Measurable groundwater flow rates range from 4.0×10^{-5} cm/s (0.11 ft/d) to 7.1×10^{-4} cm/s (2.0 ft/d), and most of the aquifer yielded values below the lower level of detection [3.5×10^{-5} cm/s (0.099 ft/d)].

The only unit with measurable permeability in the upper 50 ft of bedrock under the base is the Nodaway Coal which indicated a permeability of 1.1×10^{-3} cm/s (3.2 ft/d). The permeable Nodaway Coal is isolated from the unconsolidated aquifer by impermeable bedrock units in the eastern portion of the base and discharges water to the unconsolidated aquifer in the western portion of the base. Therefore, even if contamination were to enter the bedrock, it would be confined to the base and eventually discharged to the unconsolidated aquifer.

As a result of the hydrogeologic environment and soil characteristics, conditions are not conducive to contaminant migration. In fact, the tight clay soils inhibit leaching of fuel components from the soil into the groundwater. Indeed, conditions at the base create a natural landfill: tight clay soils, low hydraulic conductivity, impermeable bedrock isolating lower bedrock aquifers, and an asphalt/concrete cap over large portions of the base.

2.4 CONTAMINATION

Fuel is present in the subsurface environment at Forbes Field ANGB (ORNL 1989). This fuel is being held in the soil matrix underlying the facility and in the backfill of buried fuel line trenches; it does not appear to be leaching into the groundwater. In fact, the only contaminated groundwater discovered was in wells drilled into a known spill area (MW009) at Site 5, sludge burial areas (MW019 and MW021) and near the pumphouse (MW028) in the tank farm, and storm sewer/fuel line

backfill (SW005, Weston). In addition, wells drilled downgradient of each of these areas contained no detectable contamination, indicating no migration of contaminated groundwater.

To determine the likelihood of contaminants leaching into groundwater, a highly contaminated soil sample from Site 1 [490,000 $\mu\text{g}/\text{kg}$ total petroleum hydrocarbons (TPHC) and 31,000 $\mu\text{g}/\text{kg}$ xylenes in soil from MW021] was subjected to the toxicity characteristic leaching procedure (TCLP) test. Only xylenes were detected in the leachate (39 $\mu\text{g}/\text{L}$), indicating a slight leachability in the sample.

Since the tight clay soils severely inhibit contaminant migration, fuel in the lateral trenches is essentially confined by the soil and, therefore, "pools" at the low point (as if in a bathtub). Since the water table lies 3 to 9 ft below the bottom of the lateral trenches, groundwater will not contact the fuel within the trench. Comparison of water levels measured by Weston in 1984 with water levels measured by ORNL in 1988 show only minor variations, indicating that the water table is relatively static. Because the leaching process is so slow, high concentrations of fuel may never reach the water table under the ramp.

Sediments in the drainage ditch contain TPHCs, polynuclear aromatics, and pesticides; however, the contamination pattern is not consistent throughout the course of the ditch. Low-flow surface water samples do not show contamination from the above compounds.

Groundwater quality at the base and upgradient of the base is poor. Even if the hydraulic conductivity allowed production of usable quantities of groundwater, the poor quality would preclude both domestic use and most irrigation use.

The baseline risk assessment (ORNL 1989) indicates little likelihood of exposure to humans or biota from any site.

2.5 DECISIONS

2.5.1 Decision Documents for Individual Sites

Sections 3 through 9 are decision documents for individual sites at the base. Each contains a short description of the site, a brief discussion of the site's remedial investigation results, and a decision statement.

Detailed information about the findings at each site and the risks to the public or environment are available in the Remedial Investigation Report (ORNL 1989).

2.5.2 Monitoring

In November 1989, NGB and the Kansas Department of Health and Environment (KDHE) reached an agreement to conduct periodic monitoring of the groundwater and surface water at Forbes Field ANGB. The agreement requires the National Guard to collect groundwater samples from four of the monitoring wells installed during the Remedial Investigation/Feasibility Study (RI/FS). The agreement also calls for monitoring of the surface water in the drainage ditch.

The four wells to be monitored are MW002, MW015, MW025A, and MW026 (Fig. 2.3). These four wells are downgradient of the known spill sites or are on the periphery of the base. Monitoring the groundwater in these four wells and surface water in the drainage ditch will provide additional information about the transport, or lack thereof, of jet fuel in the groundwater.

Monitoring of the four wells will consist of collecting groundwater samples from the wells. Monitoring of the drainage ditch will consist of collecting a surface water sample near the point where the ditch exits the base. Samples of the groundwater and surface water will be collected during the spring and fall of 1990. Each sample will be analyzed for fuel components and TPHC.

Following analysis of these two rounds of samples, NGB and KDHE will evaluate the results. If no fuel contaminants are detected, the four wells and the drainage ditch will be sampled once in each of the following three years. If no contaminants are detected in the samples from these three years, monitoring will be discontinued. If contaminants are detected in the samples at any stage of the monitoring, NGB and KDHE will meet to decide a further course of action.

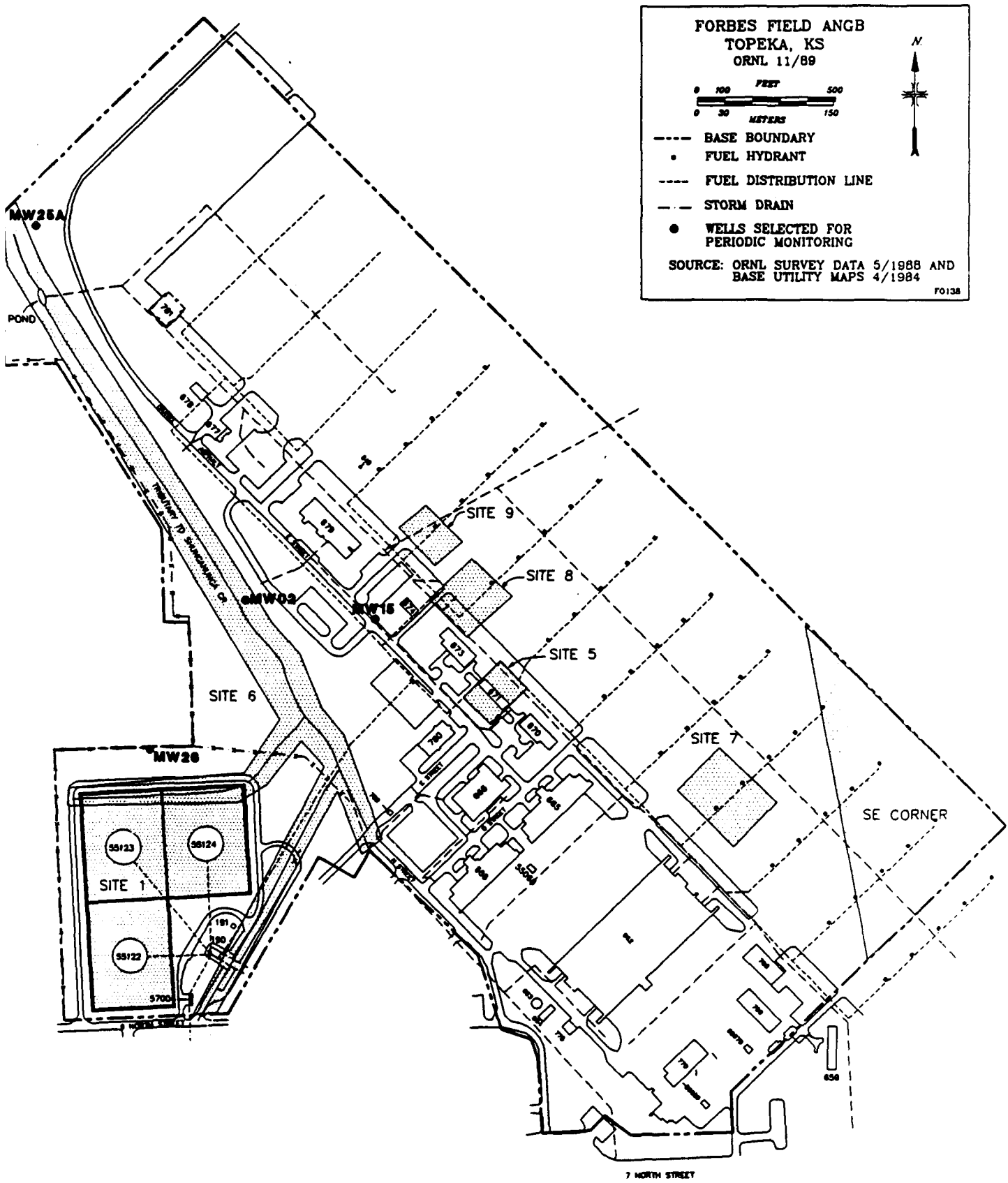


Fig. 2.3. Investigated sites and monitoring wells selected for periodic monitoring.

3. Site 1 - JP-4 BULK STORAGE AREA (TANK FARM)

3.1 SITE DESCRIPTION

The tank farm consists of three aboveground jet fuel (JP-4) storage tanks on the southwest side of the base. The tanks are surrounded by a continuous, closed earthen berm designed to impound leaks and spills. In 1981, an estimated 1200 to 1400 gal of JP-4 leaked from the southern tank onto the surrounding soil. Tank-cleaning sludges and other small disposal areas also have been located in the tank farm area.

3.2 FINDINGS

The water bearing unit underlying the tank farm is discontinuous and occurs in unconsolidated sediments of tight, silty clay. Six monitoring wells were drilled to characterize the subsurface at Site 1. JP-4 components were found in the soil at depths of 6 to 12 ft in four wells and in groundwater samples in three wells. The amount of fuel in the groundwater is very low compared to the quantity found in the contaminated soils. For example, a soil sample taken at 6 ft during the drilling of MW021 contained 490,000 $\mu\text{g}/\text{kg}$ TPHCs, while a groundwater sample contained only 760 $\mu\text{g}/\text{L}$ TPHCs. MW026, located ~50 ft downgradient from MW021, had no detectable TPHCs in soil or groundwater. The tight clay soils (hydraulic conductivity range of $<3.5 \times 10^{-5}$ to 3.4×10^{-4} cm/s) and low leachability of the JP-4 constituents in these soils (ORNL 1989) make past spills relatively immobile.

Results of a preliminary Risk Assessment, conducted as part of the Remedial Investigation (ORNL 1989), indicates that Site 1 poses no risk to the public health or the environment.

3.3 DECISION

The National Guard Bureau has reviewed the available data and finds that no significant impacts result from the disposals at Site 1; therefore, no further site characterizations or remedial actions are required.


In order to provide additional information about the transport, or lack thereof, of jet fuel in the groundwater, one monitoring well at Site 1 will be periodically sampled. The well, MW026, is -50 ft downgradient of a tank cleaning sludge burial area and the contaminated monitoring well MW021.

A sample of the groundwater will be collected during the spring and fall of 1990. Each sample will be analyzed for fuel components and TPHC.

Following analysis of these two rounds of samples, NGB and KDHE will evaluate the results. If no fuel contaminants are detected, the well will be sampled once in each of the following three years. If no contaminants are detected in the samples from these three years, monitoring will be discontinued. If contaminants are detected in the samples at any stage of the monitoring, NGB and KDHE will meet to decide a further course of action.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau



Date



State of Kansas
Kansas Department of Health and Environment

- Concur
- Nonconcur (please provide reasons)

4. SITE 5 - AREA ADJACENT TO PUMPHOUSE E, BUILDING 671

4.1 SITE DESCRIPTION

Site 5 surrounds pumphouse E, building 671, located southwest of the aircraft parking ramp near the center of the base. In 1967, an estimated 2000 to 10,000 gal of JP-4 spilled from the north side of the pumphouse into the surrounding soil.

4.2 FINDINGS

The water bearing unit is discontinuous and occurs in unconsolidated sediments of tight, silty clay. The four monitoring wells associated with Site 5 are SW005, installed by Weston in 1984, and MW009, MW010, and MW014, installed by ORNL/CAT. Due to the presence of fourteen 50,000 gal underground storage tanks and numerous buried utility lines, there is an abundance of fill material surrounding the spill area.

The Weston well SW005, located on the north side of the pumphouse, shows evidence of floating fuel (-0.2 ft measured by Weston in 1984, a thin film measured by ORNL in March 1988, and -0.16 ft measured by ORNL in September 1988). The borehole log from SW005 indicates that the well was installed in the trench backfill of a fuel line or storm sewer trench. Analyses of both soil and groundwater samples from the ORNL/CAT wells found elevated TPHCs in MW009 (26,000 $\mu\text{g}/\text{kg}$ and 1100 $\mu\text{g}/\text{L}$, respectively), but the samples from two downgradient monitoring wells (MW010 and MW014) contained no detectable contamination.

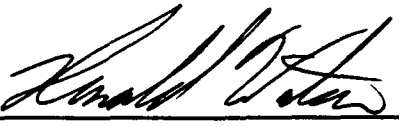
The undisturbed soil around the original spill area (MW009) is contaminated, but the concentration appears to decrease sharply with distance from the source. Since SW005 has contained measurable floating product on two occasions, groundwater contamination is apparently confined to nearby trenches and the source area.

The potential for migration is low since the tight clay soils (hydraulic conductivity range of $<3.5 \times 10^{-5}$ to 3.4×10^{-4} cm/s) have effectively immobilized the fuel components. Results of a preliminary

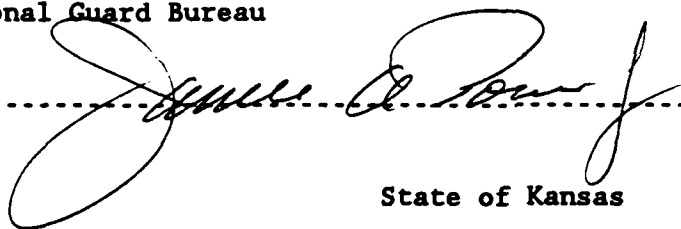
Risk Assessment, conducted as part of the Remedial Investigation (ORNL 1989), indicates that Site 5 poses no risk to the public health or the environment.

4.3 DECISION

The National Guard Bureau has reviewed the available data and finds that no significant impacts result from the disposal at Site 5; therefore, no further actions are required.


RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau

4/17/90
Date

 5/22/90
State of Kansas

Kansas Department of Health and Environment

Concur (subject to attached Addendum Comments)

Nonconcur (please provide reasons)

5. SITE 6 - SURFACE DRAINAGE DITCH AND STORM SEWER OUTFLOW

5.1 SITE DESCRIPTION

Site 6 consists of the drainage ditch and storm sewer system. The drainage ditch runs northwesterly along the northwest side of the base, eventually flowing into the South Branch of Shunganunga Creek about 1.5 miles downstream. The ditch receives sheet flow runoff from most of the base, including the tank farm. The base's storm sewers converge through successive confluences which finally drain into the ditch at three locations. The largest of these storm sewers drains the entire aircraft parking ramp plus other parts of the base and empties into the drainage ditch in a small basin or "pond" at the northwest corner of the base. Since the ditch is topographically lower than nearby U.S. Highway 75, it also receives some surface runoff from the highway. In addition, the drainage ditch serves as a discharge area for the unconsolidated aquifer underlying the base.

5.2 FINDINGS

Sediment and surface water samples were collected from the ditch on the base, and upstream and downstream from the base. Four monitoring wells were installed along the ditch to intercept contaminants migrating from the base and tank farm fuel spills. Subsequent sampling of these monitoring wells showed no contamination.

Surface water samples collected on two occasions at points just below where the ditch emerges from a culvert and begins its surface flow were found to contain small amounts (up to 46 $\mu\text{g/L}$) of 1,2-dichloroethene. The origin of this chlorinated solvent is unknown; however, it is unlikely that any of the sites studied in the remedial investigation are the source. This is because only one site studied (Site 7) is upgradient of these samples and no contaminants were discovered downgradient of Site 7. Also, no solvents were involved at any of the studied sites. The surface water samples collected farther downstream contained no detectable contamination.

Sediment samples were collected at fifteen points along the drainage ditch system, including locations upstream and downstream from the base. Three samples contained elevated concentrations of TPHCs. A sample taken from the pond sediment and a sample from the ditch east of the tank farm contained low levels of polynuclear aromatic hydrocarbons; one of the samples collected at the base boundary contained traces of the pesticides 4,4'-DDE, 4,4'-DDT, and dieldrin. The polynuclear aromatics are typically associated with jet and combustion engines, and road dust. These sampling points are located close to the storm sewer outfall and U.S. Highway 75, both of which contribute surface runoff to the ditch. It is likely that these are sources of the polynuclear aromatics. The pesticides may be from local agricultural activities. The fuel contamination appears to be the result of small spills and leaks--not a surface expression of a larger source.

Due to the low levels and relative immobility of the contaminants at Site 6 (ORNL 1989), there is minimal risk to the public or the environment. Transport of the contaminated sediments would only occur during high energy flood conditions, where dilution would render the concentrations insignificant.

5.3 DECISION

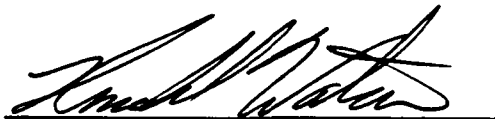
The National Guard Bureau has reviewed the available data and finds that no significant impacts result from Site 6; therefore, no further site characterizations or remedial actions are required.

In order to provide additional information about the transport, or lack thereof, of jet fuel in the groundwater, periodic water sampling will be conducted at Site 6.

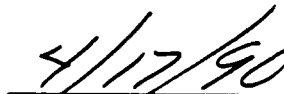
Groundwater samples will be collected from two monitoring wells, MW002 and MW025A. (MW025A is a replacement well for MW025.) A surface water sample will be collected from the drainage ditch near the point where the ditch exits the base. The monitoring wells are located between the drainage ditch and other contaminated sites. Thus, samples from these wells will monitor for fuel migrating in the groundwater. Since groundwater under the base discharges to the ditch, a surface water sample will determine if fuel is entering the ditch from the groundwater discharge.

Samples of the groundwater and surface water will be collected during the spring and fall of 1990. Each sample will be analyzed for fuel components and TPHC.

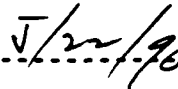
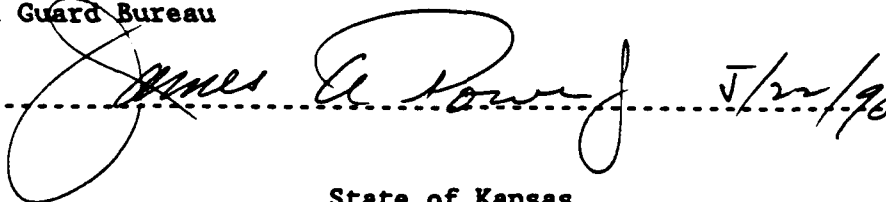
Following analysis of these two rounds of samples, NGB and KDHE will evaluate the results. If no fuel contaminants are detected, the two wells and the drainage ditch will be sampled once in each of the following three years. If no contaminants are detected in the samples from these three years, monitoring will be discontinued. If contaminants are detected in the samples at any stage of the monitoring, NGB and KDHE will meet to decide a further course of action.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau



Date



State of Kansas
Kansas Department of Health and Environment

- Concur
- Nonconcur (please provide reasons)

6. SITE 7 - AREA ADJACENT TO REFUELING HYDRANT, LATERAL 3

6.1 SITE DESCRIPTION

Site 7 consists of the area surrounding the southwest fuel hydrant on fuel lateral 3, where, in 1981, an undetermined amount of jet fuel leaked from the fuel hydrant.

6.2 FINDINGS

The water bearing unit underlying Site 7 is discontinuous and occurs in unconsolidated sediments of tight, silty clay. Groundwater is found only in the lower few feet of the unconsolidated sediments and is nearly absent in some places.

Three monitoring wells were installed to characterize the subsurface at Site 7. Analysis of both soil and groundwater samples from these wells found no detectable contamination. Soil-gas samples were taken from three locations along lateral 3. Concentrations of fuel components ranged from background values near the southwest end of the lateral to 169,000 µg/L TPHCs at a point 400 ft northeast. Apparently, spilled fuel is pooled locally in the trenches and is not migrating.

Results of a preliminary Risk Assessment, completed as part of the Remedial Investigation (ORNL 1989), indicates that Site 7 poses no risk to the public health or the environment. However, spilled fuel is present in the backfill of trenches and any excavation near the fuel distribution lines or laterals should not be undertaken without being prepared to deal with fuel-contaminated soil.

A focused Feasibility Study has been prepared to address planned contractor operations at the base (Garland 1989). Since JP-4 is not a listed hazardous waste and KDHE does not consider petroleum hydrocarbon-contaminated soil to be hazardous by characteristic (Underwood 1989), the contaminated soil in question is considered non-hazardous solid waste. Thus, the recommendation for dealing with contaminated soil encountered during excavation was to properly store the contaminated soil during construction and use that soil for trench backfill. Proper storage consists of stockpiling on a liner or existing paved area, surrounded with a berm, and covered to prevent runoff.

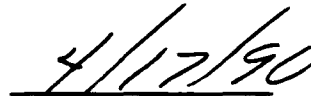
The construction contractor needs to be notified of the potential health risks involved with excavating contaminated soil. There is a potential risk for exposure of workers to contaminants through inhalation or skin contact, and possible explosive hazards when excavating. Workers must be aware of procedures to alleviate hazards, must have adequate training, and must be properly warned of potential hazards. It is recommended that a qualified industrial hygienist be on-site to monitor air exposure.

6.3 DECISION

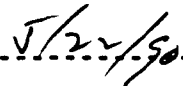
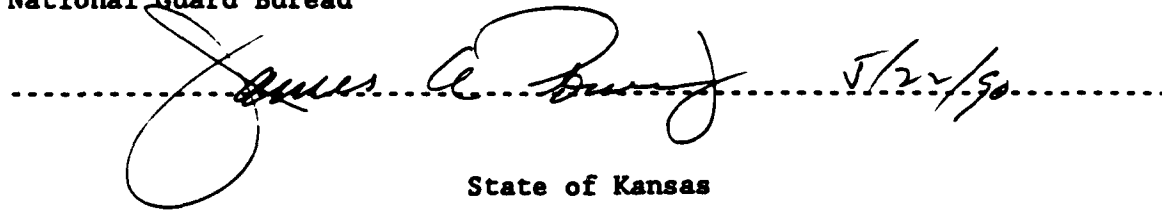
The National Guard Bureau has reviewed the available data and finds that no significant impacts result from the disposal at Site 7; therefore, no further actions are required.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau



Date



State of Kansas
Kansas Department of Health and Environment

Concur (subject to attached Addendum Comments)

Nonconcur (please provide reasons)

7. SITE 8 - AREA ADJACENT TO REFUELING HYDRANT, LATERAL 7

7.1 SITE DESCRIPTION

Site 8 consists of the area surrounding the southwest fuel hydrant on fuel lateral 7, where, in July 1982, an undetermined amount of jet fuel leaked from the fuel hydrant.

7.2 FINDINGS

The water bearing unit underlying Site 8 is discontinuous and occurs in unconsolidated sediments of tight, silty clay.

Three ORNL/CAT monitoring wells and Weston well SW004 were drilled to characterize Site 8. Analyses of both soil and groundwater samples from the ORNL/CAT wells found no detectable contamination; groundwater from SW004 (a Weston well) contained 190 $\mu\text{g/L}$ TPHCs. Soil-gas samples were taken in the trench at three locations along lateral 7. One sample contained slightly elevated TPHCs; the other two samples contained only background levels. Apparently, spilled fuel is pooled locally in the trench and is not migrating.

Results of a preliminary Risk Assessment, completed as part of the Remedial Investigation (ORNL 1989), indicates that Site 8 poses no risk to the public health or the environment. However, spilled fuel is present in the backfill of trenches and any excavation near the fuel distribution lines or laterals should not be undertaken without being prepared to deal with fuel-contaminated soil.

A focused Feasibility Study has been prepared to address planned contractor operations at the base (Garland 1989). Since JP-4 is not a listed hazardous waste and KDHE does not consider petroleum hydrocarbon-contaminated soil to be hazardous by characteristic (Underwood 1989), the contaminated soil in question is considered non-hazardous solid waste. Thus, the recommendation for dealing with contaminated soil encountered during excavation was to properly store the contaminated soil during construction and use that soil for trench backfill. Proper storage consists of stockpiling on a liner or existing paved area, surrounded with a berm, and covered to prevent runoff.

The construction contractor needs to be notified of the potential health risks involved with excavating contaminated soil. There is a potential risk for exposure of workers to contaminants through inhalation or skin contact, and possible explosive hazards when excavating. Workers must be aware of procedures to alleviate hazards, must have adequate training, and must be properly warned of potential hazards. It is recommended that a qualified industrial hygienist be on-site to monitor air exposure.

7.3 DECISION

The National Guard Bureau has reviewed the available data and finds that no significant impacts result from the disposal at Site 8; therefore, no further site characterizations or remedial actions are required.

In order to provide additional information about the transport, or lack thereof, of jet fuel in the groundwater, one monitoring well downgradient of Site 8 will be periodically sampled. The well, MW015, is downgradient of Site 8 and some of the contaminated fuel laterals.

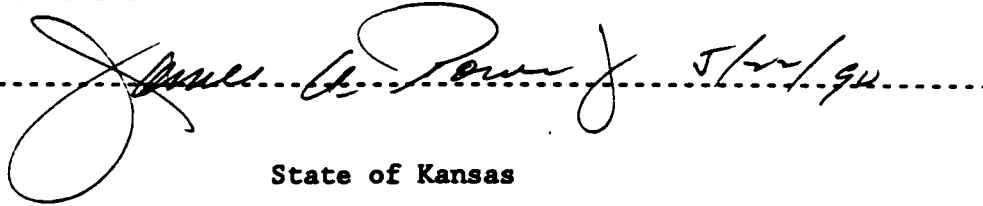
A sample of the groundwater will be collected during the spring and fall of 1990. Each sample will be analyzed for fuel components and TPHC.

Following analysis of these two rounds of samples, NGB and KDHE will evaluate the results. If no fuel contaminants are detected, the well will be sampled once in each of the following three years. If no contaminants are detected in the samples from these three years, monitoring will be discontinued. If contaminants are detected in the samples at any stage of the monitoring, NGB and KDHE will meet to decide a further course of action.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau

4/17/90
Date



State of Kansas
Kansas Department of Health and Environment

Concur

Nonconcur (please provide reasons)

8. SITE 9 - AREA ADJACENT TO REFUELING HYDRANT, LATERAL 8

8.1 SITE DESCRIPTION

Site 9 consists of the area surrounding the southwest fuel hydrant on fuel lateral 8, where, in 1983, up to 3000 gal of jet fuel leaked from the fuel hydrant.

8.2 FINDINGS

The water bearing unit underlying Site 9 is discontinuous and occurs in unconsolidated sediments of tight, silty clay.

Three ORNL/CAT monitoring wells and Weston well SW002 were drilled to characterize Site 9. Analysis of soil and groundwater samples taken from the wells showed no detectable contamination. Three soil-gas samples collected from the sandy backfill of the lateral 8 trench contained only background levels of hydrocarbons. Spilled fuel may be pooled locally in the trench, but does not appear to be migrating.

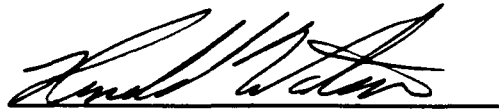
Results of a preliminary Risk Assessment, completed as part of the Remedial Investigation (ORNL 1989), indicates that Site 9 poses no risk to the public health or the environment. However, spilled fuel is present in the backfill of trenches and any excavation near the fuel distribution lines or laterals should not be undertaken without being prepared to deal with fuel-contaminated soil.

A focused Feasibility Study has been prepared to address planned contractor operations at the base (Garland 1989). Since JP-4 is not a listed hazardous waste and KDHE does not consider petroleum hydrocarbon-contaminated soil to be hazardous by characteristic (Underwood 1989), the contaminated soil in question is considered non-hazardous solid waste. Thus, the recommendation for dealing with contaminated soil encountered during excavation was to properly store the contaminated soil during construction and use that soil for trench backfill. Proper storage consists of stockpiling on a liner or existing paved area, surrounded with a berm, and covered to prevent runoff.

The construction contractor needs to be notified of the potential health risks involved with excavating contaminated soil. There is a potential risk for exposure of workers to contaminants through inhalation or skin contact, and possible explosive hazards when excavating. Workers must be aware of procedures to alleviate hazards, must have adequate training, and must be properly warned of potential hazards. It is recommended that a qualified industrial hygienist be on-site to monitor air exposure.

8.3 DECISION

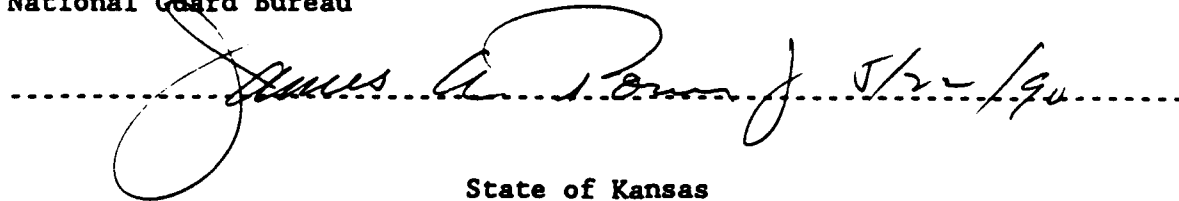
The National Guard Bureau has reviewed the available data and finds that no significant impacts result from the disposal at Site 9; therefore, no further actions are required.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau



Date



State of Kansas
Kansas Department of Health and Environment

Concur (subject to attached Addendum Comments)

Nonconcur (please provide reasons)

9. SOUTHEAST CORNER OF ANGB PROPERTY

9.1 SITE DESCRIPTION

The southeast corner of the base was included as a study area following discovery of oil and grease in the groundwater of the bedrock aquifer (Weston 1985). No contaminant sources have been reported in this area, which is hydraulically upgradient of the base.

9.2 FINDINGS

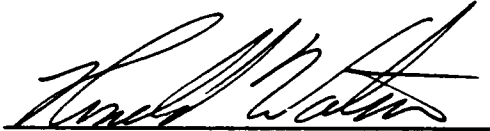
ORNL/CAT completed three alluvial monitoring wells and one bedrock well (corehole) to characterize this site. Soil and groundwater samples from the alluvial wells and groundwater samples from the corehole contained no detectable contamination.

ORNL/CAT collected a groundwater sample from Weston well DW001 in March 1988. The sample contained 680 $\mu\text{g/L}$ TPHCs. The presence of TPHCs in the groundwater sample may be the result of leachate from the Nodaway Coal, which the well probably penetrated at a depth of 20 to 30 ft (ORNL 1989).

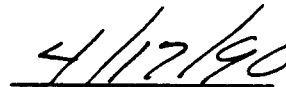
There is no evidence that fuel or other hazardous wastes were disposed of at this location; therefore, there is no potential for contamination.

9.3 DECISION

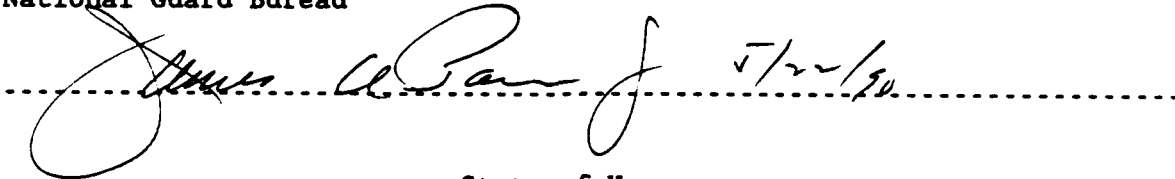
The National Guard Bureau has reviewed the available data and finds that no further actions are required at the southeast corner of ANGB property.



RONALD M. WATSON, Chairman
Environmental Affairs Committee
Air Directorate
National Guard Bureau



Date



State of Kansas
Kansas Department of Health and Environment

Concur

Nonconcur (please provide reasons)

10. REFERENCES

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Jean Underwood, Division of Environment, Bureau of Environmental Remediation, Kansas Department of Health and Environment, personal conversation with T. A. Cronk, Oak Ridge National Laboratory, Grand Junction, Colorado, January 13, 1989.