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# JET FUEL CONTAMINATION ASSESSMENT HYDRANT FUELING SYSTEM NAS FORT WORTH TX

11/1/1988

ARMY CORP OF ENGINEERS

File: 17G
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# NAVAL AIR STATION
# FORT WORTH JRB
# CARSWELL FIELD
# TEXAS

# ADMINISTRATIVE RECORD
# COVER SHEET

**AR File Number** 29

D.B.

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US Army Corps
of Engineers
Fort Worth District

# JET FUEL CONTAMINATION ASSESSMENT

# HYDRANT FUELING SYSTEM

# CARSWELL AIR FORCE BASE

# TEXAS

November 1988

# JET FUEL CONTAMINATION ASSESSMENT
# HYDRANT FUELING SYSTEM
# CARSWELL AIR FORCE BASE

- PREPARED BY -

U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT

NOVEMBER 1988

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**JET FUEL CONTAMINATION ASSESSMENT**
**HYDRANT FUELING SYSTEM**
**CARSWELL AIR FORCE BASE**

## 1. PURPOSE OF THE PROJECT

At the request of Carswell Air Force Base (CAFB), the Corps of Engineers, Fort Worth District, undertook this study to determine the degree of jet fuel (JP4) contamination present in the soil surrounding buried fuel tanks located at the Hydrant Fueling Facility. The study was performed in conjunction with design of a FY-90 project to construct a new Hydrant Fueling Facility.

## 2. DESCRIPTION OF THE FACILITY

The general location of the CAFB Hydrant Fueling System is shown on Plate 1. Investigations were conducted around fueling system pumphouse Nos. 4150, 4152, 4153, 4154, and 4170. Locations of the pumphouses are shown on Plate 2. As shown on Plates 3 through 7, each pumphouse facility consists of six buried 25,000 gallon fuel tanks and associated distribution lines. Controls for the facility are enclosed in a 55 X 27.5-foot building located over the buried tanks. The fuel tanks are 39 feet long and 10 feet in diameter. The bottom of each tank is approximately 12 feet below ground surface.

## 3. REGULATORY STATUS

The Texas Water Commission (TWC) is currently in the process of adopting standards to be implemented concerning the underground storage tank regulatory program. Provisions for removal or abandonment of

underground storage tanks are contained in Title 31, **"NATURAL RESOURCES AND CONSERVATION,"** Part IX, Texas Water Commission, Chapter 334, **"UNDERGROUND STORAGE TANKS."** The standards are generally applied on a case-by-case basis.

Specific standards concerning soil contamination from leaking tanks, such as the case at CAFB, have not been adopted as yet. However, the general guidelines recognized by TWC are as follows:

**a.** If the concentration of total petroleum hydrocarbons (TPH) in the soil surrounding the tank is less than 100 ppm, the tank may be abandoned in-place after cleaning and filling with an inert material.

**b.** If TPH in the soil surrounding the tank is greater than 100 ppm, the tank and contaminated soil should be removed and disposed at a sanitary landfill.

**c.** If TPH in the soil surrounding the tank is greater than 30,000 ppm, the tank and contaminated soil is considered hazardous, and should be removed and disposed at a hazardous waste disposal facility.

In addition, ground-water monitoring would be required if the tanks were left in-place and in contact with ground water.

## 4. INVESTIGATIONS

Investigations consisted of collecting and analyzing soil samples from 10 - 8-inch diameter auger borings drilled in a circular array around each pumphouse facility (see Plates 3 through 7). A total of 52 borings was drilled and sampled, including 2 borings that were drilled at an appropriate distance from the pumphouses in order to

collect background information. Investigations were performed by E. Nicholas and Associates, Inc., under contract with the Fort Worth District. Drilling and sampling were accomplished using a hollow stem auger. Geologic logs of the borings are included in this report as Appendix I.

Each boring was drilled to a depth of 20 feet. One-liter soil samples were obtained at depths of 12 and 20 feet. The auger was steam cleaned prior to collecting each soil sample. The samples were placed in glass jars equipped with teflon lids and sealed with electrical tape, packed inverted in ice, and transported to the laboratory within 24 hours of collection. Sample handling was recorded on a chain of custody form.

## 5. LABORATORY TESTING

Analyses of the soil samples were performed by Anachem, Inc., Carrolton, Texas, under contract with the Corps of Engineers Southwestern Division Laboratory in Dallas, Texas. Each sample was analyzed for total petroleum hydrocarbons (TPH) using EPA method 418.1. TPH detected at each sampling location is shown on Plates 3 through 7. Selected soil samples found in the initial analyses to contain high concentrations of TPH were re-analyzed by conducting GC/MS for fuel screen to positively identify the contaminant as being jet fuel (JP4). All laboratory test reports are included as Appendix II of this report.

## 6. RESULTS OF LABORATORY ANALYSES

a. **Background Locations.** Background soil samples were collected

and analyzed to determine the amount of hydrocarbons occurring naturally in the soil. These results were used as a comparison for identifying locations having higher concentrations caused by contamination from non-natural sources.

Background soil samples were collected from borings located approximately halfway between pumphouses Nos. 4153 and 4154. Soil samples were taken at depths of 12 and 20 feet from each boring. Laboratory analysis of the background samples indicated the amo unt of TPH occurring naturally in the soil ranged from 20 to 40 parts per million (PPM).

**b. Pumphouse No. 4150.** Soil borings around pumphouse 4150 generally encountered mixed sand and clay fill material to depths of 10 to 15 feet, underlain by undisturbed clay, sand, and gravel. Fuel odor was noted in borings 1147, 1149, 1151, and 1156 during drilling. Ground water was not encountered. As shown on Plate 3, laboratory results indicate significantly high concentrations of TPH in borings 1149, 1151, and 1155. All borings except 1148 indicate higher than background level concentrations of TPH at some depth.

**c. Pumphouse No. 4152.** Soil borings around pumphouse No. 4152 encountered mixed sand and clay fill to depths ranging from 8 to 14.5 feet underlain by undisturbed clay and sand. Fuel odor was noted in borings 1157, 1158, 1160, 1161, and 1166. Ground water was not encountered. Plate 4 shows that laboratory results indicate significantly high concentrations were present in borings 1157 and

1161. Slightly elevated levels were found in borings 1160, 1163, 1164, and 1165.

**d. Pumphouse No. 4153.** Borings around pumphouse No. 4153 encountered mixed sand and clay fill to depths ranging from 8 to 16 feet, underlain by undisturbed clay and sand. Fuel odor was noted in borings 1167, 1171, 1172, and 1176. Ground water was not encountered. Plate 5 shows that TPH concentrations slightly above background levels were indicated by laboratory tests in borings 1167 and 1168. The presence of fuel odor may indicate elevated levels of TPH in soil zones other than those sampled.

**e. Pumphouse No. 4154.** Borings around pumphouse No. 4154 encountered mixed sand and clay fill and undisturbed clay extending to about 13 feet and underlain by bedrock consisting of undisturbed weathered clay shale. Borings 1184 and 1185 were not able to penetrate the bedrock to full depth; boring 1184 was curtailed at 6.5 feet in weathered shale, while boring No. 1185 encountered limestone, probably an isolated boulder, at 6 feet. Boring No. 1179 encountered a suspected buried utility line at 4.5 feet and subsequently was offset 2.5 feet due west and redrilled as No. 1179A. Fuel odor and/or hydrocarbon staining were noted in all borings except No. 1184. Ground water was encountered in borings 1178, 1180, and 1182. Laboratory results show a significantly high level of TPH detected in boring No. 1181. Moderately elevated levels of TPH were found in samples from borings 1178, 1179, 1179A, 1180, and 1185, while only slightly elevated levels

were found in the remainder of the borings.

**f. Pumphouse No. 4170.** Borings around pumphouse No. 4170 encountered mixed sand and clay fill to depths ranging from 2.7 to 13 feet underlain by undisturbed clay, sand, and coarse gravel. Borings 1188 through 1196 were unable to penetrate to full depth, terminating in limestone or limestone gravel at depths ranging from 13.5 to 16 feet. Fuel odor and/or hydrocarbon staining was noted in borings 1188, 1191, 1192, 1193, 1195, and 1196. Ground water was encountered in all borings at approximately 10 to 12 feet, generally in the gravels. Laboratory analyses shown on Plate 7 indicate an unusually high level of TPH present in boring 1192. Moderately high TPH concentrations were detected in other borings, except for boring Nos. 1189 and 1190 where the concentrations were only slightly higher than background levels.

## 7. RESULTS OF GC/MS FUEL SCREEN

Re-analysis of selected soil samples containing relatively high TPH concentrations was conducted using the GC/MS fuel screen method. This method is used to specifically identify the hydrocarbon components of the contaminant. Results indicated that the contaminant is jet fuel (JP4), the same liquid that has been stored in the buried fuel tanks. Therefore, it is concluded that all TPH concentrations found during the study were concentrations of jet fuel which have leaked from the buried tanks.

## 8. CONCLUSIONS

**a.** Concentrations of jet fuel (JP4) were found in the soil surrounding pumphouses Nos. 4150, 4152, 4153, 4154, and 4170 at the CAFB Hydrant Fueling Facility. Source of the soil contamination is probably leakage from the buried fuel tanks, lines, or connections located at each pumphouse facility.

**b.** Soil surrounding the buried fuel tanks beneath the pumphouses, with the exception of No. 4154, generally consisted of mixed fill material underlain by sand and/or gravel. When the fuel contamination enters the more pervious sand and/or gravel stratum, the potential for spread is high. As a result a very large area could be affected.

**c.** The Texas Water Commission (TWC) recommends removal and disposal of the underground tank and surrounding soil if leakage has occurred to the extent that the surrounding soil is found to contain more than 100 ppm of total petroleum hydrocarbons. Concentrations surpassing this limit were found at pumphouses Nos. 4150, 4152, 4154, and 4170.

**d.** The limit between hazardous and nonhazardous levels of TPH concentrations in soil has been recognized by the (TWC) to be 50,000 PPM. None of the concentrations measured exceeded the hazardous level.

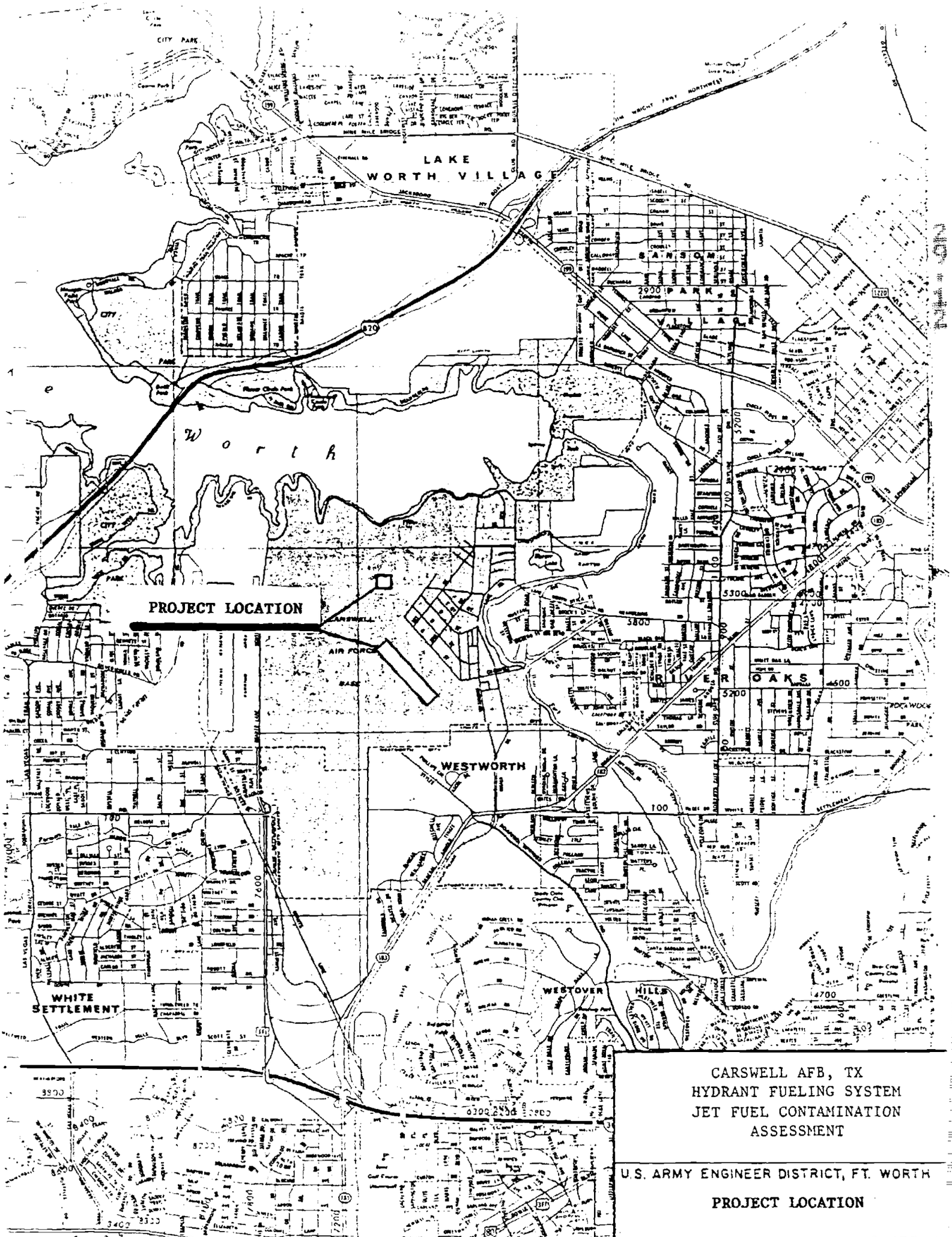
## 9. RECOMMENDATIONS

**a.** Underground fuel tanks located at pumphouses Nos. 4150, 4152, 4154, and 4170, along with contaminated soil surrounding the tanks, should be removed and disposed at a sanitary landfill. Underground tanks at pumphouse No. 4153 may be abandoned and filled in-place.

b. A plan describing the general procedures and schedule for removal or abandonment of the underground buried tanks should be submitted to the TWC for review prior to construction.

c. Removal of the tanks should be in compliance with Title 31, **"NATURAL RESOURCES AND CONSERVATION,"*** Part IX, Texas Water Commission, Chapter 334, **"UNDERGROUND STORAGE TANKS".**

*Texas Register, February 12, 1988, P 786

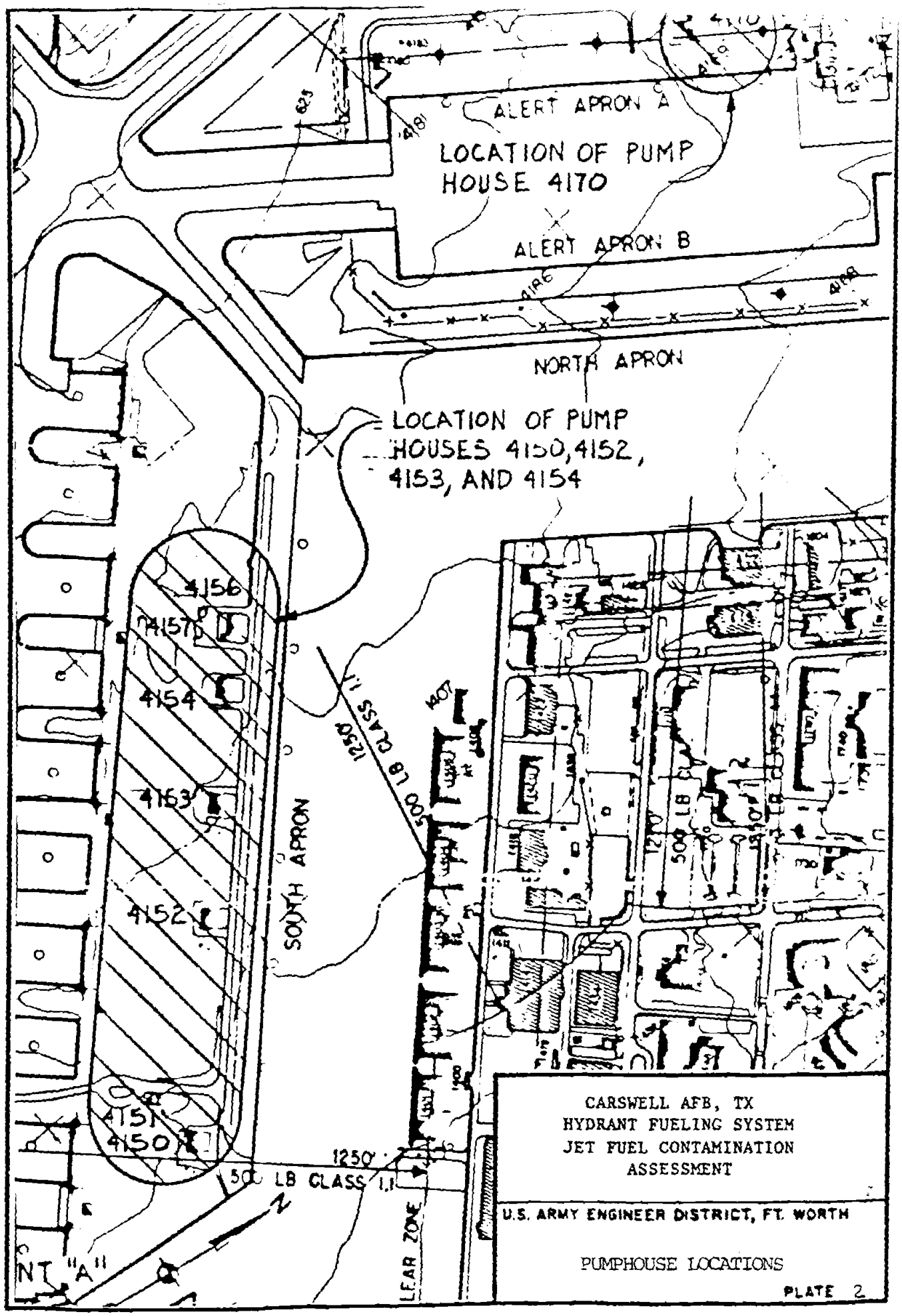


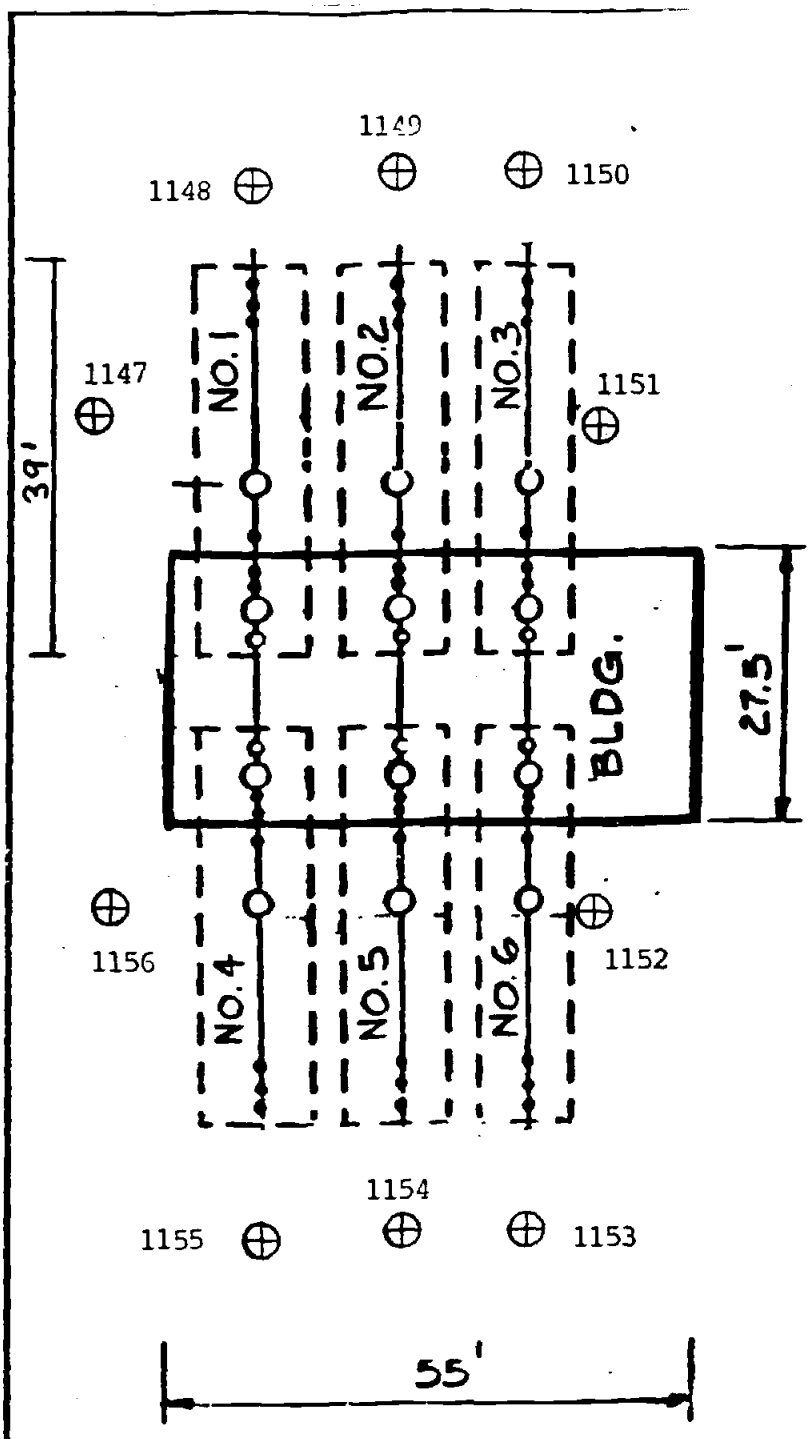

CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT

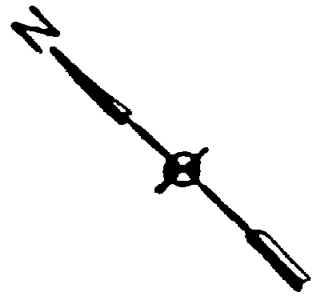
U.S. ARMY ENGINEER DISTRICT, FT. WORTH

**PROJECT LOCATION**

PLATE 1


ALERT APRON A
LOCATION OF PUMP HOUSE 4170
ALERT APRON B
NORTH APRON
LOCATION OF PUMP HOUSES 4150,4152, 4153, AND 4154
4156
4157
4154
4163
4152
4151
4150
SOUTH APRON
1250' 500 LB CLASS 1.1
1250'
500 LB CLASS 1.1
LEAR ZONE
NT "A"
CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT
U.S. ARMY ENGINEER DISTRICT, FT. WORTH
PUMPHOUSE LOCATIONS
PLATE 2




TOTAL PETROLEUM HYDROCARBON (TPH) CONCENTRATIONS

| BORING NO. | DEPTH (ft) | TPH (PPM) |
|---|---|---|
| 1147 | 12 | 226 |
| 1147 | 20 | 55 |
| 1148 | 12 | 26 |
| 1148 | 20 | 20 |
| 1149 | 12 | 19 |
| 1149 | 20 | 6978 |
| 1150 | 12 | 69 |
| 1150 | 20 | 82 |
| 1151 | 12 | 3269 |
| 1151 | 20 | 1961 |
| 1152 | 12 | 44 |
| 1152 | 20 | 51 |
| 1153 | 12 | 55 |
| 1153 | 20 | 135 |
| 1154 | 12 | 37 |
| 1154 | 20 | 47 |
| 1155 | 12 | 43 |
| 1155 | 20 | 3439 |
| 1156 | 12 | 61 |
| 1156 | 20 | 69 |

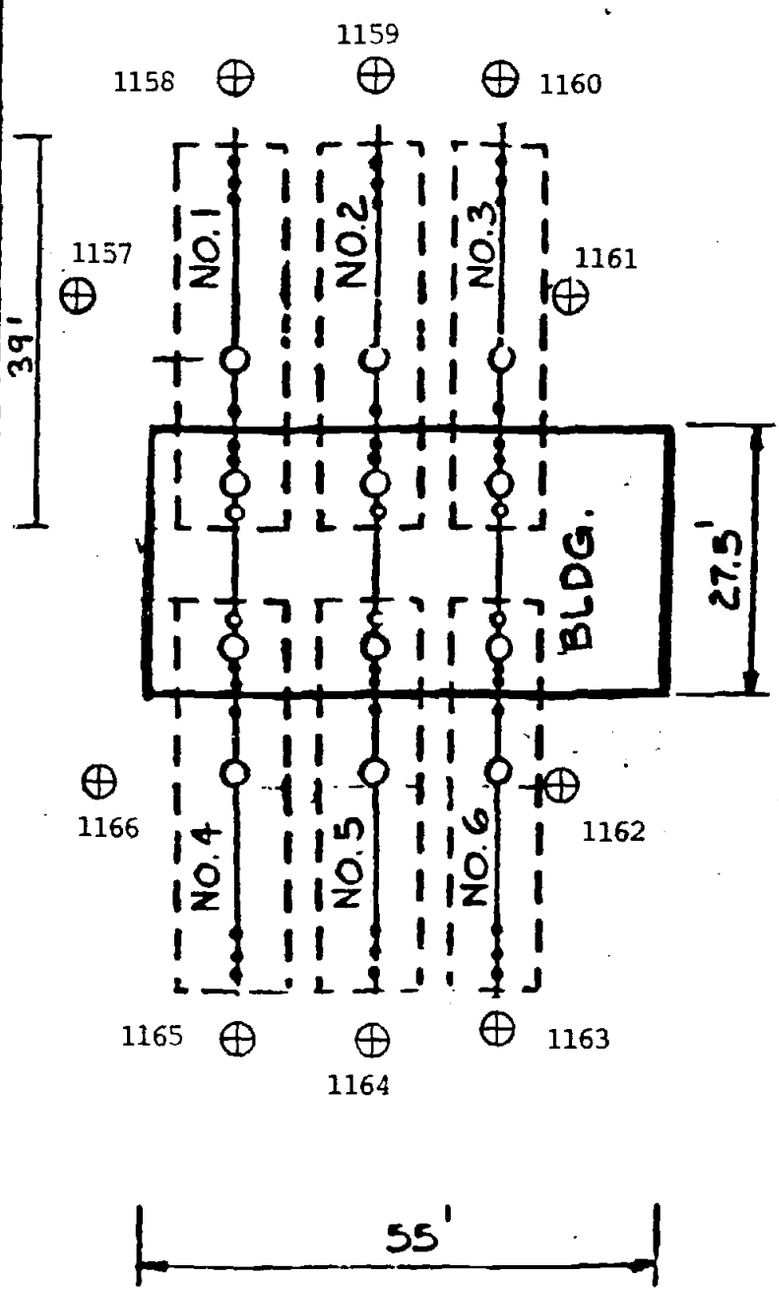
SCALE: 1" = 20'-0"

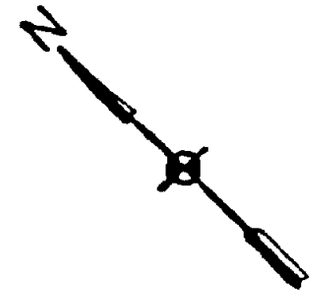
**CARSWELL AFB, TX**
**HYDRANT FUELING SYSTEM**
**JET FUEL CONTAMINATION ASSESSMENT**

**U.S. ARMY ENGINEER DISTRICT, FT. WORTH**

PUMPHOUSE 4150

**PLATE 3**




TOTAL PETROLEUM HYDROCARBON (TPH) CONCENTRATIONS

| BORING NO. | DEPTH (ft) | TPH (ppm) |
|---|---|---|
| 1157 | 12 | 200 |
| 1157 | 20 | 516 |
| 1158 | 12 | 24 |
| 1158 | 20 | 20 |
| 1159 | 12 | 24 |
| 1159 | 20 | 20 |
| 1160 | 12 | 16 |
| 1160 | 20 | 39 |
| 1161 | 12 | 40 |
| 1161 | 20 | 1300 |
| 1162 | 12 | 16 |
| 1162 | 20 | 16 |
| 1163 | 12 | 55 |
| 1163 | 20 | 24 |
| 1164 | 12 | 14 |
| 1164 | 20 | 84 |
| 1165 | 12 | 32 |
| 1165 | 20 | 31 |
| 1166 | 12 | 16 |
| 1166 | 20 | 16 |

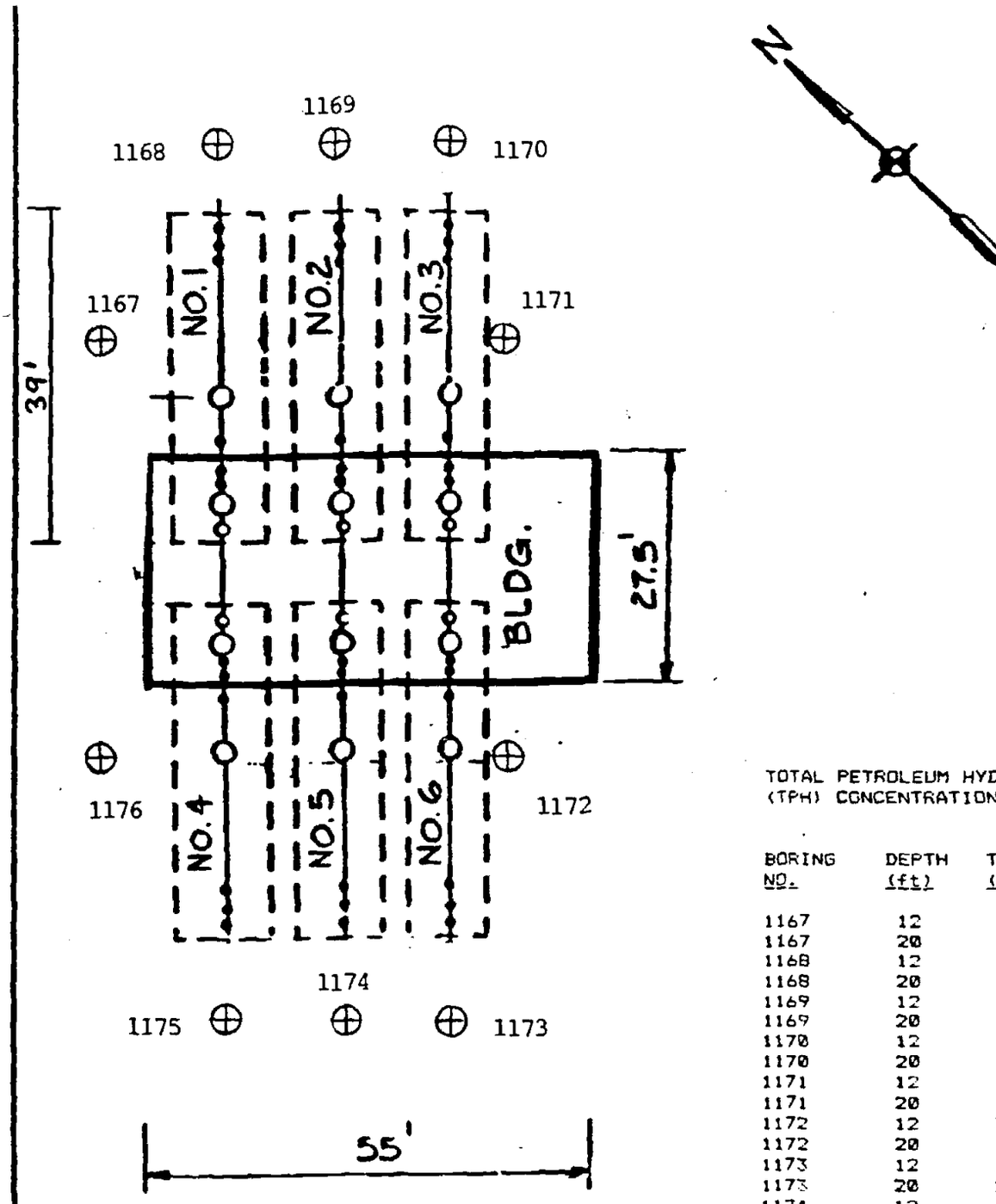
SCALE: 1" = 20'-0"

CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

PUMPHOUSE 4152

PLATE 4




TOTAL PETROLEUM HYDROCARBON (TPH) CONCENTRATIONS

| BORING NO. | DEPTH (ft) | TPH (ppm) |
|---|---|---|
| 1167 | 12 | 44 |
| 1167 | 20 | 40 |
| 1168 | 12 | 32 |
| 1168 | 20 | 44 |
| 1169 | 12 | 24 |
| 1169 | 20 | 20 |
| 1170 | 12 | 20 |
| 1170 | 20 | 20 |
| 1171 | 12 | 12 |
| 1171 | 20 | 16 |
| 1172 | 12 | 36 |
| 1172 | 20 | 16 |
| 1173 | 12 | 16 |
| 1173 | 20 | 20 |
| 1174 | 12 | 40 |
| 1174 | 20 | 24 |
| 1175 | 12 | 24 |
| 1175 | 20 | 24 |
| 1176 | 12 | 20 |
| 1176 | 20 | 24 |

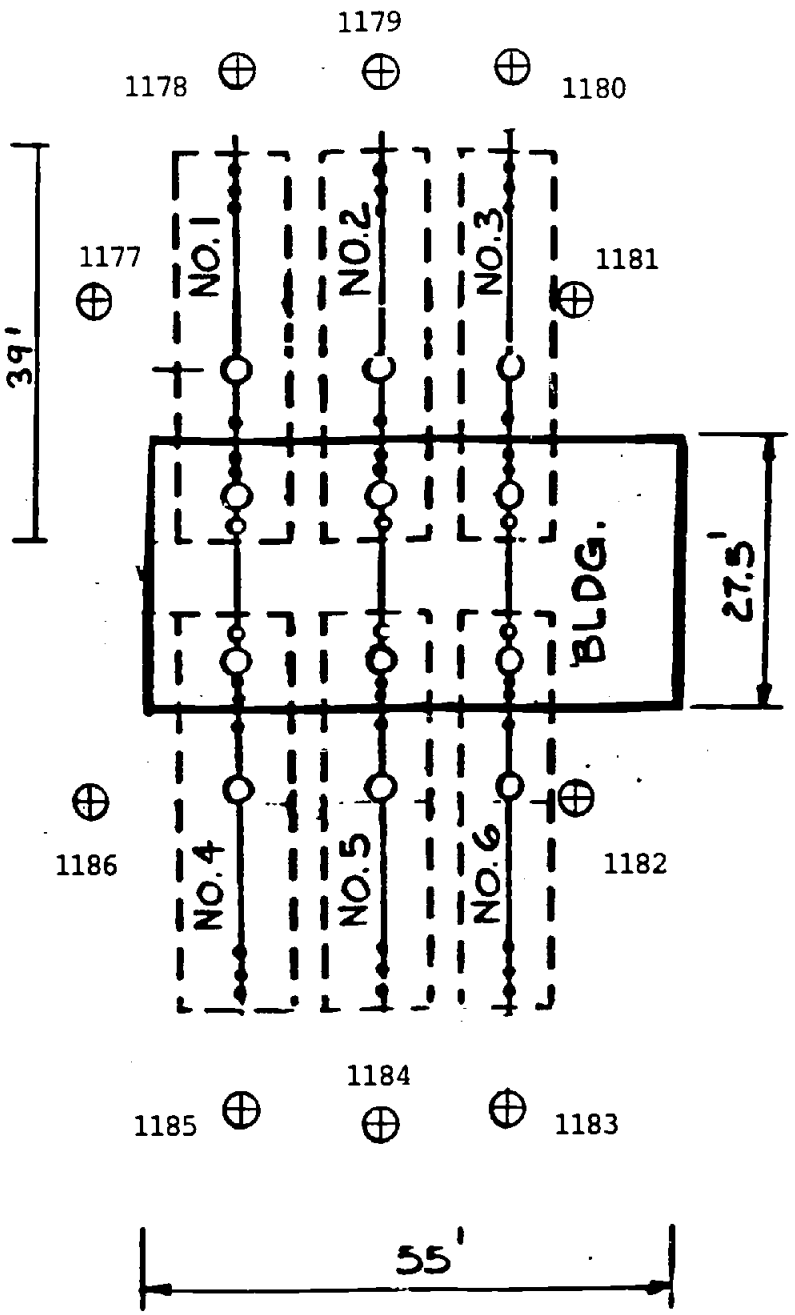
SCALE: 1" = 20'-0"

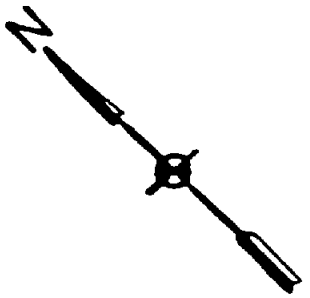
CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

PUMPHOUSE 4153

PLATE 5




TOTAL PETROLEUM HYDROCARBON (TPL) CONCENTRATIONS

| BORING NO. | DEPTH (ft) | TPH (ppm) |
|---|---|---|
| 1177 | 12 | 28 |
| 1177 | 20 | 20 |
| 1178 | 12 | 163 |
| 1178 | 20 | 212 |
| 1179 | 4* | 127 |
| 1179 | 4.5* | 428 |
| 1179A | 12 | 250 |
| 1179A | 20 | 243 |
| 1180 | 12 | 194 |
| 1180 | 20 | 217 |
| 1181 | 12 | 199 |
| 1181 | 20 | 2188 |
| 1182 | 12 | 16 |
| 1182 | 20 | 24 |
| 1183 | 12 | 20 |
| 1184 | 6** | 12 |
| 1185 | 6** | 144 |
| 1186 | 12 | 20 |
| 1186 | 20 | 48 |

* Enc buried utility
** Enc rock

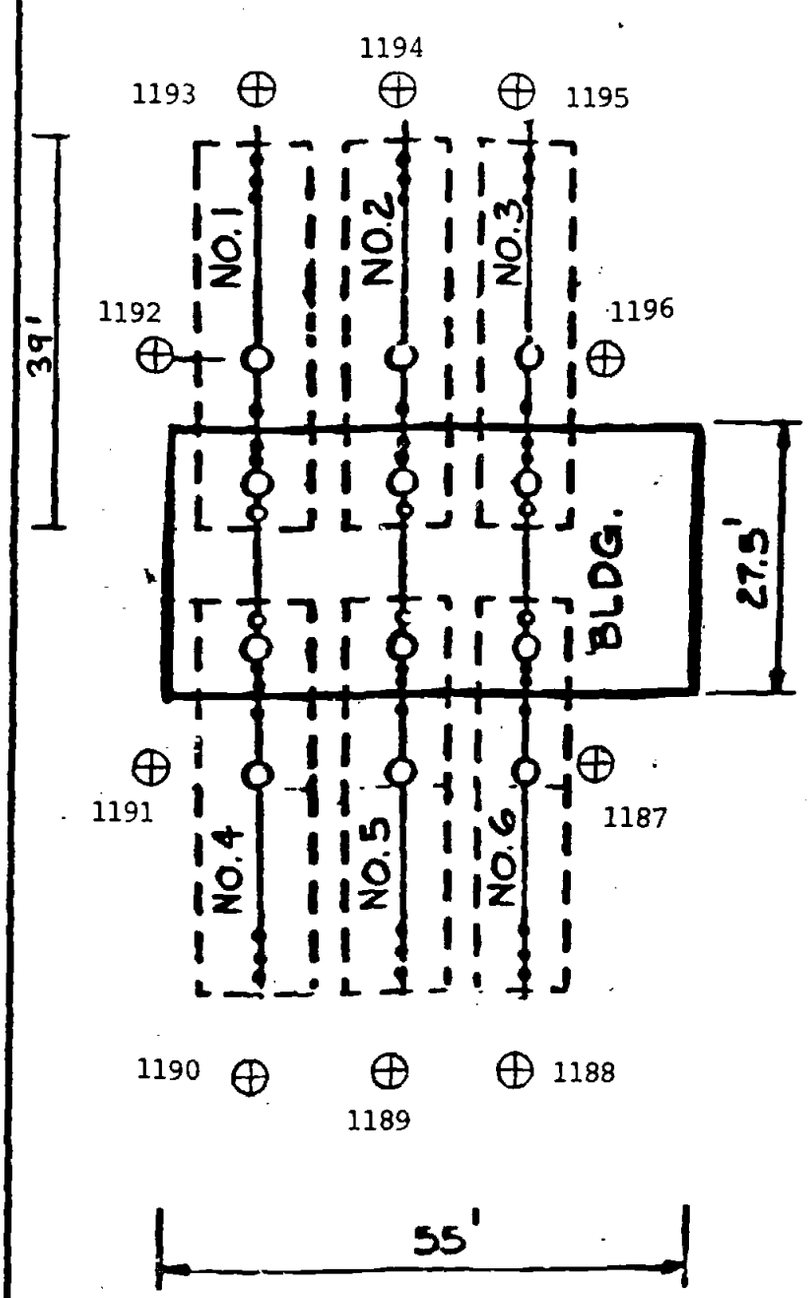
SCALE: 1" = 20'-0"

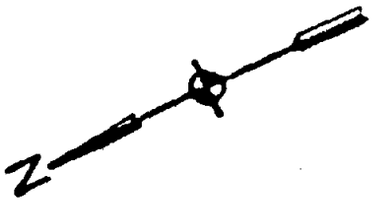
CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

PUMPHOUSE 4154

PLATE 6




TOTAL PETROLEUM HYDROCARBON (TPH) CONCENTRATIONS

| BORING NO. | DEPTH (ft) | TPH (ppm) |
|---|---|---|
| 1187 | 12 | 100 |
| 1187 | 20 | 130 |
| 1188 | 12 | 71 |
| 1188 | 20 | 307 |
| 1189 | 12 | 28 |
| 1189 | 16* | 39 |
| 1190 | 12 | 43 |
| 1190 | 15* | 34 |
| 1191 | 12 | 168 |
| 1191 | 15* | 70 |
| 1192 | 12 | 15537 |
| 1192 | 14* | 168 |
| 1193 | 12 | 293 |
| 1193 | 14* | 46 |
| 1194 | 12 | 173 |
| 1195 | 12 | 136 |
| 1195 | 13* | 139 |
| 1196 | 12 | 236 |
| 1196 | 16* | 235 |

* Enc rock

SCALE: 1" = 20'-0"

CARSWELL AFB, TX
HYDRANT FUELING SYSTEM
JET FUEL CONTAMINATION
ASSESSMENT

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

PUMPHOUSE 4170

PLATE 7

# APPENDIX I

# LOGS OF BORINGS

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1145 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 08 Aug. 88; COMPLETED 08 Aug. 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Steven [illegible] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 13.0<br>CLAY<br>0.0 to 2.0 - medium plasticity, stiff, calc., silty to sandy, slightly moist, red brown.<br>2.0 to 4.0 - medium to high plasticity, stiff, calc., silty, moist, dark brown.<br>4.0 to 13.0 - medium plasticity, stiff, calc., limey, sandy, moist, red brown.<br>13.0 to 20.0<br>SAND<br>13.0 to 18.0 - medium dense, fine to medium grained, clayey, silty, slightly moist, light red brown.<br>18.0 to 20.0 -dense, fine grained, dry, light brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1146

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1146 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 10 Aug 88; COMPLETED 10 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: Stephen [illegible] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 18.0<br><br>CLAY<br><br>0.0 to 3.2 - medium plasticity, stiff, calc., sandy, limey, dry, red brown.<br><br>3.2 to 9.5 - high plasticity, stiff, calc., silty, dry, black to dark brown.<br><br>9.5 to 18.0 - medium plasticity, stiff, calc., sandy, limey, slightly moist, brown.<br><br>18.0 to 20.0<br><br>SAND - dense, fine grained, dry, yellow brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO.

Hole No. 8A-1147

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1147 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 01 Aug 88; COMPLETED 01 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: [illegible] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 9.2<br>CLAY<br>0.0 to 8.0 - (fill) medium to high plasticity, stiff, calc., sandy to silty, fuel odor, moist, dark brown.<br>8.0 to 9.2 - (fill) medium to high plasticity, stiff, calc., sandy to silty, fuel odor, moist, olive to yellow brown.<br>9.2 to 10.2<br>SAND - (fill) dense, fine to medium grained, slightly moist, light brown.<br>10.2 to 13.0<br>CLAY - medium plasticity, stiff, calc., very sandy, slightly moist, red brown.<br>13.0 to 19.2<br>SAND - dense, fine grained, slightly moist, light brown.<br>19.2 to 20.0<br>SAND AND GRAVEL - dense, fine to coarse, with gravel to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1148

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT | Hydrant Fueling System |
| 2. LOCATION (Coordinates or Station) | Carswell AFB |
| 3. DRILLING AGENCY | Southwestern Engineering |
| 4. HOLE NO. (As shown on drawing title and file number) | 8A-1148 |
| 5. NAME OF DRILLER | Doug Shelby |
| 6. DIRECTION OF HOLE | ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. |
| 7. THICKNESS OF OVERBURDEN | 20.0 |
| 8. DEPTH DRILLED INTO ROCK | 0.0 |
| 9. TOTAL DEPTH OF HOLE | 20.0 |
| 10. SIZE AND TYPE OF BIT | * |
| 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) | |
| 12. MANUFACTURER'S DESIGNATION OF DRILL | CME |
| 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED 2 / UNDISTURBED 0 |
| 14. TOTAL NUMBER CORE BOXES | none |
| 15. ELEVATION GROUND WATER | ** |
| 16. DATE HOLE | STARTED 05 Aug. 88 / COMPLETED 05 Aug. 88 |
| 17. ELEVATION TOP OF HOLE | |
| 18. TOTAL CORE RECOVERY FOR BORING | % |
| 19. SIGNATURE OF INSPECTOR | Stephen Lane |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.0<br><br>CLAY (FILL) - medium to high plasticity, stiff, calc., silty, moist, dark brown.<br><br>3.0 to 4.1<br><br>SAND (FILL) - dense, fine to medium grained, slightly moist, light brown.<br><br>4.1 to 13.0<br><br>CLAY<br><br>4.1 to 5.6 - (fill) high plasticity, stiff, calc., moist, dark brown.<br><br>5.6 to 10.5 - (fill) high plasticity, stiff, calc., sandy, moist, olive to gray.<br><br>10.5 to 13.0 - (fill?) medium plasticity, stiff, calc., sandy, moist, red brown.<br><br>13.0 to 19.0<br><br>SAND - dense, fine to medium grained, slightly moist, light brown.<br><br>19.0 to 20.0<br><br>SAND AND GRAVEL - dense, fine to coarse, with gravels to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1149

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1149 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 05 Aug. 88; COMPLETED 05 Aug. 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR Stephen Lau |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 13.0<br><br>CLAY<br><br>0.0 to 5.5 - (fill) medium to high plasticity, medium stiff, calc., sandy, fuel odor, moist, brown to dark brown.<br><br>5.5 to 11.0 - (fill) high plasticity, stiff, calc., sandy to silty, fuel odor, moist, olive to gray.<br><br>11.0 to 13.0 - (fill?) medium plasticity, stiff, calc., very sandy, moist, red brown.<br><br>13.0 to 19.0<br><br>SAND - dense, fine to medium grained, slightly moist, fuel odor, brown.<br><br>19.0 to 20.0<br><br>SAND AND GRAVEL - dense, fine to coarse, with gravels to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1150

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1150 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0' | 16. DATE HOLE: STARTED 05 Aug 88; COMPLETED 05 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0' | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0' | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen L. Lang |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 2.5<br>CLAY (FILL) - medium to high plasticity, stiff, calc., silty, moist, dark brown.<br>2.5 to 3.6<br>SAND (FILL) - dense, fine - medium grained, slightly moist, light brown.<br>3.6 to 13.0<br>CLAY<br>3.6 to 5.6 - (fill) high plasticity, stiff, calc., moist, dark brown.<br>5.6 to 10.0 - (fill) high plasticity, stiff, calc., sandy, moist, olive to gray.<br>10.0 to 13.0 - (fill?) medium plasticity, stiff, calc., sandy to very sandy, moist, red brown.<br>13.0 to 19.0<br>SAND - dense, fine to medium grained, slightly moist, light brown.<br>19.0 to 20.0<br>SAND AND GRAVEL - dense, fine to coarse, with gravels to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO. 8A-1150

Hole No. 8A-1151

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1151 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 16. DATE HOLE: STARTED 01 Aug 88; COMPLETED 01 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: [illegible] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.7<br>CLAY (FILL) - medium plasticity, medium stiff, calc., silty, moist, brown to black.<br><br>3.7 to 14.0<br>SAND (FILL) - dense, fine to medium grained, clayey to 7.0', slightly moist, brown to light brown. Strong fuel odor.<br><br>14.0 to 15.5<br>CLAY (FILL) - medium plasticity, medium stiff, calc., silty, fuel odor, moist, brown to black.<br><br>15.5 to 19.0<br>SAND - dense, fine grained, fuel odor, slightly moist, light brown.<br><br>19.0 to 20.0<br>SAND AND GRAVEL - dense, fine to coarse, with gravel to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1152

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1152 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 29 July 88; COMPLETED 29 July 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 12.3<br>CLAY<br>0.0 to 3.0 - (fill) medium plasticity, medium stiff, calc., sandy, moist, red brown to black.<br>3.0 to 7.5 - (fill) low to medium plasticity, medium stiff, calc., very sandy, slightly moist, brown.<br>7.5 to 10.0 - (fill) high plasticity, stiff, calc., sandy, moist, olive to black.<br>10.0 to 12.3 - (fill) medium plasticity, medium stiff, calc., very sandy, moist, brown.<br>12.3 to 20.0<br>SAND<br>12.3 to 19.2 - dense, fine grained, clayey, slightly moist, light brown.<br>19.2 to 20.0 - dense, fine to coarse, with abundant gravels, slightly moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1153

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1153 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 29 July 88; COMPLETED 29 July 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 14.5<br><br>CLAY<br><br>0.0 to 1.5 - (fill) medium plasticity, medium stiff, calc., sandy, dry, brown.<br><br>1.5 to 3.2 - (fill) medium plasticity, stiff, calc., sandy, dry, red brown.<br><br>3.2 to 8.0 - (fill) medium to high plasticity, medium stiff, calc., sandy, moist, dark brown.<br><br>8.0 to 10.0 - (fill) high plasticity, stiff, calc., sandy, moist, olive to black.<br><br>10.0 to 14.5 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br><br>14.5 to 19.0<br><br>SAND - dense, fine to medium grained, dry, light brown.<br><br>19.0 to 20.0<br><br>SAND AND GRAVEL - dense, medium to coarse grained, with gravels to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1154 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 29 July 88; COMPLETED 29 July 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen Cox |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.0<br><br>CLAY (FILL) - medium to high plasticity, stiff, calc., silty to sandy, dry, dark brown.<br><br>1.0 to 2.0<br><br>SAND (FILL) - medium dense, with inter-mixed gravels and clay, dry, yellow brown.<br><br>2.0 to 14.6<br><br>CLAY<br><br>2.0 to 3.0 - (fill) medium plasticity, stiff, calc., sandy, dry, red brown.<br><br>3.0 to 8.0 - (fill) medium to high plasticity, medium stiff, calc., silty to sandy, moist, dark brown.<br><br>8.0 to 10.5 - (fill) high plasticity, stiff, calc., sandy, dry, red brown.<br><br>10.5 to 14.6 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br><br>14.6 to 18.5<br><br>SAND - dense, fine to medium grained, dry light brown.<br><br>18.5 to 20.0<br><br>SAND AND GRAVEL - dense, fine to coarse grained, with gravels to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1155 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 28 July 88; COMPLETED 28 July 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 13.0<br>CLAY<br>0.0 to 1.8 - (fill) medium to high plasticity, stiff, calc., silty to sandy, dry, dark brown.<br>1.8 to 3.1 - (fill) medium plasticity, stiff, calc., sandy, dry, red brown.<br>3.1 to 8.0 - (fill) high plasticity, stiff, silty, sandy, dry to slightly moist, dark brown.<br>8.0 to 10.1 - (fill) high plasticity, stiff, calc., sandy, slightly moist, olive to black.<br>10.1 to 13.0 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br>13.0 to 18.0<br>SAND - dense, fine to medium grained, dry, light brown.<br>18.0 to 20.0<br>SAND AND GRAVEL - dense, medium to coarse, with gravels to ½" diameter, slightly moist to dry, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1156

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1156 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 29 July 88; COMPLETED 29 July 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 13.0<br>CLAY<br>0.0 to 5.0 - (fill) medium plasticity, medium stiff, sandy, calc., fuel odor, moist, brown to black.<br>5.0 to 7.0 - (fill) medium to high plasticity, medium stiff, calc., very sandy, fuel odor, moist, brown to black.<br>7.0 to 8.0 - (fill) medium plasticity, stiff, calc., silty, dry, black.<br>8.0 to 10.0 - (fill) high plasticity, stiff, calc., sandy, fuel odor, moist, olive to black.<br>10.0 to 13.0 - medium plasticity, medium stiff, sandy, fuel odor, moist, brown.<br>13.0 to 18.5<br>SAND - dense, fine to medium grained, fuel odor, slightly moist, brown.<br>18.5 to 20.0<br>SAND AND GRAVEL - dense, fine to coarse, with gravel to ½" diameter, slightly moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1157

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1157 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 04 Aug 88; COMPLETED 04 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 18.5<br><br>CLAY<br><br>0.0 to 5.0 - (fill) medium plasticity, stiff, calc., sandy, moist, brown.<br><br>5.0 to 9.5 - (fill) medium plasticity, stiff, calc., sandy, moist, dark brown.<br><br>9.5 to 16.0 - medium to high plasticity, stiff, calc., scattered gravels, sandy, faint fuel odor, moist, brown.<br><br>16.0 to 18.5 - medium plasticity, stiff, calc., sandy, fuel odor, moist, brown.<br><br>18.5 to 20.0<br><br>SAND - dense, very fine to fine grained, silty, clayey, slightly moist, red brown to brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO.

Hole No. 8A-1158

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1158 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 05 Aug 88; COMPLETED 05 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 2.5<br><br>CLAY (FILL) - medium plasticity, stiff, calc., sandy, fuel odor, moist, brown.<br><br>2.5 to 3.0<br><br>SAND (FILL) - dense, fine to medium grained, fuel odor, slightly moist, light brown.<br><br>3.0 to 19.0<br><br>CLAY<br><br>3.0 to 10.0 - (fill) medium to high plasticity, stiff, calc., silty to sandy, fuel odor, moist, brown to dark brown.<br><br>10.0 to 19.0 - high plasticity, medium stiff, calc., with gravels, sandy, slightly moist, red brown.<br><br>19.0 to 20.0<br><br>SAND - medium dense, very fine grained, silty, clayey, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAY 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1159

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1159 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 05 Aug 88; COMPLETED 05 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 2.8<br><br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, moist, brown.<br><br>2.8 to 3.0<br><br>SAND (FILL) - dense, fine to medium grained, slightly moist, light brown.<br><br>3.0 to 18.0<br><br>CLAY<br><br>3.0 to 9.5 - (fill) medium to high plasticity, stiff, calc., sandy to silty, moist, brown to dark brown.<br><br>9.5 to 18.0 - medium to high plasticity, stiff, calc., sandy with scattered gravels, moist, red brown.<br><br>18.0 to 20.0<br><br>SAND - dense, very fine to fine grained, silty, clayey, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 8A-1160

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1160 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 05 Aug 88; COMPLETED 05 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 2.0<br><br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, fuel odor, moist, brown.<br><br>2.0 to 3.0<br><br>SAND (FILL) - dense, fine to medium grained, fuel odor, slightly moist, light brown.<br><br>3.0 to 18.0<br><br>CLAY<br><br>3.0 to 5.0 - (fill) high plasticity, stiff, calc., silty to sandy, moist, dark brown.<br><br>5.0 to 8.0 - (fill) medium to high plasticity, stiff, calc., sandy, moist, red brown.<br><br>8.0 to 14.5 - medium to high plasticity, stiff, calc., sandy, with gravels , moist, red brown.<br><br>14.5 to 18.0 - medium plasticity, medium stiff, calc., very sandy, moist, red brown.<br><br>18.0 to 20.0<br><br>SAND - dense, very fine to fine grained, silty, clayey, dry, light brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

Hole No. 8A-1161

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 3. DRILLING AGENCY Southwestern Engineering | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1161 | 14. TOTAL NUMBER CORE BOXES none |
| 5. NAME OF DRILLER Doug Shelby | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 05 Aug 88; COMPLETED 05 Aug 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 12.5<br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, fuel odor, moist, brown.<br>12.5 to 13.0<br>SAND (FILL) - dense, fine to medium grained, slightly moist, light brown.<br>13.0 to 18.0<br>CLAY - medium plasticity, medium stiff, calc., sandy, fuel odor, moist, brown to dark brown.<br>18.0 to 20.0<br>SAND - dense, very fine to fine grained, silty, slightly moist, light brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1162 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 04 Aug 88; COMPLETED 04 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen Lee |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 18.0<br><br>CLAY<br><br>0.0 to 11.5 - (fill) medium plasticity, medium stiff, calc., sandy, moist, red brown.<br><br>11.5 to 14.5 - (fill?) medium to high plasticity, stiff, calc., silty, moist, limey, brown.<br><br>14.5 to 18.0 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br><br>18.0 to 20.0<br><br>SAND - dense, fine grained, slightly moist, light brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT Hydrant Fueling System HOLE NO.

Hole No. 8A-1163

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1163 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 04 Aug 88; COMPLETED 04 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5<br><br>CLAY (FILL) - medium plasticity, medium stiff, calc., very sandy, moist, brown.<br><br>1.5 to 4.0<br><br>SAND (FILL) - medium dense, fine grained, slightly moist, light brown.<br><br>4.0 to 19.5<br><br>CLAY<br><br>4.0 to 10.0 - medium to high plasticity, stiff, calc., sandy, moist, brown to red brown. (fill)<br><br>10.0 to 13.0 - medium to high plasticity, stiff, calc., limey, sandy, moist, brown. (fill?)<br><br>13.0 to 19.5 - medium plasticity, stiff, calc., sandy, moist, brown.<br><br>19.5 to 20.0<br><br>SAND - dense, very fine to fine grained, silty, clayey, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
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|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1164 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES None |
| 6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 03 Aug. 88; COMPLETED 03 Aug. 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen L Lan |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 18.0<br><br>CLAY<br><br>0.0 to 3.5 - (fill) low to medium plasticity, medium stiff, calc., very sandy, slightly moist, brown to red brown.<br><br>3.5 to 8.0 - (fill) medium plasticity, medium stiff, calc., silty, moist, brown to black.<br><br>8.0 to 10.0 - (fill) high plasticity, stiff, calc., sandy, moist, red brown.<br><br>10.0 to 14.5 - medium plasticity, stiff, calc., sandy, limey, moist, brown.<br><br>14.5 to 18.0 - medium plasticity, stiff, calc., sandy, moist, brown.<br><br>18.0 to 20.0<br><br>SAND - dense, very fine to fine grained, silty, slightly moist, light brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT Hydrant Fueling System HOLE NO.

Hole No. 8A-1165

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1165 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 16. DATE HOLE: STARTED 03 Aug. 88; COMPLETED 03 Aug. 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: Stephen Lee |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.0<br><br>CLAY (FILL)<br><br>0.0 to 2.5 - medium plasticity, stiff, calc., sandy, moist, brown.<br><br>2.5 to 3.0 - medium plasticity, medium stiff, calc., sandy, moist, red brown.<br><br>3.0 to 4.4<br><br>SAND (FILL) - medium dense, fine to medium grained,, slightly moist, light brown.<br><br>4.4 to 18.0<br><br>CLAY<br><br>4.4 to 6.4 - (fill) medium to high plasticity, stiff, calc., silty, moist, dark brown.<br><br>6.4 to 13.0 - (fill) medium to high plasticity, stiff, calc., sandy, moist, red brown.<br><br>13.0 to 18.0 - low to medium plasticity, medium stiff, calc., very silty to sandy, slightly moist, brown to gray.<br><br>18.0 to 20.0<br><br>SAND - dense, very fine to fine, silty, slightly moist, light brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO. 8A-1165

Hole No. 8A-1166

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: x |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1166 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 16. DATE HOLE: STARTED 04 Aug. 88; COMPLETED 04 Aug. 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 18.0<br>CLAY<br>0.0 to 3.5 - (fill) medium plasticity, medium stiff, calc., sandy, fuel odor, moist, brown to black.<br>3.5 to 5.5 - high plasticity, stiff, calc., silty, moist, dark brown. (fill)<br>5.5 to 10.0 - medium to high plasticity, stiff, calc., sandy, moist, brown to red brown. (fill)<br>10.0 to 18.0 - medium to high plasticity, stiff, calc., scattered gravels, sandy, moist, brown.<br>18.0 to 20.0<br>SAND - dense, very fine to fine grained, silty, clayey, slightly moist, light brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
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|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1167 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 09 Aug 88; COMPLETED 09 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.0<br><br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, slightly moist, brown to gray.<br><br>3.0 to 3.9<br><br>SAND (FILL) - medium dense, fine to medium grained, fuel odor, slightly moist, light brown.<br><br>3.9 to 11.5<br><br>CLAY (FILL)<br><br>3.9 to 8.0 - medium to high plasticity, stiff, calc., silty, moist, black.<br><br>8.0 to 11.5 - medium plasticity, stiff, calc., sandy, moist, gray.<br><br>11.5 to 12.0<br><br>SAND (FILL) - medium dense, fine to medium grained, moist, gray.<br><br>12.0 to 19.4<br><br>CLAY<br><br>12.0 to 14.6 - (fill) medium plasticity, stiff, calc., sandy, limey, moist, olive to gray.<br><br>14.6 to 19.4 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br><br>19.4 to 20.0<br><br>SAND - medium dense, fine to medium grained, clayey, slightly moist, brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
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|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 3. DRILLING AGENCY Southwestern Engineering | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1168 | 14. TOTAL NUMBER CORE BOXES none |
| 5. NAME OF DRILLER Doug Shelby | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 09 Aug 88; COMPLETED 09 Aug 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 20.0<br>CLAY<br>0.0 to 3.0 - (fill) medium plasticity, medium stiff, calc., sandy, slightly moist, brown.<br>3.0 to 8.0 - (fill) medium to high plasticity, stiff, calc., silty to sandy, moist, black to dark gray.<br>8.0 to 13.0 - (fill) medium plasticity, medium stiff, calc., sandy to very sandy, with some gravel, moist, gray to green.<br>13.0 to 18.0 - medium plasticity, stiff, calc., sandy, some gravel, moist, brown.<br>18.0 to 20.0 - low to medium plasticity, medium stiff, calc., very sandy, moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1169

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1169 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 10 Aug 88; COMPLETED 10 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 20.0<br>CLAY<br>0.0 to 3.0 - (fill) medium plasticity, medium stiff, calc., sandy, slightly moist, brown to black.<br>3.0 to 8.5 - (fill) high plasticity, stiff, calc., silty to sandy, moist, black to dark gray.<br>8.5 to 11.7 - (fill) medium plasticity, medium stiff, calc., very sandy, moist, gray.<br>11.7 to 13.4 - (fill?) medium to high plasticity, stiff, calc., sandy, moist, greenish gray.<br>13.4 to 18.0 - medium plasticity, medium stiff, calc., sandy, moist, brown.<br>18.0 to 20.0 - low plasticity, medium stiff, calc., very sandy, sand seams present, moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Hole No. 8A-1170

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT | Hydrant Fueling System |
| 2. LOCATION (Coordinates or Station) | Carswell AFB |
| 3. DRILLING AGENCY | Southwestern Engineering |
| 4. HOLE NO. (As shown on drawing title and file number) | 8A-1170 |
| 5. NAME OF DRILLER | Doug Shelby |
| 6. DIRECTION OF HOLE | ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. |
| 7. THICKNESS OF OVERBURDEN | 20.0 |
| 8. DEPTH DRILLED INTO ROCK | 0.0 |
| 9. TOTAL DEPTH OF HOLE | 20.0 |
| 10. SIZE AND TYPE OF BIT | * |
| 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) | |
| 12. MANUFACTURER'S DESIGNATION OF DRILL | CME |
| 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED 2 / UNDISTURBED 0 |
| 14. TOTAL NUMBER CORE BOXES | none |
| 15. ELEVATION GROUND WATER | ** |
| 16. DATE HOLE | STARTED 10 Aug 88 / COMPLETED 10 Aug 88 |
| 17. ELEVATION TOP OF HOLE | |
| 18. TOTAL CORE RECOVERY FOR BORING | % |
| 19. SIGNATURE OF INSPECTOR | [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 20.0<br>CLAY<br>0.0 to 3.0 - (fill) medium to high plasticity, stiff, calc., sandy, slighlty moist, brown.<br>3.0 to 8.0 - (fill) high plasticity, stiff, calc., silty, moist, black.<br>8.0 to 11.5 - (fill) medium plasticity, stiff, calc., very sandy, moist, gray.<br>11.5 to 13.0 - (fill) medium plasticity, stiff, calc., sandy, moist, gray to brown.<br>13.0 to 18.0 - medium plasticity, medium stiff, calc., sandy, some gravel, slightly moist, red brown.<br>18.0 to 20.0 - low to medium plasticity, medium stiff, calc., very sandy, slightly moist, red brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 8A-1171

| DRILLING LOG | DIVISION: SWD | INSTALLATION: Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1171 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 16. DATE HOLE: STARTED 10 Aug 88; COMPLETED 10 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.9<br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, slightly moist, brown to black. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |
| | | | 3.9 to 4.2<br>SAND (FILL) - medium dense, fine to medium grained, slightly moist, light brown. | | | |
| | | | 4.2 to 8.0<br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, slightly moist, brown to black. | | | |
| | | | 8.0 to 17.4<br>SAND - dense, fine to medium grained, fuel odor, slightly moist, light brown to black. | | | |
| | | | 17.4 to 20.0<br>CLAY - medium to high plasticity, stiff, calc., very sandy to sandy, moist, brown. | | | |

Hole No. 8A-1172

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1172 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 09 Aug 88; COMPLETED 09 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen Lowe |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 7.5<br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, fuel odor, moist, brown to gray.<br>7.5 to 16.0<br>SAND (FILL?) - dense, fine to medium grained, fuel odor, slightly moist to dry, gray to brown.<br>16.0 to 20.0<br>CLAY - medium plasticity, stiff, calc., very sandy to sandy, moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1173

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL Cme |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1173 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 09 Aug 88; COMPLETED 09 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR [illegible] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 20.0<br><br>CLAY<br><br>0.0 to 3.2 - (fill) medium plasticity, medium stiff, calc., sandy, slightly moist, red brown.<br><br>3.2 to 8.0 - (fill) medium to high plasticity, stiff, calc., silty, moist, black to dark gray.<br><br>8.0 to 12.0 (fill) medium plasticity, stiff, calc., sandy to very sandy, slightly moist, gray.<br><br>12.0 to 13.0 - (fill) medium plasticity, stiff, calc., sandy, moist, olive.<br><br>13.0 to 20.0 - medium plasticity, medium stiff, calc., sandy, moist, red brown to brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT | Hydrant Fueling System |
| 2. LOCATION (Coordinates or Station) | Carswell AFB |
| 3. DRILLING AGENCY | Southwestern Engineering |
| 4. HOLE NO. (As shown on drawing title and file number) | 8A-1174 |
| 5. NAME OF DRILLER | Doug Shelby |
| 6. DIRECTION OF HOLE | ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. |
| 7. THICKNESS OF OVERBURDEN | 20.0 |
| 8. DEPTH DRILLED INTO ROCK | 0.0 |
| 9. TOTAL DEPTH OF HOLE | 20.0 |
| 10. SIZE AND TYPE OF BIT | * |
| 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) | |
| 12. MANUFACTURER'S DESIGNATION OF DRILL | CME |
| 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED 2 / UNDISTURBED 0 |
| 14. TOTAL NUMBER CORE BOXES | none |
| 15. ELEVATION GROUND WATER | ** |
| 16. DATE HOLE | STARTED 08 Aug 88 / COMPLETED 08 Aug 88 |
| 17. ELEVATION TOP OF HOLE | |
| 18. TOTAL CORE RECOVERY FOR BORING | % |
| 19. SIGNATURE OF INSPECTOR | [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 20.0<br><br>CLAY<br><br>0.0 to 3.0 - (fill) medium to high plasticity, stiff, calc., sandy, slightly moist, red brwon.<br><br>3.0 to 8.0 - (fill) medium to high plasticity, stiff, calc., silty, moist, black to dark gray.<br><br>8.0 to 12.0 - (fill) medium plasticity, stiff, calc., sandy, slightly moist, gray.<br><br>12.0 to 19.2 - medium to high plasticity, stiff, calc., silty to sandy, slightly moist, olive gray to red brown.<br><br>19.2 to 20.0 - low plasticity, medium stiff, calc., very sandy, moist, olive to gray. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE

PROJECT Hydrant Fueling System | HOLE NO.

Hole No. 8A-1175

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1175 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 08 Aug 88; COMPLETED 08 Aug 88 |
| 7. THICKNESS OF OVERBURDEN 20.0 | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 10.0<br>CLAY<br>0.0 to 2.5 - (fill) medium plasticity, medium stiff, calc., sandy, slightly moist, brown.<br>2.5 to 10.0 - (fill) medium to high plasticity, stiff, calc., silty, moist, black to dark gray.<br>10.0 to 12.5<br>SAND (FILL) - dense, fine to medium grained, clayey, slightly moist, gray.<br>12.5 to 20.0<br>CLAY<br>12.5 to 14.0 - medium to high plasticity, stiff, silty to sandy with some gravel, slightly moist, olive to gray.<br>14.0 to 19.2 - medium plasticity, stiff, calc., sandy, slightly moist, red brown.<br>19.2 to 20.0 - low plasticity, medium stiff, calc., very sandy, moist, red brown to olive. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

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| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1176 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| | 16. DATE HOLE: STARTED 09 Aug 88; COMPLETED 09 Aug 88 |
| 7. THICKNESS OF OVERBURDEN: 20.0 | 17. ELEVATION TOP OF HOLE: |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| 9. TOTAL DEPTH OF HOLE: 20.0 | 19. SIGNATURE OF INSPECTOR: Stephen Lee |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 3.0<br>CLAY - (fill) medium plasticity, medium stiff, calc., sandy, slightly moist, gray to brown.<br>3.0 to 16.0<br>SAND - (fill) dense, fine to medium grained, fuel odor, slightly moist, brown.<br>16.0 to 20.0<br>CLAY - medium plasticity, medium stiff, calc., sandy, moist, brown. | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 ( F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1177 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/12/88; COMPLETED 8/12/88 |
| 7. THICKNESS OF OVERBURDEN 13.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK 7.0 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 0.1<br>ASPHALT, good condition<br><br>0.1 to 1.0±<br>GRAVEL-FILL. fine to coarse grained, angular, loose, moist, sandy throughout. clayey, tan to light brown.<br><br>1.0 to 13.5±<br>CLAY-FILL, low to medium plasticity, soft to stiff, moist to wet along basal section calcareous with $CaCO_3$ nodules throughout, tan to light brown. dark gray hydrocarbon staining @ 6.5-7.5'<br><br>13.5 to 20.0<br>CLAY-SHALE, tan to rust to olive gray, badly weathered throughout. no visible hydrocarbon staining.<br><br>T.D.-20.0' | | | 1) no free water to depth.<br>-24 hour water check dry hole.<br><br>2) JARS<br>A) 12.0'<br>B) 20.0'<br><br>3) DRILLING<br>0.0 - 20.0, 8" hollow stem auger.<br>3" i.d. shelby tube advanced to depth. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Hole No. 8A-1178

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1178 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 8 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/12/88; COMPLETED 8/12/88 |
| 7. THICKNESS OF OVERBURDEN 13.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK 7.0 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR M R Hudette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, very sandy throughout, clayey, tan to light brown. | | | 1) free water encountered at 18' below grade. - 3 days later water level taped at 15.5' below grade |
| | | | 1.5 to 13.0± CLAY-FILL. low to medium plasticity. soft to stiff, moist, sandy. tan to light brown. dark gray to brown hydrocarbon stains noted to 8.0'± scattered staining noted below 8.0' to depth. | | | 2) JARS A) 12.0' B) 20.0' |
| | | | 13.0 to 20.0 CLAY-SHALE, tan to rust to olive gray, badly weathered throughout, scattered hydrocarbon stains noted throughout. | | | 3) DRILLING 0.0 - 20.0, 8" hollow stem auger advanced to depth. 3" i.d. shelby tube advanced to depth. |
| | | | T.D.-20.0' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1179

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1179 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 1; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/15/88; COMPLETED 8/15/88 |
| 7. THICKNESS OF OVERBURDEN -- | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 4.5 | 19. SIGNATURE OF INSPECTOR |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, sandy, clayey, tan to light brown. | | | 1) no free water to depth. |
| | | | 1.5 to 4.5± CLAY-FILL, low to medium plasticity, soft to stiff, moist, calcareous with $CaCO_3$ nodules throughout, gravelly, tan to light brown. dark gray to brown hydrocarbon stains noted throughout. | | | 2) JARS A) 4.5' B) 4.0' |
| | | | T.D.-4.5' | | | 3) DRILLING 0.0 - 4.5, 8" hollow stem auger refusal at top of buried utility. Drill rig offset 2.5' due west to 8A-1179(A). |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8"HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1179(A) | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/12/88; COMPLETED 8/12/88 |
| 7. THICKNESS OF OVERBURDEN 13.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK 7.0 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR K. R. Hardette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5±= GRAVEL-FILL, fine to coarse grained, angular loose, moist, sandy, clayey, tan to light brown. | | | 1) no free water encountered to depth. - 24 hours later bridged in @ 10'-dry. |
| | | | 1.5 to 3.0± CLAY-FILL, low to medium plasticity, soft to stiff, moist, calcareous, with $CaCO_3$ nodules scattered throughout, slightly gravelly, tan to light brown. | | | 2) JARS A) 12.0' B) 20.0' |
| | | | 3.0 to 4.0± SAND-FILL, fine to coarse grained, loose, moist, slightly clayey, calcareous, tan to light brown. No hydrocarbon staining. Strong hydrocarbon odors noted. | | | 3) DRILLING 0.0 - 20.0, 8" hollow stem auger. 3"i.d. shelby tube advanced to depth |
| | | | 4.0 to 13.0± CLAY-FILL, low to medium plasticity, soft to stiff moist, tan to light brown. Hydrocarbon staining @ 12.0±13.0'. hydrocarbon odors noted. | | | |
| | | | 13.0 to 20.0 CLAY-SHALE, tan to rust to olive gray, badly weathered throughout, scattered hydrocarbon staining noted in section. | | | |
| | | | T.D.-20.0' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL. A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES. INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1180 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/15/88; COMPLETED 8/15/88 |
| 7. THICKNESS OF OVERBURDEN 13.7 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK 6.3 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR R R Hudetz |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.2± GRAVEL-FILL. fine to coarse grained, angular. loose. moist, sandy. clayev, tan to light brown. | | | 1) free water encountered @ 16.0' below grade. -24 hours later water level taped at 14.0' below grade. |
| | | | 1.2 to 3.0± CLAY-FILL, low to medium plasticity, soft to stiff. moist, slightly gravelly, calcareous with $CaCO_3$ nodules throughout, light brown. scattered dark gray hydrocarbon stains noted throughout. | | | 2) JARS A) 12.0' B) 20.0' |
| | | | 3.0 to 5.5± SAND-FILL, fine to coarse grained, loose, moist, clayey, calcareous. tan to light gray. | | | 3) DRILLING 0.0 - 20.0, 8" hollow stem auger. 3" i.d. shelby tube advanced to depth. |
| | | | 5.5 to 13.7± CLAY-FILL, low to medium plasticity, soft to stiff, moist, calcareous with $CaCO_3$ nodules throughout, light brown to tan. scattered hydrocarbon staining noted in section. | | | |
| | | | 13.7 to 20.0 CLAY-SHALE, tan to rust to olive gray. badly weathered throughout, scattered thin, badly weathered limestone seams noted to depth; scattered dark gray to brown hydrocarbon staining noted along fracture planes. | | | |
| | | | T.D.-20.0' | | | |

Hole No. 8A-1181

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1181 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/15/88; COMPLETED 8/15/88 |
| 7. THICKNESS OF OVERBURDEN 12.9 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK 7.1 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR R.K. Hudette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5± GRAVEL-FILL. fine to coarse grained, angular, loose, moist, clayey, sandy. light brown to tan. | | | 1) no free water encountered to depth. -24 hours later bridged in @ 12.5'-dry. |
| | | | 1.5 to 7.2± CLAY-FILL, low to medium plasticity, soft to stiff, moist, calcareous, with $CaCO_3$ nodules throughout, tan to light brown. hydrocarbon staining noted @ 4.5' to depth. Hydrocarbon odors noted. | | | 2) JARS<br>A) 12.0'<br>B) 20.0' |
| | | | 7.2 to 10.4± SAND-FILL. fine to coarse grained, loose, moist, very clayey throughout, calcareous, gravelly throughout, tan to light brown. | | | 3) DRILLING<br>0.0 - 20.0, 8" hollow stem auger.<br>3" i.d. shelby tube advanced to depth. |
| | | | 10.4 to 12.5± CLAY-FILL, low to medium plasticity, soft to stiff, wet, hydrocarbon staining noted. | | | |
| | | | 12.5 to 20.0 CLAY-SHALE. tan to rust to olive gray, badly weathered; scattered thin, badly weathered limestone seams noted to depth; hydrocarbon staining noted throughout; very strong staining 13.5'-16.0' | | | |
| | | | T.D -20.0' | | | |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT Hydrant Fueling System | 10. SIZE AND TYPE OF BIT * |
| 2. LOCATION (Coordinates or Station) Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL CME |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1182 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER Doug Shelby | 14. TOTAL NUMBER CORE BOXES none |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 20.0 | 16. DATE HOLE: STARTED 11 Aug 88; COMPLETED 11 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK 0.0 | 17. ELEVATION TOP OF HOLE |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING % |
| | 19. SIGNATURE OF INSPECTOR Stephen Cox |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 2.0<br>CLAY (FILL) - medium plasticity, medium stiff, calc., sandy, moist, brown.<br>2.0 to 3.0<br>SAND (FILL) - medium dense, fine to medium grained, moist, yellow brown.<br>3.0 to 8.0<br>CLAY (FILL) - medium to high plasticity, stiff, calc., sandy, moist, brown to black.<br>8.0 to 12.0<br>SAND (FILL) - dense, fine to medium grained, fuel odor, wet, brown to black.<br>12.0 to 20.0<br>CLAY<br>12.0 to 13.0 - medium plasticity, medium stiff, fuel odor, silty, wet, yellow brown to black.<br>13.0 to 18.0 - medium plasticity, stiff, sandy, fuel odor, moist, brown to black.<br>18.0 to 20.0 - medium plasticity, medium stiff, very sandy to gravelly, fuel odor, wet. brown to black. | | | ** 24 Hr Water Level 7.3'<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT Hydrant Fueling System HOLE NO.

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1183 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 13.0 | 16. DATE HOLE: STARTED 11 Aug 88; COMPLETED 11 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 13.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 13.0<br><br>CLAY<br><br>0.0 to 2.6 - medium to high plasticity, medium stiff to stiff, calc., sandy, fuel odor, slightly moist, brown.<br><br>2.6 to 5.5 - high plasticity, stiff, calc., silty, slightly moist, black.<br><br>5.5 to 8.0 - medium to high plasticity, stiff, calc., sandy, limey, moist, yellow brown.<br><br>8.0 to 13.0 - low to medium plasticity, medium stiff, weathered, limey, sandy, calc., slightly moist, off white to yellow brown.<br><br>13.0 - CLAY SHALE | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger.<br><br>## Sample was taken at 12.0 only. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1184

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1184 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 5.0 | 16. DATE HOLE: STARTED 11 Aug. 88; COMPLETED 11 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK: 1.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 6.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: [signature] |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 6.5<br><br>CLAY<br><br>0.0 to 1.2 - medium plasticity, medium stiff, calc., limey, sandy, slightly moist, brown.<br><br>1.2 to 5.0 - high plasticity, stiff, calc., silty, moist, black to dark brown.<br><br>5.0 to 6.5 - weathered shale, medium plasticity, medium stiff, calc., sandy, slightly moist, off white to light brown. | | | ** Dry Hole<br><br>Samples Taken<br><br>12.0 feet (1) jar<br>20.0 feet (1) jar<br><br>Drilling Method<br><br>0.0 to 20.0 Continuous Flight Auger.<br><br>## Sample was taken at 6.0' on top of refusal. |

| DRILLING LOG | DIVISION SWD | INSTALLATION Fort Worth | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT: Hydrant Fueling System | 10. SIZE AND TYPE OF BIT: * |
| 2. LOCATION (Coordinates or Station): Carswell AFB | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL): |
| 3. DRILLING AGENCY: Southwestern Engineering | 12. MANUFACTURER'S DESIGNATION OF DRILL: CME |
| 4. HOLE NO. (As shown on drawing title and file number): 8A-1185 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER: Doug Shelby | 14. TOTAL NUMBER CORE BOXES: none |
| 6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER: ** |
| 7. THICKNESS OF OVERBURDEN: 6.0 | 16. DATE HOLE: STARTED 11 Aug 88; COMPLETED 11 Aug 88 |
| 8. DEPTH DRILLED INTO ROCK: 0.0 | 17. ELEVATION TOP OF HOLE: |
| 9. TOTAL DEPTH OF HOLE: 6.0 | 18. TOTAL CORE RECOVERY FOR BORING: % |
| | 19. SIGNATURE OF INSPECTOR: Stephen Lim |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 6.0<br>CLAY<br>0.0 to 5.0 - medium plasticity, stiff, calc., sandy, limey, fuel odor, brown.<br>5.0 to 6.0 - low plasticity, medium stiff, weathered, limey, slightly moist, olive to off-white.<br>6.0 - LIMESTONE | | | ** Dry Hole<br>Samples Taken<br>12.0 feet (1) jar<br>20.0 feet (1) jar<br>Drilling Method<br>0.0 to 20.0 Continuous Flight Auger.<br>## Sample was taken at 6.0' on top of rock. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1186

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT CARSWELL. A.F.B. | 10. SIZE AND TYPE OF BIT 8"HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F-700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1186 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 13.0 | 16. DATE HOLE: STARTED 8/11/88; COMPLETED 8/11/88 |
| 8. DEPTH DRILLED INTO ROCK 7.0 | 17. ELEVATION TOP OF HOLE -- |
| 9. TOTAL DEPTH OF HOLE 20.0 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| | 19. SIGNATURE OF INSPECTOR K. R. Hudette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 0.1<br>ASPHALT. good condition<br>0.1 to 1.5±<br>GRAVEL-FILL. fine to coarse grained, angular, loose, dry, clayey. very sandy throughout. tan to light brown.<br>1.5 to 13.0±<br>CLAY-FILL, low to medium plasticity, soft to stiff, moist, slightly sandy, tan to light brown. dark gray to brown hydrocarbon stains noted throughout entire section.<br>13.0 to 20.0<br>CLAY-SHALE, tan to rust to olive gray, badly weathered throughout, hydrocarbon staining noted throughout entire section.<br>T.D.-20.0' | | | 1) no free water encountered to depth. - 24 hours later boring taped to depth-dry.<br>2) JARS<br>A) 12.0'<br>B) 20.0'<br>3) DRILLING<br>0.0 - 20.0, 8"hollow stem auger.<br>3" i.d. shelby tube advanced to depth. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/17/88; COMPLETED 8/17/88 |
| 7. THICKNESS OF OVERBURDEN -- | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 20.0 | 19. SIGNATURE OF INSPECTOR R. R. Hardette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.0± <br> GRAVEL-FILL, fine to coarse grained, angular loose, moist., very sandy throughout. clayey, tan to light brown. | | | 1) Free water taped at 11'± below grade. <br> - 24 hours later water level taped at 9.2' below grade. |
| | | | 1.0 to 13.0± <br> CLAY-FILL, low to medium plasticity. soft to stiff, moist to wet along basal section, calcareous with $CaCO_3$ nodules throughout, slightly gravelly, tan to light brown. No hydrocarbon stains. | | | 2) JARS <br> A) 12.0' <br> B) 20.0' |
| | | | 13.0 to 16.5± <br> SAND, fine to coarse grained. loose, wet, very clayey throughout, calcareous, tan to light brown. No trace hydrocarbons noted. | | | 3) DRILLING <br> 0.0– 20.0, 8" hollow stem auger. <br> 3" i.d. shelby tube advanced to depth. |
| | | | 16.5 to 20.0 <br> CLAY, (borderline sand) low plasticity. soft, moist, very sandy throughout, tan to light brown. | | | |
| | | | T.D.-20.0' | | | |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET OF SHEETS |
|---|---|---|---|

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|---|---|
| 1. PROJECT CARSWELL. A.F.B. | 10. SIZE AND TYPE OF BIT 8"HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1188 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/18/88; COMPLETED 8/18/88 |
| 7. THICKNESS OF OVERBURDEN 16.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE -- | 19. SIGNATURE OF INSPECTOR R.R.Audette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 0.8± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, clayey, very sandy. tan to light brown. | | | 1) Free water at 12'± below grade. -3 hours later water level taped at 9.7' |
| | | | 0.8 to 3.0± CLAY-FILL, low plasticity, soft. moist. calcareous with $CaCO_3$ nodules throughout, tan to light brown. No hydrocarbon staining. | | | 2) JARS A) 12.0' B) 20.0' |
| | | | 3.0 to 4.8± SAND, fine to coarse grained, loose, moist, clayey. tan to rust. hydrocarbon stains noted. | | | 3) DRILLING 0.0 - 16.0' hollow stem auger refusal at interpreted top of limestone primary. 3" i.d. shelby tube advanced to depth. |
| | | | 4.8 to 9.0± CLAY, low to medium plasticity, soft to stiff, moist, calcareous with $CaCO_3$ nodules throughout. tan to light brown. Trace odor hydrocarbons. | | | |
| | | | 9.0 to 11.5± SAND, fine to coarse grained, loose. wet, tan to light brown. Trace odor hydrocarbons. | | | |
| | | | 11.5 to 16.0 SAND. coarse grained, dense. wet, gravelly with pea size gravels noted. tan to light brown. | | | |
| | | | T.D.-16.0' | | | |

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55(F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1189 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/18/88; COMPLETED 8/18/88 |
| 7. THICKNESS OF OVERBURDEN -- | 17. ELEVATION TOP OF HOLE |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 16.5 | 19. SIGNATURE OF INSPECTOR W.R. Audette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.2± GRAVEL-FILL, fine to coarse grained, angular loose, moist, sandy, clayey, tan to light brown. | | | 1) Free water @ 12'± below grade. 3 hours later water level taped at 9.5' below grade. Boring subsequently collapsed at 9.2' |
| | | | 1.2 to 2.7± CLAY-FILL, low plasticity. soft, moist, sandy, throughout, calcareous with $CaCO_3$ nodules throughout, tan to light brown. No trace hydrocarbons. | | | 2) JARS A) 12.0' B) 16.0' |
| | | | 2.7 to 5.2± SAND, fine to coarse grained, loose, moist, clayey, tan to rust. No trace hydrocarbons. | | | 3) DRILLING 0.0 - 16.0 8" hollow stem auger to top of interpreted limestone refusal. 3" i.d. shelby tube advanced to depth. |
| | | | 5.2 to 8.5± CLAY, low to medium plasticity, soft to stiff, moist. sandy, calcareous, tan to light brown to light gray. | | | |
| | | | 8.5 to 13.0± SAND, fine to coarse grained, loose, moist to wet along basal section, clayey. tan to rust to light brown. | | | |
| | | | 13.0 to 16.5 SAND. coarse grained, dense. wet, gravelly with pea size gravels throughout, tan to light brown. No trace hydrocarbons. | | | |
| | | | T.D.-16.5' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No.

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1190 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER -- |
| | 16. DATE HOLE: STARTED 8/18/88; COMPLETED 8/18/88 |
| 7. THICKNESS OF OVERBURDEN 15.5 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 15.5 | 19. SIGNATURE OF INSPECTOR R. R. Hudetta |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.7± GRAVEL-FILL. fine to coarse grained, angular, loose, moist, very sandy throughout, clayey, tan to light brown. | | | 1) Free water at 12.5± below grade. -immediately after drilling water level taped at 9.5' below grade. Hole collapsed at 9.0' |
| | | | 1.7 to 3.5± CLAY-FILL. low plasticity, soft, moist, sandy throughout, calcareous with $CaCO_3$ nodules throughout. tan to light brown. No visible trace hydrocarbons. | | | 2) JARS A) 12.0' B) 15.5' |
| | | | 3.5 to 6.5± SAND, fine to coarse grained, loose, moist, very clayey, tan to rust. No visible trace hydrocarbons. | | | 3) DRILLING 0.0 - 15.5, Hollow stem auger refusal at top interpreted top of limestone primary 3" i.d shelby tube advanced to depth. |
| | | | 6.5 to 8.8± CLAY, low to medium plasticity, soft to stiff, moist, tan to light brown. No trace hydrocarbons. | | | |
| | | | 8.8 to 15.5 SAND. coarse grained, dense, moist to wet along basal section. gravelly with pea size gravels throughout, tan to light brown. No trace hydrocarbons. | | | |
| | | | T.D.-15.5' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1191

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A -1191 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| 7. THICKNESS OF OVERBURDEN 15.0 | 16. DATE HOLE: STARTED 8/17/88; COMPLETED 8/17/88 |
| 8. DEPTH DRILLED INTO ROCK -- | 17. ELEVATION TOP OF HOLE -- |
| 9. TOTAL DEPTH OF HOLE 15.0 | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| | 19. SIGNATURE OF INSPECTOR R. K. Hudetz |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.2± <br> GRAVEL-FILL. fine to coarse grained, angular, loose, moist, sandy, clayey, tan to light brown. | | | 1) Free water at 10.5' below grade. -24 hours later water level taped at 8.2' below grade. |
| | | | 1.2 to 11.5± <br> CLAY-FILL, low to medium plasticity, soft to stiff, moist to wet along basal zone, calcareous with $CaCO_3$ nodules throughout, tan to light brown. prominent hydrocarbon staining 6.5'-8.0'; hydrocarbon odors 8.0' 11.5' | | | 2) JARS <br> A) 12.0' <br> B) 15.0' <br> 3) DRILLING <br> 0.0 - 15.0, 8" hollow stem auger. <br> 3" i.d. shelby tube advanced to depth. |
| | | | 11.5 to 12.5± <br> SAND. fine to coarse grained, loose, moist, wet, light brown. hydrocarbon stains throughout. | | | |
| | | | 12.5 to 15.0 <br> GRAVEL, fine to coarse grained, angular, dense, wet, very sandy throughout, light brown, dark gray to brown hydrocarbon staining staining throughout. | | | |
| | | | T.D.-15.0' | | | |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO.

Hole No. 8A-1192

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SY STEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1192 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/17/88; COMPLETED 8/17/88 |
| 7. THICKNESS OF OVERBURDEN 14.5 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 14.5 | 19. SIGNATURE OF INSPECTOR R. R. Hodette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.2± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, clayey, sandy, light brown. | | | 1) Free water at 10'± below grade. - 24 hours later water level taped at 8.6' below grade. |
| | | | 1.2 to 11.0± CLAY-FILL, low to medium plasticity, soft to stiff, moist to wet along basal section, calcareous with $CaCO_3$ nodules throughout, tan to light brown. Dark gray to brown hydrocarbon stains throughout. | | | 2) JARS A) 12.0' B) 14.5' |
| | | | 11.0 to 14.5 SAND, fine to coarse grained, loose, wet, tan to rust. Strong hydrocarbon staining noted throughout. | | | 3) DRILLING 0.0 - 14.5, 8" hollow stem auger refusal at top of interpreted limestone. 3" i.d. shelby tube advanced to depth. |
| | | | T.D.-14.5' | | | |

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO.

Hole No. 8A-1193

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1193 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/17/88; COMPLETED 8/17/88 |
| 7. THICKNESS OF OVERBURDEN 14.4 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 14.4 | 19. SIGNATURE OF INSPECTOR R.R. Hendrickson |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 0.9± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, very sandy, clayey, tan to light brown. | | | 1) Free water measured at 11'± below grade. -24 hours later water level taped at 8.9' below grade. |
| | | | 0.9 to 7.0± CLAY-FILL, low to medium plasticity, soft to stiff, moist, calcareous with $CaCO_3$ nodules throughout, tan to light brown. scattered hydrocarbon stains throughout. | | | 2) JARS A) 12.0' B) 14.4' |
| | | | 7.0 to 8.0± SAND, fine to coarse grained, loose, moist, clayey, tan to rust. hydrocarbon stains noted. | | | 3) DRILLING 0.0 - 14.4, 8" hollow stem auger refusal at top of interpreted limestone primary. 3" i.d. shelby tube advanced to depth. |
| | | | 8.0 to 13.0± CLAY-FILL, low plasticity, soft, moist, sandy, tan to rust. hydrocarbon stains noted. | | | |
| | | | 13.0-14.4 GRAVEL, coarse grained, angular, dense, wet, very sandy throughout. light brown. | | | |
| | | | T.D.-14.4' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1194

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT HOOD | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1194 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2, UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/16/88, COMPLETED 8/16/88 |
| 7. THICKNESS OF OVERBURDEN 14.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK --- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 14.0 | 19. SIGNATURE OF INSPECTOR R.K. Hudette |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.4± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, sandy, clayey, tan to light brown. | | | 1) free water at 11.5'± below grade. -24 hours later water level taped at 8.7' below grade. |
| | | | 1.4 to 13.0± CLAY-FILL, low to medium plasticity, soft to stiff, calcareous with $CaCO_3$ nodules throughout, tan to light brown to rust. No visible hydrocarbon staining. | | | 2) JARS A) 12.0' B) 14.0' |
| | | | 13.0 to 14.0 GRAVEL, coarse grained, angular, dense, wet, very sandy, light brown. | | | 3) DRILLING 0.0 - 14.0, 8" hollow stem auger refusal at top of interpreted limestone primary. |
| | | | T.D.-14.0' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1195

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1195 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| | 15. ELEVATION GROUND WATER ** |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 8/16/88; COMPLETED 8/16/88 |
| 7. THICKNESS OF OVERBURDEN 13.5 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 13.5 | 19. SIGNATURE OF INSPECTOR R.R. Hudetta |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.7± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, sandy, clayey, tan to light brown. | | | 1) Free water at 11'± below grade. - 24 hours later water level taped at 9.3' below grade. |
| | | | 1.7 to 11.5± CLAY-FILL, low plasticity, soft, moist to wet along basal section, calcareous with $CaCO_3$ nodules throughout, tan to light brown. scattered hydrocarbon staining throughout. | | | 2) JARS A) 12.0' B) 13.5' |
| | | | 11.5 to 13.5 SAND, fine to coarse grained, loose, wet, clayey, tan to rust. Hydrocarbon staining noted. | | | 3) DRILLING 0.0- 13.5', 8" hollow stem auger refusal at interpreted top of limestone primary. 3" i.d. shelby tube advanced to depth. |
| | | | T.D.-13.5' | | | |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 8A-1196

| DRILLING LOG | DIVISION SOUTHWESTERN | INSTALLATION FORT WORTH | SHEET 1 OF 1 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT CARSWELL, A.F.B. | 10. SIZE AND TYPE OF BIT 8" HOLLOW STEM AUGER |
| 2. LOCATION (Coordinates or Station) HYDRANT FUELING SYSTEM | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY SOUTHWESTERN LABORATORIES, INC. | 12. MANUFACTURER'S DESIGNATION OF DRILL CME 55 (F700) |
| 4. HOLE NO. (As shown on drawing title and file number) 8A-1196 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED 0 |
| 5. NAME OF DRILLER SHELBY | 14. TOTAL NUMBER CORE BOXES -- |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT. | 15. ELEVATION GROUND WATER ** |
| | 16. DATE HOLE: STARTED 8/17/88; COMPLETED 8/17/88 |
| 7. THICKNESS OF OVERBURDEN 16.0 | 17. ELEVATION TOP OF HOLE -- |
| 8. DEPTH DRILLED INTO ROCK -- | 18. TOTAL CORE RECOVERY FOR BORING -- % |
| 9. TOTAL DEPTH OF HOLE 16.0 | 19. SIGNATURE OF INSPECTOR R.R. Hudlow |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | 0.0 to 1.5± GRAVEL-FILL, fine to coarse grained, angular, loose, moist, sandy, clayey, tan to light brown. | | | 1) free water at 12'± below grade. - 5 hours later water level taped at 8.5' below grade. |
| | | | 1.5 to 11.7± CLAY-FILL, loe to medium plasticity, soft to stiff, moist to wet along basal zone, calcareous with $CaCO_3$ nodules throughout, slightly gravelly, tan to light brown. scattered hydrocarbon staining noted. | | | 2) JARS A) 12.0' B) 16.0' |
| | | | 11.7 to 16.0 SAND, fine to coarse grained, loose, wet, clayey, tan to rust. hydrocarbon stains throughout. | | | 3) DRILLING 0.0 - 16.0, 8" hollow stem auger refusal at top of interpreted limestone primary. |
| | | | T.D.-16.0' | | | 3" i.d. shelby tube advanced to depth. |

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

# APPENDIX II

# LABORATORY TEST REPORTS

SWDED-CL REPORT NO. 14758

# RESIDUAL CHEMICAL ANALYSIS OF SOIL SAMPLES

## HYDRANT FUELING AREA

## CARSWELL AFB - FORT WORTH DISTRICT

CORPS OF ENGINEERS

U.S. ARMY

DALLAS DIVISION LABORATORY

DALLAS, TEXAS

SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 Cass Street
Dallas, Texas 75235

SUBMITTAL OF SWDED-SL REPORT 14738 (7 pages)

PROJECT: CARSWELL AIR FORCE BASE
Feature: AIRCRAFT FUELING AREA

Contract No.

TEST REQUEST NO.: ESTS8C15a
Dated: 22 JULY 88
Received: 27 JULY 88

From: GEOTECH BRANCH, FORT WORTH:
GREEN

MATERIAL: 30 soil samples

see following page for identification

Date received: 1 Aug 88, 2 Aug 88, 3 Aug 88, 4 Aug 88

REMARKS:

Results for total recoverable petroleum hydrocarbons

Report sent to:
FORT WORTH DISTRICT

Copy furnished:

| Date: | Name and title: | Signature |
|---|---|---|
| 19 Aug 88 | WILLIAM R. TANNER<br>Director<br>SWD Laboratory | Wm R Tanner |

| Field No. | SWD NO. | DATE SAMPLED |
|---|---|---|
| 8A-1152(12') | 8- 925 | 29 JULY 88 |
| 8A-1152(20') | 8- 926 | 29 JULY 88 |
| 8A-1153(12') | 8- 927 | 29 JULY 88 |
| 8A-1153(20') | 8- 928 | 29 JULY 88 |
| 8A-1154(12') | 8- 929 | 29 JULY 88 |
| 8A-1154(20') | 8- 930 | 29 JULY 88 |
| 8A-1155(12') | 8- 931 | 29 JULY 88 |
| 8A-1155(20') | 8- 932 | 29 JULY 88 |
| 8A-1156(12') | 8- 933 | 29 JULY 88 |
| 8A-1156(20') | 8- 934 | 29 JULY 88 |
| 8A-1147(12') | 8- 943 | 1 AUGUST 88 |
| 8A-1147(20') | 8- 944 | 1 AUGUST 88 |
| 8A-1150(12') | 8- 945 | 1 AUGUST 88 |
| 8A-1150(20') | 8- 946 | 1 AUGUST 88 |
| 8A-1151(12') | 8- 947 | 1 AUGUST 88 |
| 8A-1151(20') | 8- 948 | 1 AUGUST 88 |
| 8A-1148(12') | 8- 969 | 2 AUGUST 88 |
| 8A-1148(20') | 8- 970 | 2 AUGUST 88 |
| 8A-1149(12') | 8- 971 | 2 AUGUST 88 |
| 8A-1149(20') | 8- 972 | 2 AUGUST 88 |
| 8A-1150A | 8- 973 | 2 AUGUST 88 |
| 8A-1150B | 8- 974 | 2 AUGUST 88 |
| 8A-1145(12') | 8- 996 | 3 AUGUST 88 |
| 8A-1145(20') | 8- 997 | 3 AUGUST 88 |
| 8A-1163(12') | 8- 998 | 3 AUGUST 88 |
| 8A-1163(20') | 8- 999 | 3 AUGUST 88 |
| 8A-1164(12') | 8-1000 | 3 AUGUST 88 |
| 8A-1164(20') | 8-1001 | 3 AUGUST 88 |
| 8A-1165(12') | 8-1002 | 3 AUGUST 88 |
| 8A-1165(20') | 8-1003 | 3 AUGUST 88 |

# ANACHEM INC.

Laboratory Testing • Materials Analyses
Consulting Chemists • Failure Investigations

REPORT OF: Soil Analysis — August 4, 1988

CUSTOMER'S NAME: Southwestern Div. Lab. — SAMPLE LOG: 23880

CUSTOMER'S ID: See Data Table — LAB SAMPLE ID:

MATRIX: SOIL — COMP. FILE ID.: 23880

DATE RECEIVED: 8-2-88 — LEVEL: MED

DATE ANALYZED: 8-2-88 — DILUTION FACTOR: 10 on 8-967, 8-968 & 8-932

SAMPLES: The samples consisted of 16 jars of soil. The samples are labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS: See Data Table.

| SAMPLE I.D. | TPH | SAMPLE I.D. | TPH |
|---|---|---|---|
| 8A1147-8-963 | 226 ppm | 8A1153-8-927 | 55 ppm |
| 8A1147-8-964 | 55 ppm | 8A1153-8-928 | 135 ppm |
| 8A1150-8-965 | 69 ppm | 8A1154-8-929 | 37 ppm |
| 8A1150-8-966 | 82 ppm | 8A1154-8-930 | 47 ppm |
| 8A1151-8-967 | 3269 ppm | 8A1155-8-931 | 43 ppm |
| 8A1151-8-968 | 1961 ppm | 8A1155-8-932 | 3439 ppm |
| 8A1152-8-925 | 44 ppm | 8A1156-8-933 | 61 ppm |
| 8A1152-8-926 | 51 ppm | 8A1156-8-934 | 59 ppm |

DISTRIBUTION OF REPORTS:
2-Southwestern Division Lab
Attn: Jeff Tye

RESPECTFULLY SUBMITTED,

ANACHEM, INCORPORATED
Tooran Khosh
Chemist

Hugh L. Waldrum
President

LAB NUMBER: 23880-A djw

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# ANACHEM INC.

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REPORT OF: Soil Analysis — August 8, 1988

CUSTOMER'S NAME: Southwestern Div. Lab. — SAMPLE LOG: 23893

CUSTOMER'S ID: See Data Table — LAB SAMPLE ID:

MATRIX: SOIL — COMP. FILE ID.: 23893

DATE RECEIVED: 8-4-88 — LEVEL: MED

DATE ANALYZED: 8-5-88 — DILUTION FACTOR: 10 on #8-972

SAMPLES: The samples consisted of 14 bottles of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS: See Data Table.

| SAMPLE I.D. | TPH | SAMPLE I.D. | TPH |
|---|---|---|---|
| 8A1148 1/2 8-969 | 28 ppm | 8A1145 2/2 8-997 | 40 ppm |
| 8A1148 2/2 8-970 | 20 ppm | 8A1163 1/2 8-998 | 55 ppm |
| 8A1149 1/2 8-971 | 19 ppm | 8A1163 2/2 8-999 | 24 ppm |
| 8A1149 2/2 8-972 | 6978 ppm | 8A1164 1/2 8-1000 | 14 ppm |
| 8A1150A 8-973 | 317 ppm | 8A1164 2/2 8-1001 | 84 ppm |
| 8A1150B 8-974 | 91 ppm | 8A1165 1/2 8-1002 | 32 ppm |
| 8A1145 1/2 8-996 | 32 ppm | 8A1165 2/2 8-1003 | 31 ppm |

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Tooran Khosh
Chemist

Hugh L. Waldrum
President

LAB NUMBER: 23893-A djw

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SWDED-GL REPORT NO. 14758-1

# RESULTS OF CHEMICAL ANALYSES OF SOIL SAMPLES

## SOIL INVESTIGATION

## CARSWELL AFB - FORT WORTH DISTRICT

CORPS OF ENGINEERS

U.S. ARMY

SOUTHWESTERN DIVISION LABORATORY

DALLAS, TEXAS

SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 Cass Street
Dallas, Texas 75235

SUBMITTAL OF SWDED-GL REPORT 14758-1 (12 PAGES)

PROJECT: CARSWELL AFB HYDRANT FUEL
Feature: SOIL INVESTIGATION

Contract No.

TEST REQUEST NO.: E87880256
Dated: 22 JULY 88
Received: 25 JULY 88

From: CHIEF, GEOTECHNICAL BRANCH

MATERIAL: Seventy-four soil samples

See following pages for identification

Date Received: 5 AUG 88, 8 AUG 88, 9 AUG 88, 10 AUG 88, 11 AUG 88, 12 AUG 88, 15 AUG 88, 17 AUG 88, 18 AUG 88, 19 AUG 88

REMARKS:

Report sent to:
Tulsa District

Copy furnished:

| Date: | Name and title: | Signature |
|---|---|---|
| 14 Sep 88 | WILLIAM R. TANNER<br>Director<br>SWD Laboratory | William R. Tanner |

# ANACHEM INC.

Laboratory Testing • Materials Analyses
Consulting Chemists • Failure Investigations

REPORT OF: Soil Analysis

August 18, 1988

CUSTOMER'S NAME: Corps. of Engineers

SAMPLE LOG: 23903

CUSTOMER'S ID: As Shown in Data Table

LAB SAMPLE ID:

MATRIX: SOIL

COMP. FILE ID.: 23903

DATE RECEIVED: 8-8-88

LEVEL: MED

DATE ANALYZED: 8-9-88

DILUTION FACTOR: 10 on 8-1007 and 8-1020

SAMPLES: The samples consisted of 14 bottles of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS: See Data Table.

| SAMPLE I.D. | TPH | SAMPLE I.D. | TPH |
|---|---|---|---|
| 8A1157 8-1006 | 200 ppm | 8A1166 8-1013 | 16 ppm |
| 8A1157 8-1007 | 516 ppm | 8A1159 8-1015 | 24 ppm |
| 8A1158 8-1008 | 24 ppm | 8A1159 8-1016 | 20 ppm |
| 8A1158 8-1009 | 20 ppm | 8A1160 8-1017 | 16 ppm |
| 8A1162 8-1010 | 16 ppm | 8A1160 8-1018 | 39 ppm |
| 8A1162 8-1011 | 16 ppm | 8A1161 8-1019 | 40 ppm |
| 8A1166 8-1012 | 16 ppm | 8A1161 8-1020 | 1300 ppm |

DISTRIBUTION OF REPORTS:
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Attn: Jeff Tye

RESPECTFULLY SUBMITTED,

Tooran Khosh

ANACHEM, INCORPORATED
Tooran Khosh
Chemist

Hugh L. Waldrum
President

LAB NUMBER: 23903-A djw

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# ANACHEM INC.

Laboratory Testing • Materials Analyses
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REPORT OF: Soil Analysis — August 12, 1988

CUSTOMER'S NAME: Southwestern Div. Lab — SAMPLE LOG: 23920

CUSTOMER'S ID: As Shown — LAB SAMPLE ID:

MATRIX: SOIL — COMP. FILE ID.: 23920

DATE RECEIVED: 8-10-88 — LEVEL: MED

DATE ANALYZED: 8-11-88 — DILUTION FACTOR: NONE

SAMPLES: The samples consisted of 14 bottles of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons by EPA method 418.1.

RESULTS:

| SAMPLE I.D. | TPH | SAMPLE I.D. | TPH |
|---|---|---|---|
| 8A1173 8-1038 | 16 ppm | 8A1167 8-1053 | 40 ppm |
| 8A1173 8-1039 | 20 ppm | 8A1168 8-1054 | 32 ppm |
| 8A1174 8-1040 | 40 ppm | 8A1168 8-1055 | 44 ppm |
| 8A1174 8-1041 | 24 ppm | 8A1172 8-1056 | 36 ppm |
| 8A1175 8-1042 | 24 ppm | 8A1172 8-1057 | 16 ppm |
| 8A1175 8-1043 | 24 ppm | 8A1176 8-1058 | 20 ppm |
| 8A1167 8-1052 | 44 ppm | 8A1176 8-1059 | 24 ppm |

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ANACHEM, INCORPORATED
Hugh L. Waldrum
President

LAB NUMBER: 23920-A djw

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# ANACHEM INC.

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Consulting Chemists • Failure Investigations

REPORT OF: Soil Analysis — August 18, 1988

CUSTOMER'S NAME: Corps. of Engineers — SAMPLE LOG: 23935

CUSTOMER'S ID: As Shown in Data Table — LAB SAMPLE ID:

MATRIX: SOIL — COMP. FILE ID.: 23935

DATE RECEIVED: 8-15-88 — LEVEL: LOW

DATE ANALYZED: 8-16-88 — DILUTION FACTOR: NONE

SAMPLES: The samples consisted of 17 bottles of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS: See Data Table.

| SAMPLE I.D. | TPH | SAMPLE I.D. | TPH |
|---|---|---|---|
| 8A1146 8-1084 | 20 ppm | 8A1182 8-1092 | 16 ppm |
| 8A1146 8-1085 | 24 ppm | 8A1182 8-1093 | 24 ppm |
| 8A1169 8-1086 | 24 ppm | 8A1177 8-1094 | 28 ppm |
| 8A1169 8-1087 | 20 ppm | 8A1177 8-1095 | 20 ppm |
| 8A1170 8-1088 | 20 ppm | 8A1183 8-1096 | 20 ppm |
| 8A1170 8-1089 | 20 ppm | 8A1184 8-1097 | 12 ppm |
| 8A1171 8-1090 | 12 ppm | 8A1185 8-1098 | 144 ppm |
| 8A1171 8-1091 | 16 ppm | 8A1186 8-1099 | 20 ppm |
| | | 8A1186 8-1100 | 48 ppm |

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Tooran Khosh

ANACHEM, INCORPORATED
Tooran Khosh
Chemist

Hugh L. Waldrum

Hugh L. Waldrum
President

LAB NUMBER: 23935-A djw

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REPORT OF: Soil Analysis

CUSTOMER'S NAME: Corps. of Engineers

CUSTOMER'S ID: As Shown

MATRIX: SOIL

DATE RECEIVED: 8-18-88

DATE ANALYZED: 8-19-88

August 24, 1988

SAMPLE LOG: 23957

LAB SAMPLE ID:

COMP. FILE ID.: 23957

LEVEL: MED

DILUTION FACTOR:
10 on 8-1176
20 on 8-1134
40 on 8-1198

SAMPLES: The samples consisted of 25 jars of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS: See Data Table.

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Attn: Jeff Tye

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Tooran Khosh
Chemist

Hugh L. Waldrum
President

LAB NUMBER: 23957-A djw

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Report To: Corps. of Engineers
Lab Number: 23957
Page Two

| SAMPLE I.D. | TPH (ppm) | SAMPLE I.D. | TPH (ppm) |
|---|---|---|---|
| 8A1178 8-1133 | 163 | 8A1195 8-1180 | 136 |
| 8A1178 8-1134 | 212 | 8A1195 8-1181 | 139 |
| 8A1179 8-1135 | 428 | 8A1187 8-1192 | 100 |
| 8A1179A 8-1136 | 250 | 8A1187 8-1193 | 130 |
| 8A1179A 8-1137 | 243 | 8A1188 8-1194 | 71 |
| 8A1180 8-1138 | 194 | 8A1188 8-1195 | 307 |
| 8A1180 8-1139 | 217 | 8A1191 8-1196 | 168 |
| 8A1179 8-1174 | 127 | 8A1191 8-1197 | 70 |
| 8A1181 8-1175 | 199 | 8A1192 8-1198 | 15537 |
| 8A1181 8-1176 | 2188 | 8A1192 8-1199 | 168 |
| 8A1193 8-1177 | 293 | 8A1196 8-1200 | 236 |
| 8A1193 8-1178 | 46 | 8A1196 8-1201 | 235 |
| 8A1194 8-1179 | 173 | | |

SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 CASS STREET
DALLAS, TEXAS 75235-8011
(214) 905-9130

REQUEST FOR ANALYSES

LABORATORY: ANACHEM LABS

PROJECT: CARSWELL AIR FORCE BASE

DATE RESULTS REQUIRED: 19 SEPT 88

DATE SAMPLES SENT: 18 AUGUST 88

TEST THE FOLLOWING SAMPLES AS INDICATED BELOW:

| FIELD ID | SWD NO. | DATE SAMPLED |
|---|---|---|
| 8A-1178(12') | 8-1133 | 15 AUG 88 |
| 8A-1178(20') | 8-1134 | 15 AUG 88 |
| 8A-1179(4.5') | 8-1135 | 15 AUG 88 |
| 8A-1179A(12') | 8-1136 | 15 AUG 88 |
| 8A-1179A(20') | 8-1137 | 15 AUG 88 |
| 8A-1180(12') | 8-1138 | 15 AUG 88 |
| 8A-1180(20') | 8-1139 | 15 AUG 88 |
| 8A-1179(4.0) | 8-1174 | 17 AUG 88 |
| 8A-1181(12') | 8-1175 | 17 AUG 88 |
| 8A-1181(20') | 8-1176 | 17 AUG 88 |
| 8A-1193(12') | 8-1177 | 17 AUG 88 |
| 8A-1193(14.4') | 8-1178 | 17 AUG 88 |
| 8A-1194(12') | 8-1179 | 17 AUG 88 |
| 8A-1195(12') | 8-1180 | 17 AUG 88 |
| 8A-1195(13.5') | 8-1181 | 17 AUG 88 |
| 8A-1187(12') | 8-1192 | 18 AUG 88 |
| 8A-1187(20') | 8-1193 | 18 AUG 88 |
| 8A-1188(12') | 8-1194 | 18 AUG 88 |
| 8A-1188(16') | 8-1195 | 18 AUG 88 |
| 8A-1191(12') | 8-1196 | 18 AUG 88 |
| 8A-1191(15') | 8-1197 | 18 AUG 88 |
| 8A-1192(12') | 8-1198 | 18 AUG 88 |
| 8A-1192(14.5') | 8-1199 | 18 AUG 88 |
| 8A-1196(12') | 8-1200 | 18 AUG 88 |
| 8A-1196(16') | 8-1201 | 18 AUG 88 |

ANALYZE 25 SOIL SAMPLES FOR TOTAL RECOVERABLE PETROLEUM HYDROCARBONS EPA METHOD 418.1

| RELINQUISHED BY | RECEIVED BY | DATE | TIME |
|---|---|---|---|
| [illegible] | [illegible] | 8/18/88 | 1500 |

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REPORT OF: Soil Analysis — September 1, 1988

CUSTOMER'S NAME: Corps. of Engineers — SAMPLE LOG: 23969

CUSTOMER'S ID: As Shown in Data Table — LAB SAMPLE ID:

MATRIX: SOIL — COMP. FILE ID.: 23969

DATE RECEIVED: 8-22-88 — LEVEL: LOW

DATE ANALYZED: 8-26-88 — DILUTION FACTOR: NONE

SAMPLES: The samples consisted of 4 jars of soil labeled as shown in the data table.

TESTS: Each sample was analyzed for Total Petroleum Hydrocarbons using EPA method 418.1.

RESULTS:

| SAMPLE I.D. | TOTAL PETROLEUM HYDROCARBONS |
|---|---|
| 8A1189 8-1202 | 28 ppm |
| 8A1189 8-1203 | 39 ppm |
| 8A1190 8-1204 | 43 ppm |
| 8A1190 8-1205 | 34 ppm |

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Attn: Jeff Tye

RESPECTFULLY SUBMITTED,

ANACHEM, INCORPORATED
Tooran Khosh
Chemist

Hugh L. Waldrum
President

LAB NUMBER: 23969-A djw

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## TOTAL PETROLEUM HYDROCARBONS DUPLICATES

| DATE | SAMPLE I.D. | $TPH_1$ | $TPH_2$ | % VARIANCE |
|---|---|---|---|---|
| 8-2-88 | 8-934 8A1156 | 69 | 53 | 26 |
| 8-2-88 | 8-929 8A1154 | 37 | 32 | 14 |
| 8-8-88 | 8-973 | 317 | 400 | 23 |
| 8-9-88 | 8-1010 | 16 | 20 | 22 |
| 8-9-88 | 8-1020 | 1300 | 1240 | 5 |
| 8-10-88 | #19* | 64 | 60 | 6 |
| 8-15-88 | 8-1090 8A1171 | 14 | 20 | 35 |
| 8-15-88 | 8-1098 8A1185 | 144 | 117 | 10 |
| 8-15-88 | 88-22* | 219 | 207 | 6 |
| 8-15-88 | 88-21* | 168 | 175 | 4 |
| 8-19-88 | 1176 | 2188 | 2113 | 3 |
| 8-19-88 | 1196 | 168 | 168 | 0 |
| 8-22-88 | 361-15 | 12 | 11 | 9 |
| 8-26-88 | 8-1205 | 34 | 26 | 27 |

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SWDED-GL REPORT NO. 14758-2

# RESULTS OF CHEMICAL ANALYSIS OF SOIL SAMPLES

HYDRANT FUELING AREA

CARSWELL AFB - FORT WORTH DISTRICT

CORPS OF ENGINEERS

U.S. ARMY

DIVISION LABORATORY

DALLAS, TEXAS

SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 Cass Street
Dallas, Texas 75235

SUBMITTAL OF SWDED-GL REPORT 14758-2 (5 pages)

PROJECT: CARSWELL AIR FORCE BASE
Feature: HYDRANT FUELING AREA

Contract No.

TEST REQUEST NO.: E87880256
Dated: 22 JULY 88
Received: 27 JULY 88

From: GEOTECH BRANCH, FORT WORTH
GREEN

MATERIAL: Seven soil samples

| | | |
|---|---|---|
| 8A-1155 | 20' | 8- 932 |
| 8A-1149 | 20' | 8- 972 |
| 8A-1161 | 20' | 8- 1020 |
| 8A-1179 | 12' | 8- 1136 |
| 8A-1181 | 20' | 8- 1176 |
| 8A-1188 | 16' | 8- 1195 |
| 8A-1192 | 12' | 8- 1198 |

Date received: 1 Aug 88, 3 Aug 88, 8 Aug 88, 15 Aug 88, 17 Aug 88, 18 Aug 88

REMARKS: GS/MS Fuel screens on previously reported material

Report sent to:
FORT WORTH DISTRICT

Copy furnished:

| Date: | Name and title: | Signature |
|---|---|---|
| 23 Nov 88 | WILLIAM R. TANNER<br>Director<br>SWD Laboratory | Wm R Tanner |

# ANACHEM INC.

Laboratory Testing • Environmental Analyses
Consulting Chemists • Failure Investigations

| | |
|---|---|
| REPORT OF: Soil Analysis | November 17, 1988 |
| CUSTOMER'S NAME: Corps. of Engineers | SAMPLE LOG: 24100 |
| CUSTOMER'S ID: P.O. #DACW63-88-M-D339 | LAB SAMPLE ID: |
| MATRIX: SOIL | COMP. FILE ID.: 24100 |
| DATE RECEIVED: 9-22-88 | LEVEL: LOW |
| DATE ANALYZED: 10-4-88 | DILUTION FACTOR: NONE |

SAMPLES: The samples consisted of 7 glass jars filled with soil and labeled 8-932, 972, 1020, 1136, 1176, 1195 and 1198.

TESTS: A 150 gram aliquot of each sample was steam distilled and the hydrocarbon fraction collected in 5ml of trimethyl pentane. The trimethyl pentane was then analyzed by GC/MS and the resulting chromatograms were compared to the chromatograms of fuel mixtures such as gasoline, diesel and Jet A.

RESULTS: The chromatograms for all seven samples closely resemble the chromatogram of Jet A. The boiling range is too high for gasoline and the aromatic content is virtually zero. These findings are all consistent with Jet A or a weathered diesel.

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Attn: Kathy Hutchins

LAB NUMBER: 24100-A djw

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SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 CASS STREET
DALLAS, TEXAS 75235-8011
(214) 905-9130

REQUEST FOR ANALYSES

LABORATORY: ANACHEM

PROJECT: CARSWELL AFB

DATE RESULTS REQUIRED: 22 OCT 88

DATE SAMPLES SENT: 22 SEPT 88

TEST THE FOLLOWING SAMPLES AS INDICATED BELOW:

| FIELD ID | SWD NO. | DATE SAMPLED | ANALYSES |
|---|---|---|---|
| 8A-1155(20') | 8- 932 | 29 JULY 88 | GC/MS FUEL SCREEN |
| 8A-1149(20') | 8- 972 | 2 AUGUST 88 | GC/MS FUEL SCREEN |
| 8A-1161(20') | 8- 1020 | 5 AUGUST 88 | GC/MS FUEL SCREEN |
| 8A-1179(12') | 8- 1136 | 15 AUGUST 88 | GC/MS FUEL SCREEN |
| 8A-1181(20') | 8- 1176 | 17 AUGUST 88 | GC/MS FUEL SCREEN |
| 8A-1188(16') | 8- 1195 | 18 AUGUST 88 | GC/MS FUEL SCREEN |
| 8A-1192(12') | 8- 1198 | 18 AUGUST 88 | GC/MS FUEL SCREEN |

ANALYZE SEVEN SOIL SAMPLES FOR GC/MS FUEL SCREEN

| RELINQUISHED BY | RECEIVED BY | DATE | TIME |
|---|---|---|---|
| | | | |
| | | | |

# FINAL PAGE

## ADMINISTRATIVE RECORD

# FINAL PAGE

# FINAL PAGE

## ADMINISTRATIVE RECORD

# FINAL PAGE