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ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

MEMORANDUM

TO: Mike Hood, Technical Manager, Solid Waste Division MH

FROM: Robert Lemmer, Geologist Supervisor, Solid Waste Division

DATE: January 6, 1997

SUBJECT: Preliminary Site Investigation, Conducted on November 7, 1996, for the Proposed Modification of the USA/Sunray Services Class 1 Landfill at Tontitown, Arkansas
CSN: 72-0144 Permit No.: P097

LOCATION AND DESCRIPTION

The proposed modification to USA/Sunray's Tontitown Class 1 landfill includes a lateral expansion of approximately ten acres and an improved cap design. The Tontitown landfill facility is located about 2½ miles southwest of Tontitown, Arkansas (Washington County) and along County Road 865 approximately ½ miles south of County Road 52 (Figure 1). The landfill facility consists of two class 1 sites, an inactive (Site 4) and active (Site 3) site; and two class 4 areas, which include a closed and an active area. There is also a proposal pending with the Department for another class 4 landfill at the facility. The facility is also located in the N½ of Section 23, Township 17 North, Range 31 West.

The expansion area is located between the Class 1 disposal Sites, 3 and 4, and extends into the area immediately north of those two sites. Although most of the proposed site is vacant, the central portion is being used as a haul road and entrance to the facility. There are approximately 200 dwellings (according to submitted pre-application form) within one mile of the site. Although there are probably water wells present near the site, the nearby residents and the facility receive potable water from the Washington County Water Authority.

The proposed facility intends to accept non-hazardous household, commercial, and industrial solid waste. This waste will be generated by Washington, Benton, Madison, and Carroll counties.

TOPOGRAPHY AND GEOLOGY

Prior to development of the current landfill facility (and including the proposed expansion area) the topography the area consisted of a gently rolling terrain incised by several southeast-flowing drainage channels, ephemeral tributaries of Little Wildcat Creek (see Robinson and Springdale Quadrangles, U.S. Geological Survey, 1970). Disposal Sites 3 and 4 have been constructed over two of these tributaries, and the proposed expansion site is located on the land between the two disposal sites (Figure 2). The footprint of the proposed site slopes to the south with approximately forty feet of relief. Its elevations range from 1,292± feet in the north to 1,250± feet in the south. Most of the site's surface drainage is routed into the facility's numerous detention basins located in the southern and eastern areas of the facility. Surface drainage for the facility, is to the southeast into Little Wildcat Creek, a tributary of the westward flowing Clear Creek. However, at approximately the 1300 foot contour near the northern and northwestern boundary of the site exists a drainage divide (see Robinson Quadrangle, U.S. Geological Survey, 1970). Near this contour interval, surface drainage and presumably groundwater flow is to the northwest and west.

The site is located on the Springfield Plateau subdivision of the Ozark Physiographic Province. The rocks of the Ozark Plateau were deposited in an essentially horizontal orientation along the south and west flanks of the Ozark Dome (Branner, 1940). However, in response to past regional stresses, primarily associated with the Ouachita orogeny to the south, these rock layers have been slightly tilted, reflecting a regional dip ($\leq 1°$) to the south and southwest, as well as having experienced some minor folding, fracturing, and faulting. Much of this structure has been mapped by Haley et al. (1993).

Several investigations have mapped surface and subsurface expressions of regional geologic structure near the site. The axial trace of the "Wheeler Anticline" was mapped to extend beneath the site (Evans, 1952), however, Ogden and Quintana (1979) reported that subsequent field investigations failed to demonstrate its existence. Also, since the work of Haley et al. (1993) many more faults, continuation of previously terminated faults, and fracture traces have been documented to be present in the area (Brahana, 1993 and 1995; Arkansas Department of Pollution Control and Ecology, 1996) and near the proposed site (Stanton and Brahana, 1996). Recent work by Stanton and Brahana (1996) has revealed a fault coinciding with Clear Creek and mimicking the direction and sense of movement of the White River Fault immediately to the south (Croneis, 1930; Haley et al., 1993). This fault, along Clear Creek, was previously unmapped and has its southern block displaced more than 100 feet below the northern block. Also, a structural lineament has been mapped along Little Wildcat Creek and has many features similar to that of a fault (Stanton and Brahana, 1996), although no offset has been documented.

Bedrock beneath the site consists of layers of limestone and chert belonging to the Mississippian aged Boone Formation. The rock layers of the Boone Formation are interbedded, discontinuous, and in this area, without a prominent marker bed. Overlying the bedrock is mantle of regolith, left as an end-product during the weathering of the bedrock. Generally, this covering consists of a silty clay with abundant chert fragments (in which the chert abundance increases with depth). The reported thickness of the regolith varies across the site, from 33 feet in the north to about 63 feet in the central part.

Existing ground water data indicate the depth to the water table to be sixty (60) to seventy (70) feet across the site and flowing in a southeast direction.

SITE INVESTIGATION

The Department's site investigation was conducted on November 7, 1996. The investigation included excavating and logging four (4) test pits, examining the exposed walls of the borrow area adjacent to the site (proposed Class 4 area), and performing a site reconnaissance.

The test pits were generally about twelve (12) feet long and six (6) to eight (8) feet deep. All of the test pits were logged from the surface and on the proposed footprint. The logs of the test pits can be found at the end of this memorandum, and their locations can be seen on Figure 3. No test pits were excavated south of the facility's weigh scales because of truck activity to and from the active disposal areas of the facility.

Generally, all of the test pits revealed a deposit of regolith, consisting of a red clay containing abundant chert fragments. The chert fragment abundance increased with depth. Backhoe refusal was achieved in test pit TP-2 at about six foot deep. Refusal was due to either bedrock (pinnacle?) or a large boulder. The regolith is overlain with about one foot of top soil, which consists of a silty clay containing numerous fragments of chert. This is consistent with soils occurring along narrow ridgetops in the County and described by Harper et al. (1969).

The two southernmost test pits (TP-3 and TP-4) were dry while the other two (TP1 and TP-2) had water seepage at the one to three foot depth. It should be noted that the test pits were excavated following several inches of rainfall.

Immediately west of Site 3 is the proposed Class 4 site which is currently a borrow area for the landfill. Overburden removal was in progress the day of Department's site visit. The west wall exposed regolith near the top of the slope and a chert and limestone outcrop below it. The exposed rock was extremely fractured and weathered. Due to the slope grade (probably 2:1) it could not be determined if the exposure was bedrock or a extremely large boulder. The rock exposure was approximately twenty feet high and greater than fifty long. Water was flowing out of the fractures of the exposed rock.

PAST OPERATION

The Tontitown Landfill has been in operation since the 1970's. Currently, the facility operates under two landfill permits (123-SR-2 and 162-SR-2) which were revised in 1991. Operating deficiencies noted during the mid-1980's have since been corrected. Current operations have been very good, as indicated by Department inspection reports and evaluation. However, early in 1996 the landfill entered into a period of assessment monitoring after detecting contaminants in the ground water at the point of compliance.

RECOMMENDATION

The proposed site is suitable for further consideration as a Class 1 solid waste disposal facility. However, the following site limitations were noted and must be considered:

- Bedrock beneath the expansion area belongs to the Boone Formation, therefore, Section 22.425 (and all other pertinent sections) should be followed as per Regulation 22.

  Section 22.425(b)(2) requires a minimum separation of 10 feet from the liner to bedrock high points (pinnacles). A possible pinnacle was encountered in TP-2 at a depth of six feet. The applicant should determine if any bedrock exists at a depth of less than ten feet anywhere on the site.

- The applicant should determine if any karst features are present, and currently obscured by the mantle of regolith, beneath the site which would affect, or could be affected by, the development of the proposed expansion.

- The geologic model developed for the site should include a structural and stratigraphic analysis of the underlying bedrock. The recent discovery of faulting (along Clear Creek), and possible faulting (along Little Wildcat Creek) near the site, and the site's ground water flow in a different direction (southeast) than regional flow (southwest); all emphasizing the importance of developing an accurate site geologic model, which will lead to an accurate conceptual hydrogeologic model for the site and the ability to detect any contaminant release should it occur.

- With the facility currently in assessment monitoring, any landfill expansion should include a design which will improve ground water conditions not exacerbate them. Determining the precise ground water flow regime would be a necessary consideration. It has been found elsewhere within the Boone Formation outcrop area, that ground water primarily moves through solution-enlarged fractures, faults and bedding surfaces. A conceptual hydrogeologic model for the site should be one which includes this type of flow. A dye trace study is warranted.

REFERENCES

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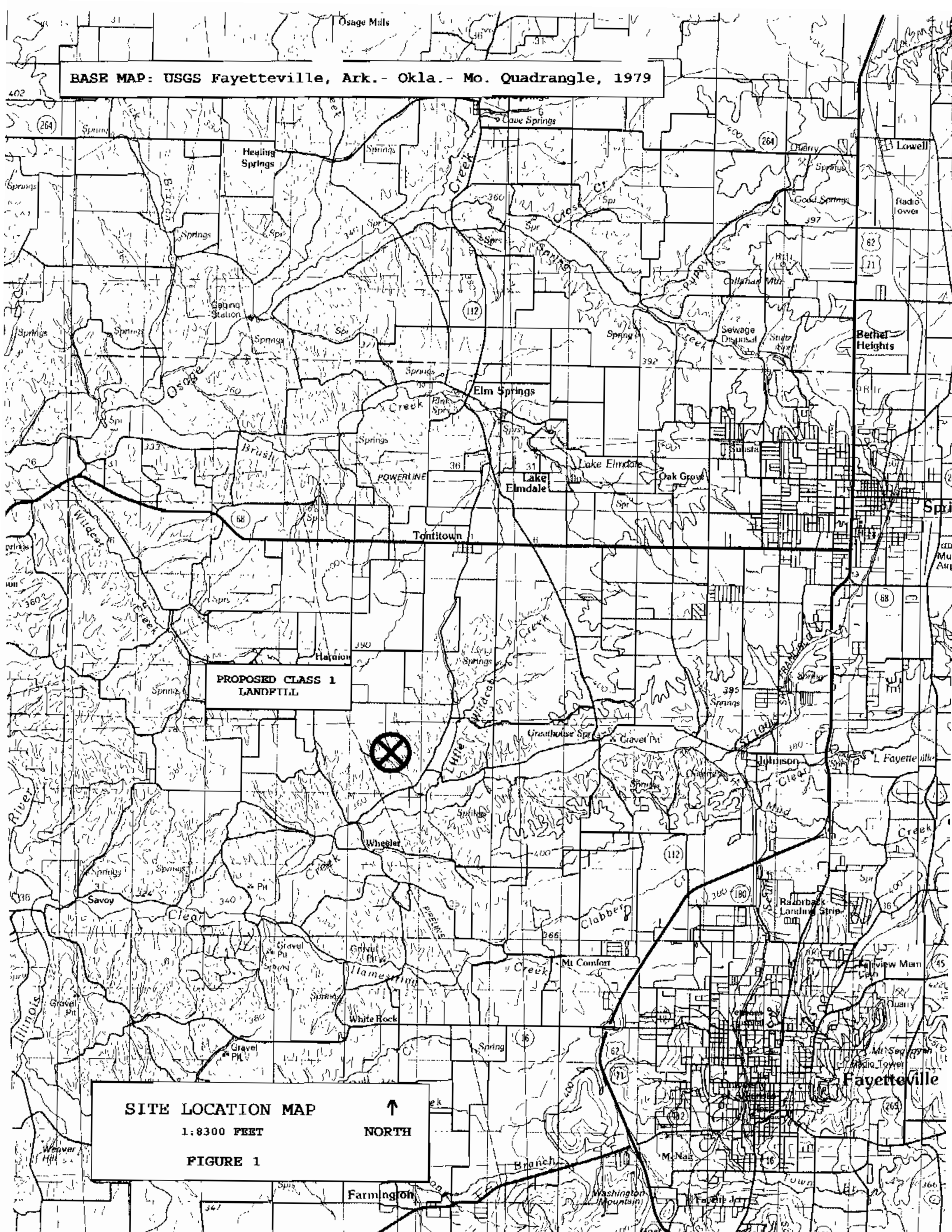
U.S. Geological Survey, 1970, Robinson, Arkansas, 7½ Minute Topographic Quadrangle, Scale 1:24,000.

U.S. Geological Survey, 1970, Springdale, Arkansas, 7½ Minute Topographic Quadrangle, Scale 1:24,000.

FIGURES

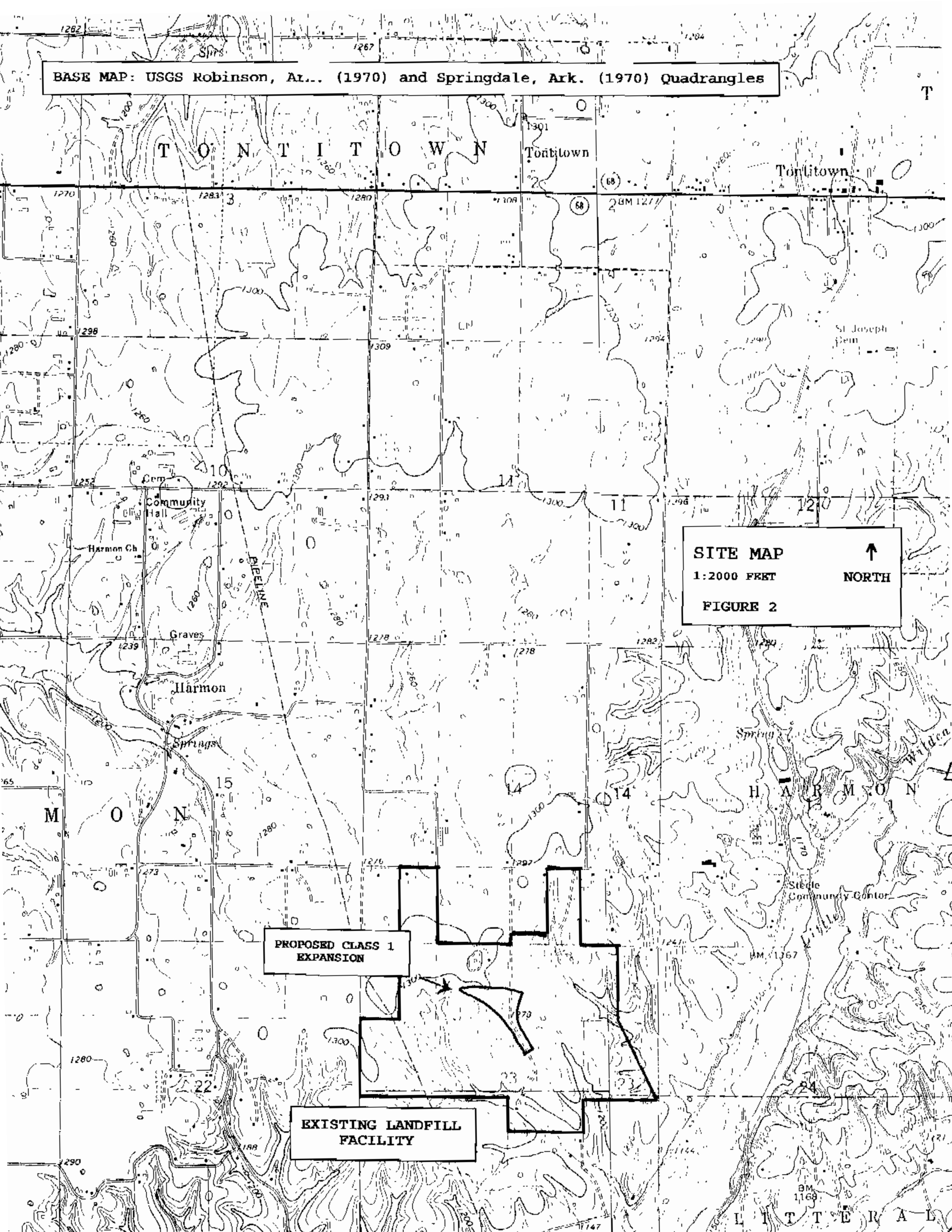


SITE LOCATION MAP

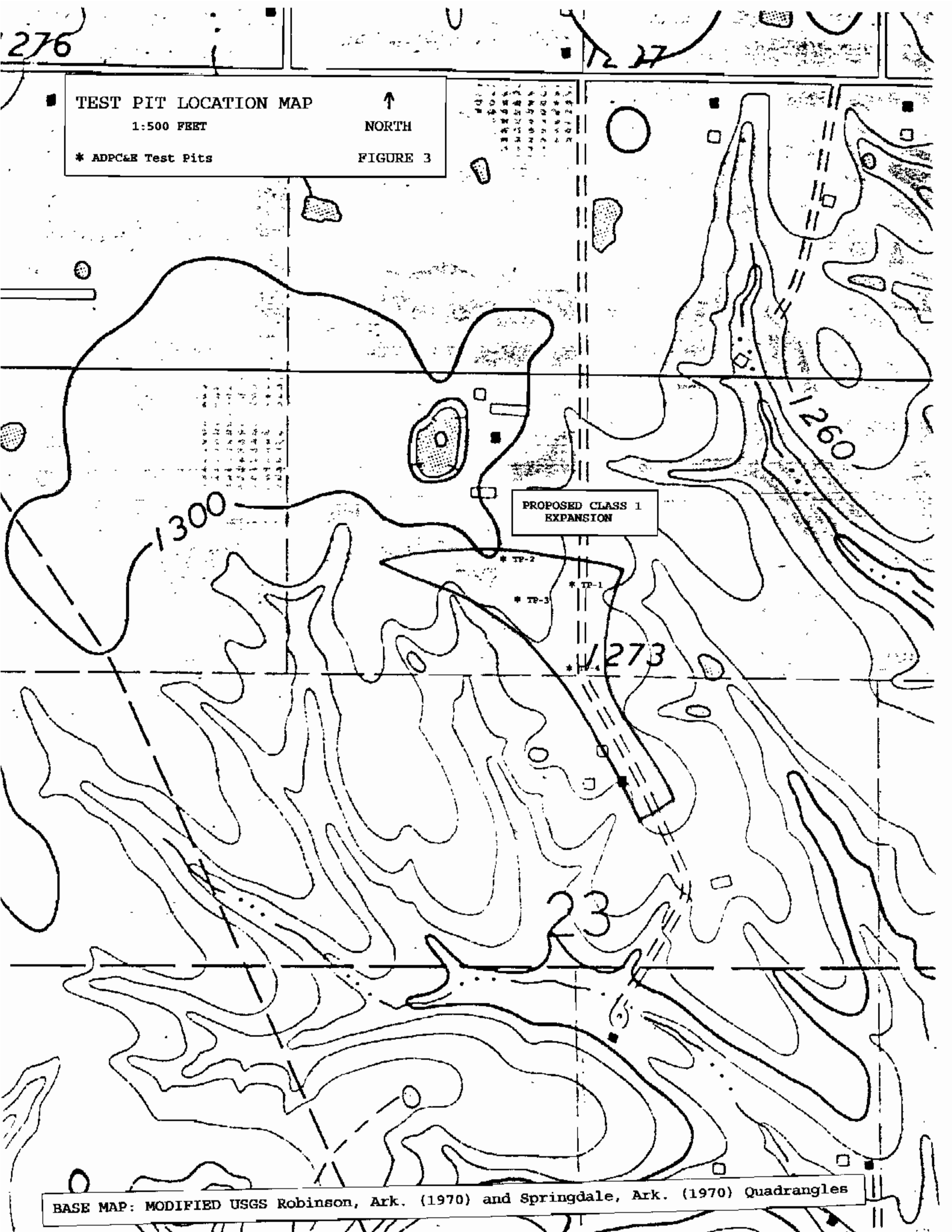
1:8300 FEET

NORTH

FIGURE 1



BASE MAP: USGS Robinson, Ar... (1970) and Springdale, Ark. (1970) Quadrangles
SITE MAP
1:2000 FEET
NORTH
FIGURE 2
PROPOSED CLASS 1 EXPANSION
EXISTING LANDFILL FACILITY
TONTITOWN
Tontitown
HARMON
Harmon
Harmon Ch
Community Hall
Cem
Graves
Springs
PIPELINE
Steele Community Center


TEST PIT LOCATION MAP
1:500 FEET
NORTH
* ADPC&E Test Pits
FIGURE 3
1276
1277
1300
1260
1273
23
PROPOSED CLASS 1
EXPANSION
TP-1
TP-2
TP-3
TP-4
BASE MAP: MODIFIED USGS Robinson, Ark. (1970) and Springdale, Ark. (1970) Quadrangles

TEST PIT LOGS

Project Name: Tontitown

Project Number:

Equipment: CAT 426 Backhoe

Logged By: R Hill

Elevation: 1279±

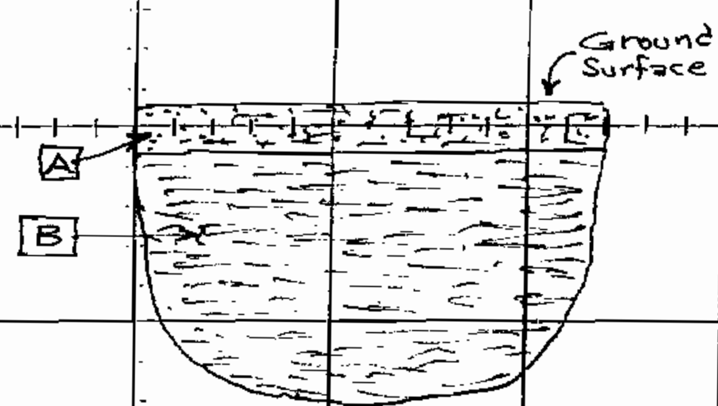
Location: 500E 100N

TRENCH NO. TP-1

ENGINEERING PROPERTIES

GEOLOGIC ATTITUDES	DATE: 11-7-96 DESCRIPTION:	GEOLOGIC UNIT
	A 0-1'2" Top soil, silty clay with numerous rock fragments and abundant rootlets brown color	
	B 1'-2"-7'10" Red clay with abundant rock and chert fragments	
	Note: Water seeping into pit from all sides, water in southeast corner at 24" depth was flowing into pit. NO CAVING Total depth 7'10". Backfilled 11-7-96	

GRAPHIC REPRESENTATION E. WALL SCALE: 1" = 5'0" SURFACE SLOPE: TREND: N2E ←



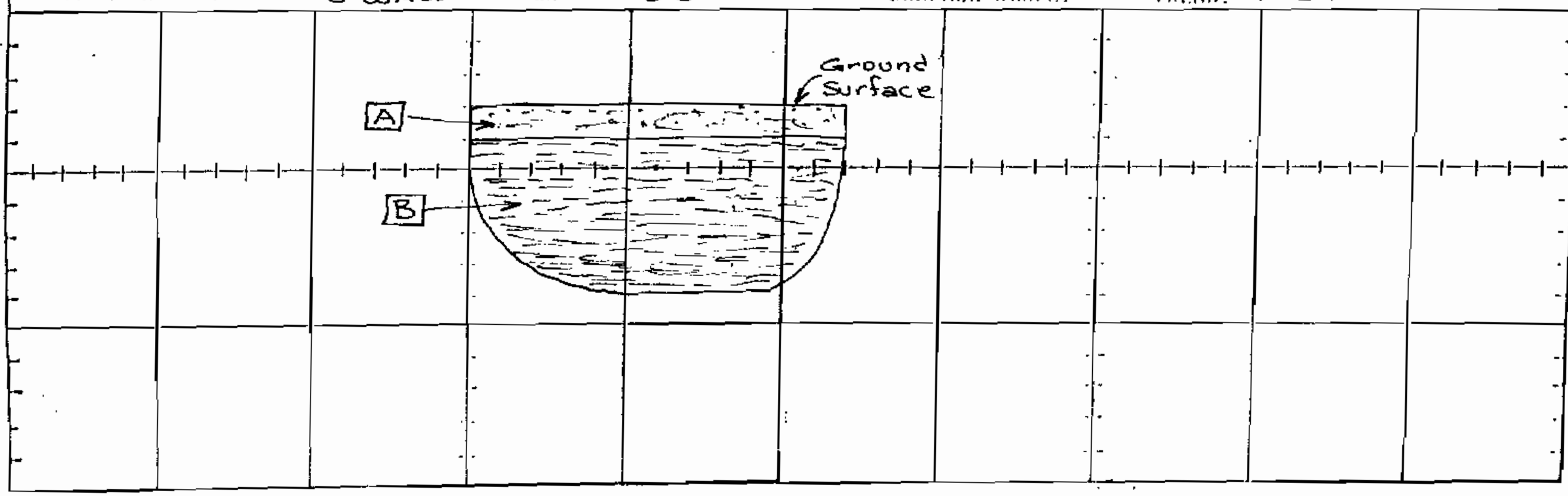
1 OF TRENCH NO. TP-1

Project Name: Tontitown	Logged By: R HILL		
Project Number:	Elevation: 1292±	TRENCH NO. TP-2	
Equipment: CAT 426 Backhoe	Location: -100 N 700E		

ENGINEERING PROPERTIES

GEOLOGIC ATTITUDES	DATE: 11-7-96 DESCRIPTION:	GEOLOGIC UNIT	U.S.C.S.	Sample No.	Moisture (%)	Density (pcf)
	[A] 0-1'0" Top Soil, brown color, silty clay with numerous rock fragments and abundant rootlets [B] 1'0"-6'0" Red clay with abundant chert HAD Refusal at 6'0" - either bedrock or large boulder - the small bucket on the backhoe made it impossible to determine which caused the refusal Note: WATER seeping into pit from 1-3' depth No CAVING TOTAL DEPTH 6'0" Backfilled 11-7-96					

GRAPHIC REPRESENTATION S WALL SCALE: 1" = 5'0" SURFACE SLOPE: TREND: N 87 E ←



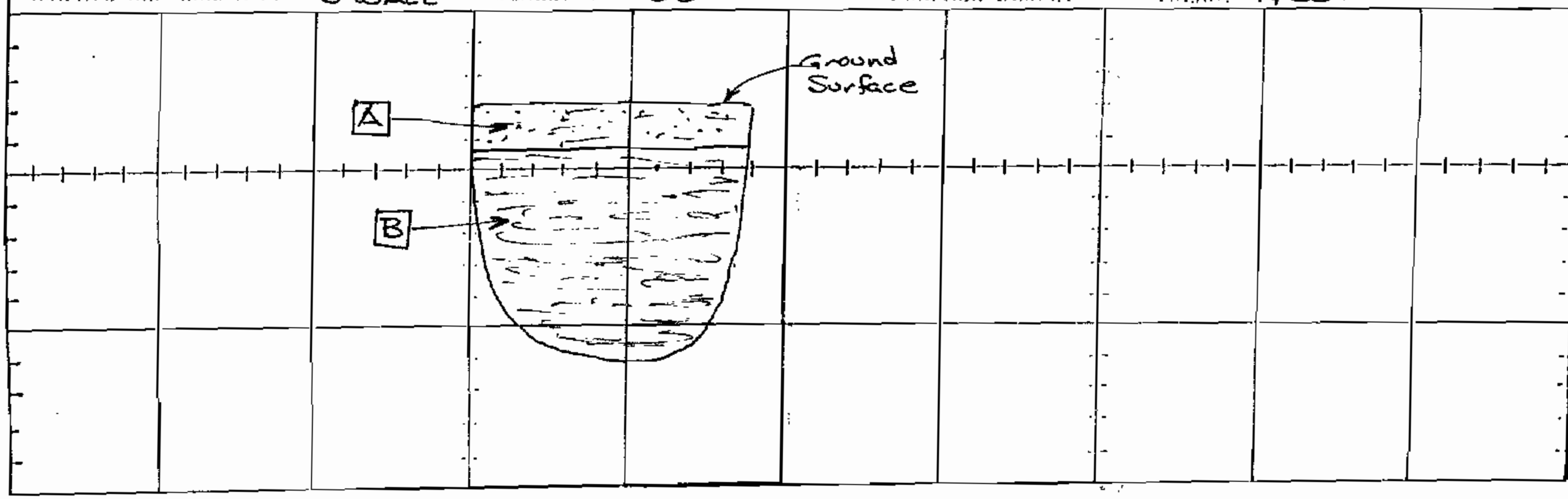
OF TRENCH NO. TP-2

Project Name: Tontitown
Logged By: R Hill
Project Number:
Elevation: 1287±
TRENCH NO. TP-3
Equipment: CAT 426 Backhoe.
Location: 100 N 700 E

ENGINEERING PROPERTIES: U.S.C.S. | Sample No. | Moisture (%) | Density (pcf)

GEOLOGIC ATTITUDES	DATE: 11-7-96 DESCRIPTION:	GEOLOGIC UNIT	U.S.C.S.	Sample No.	Moisture (%)	Density (pcf)
	[A] 0-1'4" Top soil, silty clay with abundant plant roots and gravel sized rock fragments brown color [B] 1'4"-8'2" Red clay with abundant chert fragments Notes Material below the first few inches depth are dry. No water seepage NO CAVING TOTAL DEPTH 8'2" Backfilled 11-7-96					

GRAPHIC REPRESENTATION S WALL SCALE: 1" = 5'0" SURFACE SLOPE: TREND: N 56 E ←



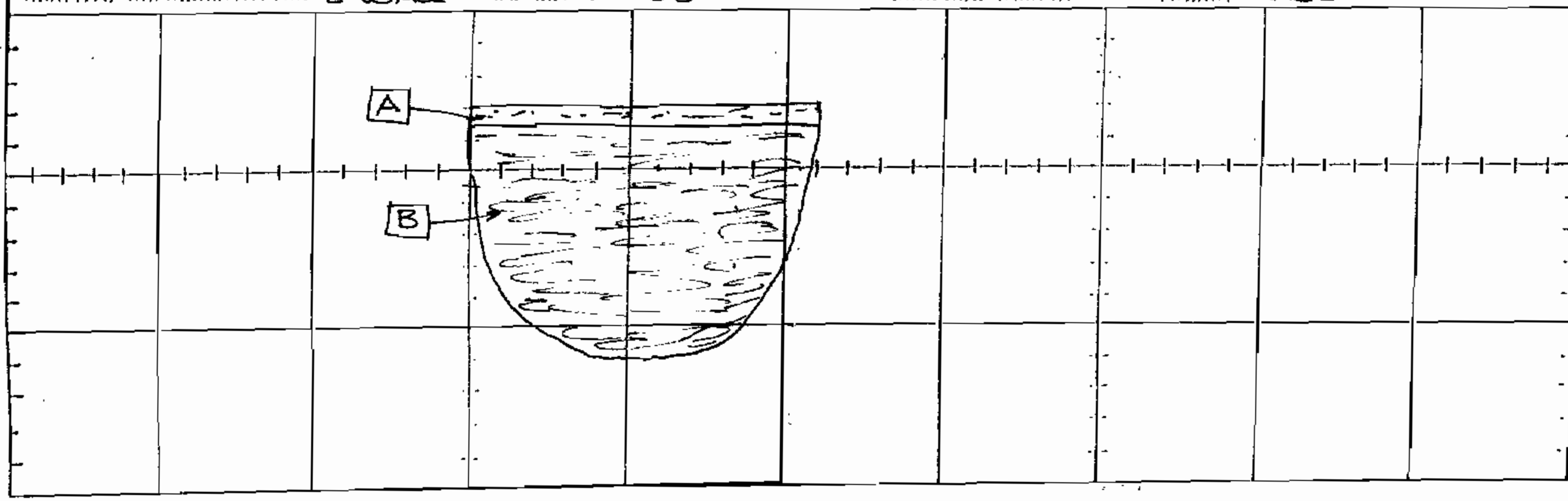
LOG OF TRENCH NO. TP-3

Project Name: Tontitown | Logged By: R Hill
Project Number: | Elevation: 1273±
Equipment: CAT 426 Backhoe | Location: 400 N 600E | TRENCH NO. TP4

GEOLOGIC ATTITUDES	DATE: 11-7-96 DESCRIPTION:	GEOLOGIC UNIT	U.S.C.S.	SAMPLE NO.	MOISTURE (%)	DENSITY (pcf)
	[A] 0-0'6" Top Soil, brown color, silt with Rock fragments, dry, Few Plant roots [B] 0'6"-8'0" Red clay with abundant chert fragments, dry Note: No WATER No CAVING Total depth 8'0" Backfilled 11-7-96					

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION E WALL SCALE: 1" = 5'0" SURFACE SLOPE: TREND: N18E ←



LOG OF TRENCH NO: TP4

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ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

MEMORANDUM

TO : Mike Hood, Technical Branch Manager, Solid Waste MH

THRU : Robert Lemmer, Geologist Supervisor, Solid Waste REL

FROM : Dave Ann Pennington, Geologist, Solid Waste DP

DATE : January 7, 1997

SUBJECT : Sunray Tontitown's Analytical Results from the September, 1996 Sampling Event and the Submittal of the First Half 1996 Statistical Evaluation Report
CSN: 72-0144 Permit No.: 162-SR-2

Parameters tested were metals, inorganics, and volatiles. The following are the results of the September, 1996 sampling event at the above referenced facility.

MW-1

Iron **4600 ug/l** SDWS 300 ug/l
Manganese **8940 ug/l** SDWS 50 ug/l
TDS **626 mg/l** SDWS 500 mg/l
Vinyl Chloride **14 ug/l** MCL 2 ug/l
Chloroethane **6 ug/l** MCL n/a
1,1-Dichloroethane **24 ug/l** MCL n/a
cis-1,2-Dichloroethene **9 ug/l** MCL 70 ug/l
Benzene **5 ug/l** MCL 5 ug/l
1,4-Dichlorobenzene **12 ug/l** MCL 75 ug/l

MW-3

Iron **334 ug/l** SDWS 300 ug/l
Manganese **2210 ug/l** SDWS 50 ug/l

Vinyl Chloride **6 ug/l** MCL 2 ug/l
1,1-Dichloroethane **3 ug/l** MCL n/a

MW-4

Iron **1010 ug/l** SDWS 300 ug/l
Manganese **9320 ug/l** SDWS 50 ug/l
TDS **634 mg/l** SDWS 500 mg/l
Vinyl Chloride **7 ug/l** MCL 2 ug/l
1,1-Dichloroethane **10 ug/l** MCL n/a
cis-1,2-Dichloroethene **16 ug/l** MCL 70 ug/l
Benzene **3 ug/l** MCL 5 ug/l
Trichloroethene **4 ug/l** MCL 5 ug/l

MW-5

Trichlorofluoromethane **4 ug/l** MCL n/a
1,1-Dichloroethane **6 ug/l** MCL n/a
Tetrachloroethene **4 ug/l** MCL 5 ug/l

MW-6

Vinyl Chloride **5 ug/l** MCL 2 ug/l
1,1-Dichloroethane **5 ug/l** MCL n/a
Trichloroethene **3 ug/l** MCL 5 ug/l
Tetrachloroethene **3 ug/l** MCL 5 ug/l

MW-7

Manganese **1060 ug/l** SDWS 50 ug/l
Acetone **36 ug/l** MCL n/a
1,1-Dichloroethane **3 ug/l** MCL n/a
cis-1,2-Dichloroethene **7 ug/l** MCL 70 ug/l

MW-11

Iron **514 ug/l** SDWS 300 ug/l

MCL - Maximum Contaminant Level
SDWS - Secondary Drinking Water Standards

A statistical evaluation has not been presented for the September, 1996 sampling event. A detailed report is expected after the next sampling event, scheduled for the Spring of 1997.

Vinyl Chloride exceeded its MCL in monitoring wells MW-1, MW-3, MW-4, and MW-6. Vinyl chloride is primarily used to make polyvinyl chloride plastic. Some of the vinyl chloride found in the environment is believed to come from the breakdown of other compounds such as trichloroethylene, trichloroethane, and tetrachloroethylene. Vinyl chloride has been used as a propellant in spray cans. Vinyl chloride is also a component of tobacco smoke. Vinyl chloride is listed by the Department of Health and Human Services as a known human carcinogen (Memorandum by Robert Lemmer dated August 2, 1996).

The benzene level reported for monitoring well MW-1 matched its MCL level of 5 ug/l. Benzene is used in many products including plastics, rubber products, lubricants, dyes, detergents, and it is a major component of gasoline. It is also found in many natural products especially tobacco smoke. Benzene is listed by the Department of Health and Human Services as a known human carcinogen (Memorandum by Robert Lemmer dated August 2, 1996).

The iron concentrations in monitoring wells MW-1, MW-3, MW-4, and MW-11 exceeded the Secondary Drinking Water Standards. The manganese concentrations in monitoring wells MW-1, MW-3, MW-4, and MW-7 exceeded the Secondary Drinking Water Standards. The total dissolved solids concentrations in monitoring wells MW-1 and MW-4 exceeded the Secondary Drinking Water Standards. Secondary Drinking Water Standards are associated with the aesthetic qualities of drinking water.

On November 26, 1996, I sent a letter to Kevin Hodges of Sunray, stating that monitoring well MW-3 must be added to the assessment monitoring program because the MCL for vinyl chloride was exceeded in this well at the March, 1996 and June 1996 sampling events. The Maximum Contaminant Level (MCL) of 2 ug/l was exceeded in monitoring wells MW-1, MW-3, and MW-4 for vinyl chloride.

On December 30, 1996, I sent a letter to Kevin Hodges of Sunray granting the request that the December, 1996 sampling event be postponed until the next scheduled event in March, 1997 so as to not interfere with the ongoing dye test study. Also, the water quality of the samples could be compromised by the dyes used in the test.

Based on the results of the historical groundwater monitoring data from April, 1993 to June, 1996, Genesis reported (Submittal of First Half 1996 Statistical Evaluation Report for the Sunray/USA Waste Tontitown Class I Sanitary Landfill, Permit No. 162-SR-2 dated December 20, 1996) statistically significant increases for two volatile parameters in Monitoring Well MW-1. These parameters were 1,1 dichloroethane, and 1,4 dichlorobenzene. 1,1 dichloroethane is used as a solvent and cleaning compound and is listed as a suspect carcinogen.