CDM Camp Dresser & McKee

environmental services

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Fac/Perm/Co ID #	Date	Doc ID#
BC	12/17/10	DIN

AUG 1995
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Solid Waste
Section

August 4, 1995

Mr. William D. Sessoms, P.E.
Solid Waste Section
North Carolina Department of Environment, Health
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Subject: Solid Waste Section Technical Review
Permit to Construct Application
Proposed Buncombe County Solid Waste Management Facility

Dear Mr. Sessoms:

This letter has been prepared in response to the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR) second technical review letter dated July 31, 1995 for the referenced project.

In order to assist the Solid Waste Section's review of this response letter, this submittal has been formatted to present NCDEHNR's comment (in bold type) followed immediately by Camp Dresser & McKee's (CDM) response. In most cases, the response provides a stand-alone answer and the referenced Permit to Construct sections. Supporting documents and/or drawings have been modified accordingly.

In making revisions to the contents of the report, CDM has included a revision date in the lower right-hand corner of each revised page of the attached supporting documents. Also, a vertical line (bar) in the right margin has been used to delineate those portions of supporting documents that have been modified as part of this response.

Since submittal of CDM's response to comment letter of the Section's initial review of the Permit to Construct Application, Buncombe County wishes to include construction of the drainage relief system, located to the east of Cell 3, in the initial construction phase. We would appreciate if if the Section's approval to construct this system was included in the Draft Permit to Construct.

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n:\buncombe\permapp\commresp.lt2

We trust these responses and associated support documentation are sufficient for your review, however, if any additional questions should arise during the review process, please do not hesitate to call on us for further clarification or assistance. We appreciate your assistance and expedient turnaround time in reviewing this document for Buncombe County.

Very truly yours,

CAMP DRESSER & McKEE

L.B. Garrett, Jr. FOR JOSEPH F. WISEMAN, JR. & TIMOTHY D. GRANT

Joseph F. Wiseman, Jr., P.E.
Principal Engineer

Timothy D. Grant, P.G.

cc: Bob Hunter - Buncombe County
Bernie Garrett - CDM
William Almes - CDM

SOLID WASTE SECTION COMMENT

Section 1 - Facility Report

The Facility Report (page 1-1) states that tires, white goods, and yard/wood waste will be handled on other portions of the site. Revise to reflect that these items will be handled on a separate site.

RESPONSE

A revised page 1-1 is included.

SOLID WASTE SECTION COMMENT

Section 3 - CQA Plan

Section 7 - LLDPE, refers to the layer below the synthetic cap as subgrade rather than the clay liner or cap. Please revise.

Pages 7-5, 7-9, 7-11, 7-12, and 7-13 refer to the Engineer Field Representative (EFR) as the EAR.

Section 9, Page 9-1, Should #5 stone be #57 stone?

RESPONSE

A revised Section 7 and Section 9, page 9-1 is included. Note that the stone in the leachate header line trench is NCDOT No. 4, which is consistent with the Detail on Sheet D-4.

SOLID WASTE SECTION COMMENT

Section 4 - Operations Plan

Section 5.5 and 9.4 of the Operations Plan has an incorrect zip code for the Solid Waste Section.

RESPONSE

A revised Section 5.5, page 5-7 and Section 9.4, page 9-2 is included.

SOLID WASTE SECTION COMMENT

Section 5 - Closure and Post-Closure Plan

The closure cost estimate is for 10 gas monitoring wells. The post-closure cost estimate for gas well monitoring indicates 5 wells. On drawing SD-2, 11 wells are shown. Please revise to reflect final design.

cessively greater depths to obtain travel times from a seismic source placed at the surface (Mooney, 1981). Seismic velocities can also be obtained by conducting refraction surveys.

Seismic investigations are carried out from a point where borehole information is available or where the stratigraphy has been determined through other geophysical methods. To locate the water table with the refraction method, the water table should be well above the contact between the bedrock and the overlying alluvial deposits (Wallace, 1970). If seismic exploration methods are used in conjunction with other geophysical methods, exploratory drilling costs can be minimized.

In the seismic reflection method, the seismic wave produced by a hammer blow or other seismic source reflects off the bedrock and returns directly to the geophone, where the elapsed time is recorded. In order to maximize the reliability of the reflected wave energy, hammer stations are usually not more than 30 ft (9.1 m) from the geophone.

The most difficult problem with the reflection method is that the reflected wave is never the first to appear on the seismic record. Therefore, on an ordinary receiving device its arrival is almost impossible to recognize among the multitude of other wave arrivals. This problem can be overcome by using signal enhancement, which permits the operator to separate the primary reflected wave from other waves. In practice, the operator strikes a hammer plate one or more times at five to ten sites that are located within 30 ft (9.1 m) of the geophone. The seismic signals received from these sites are summed automatically by the seismograph. When the signals from several hammer sites are summed, the surface waves and other extraneous impulses which ordinarily obscure the primary reflected wave are canceled out, leaving the primary

Table 8.2. Approximate Range of Velocities of Compressional (P) Waves for Representative Materials Found in the Earth's Crust

Material	Velocity* ft/sec	Velocity* m/sec
Weathered surface material	1,000 - 2,000	305 - 610
Gravel, rubble, or sand (dry)	1,500 - 3,000	457 - 915
Sand (wet)	2,000 - 6,000	610 - 1,830
Clay	3,000 - 9,000	915 - 2,740
Water (depending on temperature and salt content)	4,700 - 5,500	1,430 - 1,680
Sea water	4,800 - 5,000	1,460 - 1,520
Sandstone	6,000 - 13,000	1,830 - 3,960
Shale	9,000 - 14,000	2,740 - 4,270
Chalk	6,000 - 13,000	1,830 - 3,960
Limestone	7,000 - 20,000	2,130 - 6,100
Salt	14,000 - 17,000	4,270 - 5,180
Granite	15,000 - 19,000	4,570 - 5,790
Metamorphic rocks	10,000 - 23,000	3,050 - 7,010
Ice	12,050	3,670

*The higher values in a given range are usually obtained at depth.

(Jakosky, 1950)

RESPONSE

Revised closure and post closure cost estimates are included based on 11 gas monitoring wells.

SOLID WASTE SECTION COMMENT

Section 6 - Water Quality Monitoring Plan

Please refer to the attached Memorandum for hydrogeologic comments.

RESPONSE

Please refer to the hydrogeologic responses provided below. In summary, additional clarification has been provided on revised Drawings EP-3, D-1, and D-3.

Hydrogeologic Review of "Response To Comments - Buncombe County MSWLF Landfill Design Hydrogeologic Report"

The following section is presented in response to the comments in the memorandum from Mr. Bobby Lutfy dated July 28, 1995, regarding the hydrogeologic review of the Response to Comments report. Some of the Solid Waste Section comments have been summarized.

SOLID WASTE SECTION COMMENT

OK ±

The SWS stated that the depth to bedrock elevations for BC-114 and B-314 in Table 1 are incorrect.

RESPONSE

The depth to bedrock at this location was calculated using the depth to refusal for boring B-314C. This boring was advanced using mud rotary drilling methods and encountered refusal at 32.5 feet below ground surface. BC-114 was advanced using hollow stem augers and encountered refusal at 28.5 feet below ground surface. Using the depth to bedrock as determined at B-314, the bedrock elevations given in Table 1 are correct for this location. Depth to refusal using hollow stem augers can be highly variable and often, refusal is encountered on hard lenses within the partially weathered rock zone. Using the refusal depth obtained by mud rotary drilling methods is a better indicator of the bedrock depth.

SOLID WASTE SECTION COMMENT

?

This comment addresses the depth to bedrock in the vicinity of the leachate pond, specifically at B-247.

BC-125 bedrock elev 1966

RESPONSE

Auger refusal at boring B-247 was likely caused by a hard lens within the saprolite or partially weathered rock zone rather than the bedrock surface. Depth to auger refusal at B-247 was encountered at significantly higher elevation than at other borings at similar elevations (for example, auger refusal at BC-108 was encountered at 48.5 feet, while at B-247 auger refusal was encountered at 5.5 feet), which would further indicate that auger refusal was the result of a hard lens within the partially weathered rock zone. In order to verify that bedrock elevation was deeper at this location than was indicated by auger refusal, a seismic refraction survey was conducted at this and other critical locations. A copy of the seismic refraction survey report is included in Appendix A. The plates included in the report have been modified by CDM to show the base grade elevations and the top of bedrock elevations. Survey profile line B was conducted in the area around B-247.

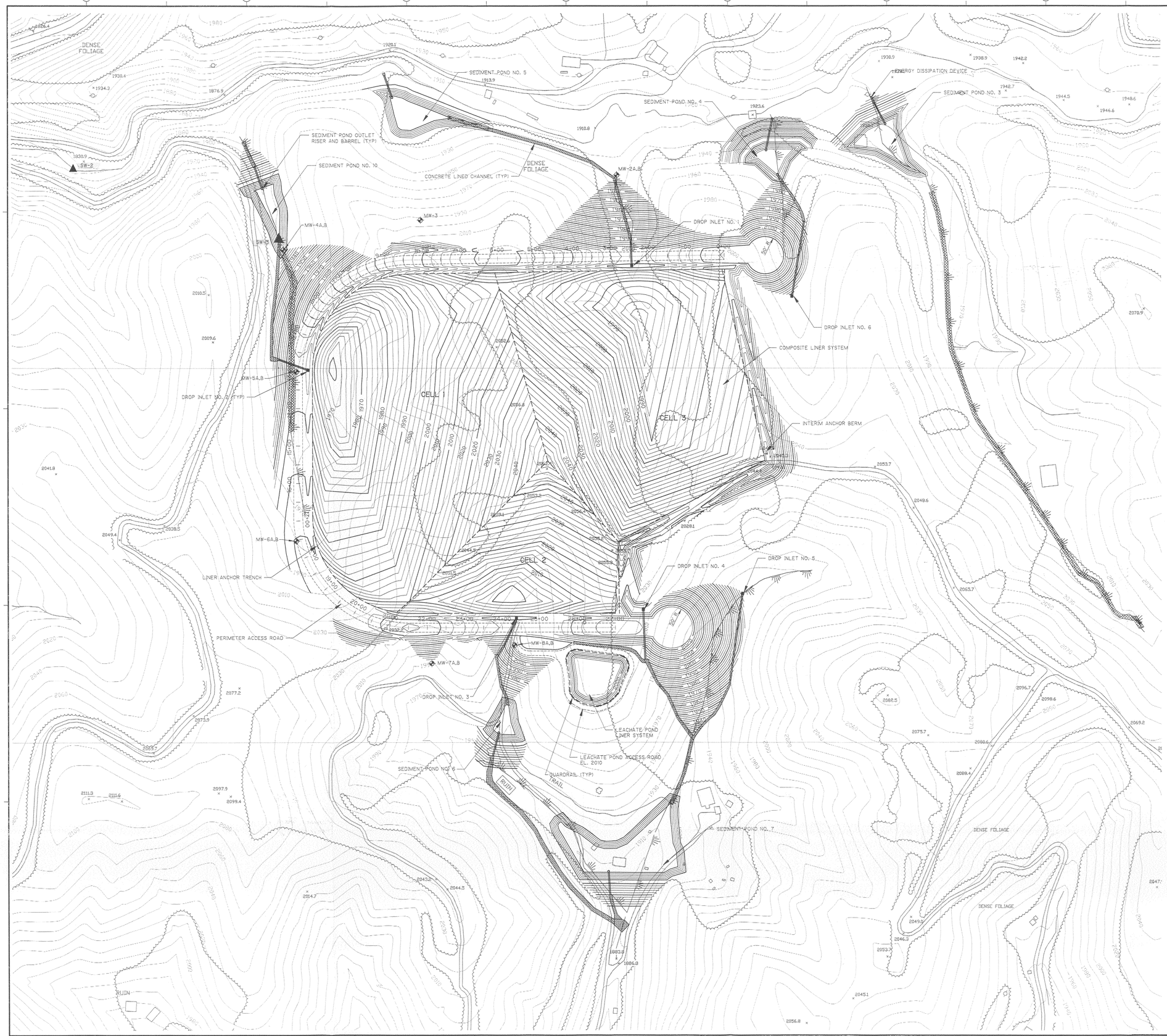
Seismic profiles are determined by increases in velocity, the denser the material, the higher the velocity. A seismic velocity of 10,000 to 23,000 ft/sec would be expected for bedrock (Source: Groundwater and Wells, Fletcher Driscoll, 1986, page 172). Therefore, the seismic profiles lines shown in the attached report represent the top of the partially weathered rock surface rather than the top of bedrock surface. For example, the seismic profile for Line B indicates a velocity for the overburden soils of 1,533 feet per second (ft/sec) and a velocity of the partially weathered bedrock of 5,188 ft/sec. Note that on the seismic profile for Line B, the seismic line, which correlates to the top of the partially weathered rock surface, closely parallels the top of bedrock elevation line until it nears the area around B-247. At this point the bedrock elevation line rises quickly to approximately the same elevation as the partially weathered rock seismic line. This would indicate that the auger refusal depth at B-247 was encountered at the top of the partially weathered rock zone rather than the top of bedrock. It would be expected that the top of bedrock surface would continue to parallel the seismic line, keeping the same separation, thus giving approximately 10 feet separation between the bottom of the leachate pond and the top of the bedrock surface.

Also attached are graphs prepared by Caterpillar, Inc, which provide an estimation of the ripping ability for various equipment based on seismic velocity. Note that the maximum velocity for rippability by a D9 for metamorphic rock is over 7,000 ft/sec. The velocity of 5,188 ft/sec is well within the range of rippable material for standard excavation equipment. This further indicates that in the area of B-247 is not bedrock but rather partially weathered rock. This also applies to the area around B-314. Seismic velocity in that area was calculated to be 6,501 ft/sec, still well within the range of rippable material.

SOLID WASTE SECTION COMMENT

OK

This comment stated that the Base Grade Elevation in Sheet 1 of the Response To Comments report (and LC-1 of the Facility Plan) are different from the revised Base Grade Elevations illustrated on Sheet EP-2 of the Engineering Plan.



N

1" = 100'
50 0 100

NOTES:

1. MW-1A,B WELL NEST IS LOCATED APPROXIMATELY 2800 FEET EAST OF CELLS 1-3. THIS LOCATION WILL SERVE AS THE BACKGROUND MONITORING POINT FOR THE LIFE OF THE LANDFILL. SEE FIGURE 3-1 FOR LOCATION.
2. CELL GRADING CONTOURS ARE BOTTOM OF CLAY LINER.
3. SW-1, UPGRADIENT SURFACE WATER SAMPLING LOCATION, IS LOCATED AT EASTERN EDGE OF PROPERTY. SEE FIGURE 3-1 FOR LOCATION.

1970

TREELINE
LIMITS OF CELL/LEACHATE POND
PROPOSED LANDFILL PERIMETER ACCESS ROAD
SPRING DRAIN
CONCRETE CHANNEL
MW-12A GROUNDWATER MONITORING WELL
SW-2 SURFACE WATER SAMPLING LOCATION

AUG 1995 Received Solid Waste Section

REV. NO.	DATE	DRWN.	CHKD	REMARKS
1	8/2/95	TMB	TDG	REVISED MONITORING WELL LOCATIONS AND BASE GRADE

DESIGNED BY: B. GARRETT
DRAWN BY: J. KILLINGSWORTH / M. BASS
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: AUGUST 1995

CAMP DRESSER & McKEE

environmental engineers, scientists, planners, & management consultants CDM

BUNCOMBE COUNTY
NORTH CAROLINA

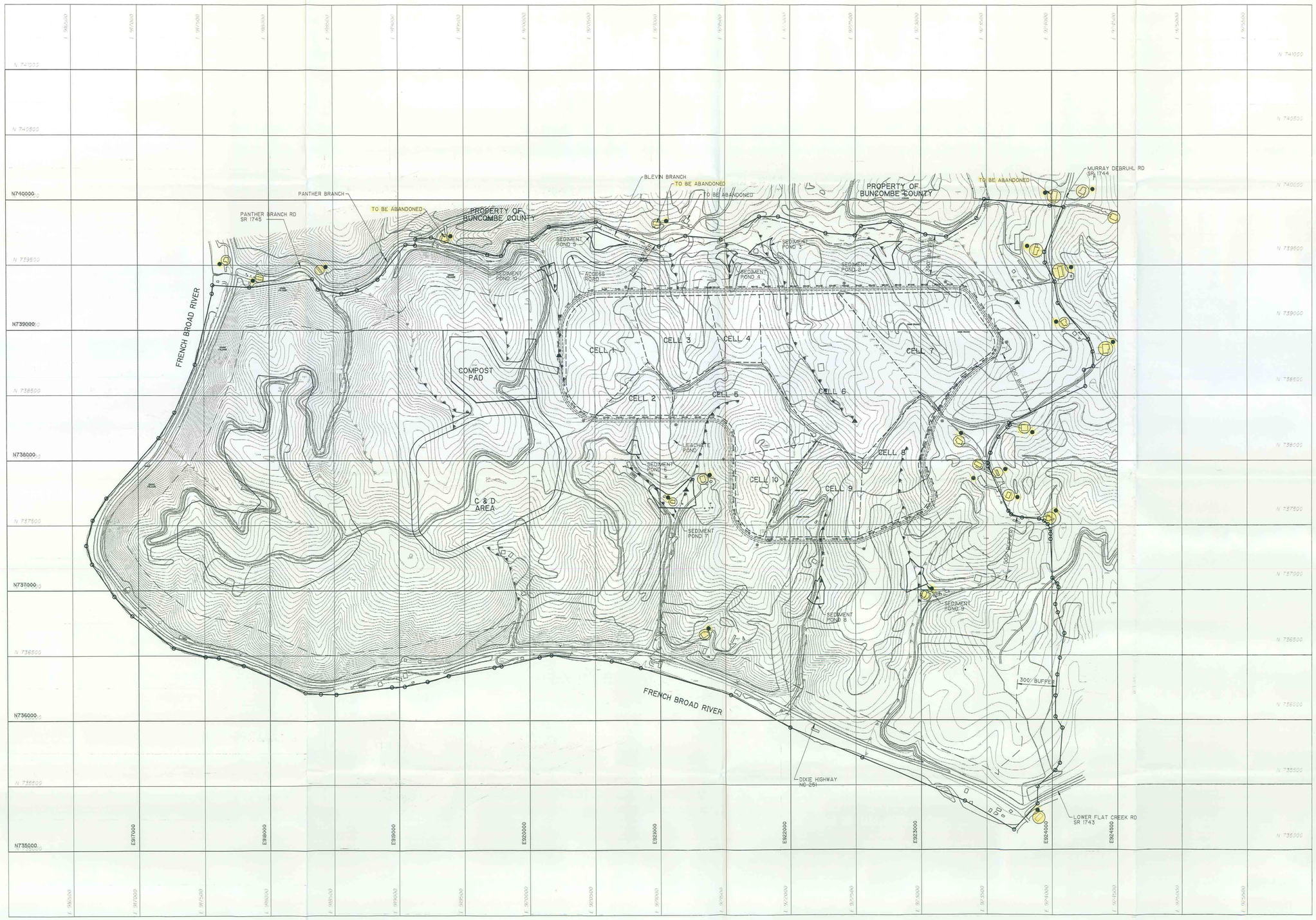
BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

WATER QUALITY MONITORING PLAN

PROJECT NO. 6447-01
FILE NAME: PLATE3-1

SHEET NO.
PLATE 3-1

C:\6447-01\ PLATE3-1 08/02/95 16:05:33 Mike Bass, Camp Dresser and Mc



N

1" = 300'

150 0 300

NOTES:

1. A 300 FOOT BUFFER IS MAINTAINED BETWEEN THE PROPOSED MSWLF PROPERTY LIMITS AND THE MSWLF UNITS.
2. A 500 FOOT BUFFER IS MAINTAINED BETWEEN EXISTING PRIVATE RESIDENCES/WELLS AND THE MSWLF UNITS.
3. A 50 FOOT BUFFER IS MAINTAINED BETWEEN THE MSWLF AND THE EXISTING STREAMS (BLEVIN BRANCH AND PANTHER BRANCH) AND THE FRENCH BROAD RIVER.
4. EXISTING PIEZOMETER, MONITORING WELLS, AND BOREHOLES ARE NOT SHOWN FOR CLARITY. REFERENCE DESIGN HYDROGEOLOGICAL REPORT.
5. ADDITIONAL INFORMATION ON RESIDENTIAL WATER SUPPLY WELLS WAS OBTAINED FROM ¼ MILE RADIUS MAP INCLUDED IN SITE PLAN APPLICATION.

- EXISTING INDEX CONTOUR
- PROPOSED MSWLF PROPERTY LIMITS
- LIMITS OF CELL/LEACHATE POND
- CENTERLINE OF PERIMETER ROAD (0+00 1+00 2+00)
- EDGE OF PROPOSED LANDFILL ACCESS ROAD
- BLEVIN BRANCH
- REQUIRED BUFFER
- JURISDICTIONAL SYSTEM
- PROPOSED IMPACTED JURISDICTIONAL SYSTEM
- EXISTING TREELINE
- SPRING DRAIN
- STRUCTURE
- PRIVATE RESIDENCE
- WATER SUPPLY WELL
- PROPOSED GAS MONITORING WELL

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REV. NO.	DATE	DRWN	CHKD	REMARKS
1	7/7/95	LBG		ADD FUTURE OPERATIONS BORROW AREA
2	7/7/95	LBG		ADD METHANE GAS MONITORING WELL LOCATIONS

DESIGNED BY: B. GARRETT
DRAWN BY: J. KILLINGSWORTH / M. BASS
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY: J. WISEMAN
DATE: AUGUST 1995

CAMP DRESSER & McKEE

environmental engineers, scientists, planners, & management consultants CDM

BUNCOMBE COUNTY
NORTH CAROLINA

FACILITY PLAN
BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

RESIDENTIAL WELL LOCATIONS

PROJECT NO. 6447-11
FILE NAME: SHT-3

SHEET NO. 3

C:\6447-11\ SHT-3 08/02/95 14:45:15 0/07:21 Mike Bass, Camp Dresser and Mc

N

1" = 300'
150 0 300

NOTES:

1. A 300 FOOT BUFFER IS MAINTAINED BETWEEN THE PROPOSED MSWLF PROPERTY LIMITS AND THE MSWLF UNITS.
2. A 500 FOOT BUFFER IS MAINTAINED BETWEEN EXISTING PRIVATE RESIDENCES/WELLS AND THE MSWLF UNITS.
3. A 50 FOOT BUFFER IS MAINTAINED BETWEEN THE MSWLF AND THE EXISTING STREAMS (BLEVIN BRANCH AND PANTHER BRANCH) AND THE FRENCH BROAD RIVER.
4. THERE ARE NO ON-SITE WETLANDS.
5. THE MSWLF DOES NOT DAMAGE, DESTROY, OR ADVERSELY IMPACT ANY CULTURAL RESOURCES, STATE NATURE AND HISTORICAL PRESERVES, WATER SUPPLY WATERSHEDS, OR ENDANGERED AND THREATENED SPECIES.
6. ADDITION MSWLF SITING RESTRICTIONS INCLUDING FAULT AREAS, SEISMIC IMPACT ZONES, AND UNSTABLE AREAS ARE ADDRESSED IN THE ENGINEERING PLAN REPORT - GEOTECHNICAL SITE EVALUATION.
7. EXISTING PIEZOMETER, MONITORING WELLS, AND BOREHOLES ARE NOT SHOWN FOR CLARITY. REFERENCE DESIGN HYDROGEOLOGICAL REPORT.

BENCHMARK INFORMATION

BENCHMARK NO.	NORTHING	EASTING	ELEVATION
1	741469.14	924888.04	2095.93
2	736529.19	920914.95	1774.94
3	736345.61	918761.82	1766.00
4	739502.72	917735.76	1745.34
5	740603.72	916917.82	1747.56

- EXISTING INDEX CONTOUR
- PROPOSED MSWLF PROPERTY LIMITS
- LIMITS OF CELL/LEACHATE POND
- CENTERLINE OF PERIMETER ROAD
- EDGE OF PROPOSED LANDFILL ACCESS ROAD
- BLEVIN BRANCH
- REQUIRED BUFFER
- JURISDICTIONAL SYSTEM
- PROPOSED IMPACTED JURISDICTIONAL SYSTEM
- EXISTING TREELINE
- SPRING DRAIN
- MAXIMUM STAGE OF SEDIMENT POND
- 100 YEAR FLOOD PLAIN
- STRUCTURE
- PRIVATE RESIDENCE
- POWER POLE
- BENCHMARK
- MW-1A GROUNDWATER MONTORING WELL
- SW-1 SURFACE WATER SAMPLING STATION

AUG 1995 Received Solid Waste Section

REV. NO.	DATE	DRWN	CHKD	REMARKS
1	8/2/95	TMB	TDG	REVISED MONITORING WELL LOCATIONS

DESIGNED BY: B. GARRETT
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MARCH 1995

CAMP DRESSER & McKEE

environmental engineers, scientists, planners, & management consultants CDM

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

SITE WATER QUALITY MONITORING PLAN

PROJECT NO. 6447-11
FILE NAME: SSWQMP

SHEET NO. 2

C:\6447-11\ SIT-2 08/02/95 16:30:23 0:04:06 Mike Bass, Camp Dresser and Mc

NOTES:

1. CONTOURS WITHIN LIMITS OF CELL/LEACHATE POND REPRESENT PROPOSED BASE GRADE.
2. CONTOURS OUTSIDE LIMITS OF CELL/LEACHATE POND REPRESENT FINISHED GRADE.

LEGEND

- 1970 — EXISTING INDEX CONTOUR
- PROPERTY LINE WITH CORNER
- 2000 — PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- JURISDICTIONAL SYSTEM
- FUTURE IMPACTED JURISDICTIONAL SYSTEM
- SPRING HEAD
- EXISTING TREELINE
- LIMITS OF CELL/LEACHATE POND
- PROPOSED LANDFILL PERIMETER ACCESS ROAD
- SPRING DRAIN
- CONCETE FLUME
- RIP-RAP LINED CHANNEL
- CONCRETE LINED CHANNEL
- METHANE GAS MONITORING WELL

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Solid Waste
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REV. NO.	DATE	DRWN	CHKD	REMARKS
1	7/7/95	LBG		CELL GRADING REVISED FOR ALTERNATE GROUNDWATER MONITORING SYSTEM

DESIGNED BY: B. GARRETT
DRAWN BY: J. KILLINGSWORTH
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: JULY 1995

CAMP DRESSER & McKEE

environmental engineers, scientists, planners, & management consultants **CDM**

BUNCOMBE COUNTY
NORTH CAROLINA

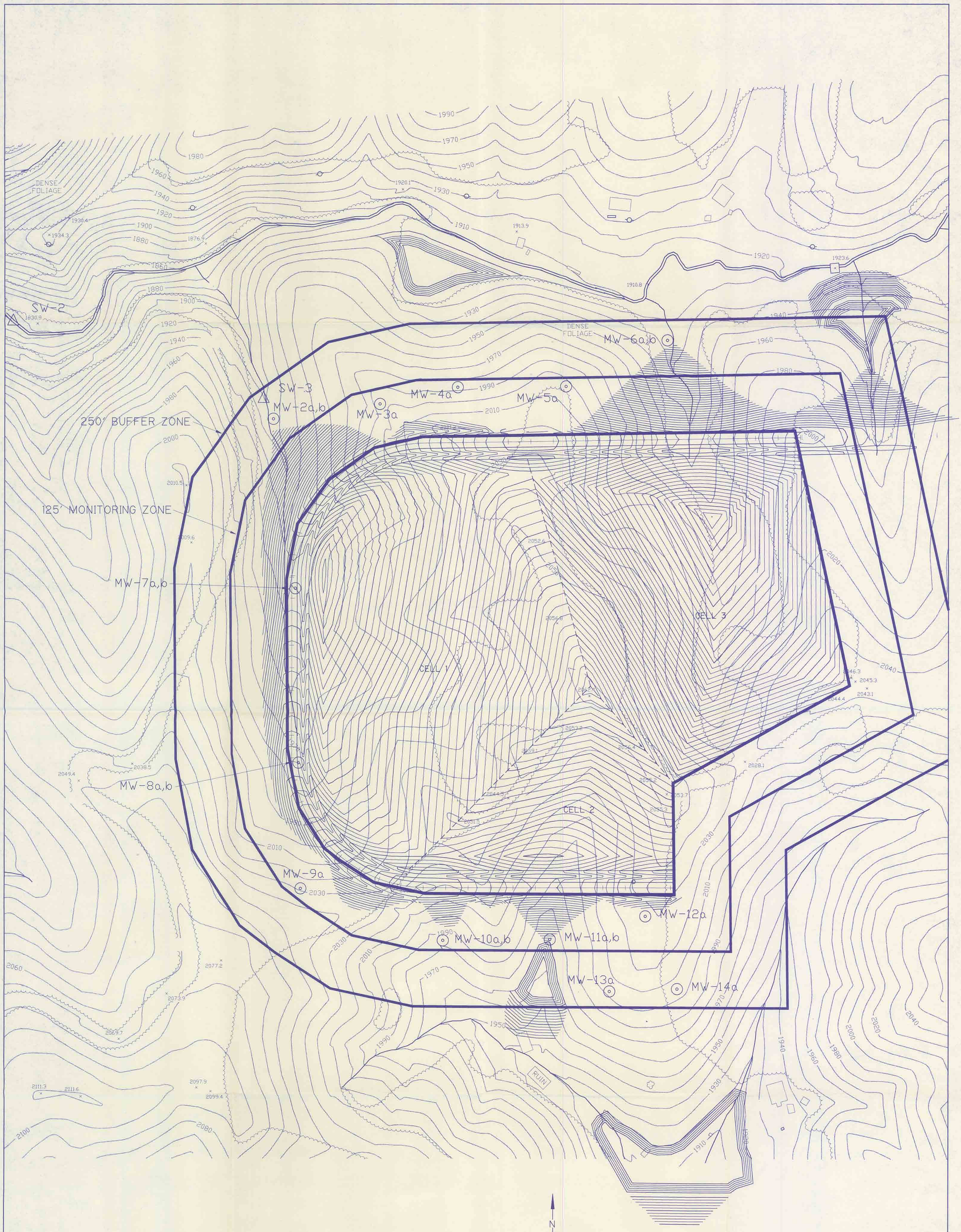
ENGINEERING PLAN
BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

LANDFILL BASE GRADE AND BORING LOCATIONS

PROJECT NO. 6447-11
FILE NAME: BASEGRAD

SHEET NO. 1

F:\TEMP\ EP-2 07/09/95 15:23:15 10:07:52 Mike Boss, Camp Dresser and Mc



REVISED JUNE 1995

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:
DRAWN BY:
SHEET CHK'D BY:
DATE:

CAMP DRESSER & McKEE INC.

environmental engineers, scientists, planners, & management consultants

CDM

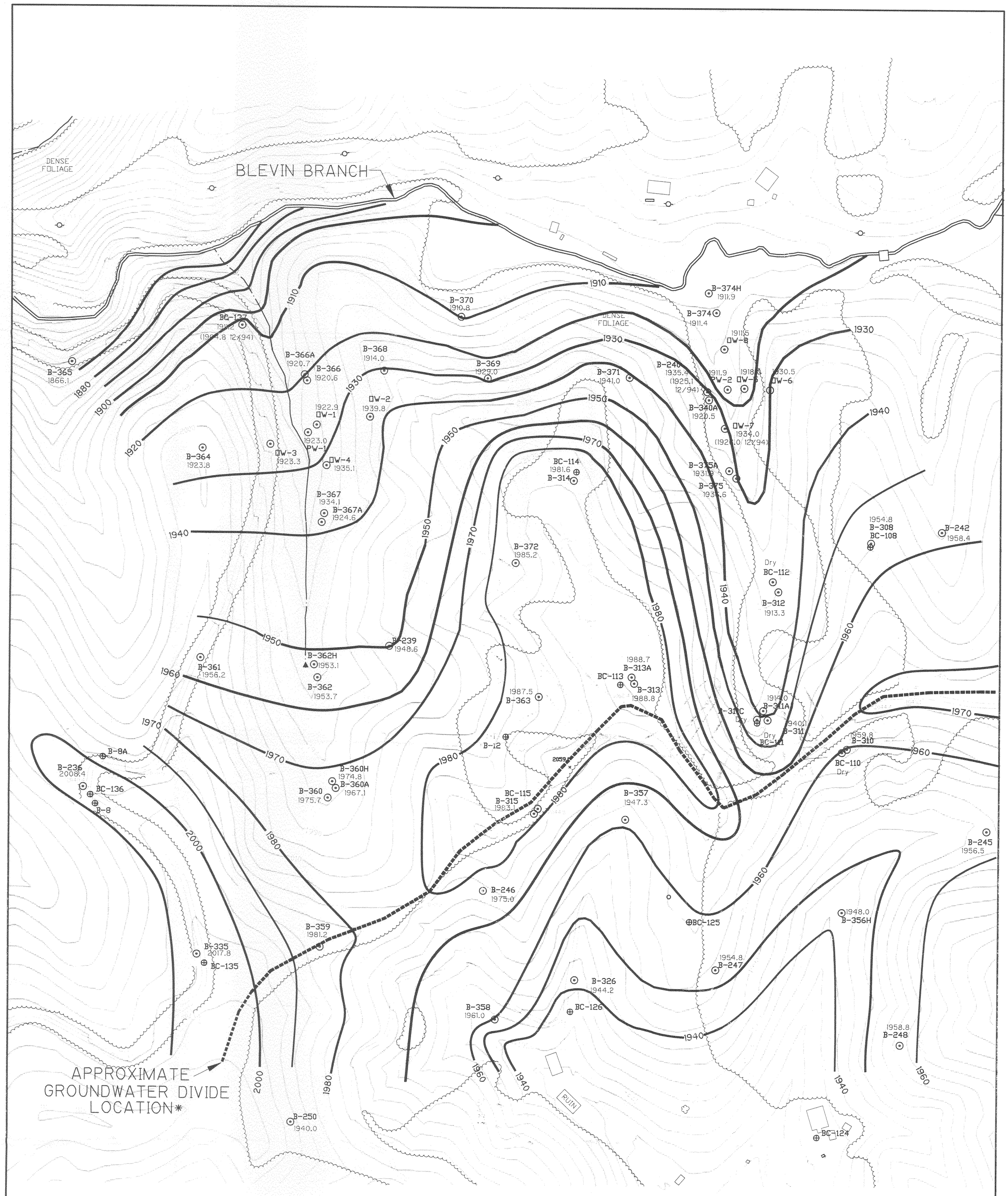
BUNCOMBE COUNTY
NORTH CAROLINA

NEW BUNCOMBE COUNTY SOLID WASTE FACILITY

WATER QUALITY MONITORING PLAN

PROJECT NO. 6447-010

SHEET NO. PLATE 3-1



LEGEND

⊕ B-8	BOREHOLE (INSTALLED 1990)
⊕ BC-126	BOREHOLE
⊙ BC-135	PIEZOMETER (INSTALLED 1992)
⊙ B-250	PIEZOMETER (INSTALLED 1993)
⊙ B-360	PIEZOMETER (INSTALLED 1994)
1942.2	WATER LEVEL ELEVATION DATUM 2/17/95 (SEE TABLE 3-5)
⌒	WATER LEVEL CONTOUR (FEET MSL)

WATER LEVEL CONTOUR INTERVAL = 10 FEET

NOTE: CONTOURING IS A FUNCTION OF PIEZOMETER DEPTH COMPLETION AS WELL AS WATER LEVEL AREAL DISTRIBUTIONS

* BETWEEN BLEVIN BRANCH TO THE NORTH AND THE FRENCH BROAD RIVER TO THE SOUTH.

▲ SPRINGHEAD

REVISED JUNE 1995

CAMP DRESSER & McKEE INC.

environmental engineers, scientists, planners, & management consultants CDM

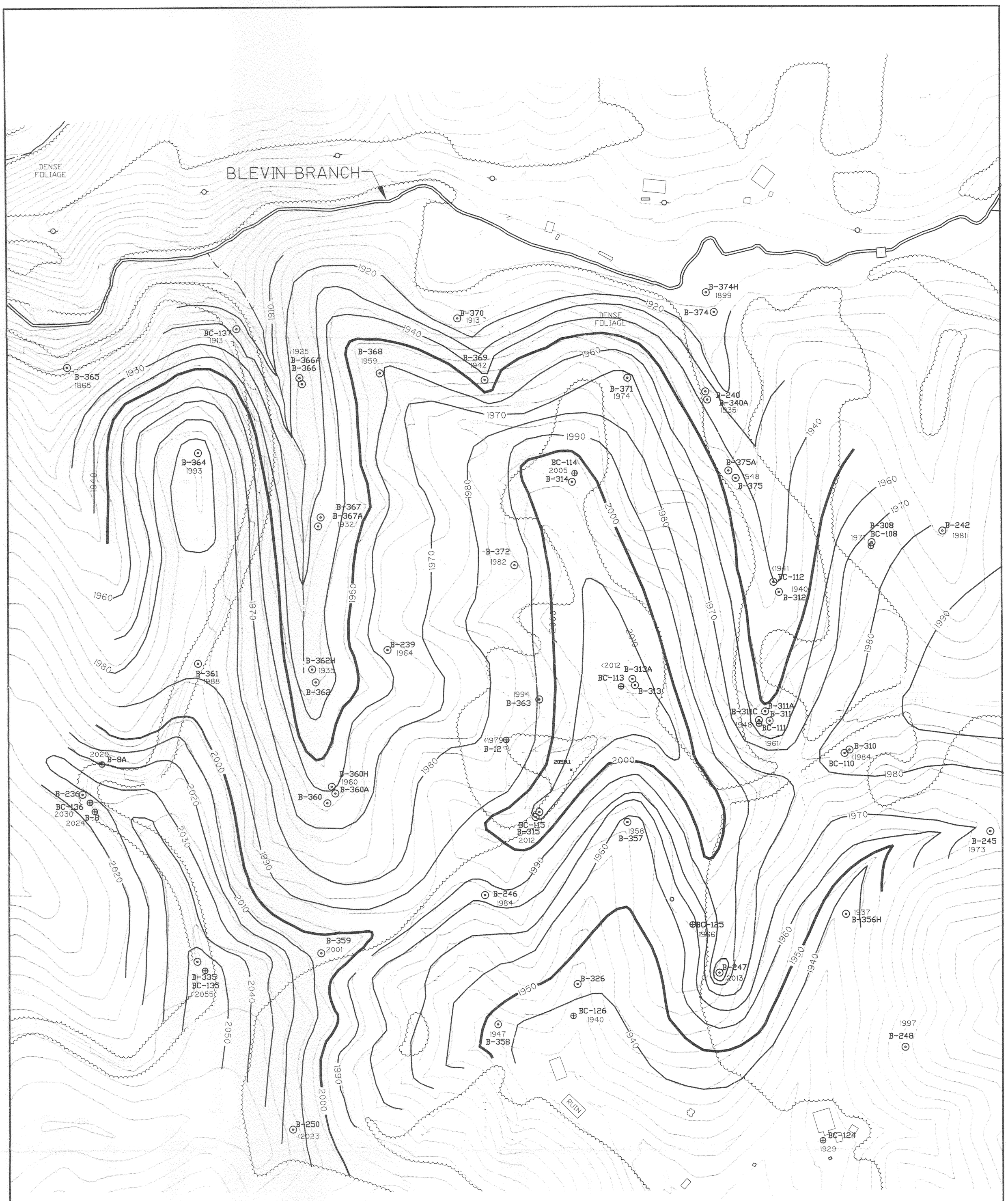
BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

POTENTIOMETRIC SURFACE MAP
FEBRUARY 1995, CELL 1-3 AREA

PROJECT NO. 6447-010
FILE NAME: WATLEV.DWG

PLATE
3-5



LEGEND

⊕ B-8	BOREHOLE (INSTALLED 1990)
⊕ BC-126	BOREHOLE
⊙ BC-135	PIEZOMETER (INSTALLED 1992)
⊙ B-250	PIEZOMETER (INSTALLED 1993)
⊙ B-360	PIEZOMETER (INSTALLED 1994)
2055 FT	BEDROCK ELEVATION DATUM (SEE TABLE 3-1)
⌒	BEDROCK CONTOUR (FEET MSL)

BEDROCK CONTOUR INTERVAL = 10 FEET

REVISED JUNE 1995

CAMP DRESSER & McKEE INC.

environmental engineers, scientists, planners, & management consultants CDM

BUNCOMBE COUNTY
NORTH CAROLINA

BUNCOMBE COUNTY SOLID WASTE MANAGEMENT FACILITY

TOP OF BEDROCK ELEVATION MAP CELL 1-3 AREA

PROJECT NO. 6447-010
FILE NAME: BEDROCK

PLATE
3-3

Summary of Base Grade, Ground Surface, Bedrock, and Water Level Elevations
Buncombe County Solid Waste Management Facility

Table 1

Boring/ Well	Ground Surface Elevation (feet msl)	Base Grade Elevation (feet msl)	Excavation /Fill Depth * (feet)	Top of Bedrock Elevation (feet msl)	Height above Bedrock (feet)	Water Level Elevation ** (feet msl)	Height above Water (feet)
BC-108	2019.9	2012	-8	1971.4	41	DRY	ND
B-308	2017.1	2012	-5	1971.4	41	1954.83	57
BC-110	2032.2	NA	NA	< 1983.7	NA	DRY	NA
B-310	2033.7	NA	NA	< 1983.7	NA	1959.75	NA
BC-111	2004.0	2012	8	1961.0	51	ND	ND
B-311C	2002.9	2012	9	1948.4	64	DRY	ND
B-311	2006.2	2013	7	1948.4	65	1940.05	73
B-311A	2003.1	2009	6	1948.4	61	1914.00	95
BC-112	1975.5	1990	15	< 1941.0	> 49	DRY	ND
B-312	1977.8	1992	14	1940.3	52	1913.33	79
BC-113	2060.7	2046		< 2012.0	34	ND	ND
B-313	2058.6	2042	-17	< 2012.0	30	1988.81	53
B-313A	2058.2	2042	-16	< 2012.0	30	1988.73	53
BC-114	2034.8	2010		2004.5	6	ND	ND
B-314C	2037.0	2010	-27	2004.5	6	1981.63	28
BC-115	2044.6	2021	-24	2012.1	9	DRY	ND
B-315	2044.8	2019	-26	2012.1	7	1983.11	36
BC-124	1934.9	NA	NA	1929.0	NA	ND	NA
BC-125	2031.6	2010	-22	1965.6	44	ND	ND
BC-126	1957.0	1950	-7	1940.0	10	ND	ND
B-326	1963.9	1968	4	1947.0	21	1944.24	24
BC-135	2071.6	NA	NA	2054.5	NA	ND	NA
B-335	2071.6	NA	NA	2054.5	NA	2017.76	NA
BC-136	2050.0			2029.5	NA	ND	NA
B-236	2050.0	NA	NA	2029.5	NA	2008.40	NA
BC-137	1922.0	NA	NA	1913.0	NA	1911.22	NA
B-239	1986.9	1970	-17	1963.7	6	1948.58	21
B-240	1939.8	1974	34	1934.8	39	1935.42	39
B-340A	1942.7	1981	38	1934.8	46	1920.54	60
B-242	1988.4	NA	NA	1980.9	NA	1958.42	NA
B-245	1985.8	NA	NA	1973.3	NA	1956.48	NA
B-246	2027.1	2020	-7	1984.1	36	1975.04	45
B-247	2018.2	2006	-12	1996.0***	10	1954.76	51
B-248	2002.3	NA	NA	1997.3	NA	1958.84	NA

Fill

Fill

OK

OK

?

Table 1 (cont.)

Summary of Base Grade, Ground Surface, Bedrock, and Water Level Elevations
Buncombe County Solid Waste Management Facility

Boring/ Well	Ground Surface Elevation (feet msl)	Base Grade Elevation (feet msl)	Excavation /Fill Depth * (feet)	Top of Bedrock Elevation (feet msl)	Height above Bedrock (feet)	Water Level Elevation ** (feet msl)	Height above Water (feet)
B-250	2074.9	NA	NA	< 2023.4	NA	1939.96	NA
B-356H	1952.3	1986	34	1937.3	49	1947.97	38
B-357	2013.6	2015	1	1957.6	57	1947.29	68
B-358	1956.6	NA	NA	1946.6	NA	1961.01	NA
B-359	2045.5	NA	NA	2000.5	NA	1981.23	NA
B-360H	1974.4	2000	26	1960.4	40	1974.80	25
B-360	1977.5	2000	22	1960.4	40	1975.74	24
B-360A	1977.1	2000	23	1960.4	40	1967.07	33
B-361	2015.3	NA	NA	1988.3	NA	1956.19	NA
B-362H	1956.7	1986	29	1935.7	50	1953.14	33
ok B-362	1959.0	1985	26	1935.7	49	1953.74	31
B-363	2028.8	2023	-6	1994.3	29	1987.50	36
B-364	2008.4	NA	NA	1992.9	NA	1923.77	NA
B-365	1870.3	NA	NA	1865.3	NA	1866.08	NA
B-366	1929.9	NA	NA	1925.3	NA	1920.55	NA
B-366A	1930.8	NA	NA	1925.3	NA	1920.66	NA
B-367	1943.9	1991	47	1932.4	59	1934.10	57
B-367A	1944.6	1989	44	1932.4	57	1924.63	64
B-368	1977.9	NA	NA	1958.9	NA	1913.95	NA
B-369	1960.1	NA	NA	1941.6	NA	1929.04	NA
B-370	1934.0	NA	NA	1913.0	NA	1910.77	NA
ok B-371	1989.2	NA	NA	1973.7	NA	1940.95	NA
B-372	2025.4	2007	-18	1981.4	25	1985.20	22
B-374H	1914.9	NA	NA	1898.4	NA	1911.90	NA
B-374	1921.7	NA	NA	1898.4	NA	1911.38	NA
B-375	1954.3	1993	39	1947.8	45	1936.55	56
B-375A	1953.5	1991	38	1947.8	43	1931.91	59
Minimum			-27		6		21
Maximum			47		65		95
Average			NA		37		47

NA = Not Applicable (outside landfill area).

ND = Not Determined (borehole not completed as piezometer).

* Positive number indicates fill, negative number indicates cut.

** The seasonal high water level elevation data are from February 1995.

*** Estimated from seismic refraction survey.

RESPONSE

The base grade elevations on Sheet 1 have been revised to be consistent with the base grade elevations shown in Sheet EP-2 (7/95). A revised Sheet 1 is attached. A revised Table 1 is also included reflecting the changes in the base grades in Cells 1-3. Base grade elevations shown on Sheet LC-1 (3/95) indicate the original submittal base grades for the entire facility. Base grade elevations indicated on the Engineering Plan drawings represent base grade contours revised for the alternative groundwater monitoring system.

SOLID WASTE SECTION COMMENT

OK **This comment stated that the Alternate Groundwater Monitoring System for the leachate pond is not shown on the revised design drawings.**

RESPONSE

The limits of the Alternate Groundwater Monitoring System for the leachate pond is shown on Sheet EP-3. The leachate pond liner system detail (B/D-1) has been modified to include the Alternate Groundwater Monitoring System.

SOLID WASTE SECTION COMMENT

OK **This comment requests additional discussion and details for the Alternate Groundwater Monitoring System.**

RESPONSE

The applicability of alternative monitoring has been evaluated and a system has been designed that, in conjunction with the groundwater monitoring wells and the surface water sampling locations, should provide adequate means to monitor groundwater quality on the site. The alternate monitoring system is designed to detect contamination where it is most likely to first occur., i.e. to supplement conventional groundwater monitoring wells. The proposed system consists of a high permeability stone layer underlain by a scrim reinforced plastic tarp, located below the sump areas within each cell. The stone layer will provide a preferential pathway where any leakage from the landfill units will be collected. An outlet pipe with a capped end will be installed from the low point of the stone layer through the landfill embankment (sloped for positive drainage). Note that some infiltration of stormwater may occur, as is the case with conventional monitoring wells, therefore the presence of water in the system will not necessarily indicate a leak. Analytical testing of any water collected will be used to determine if a leak has occurred.

To accommodate the alternative monitoring system, minor revisions have been made to the subbase grading in each cell. The grading revisions will provide a larger, flatter sump area in each cell. The revisions will allow a meaningful alternative monitoring system area to be defined and will lower the maximum head on the liner in a sump area if a pump failure occurs. The plan view area covered by the Alternate Monitoring System is defined by the area at each cell that would pond stormwater from a 25 year

on Sheet 3.

SOLID WASTE SECTION COMMENT

This comment requested that all wells within 500 feet of the facility boundary be clearly identified and that any wells within 500 feet of Cells 1-3 should be sampled prior to Permit To Operate.

RESPONSE

OK

Sheet 3 shows the location of all water supply wells within 500 feet of the facility boundary. There are three wells located within 500 feet of Cells 1-3, but these wells are on property being acquired by the County and thus are scheduled to be abandoned. Therefore, sampling will not be required.

SOLID WASTE SECTION COMMENT

OK

The certification of the effectiveness of the water quality monitoring system (Appendix B) needs to say a geological professional, not an "engineering professional".

RESPONSE

The revised certification page is included in Appendix B.

SOLID WASTE SECTION COMMENT

This comment stated that the designations for the proposed monitoring wells are different on Plate 3-1 and Sheet 2.

RESPONSE

During the meeting on August 1, 1995 between CDM and the Solid Waste Section, revisions to the groundwater monitoring well network were discussed. As a result of these discussions, Plate 3-1 and Sheet 2, attached following this letter, have been revised and present the proposed locations for the groundwater monitoring wells. The proposed groundwater monitoring system has been revised to account for the addition of the Alternate Monitoring System that underlies the critical portions of Cells 1, 2 and 3, and the entire leachate pond. The monitoring wells target the preferential flow pathways identified in the Design Hydrogeologic Report. Monitoring wells will not be necessary around the leachate pond since the Alternate Monitoring System underlies the entire area. Table 3-1 from the Water Quality Monitoring Plan has also been revised to reflect these changes and is attached to this letter. This table presents the anticipated completion depths for each well and the rationale for the well location.

SOLID WASTE SECTION COMMENT

OK **For the Sampling and Analysis Plan, revised text needs to be provided to be inserted into the Design Hydrogeologic Report to clarify the sampling frequency, sampling equipment protocol, statistical comparisons, and the phrase "within 30 days".**

RESPONSE

The revised Sections 4 and 5 of the Sampling and Analysis Plan are attached.

Table 1

Summary of Base Grade, Ground Surface, Bedrock, and Water Level Elevations
Buncombe County Solid Waste Management Facility

Boring/ Well	Ground Surface Elevation (feet msl)	Base Grade Elevation (feet msl)	Excavation /Fill Depth * (feet)	Top of Bedrock Elevation (feet msl)	Height above Bedrock (feet)	Water Level Elevation ** (feet msl)	Height above Water (feet)
BC-108	2019.9	2012	-8	1971.4	41	DRY	ND
B-308	2017.1	2012	-5	1971.4	41	1954.83	57
BC-110	2032.2	NA	NA	< 1983.7	NA	DRY	NA
B-310	2033.7	NA	NA	< 1983.7	NA	1959.75	NA
BC-111	2004.0	2012	8	1961.0	51	ND	ND
B-311C	2002.9	2012	9	1948.4	64	DRY	ND
B-311	2006.2	2013	7	1948.4	65	1940.05	73
B-311A	2003.1	2009	6	1948.4	61	1914.00	95
BC-112	1975.5	1990	15	< 1941.0	> 49	DRY	ND
B-312	1977.8	1992	14	1940.3	52	1913.33	79
BC-113	2060.7	2046		< 2012.0	34	ND	ND
B-313	2058.6	2042	-17	< 2012.0	30	1988.81	53
B-313A	2058.2	2042	-16	< 2012.0	30	1988.73	53
BC-114	2034.8	2010		2004.5	6	ND	ND
B-314C	2037.0	2010	-27	2004.5	6	1981.63	28
BC-115	2044.6	2021	-24	2012.1	9	DRY	ND
B-315	2044.8	2019	-26	2012.1	7	1983.11	36
BC-124	1934.9	NA	NA	1929.0	NA	ND	NA
BC-125	2031.6	2010	-22	1965.6	44	ND	ND
BC-126	1957.0	1950	-7	1940.0	10	ND	ND
B-326	1963.9	1968	4	1947.0	21	1944.24	24
BC-135	2071.6	NA	NA	2054.5	NA	ND	NA
B-335	2071.6	NA	NA	2054.5	NA	2017.76	NA
BC-136	2050.0			2029.5	NA	ND	NA
B-236	2050.0	NA	NA	2029.5	NA	2008.40	NA
BC-137	1922.0	NA	NA	1913.0	NA	1911.22	NA
B-239	1986.9	1970	-17	1963.7	6	1948.58	21
B-240	1939.8	1974	34	1934.8	39	1935.42	39
B-340A	1942.7	1981	38	1934.8	46	1920.54	60
B-242	1988.4	NA	NA	1980.9	NA	1958.42	NA
B-245	1985.8	NA	NA	1973.3	NA	1956.48	NA
B-246	2027.1	2020	-7	1984.1	36	1975.04	45
B-247	2018.2	2006	-12	1996.0***	10	1954.76	51
B-248	2002.3	NA	NA	1997.3	NA	1958.84	NA

Table 1

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Buncombe County Solid Waste Management Facility

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B-358	1956.6	NA	NA	1946.6	NA	1961.01	NA
B-359	2045.5	NA	NA	2000.5	NA	1981.23	NA
B-360H	1974.4	2000	26	1960.4	40	1974.80	25
B-360	1977.5	2000	22	1960.4	40	1975.74	24
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B-361	2015.3	NA	NA	1988.3	NA	1956.19	NA
B-362H	1956.7	1986	29	1935.7	50	1953.14	33
B-362	1959.0	1985	26	1935.7	49	1953.74	31
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B-370	1934.0	NA	NA	1913.0	NA	1910.77	NA
B-371	1989.2	NA	NA	1973.7	NA	1940.95	NA
B-372	2025.4	2007	-18	1981.4	25	1985.20	22
B-374H	1914.9	NA	NA	1898.4	NA	1911.90	NA
B-374	1921.7	NA	NA	1898.4	NA	1911.38	NA
B-375	1954.3	1993	39	1947.8	45	1936.55	56
B-375A	1953.5	1991	38	1947.8	43	1931.91	59
Minimum			-27		6		21
Maximum			47		65		95
Average			NA		37		47

NA = Not Applicable (outside landfill area).

ND = Not Determined (borehole not completed as piezometer).

* Positive number indicates fill, negative number indicates cut.

** The seasonal high water level elevation data are from February 1995.

*** Estimated from seismic refraction survey.

Table 3-1

Water Quality Monitoring Plan Wells
Buncombe County Solid Waste Management Facility

Nest	Well	Drilling Method	Screen Interval Depth (feet) **	Rationale
MW-1	MW-1a	Air Rotary	35-50	Background Well Nest
	MW-1b	Air Rotary	80-90	Background Well Nest
MW-2	MW-2a *	HSA	5-20	Downgradient of Cell 3 sump within drainage feature
	MW-2b	Air Rotary	40-50	Downgradient of Cell 3 sump within drainage feature
MW-3	MW-3	Air Rotary	35-50	Drainage feature
MW-4	MW-4a *	HSA	5-20	Drainage feature between sed. pond and MSWLF
	MW-4b	Air Rotary	40-50	Drainage feature between sed. pond and MSWLF
MW-5	MW-5a *	HSA	5-20	Downgradient of Cell 1 sump within drainage feature
	MW-5b	Air Rotary	40-50	Downgradient of Cell 1 sump within drainage feature
MW-6	MW-6a	Air Rotary	20-35	Head of drainage feature
	MW-6b	Air Rotary	55-65	Head of drainage feature
MW-7	MW-7a	Air Rotary	20-35	Drainage feature
	MW-7b	Air Rotary	55-65	Drainage feature
MW-8	MW-8a	Air Rotary	20-35	Downgradient of Cell 2 sump within drainage feature
	MW-8b	Air Rotary	50-60	Downgradient of Cell 2 sump within drainage feature

* Optional well, will be installed only if a sufficient thickness of saturated saprolite/PWR is found. (The shallow bedrock well may include any saturated saprolite/PWR zone).

** The screen interval depths are estimated. Actual depths will be depended on subsurface conditions. below the bottom of the shallow bedrock well, or until fractures are encountered up to 100 feet bgs.

Table 3-1

Water Quality Monitoring Plan Wells
Buncombe County Solid Waste Management Facility

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	MW-2b	Air Rotary	40-50	Downgradient of Cell 3 sump within drainage feature
MW-3	MW-3	Air Rotary	35-50	Drainage feature
MW-4	MW-4a *	HSA	5-20	Drainage feature between sed. pond and MSWLF
	MW-4b	Air Rotary	40-50	Drainage feature between sed. pond and MSWLF
MW-5	MW-5a *	HSA	5-20	Downgradient of Cell 1 sump within drainage feature
	MW-5b	Air Rotary	40-50	Downgradient of Cell 1 sump within drainage feature
MW-6	MW-6a	Air Rotary	20-35	Head of drainage feature
	MW-6b	Air Rotary	55-65	Head of drainage feature
MW-7	MW-7a	Air Rotary	20-35	Drainage feature
	MW-7b	Air Rotary	55-65	Drainage feature
MW-8	MW-8a	Air Rotary	20-35	Downgradient of Cell 2 sump within drainage feature
	MW-8b	Air Rotary	50-60	Downgradient of Cell 2 sump within drainage feature

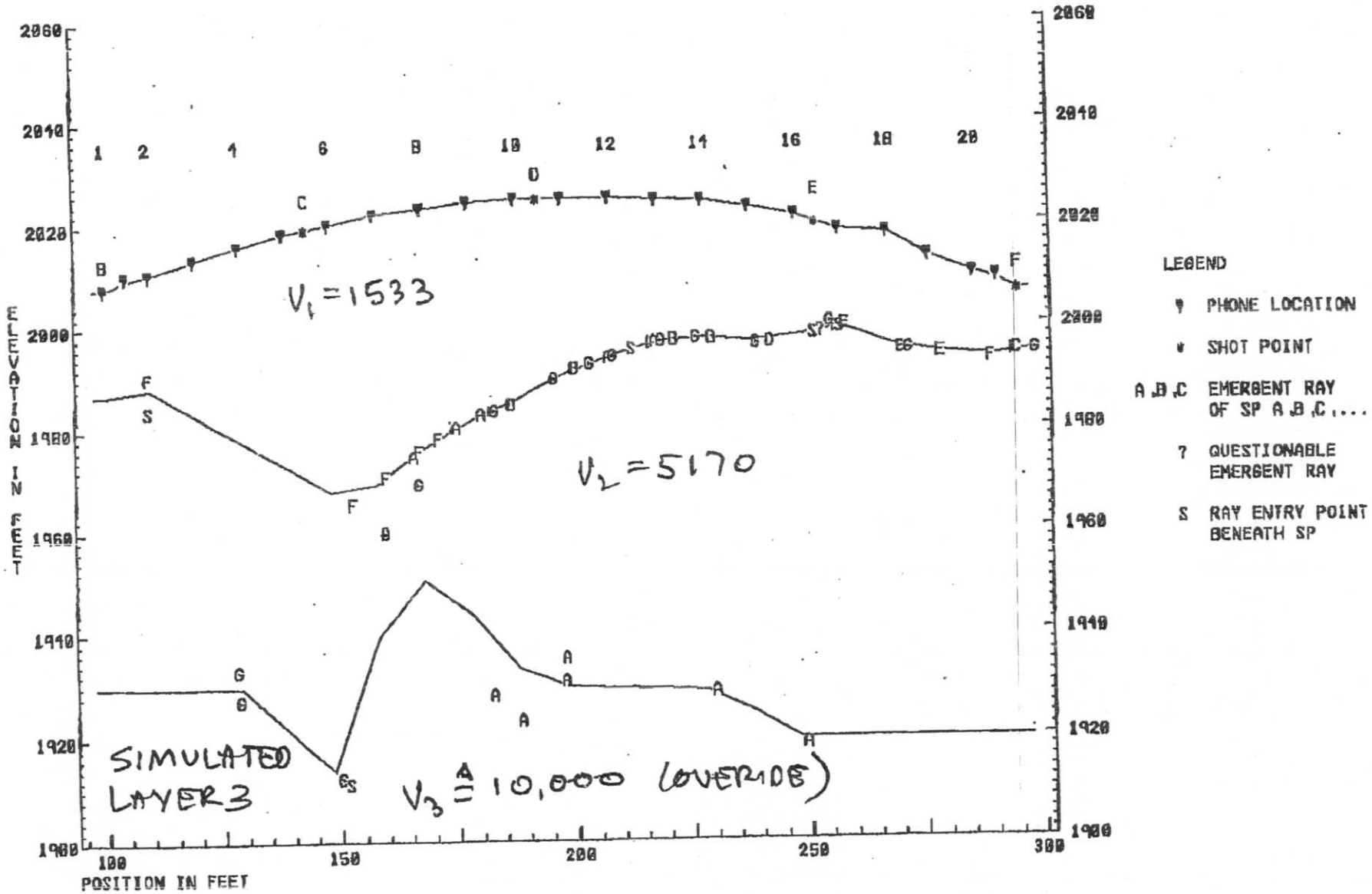
* Optional well, will be installed only if a sufficient thickness of saturated saprolite/PWR is found. (The shallow bedrock well may include any saturated saprolite/PWR zone).

** The screen interval depths are estimated. Actual depths will be depended on subsurface conditions. below the bottom of the shallow bedrock well, or until fractures are encountered up to 100 feet bgs.

FILE 8SV2TB1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

LINE B

SPREAD 1



SEISMIC REFRACTION SURVEY
PROPOSED BUNCOMBE COUNTY
MUNICIPAL SOLID WASTE FACILITY
BUNCOMBE COUNTY, NORTH CAROLINA

Prepared for:

GEI Consultants, Inc.
7721 Six Forks Road, Suite 136
Raleigh, North Carolina 27615-5014

July 14, 1995

Prepared by:

North American Exploration Of Virginia, Inc.
Post Office Box 7584
Charlottesville, Virginia 22906
(804) 973-4328
(804) 973-9791 Fax

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Survey Method	1
Data Processing	2
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Table 1 Calculated Seismic Velocities

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Seismic Refraction Profile LINE A	Plate 2
Seismic Refraction Profile LINE B	Plate 3
Seismic Refraction Profile LINE C	Plate 4
Seismic Refraction Profile LINE D	Plate 5
Seismic Refraction Profile LINE E	Plate 6
Seismic Refraction Profile LINE F	Plate 7
Seismic Refraction Profile LINE G	Plate 8
Seismic Refraction Profile LINE H	Plate 9
Seismic Refraction Profile LINE J	Plate 10

Appendices

Appendix A Time Distance Plot of Raw Arrival Times, Input Data Files, and Depth Model Tables for Lines A through J

Appendix B Table Showing NAEVA Coordinate System vs. Hutchinson and Biggs Coordinates

INTRODUCTION

North American Exploration of Virginia, Inc. (NAEVA) was contracted by GEI Consultants, Inc. to conduct a seismic refraction survey in selected portions of the new Buncombe County Solid Waste Management Facility, northwest of Asheville, North Carolina. The site overlies Precambrian gneiss or granitic gneiss, reported to be overlain by 30 to 65 feet of residual overburden.

The survey objective was to investigate depth to bedrock below nine survey lines, using seismic refraction techniques. The line locations and lengths were selected by GEI Consultants. The seismic data were processed to provide a profile along the survey line of the depth to the first refractive layer, interpreted as bedrock. Field work was performed on June 13 and 14, 1995.

SURVEY METHOD

The geophysical investigation utilized a Bison 9024 24 channel seismograph, with 14 Hz geophones and a 10 foot geophone spacing. Hutchinson and Biggs, a local surveying firm, established nine survey lines (Plate 1), marking stations every 10 feet along the lines. The lines varied in length from 110 to 400 feet and were designated A, B, C, D, E, F, G, H, J. Total line footage for the nine lines is 1,840 feet. A four geophone overlap was used on Line E, the only line long enough to require two spreads. Preliminary work was performed at the first shot point (on Line B) to determine the preferred seismic source and number of samples per channel. Field printouts were used to compare results of a 16 pound sledgehammer with 12 stacks versus 1 stack from a Betsy Seisgun using 10 gauge, 219 grain blackpowder shotgun shells. The Seisgun produced a record with substantially less noise and cleaner first breaks and was used for

the remainder of the survey. A sample rate of 0.2 milliseconds with 1,000 samples per channel was selected, resulting in a time window of 200 ms. Depending on the length of the seismic spread, 5 to 7 shot points were recorded per spread. The shot points were placed at 20 to 40 foot offsets on either end of the spreads, at end points, and at one to three locations within the spreads.

DATA PROCESSING

The seismic data were processed using SIPx software programs from Rimrock Geophysical. SIPx uses the delay-time method to produce a first-approximation model which is refined by iterative ray tracing. The software allows the data to be interpreted as either a 2 layer model or a 3 layer model. A two-layer model was found to produce a better result at this particular site. Using a 2 layer model (overburden and weathered bedrock), bedrock profiles were generated along the seismic lines and are presented as Plates 2 through 10. Acoustic velocities averaged approximately 1,400 feet per second for the overburden and approximately 5,200 feet per second for the weathered bedrock. Calculated seismic velocities are summarized in Table 1. Depth to the first refracting layer varied from a minimum of 8 to a maximum depth of 48 feet. Because the seismic refraction lines were rather short (most were approximately 200 feet long), no deeper layer was detected with higher velocities (of order 10,000 ft/sec) appropriate for hard, fresh bedrock.

CONCLUSIONS

The refractor depicted on Plates 2 through 9 probably represents the top surface of weathered bedrock and is likely shallower than ripping refusal. Interpreted refractor depth varies from 8 to 48 feet. It is expected that a gradational change is present, with weathered rock of indeterminate thickness overlying fresh, competent rock. Depth to hard rock could be defined with longer spreads (greater geophone separation) and stronger seismic sources (or more stacks).

Note that the shortest line (Line G, 110 feet long) indicates a second layer velocity of only 3,663 ft/sec. Two other short lines (Lines C and D, each 150 feet long) indicate relatively slow second layer velocities of 3,770 and 2,523 ft/sec, respectively. If these lines had been longer, they might have sensed a somewhat deeper and faster (+5,000 ft/sec) second layer, similar to the other lines, or a third refractor. This may explain the poor agreement between the south end of Line C and the north end of Line A. The cross points (intersections) of the seismic lines, with the exception of Lines A and B, correlate very well. Lines A and B show a difference of roughly 8 feet in depth at their intersection. The remaining four cross points have excellent correlation having agreement within 1 to 4 feet.

TABLE 1
Calculated Seismic Velocities

Line	Number of Geophones		V_1 (ft/sec)	V_2 (ft/sec)
A	21		1,794	5,998
B	21		1,533	5,188
C	16		1,221	3,770*
D	16		1,046	2,523*
E	24 + 21		1,258	5,891
F	24		1,255	5,729
G	12		1,417	3,663*
H	21		1,635	4,504
J	21		1,398	6,501
		Averages	1,395 ft/sec	5,635.2 ft/sec[1] or 4,863 ft/sec[2]

[1] Average computed excluding low V_2 from Lines C, D, G

[2] Average computed using V_2 from all lines

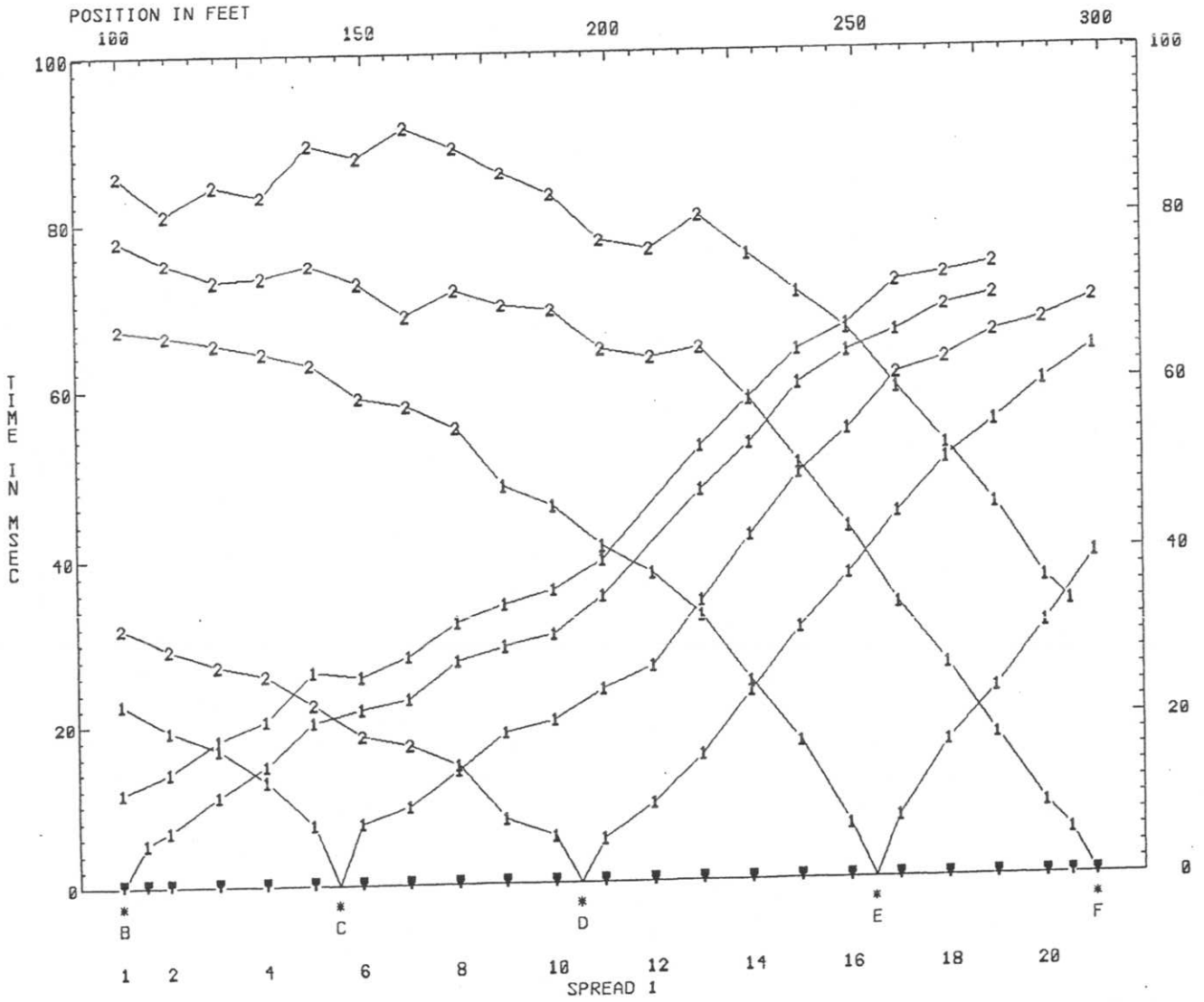
* Low velocities computed on shortest spreads

APPENDIX A

Time Distance Plot of Raw Arrival Times
Input Data Files
Depth Model Tables

* Line Identified by Highlighted Letter

FILE BUV2TA1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUV2TA1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUV2TA1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Spreds	Exit	Layrs	Over	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	Off SP	LDip
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 23 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2001.0	70.0	0.0	0.0	0.0	0.0	0
B	2008.3	100.0	0.0	0.0	0.0	0.0	1
C	2017.4	145.0	0.0	0.0	0.0	0.0	0
D	2024.5	195.0	0.0	0.0	0.0	0.0	0
E	2028.2	255.0	0.0	0.0	0.0	0.0	0
F	2031.4	300.0	0.0	0.0	0.0	0.0	2
G	2032.0	330.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G	L
1	2008.3	100.0	0.0	11.6	1	0.0	0	22.6	1	31.8	2	67.2	2	77.8	2	85.8	2
-1	2009.3	105.0	0.0	0.0	0	5.4	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	(
2	2010.3	110.0	0.0	14.0	1	6.8	1	19.2	1	29.2	2	66.2	2	75.0	2	81.0	2
3	2012.4	120.0	0.0	18.0	1	11.0	1	16.8	1	27.2	2	65.2	2	72.8	2	84.4	2
4	2014.5	130.0	0.0	20.4	1	14.8	1	12.8	1	26.0	2	64.2	2	73.2	2	83.2	2
5	2016.5	140.0	0.0	26.4	1	20.2	1	7.4	1	22.4	2	62.8	2	74.6	2	89.4	2
6	2018.3	150.0	0.0	25.8	1	21.8	1	7.6	1	18.4	2	58.8	2	72.4	2	87.8	2
7	2020.0	160.0	0.0	28.2	1	23.0	1	9.6	1	17.2	2	57.8	2	68.4	2	91.4	2
8	2021.2	170.0	0.0	32.2	1	27.6	1	14.0	1	14.6	1	55.2	2	71.6	2	88.8	2
9	2022.8	180.0	0.0	34.2	1	29.2	1	18.6	1	8.0	1	48.2	1	69.6	2	85.8	
10	2024.0	190.0	0.0	36.0	1	30.6	1	20.2	1	5.8	1	45.8	1	69.0	2	83.0	
11	2025.0	200.0	0.0	39.4	1	35.2	1	24.0	1	5.4	1	41.0	1	64.2	2	77.4	
12	2025.9	210.0	0.0	0.0	0	0.0	0	26.6	1	9.6	1	37.8	1	63.2	2	76.2	
13	2026.6	220.0	0.0	52.6	1	47.4	1	34.4	1	15.6	1	32.6	1	64.2	2	80.2	
14	2027.1	230.0	0.0	58.2	1	52.8	1	42.0	1	23.4	1	24.6	1	58.0	1	75.4	
15	2027.8	240.0	0.0	63.8	1	59.8	1	49.2	1	31.0	1	17.0	1	50.4	1	70.8	
16	2028.0	250.0	0.0	66.8	1	63.6	1	54.4	1	37.4	1	6.6	1	42.8	1	66.2	
17	2028.4	260.0	0.0	72.0	2	66.0	1	60.8	2	44.4	1	7.6	1	33.8	1	59.2	

18	2029.1	270.0	0.0	72.8	2	69.0	2	62.6	2	50.8	1	16.8	1	26.4	1	52.4	1
19	2029.8	280.0	0.0	74.0	2	70.2	2	65.8	2	55.2	1	23.4	1	17.6	1	45.4	1
20	2030.7	290.0	0.0	0.0	0	0.0	0	67.2	2	59.8	1	31.2	1	9.0	1	36.6	1
21	2031.0	295.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	5.6	1	33.8	1
21	2031.4	300.0	0.0	0.0	0	0.0	0	69.8	2	63.8	1	39.4	1	0.0	0	0.0	0

DEPTH MODEL TABLES for BUV2TA1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

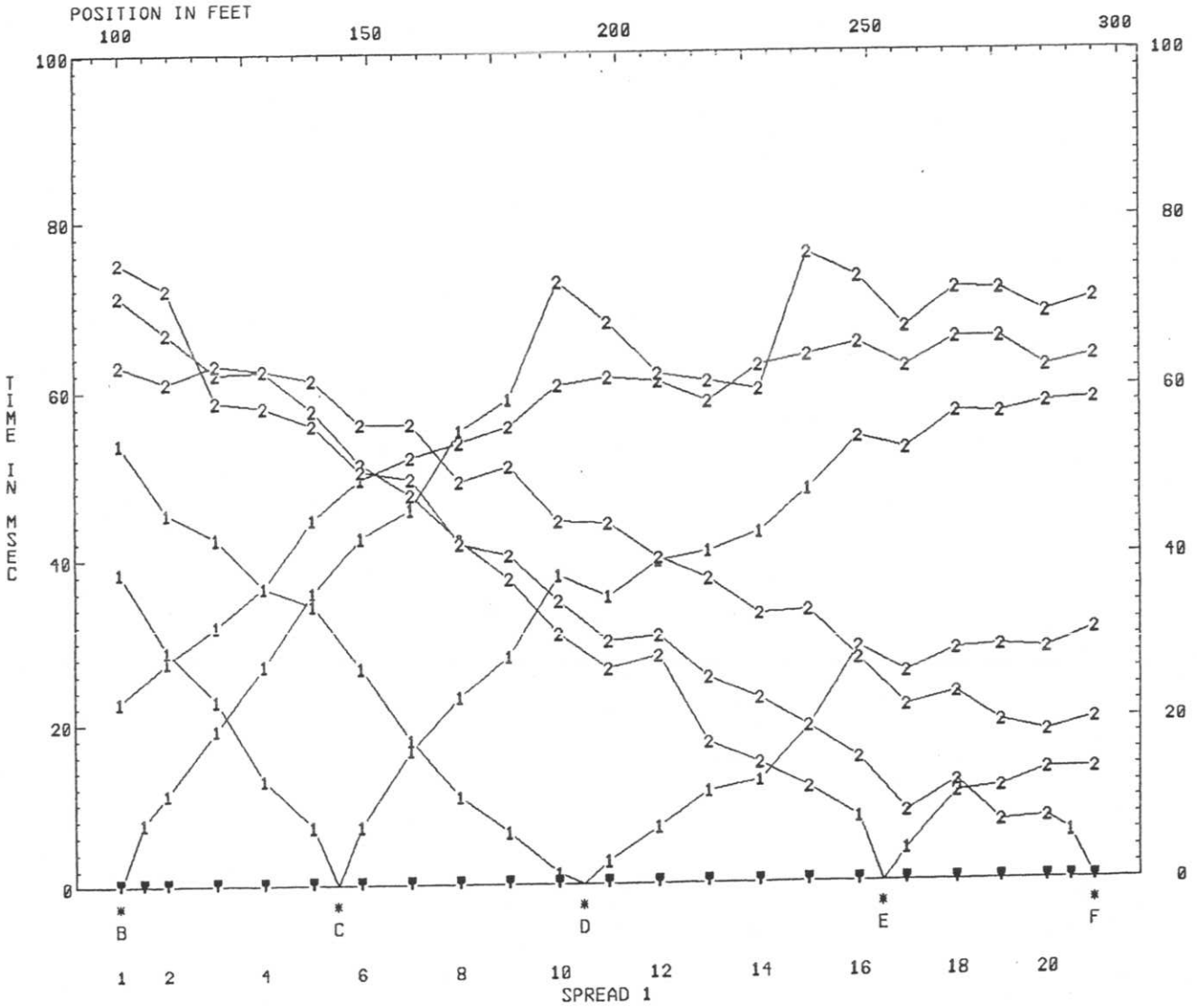
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2008.3	21.8	1986.5
C	144.1	2017.4	34.1	1983.3
D	193.5	2024.5	41.0	1983.5
E	253.4	2028.2	37.9	1990.3
F	298.3	2031.4	47.8	1983.6

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2008.3	21.8	1986.5
-1	104.9	2009.3	22.8	1986.5
2	109.8	2010.3	27.1	1983.2
3	119.6	2012.4	29.4	1983.0
4	129.4	2014.5	31.6	1982.9
5	139.1	2016.5	33.1	1983.4
6	149.0	2018.3	35.1	1983.2
7	158.8	2020.0	37.8	1982.2
8	168.8	2021.2	38.2	1983.0
9	178.6	2022.8	39.0	1983.8
10	188.6	2024.0	39.4	1984.6
11	198.5	2025.0	42.6	1982.4
12	208.5	2025.9	42.0	1983.9
13	218.5	2026.6	41.2	1985.4
14	228.4	2027.1	40.8	1986.3
15	238.4	2027.8	40.7	1987.1
16	248.4	2028.0	38.3	1989.7
17	258.4	2028.4	37.6	1990.8
18	268.4	2029.1	40.3	1988.8
19	278.4	2029.8	43.7	1986.1
20	288.3	2030.7	47.4	1983.3
-21	293.3	2031.0	47.5	1983.5
21	298.3	2031.4	47.8	1983.6

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1794	
Horizontal		5998

FILE BUV2TB1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUV2TB1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUV2TB1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Spreds	Exit	Layrs	Over	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	Off SP
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 23 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	1999.8	70.0	0.0	0.0	0.0	0.0	0
B	2007.9	100.0	0.0	0.0	0.0	0.0	1
C	2019.2	145.0	0.0	0.0	0.0	0.0	0
D	2025.0	195.0	0.0	0.0	0.0	0.0	0
E	2019.8	255.0	0.0	0.0	0.0	0.0	0
F	2006.5	300.0	0.0	0.0	0.0	0.0	2
G	1996.5	330.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G
1	2007.9	100.0	0.0	22.6	1	0.0	0	38.4	1	53.8	1	71.2	2	75.0	2	63.0
-1	2009.4	105.0	0.0	0.0	0	7.6	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2	2010.6	110.0	0.0	27.6	1	11.2	1	28.8	1	45.4	1	66.8	2	72.0	2	61.0
3	2013.3	120.0	0.0	31.8	1	19.2	1	22.8	1	42.4	1	62.0	2	58.6	2	63.0
4	2015.8	130.0	0.0	36.6	1	27.0	1	12.8	1	36.4	1	62.2	2	58.0	2	62.4
5	2018.3	140.0	0.0	44.6	1	35.8	1	7.0	1	34.2	1	57.6	2	55.8	2	61.2
6	2020.2	150.0	0.0	49.4	1	42.4	1	7.0	1	26.6	1	51.2	2	50.2	2	56.0
7	2022.0	160.0	0.0	52.0	2	45.8	1	16.4	1	17.8	1	47.4	2	49.4	2	56.0
8	2023.2	170.0	0.0	53.6	2	55.0	1	23.0	1	10.6	1	42.0	2	41.6	2	49.0
9	2024.4	180.0	0.0	55.6	2	58.8	1	28.0	1	6.2	1	37.4	2	40.2	2	50.8
10	2025.0	190.0	0.0	60.4	2	72.6	2	37.8	1	1.4	1	30.6	2	34.6	2	44.2
11	2025.0	200.0	0.0	61.4	2	67.8	2	35.2	1	2.8	1	26.4	2	29.8	2	44.0
12	2025.1	210.0	0.0	60.8	2	61.8	2	39.4	1	6.8	1	28.0	2	30.4	2	39.8
13	2024.6	220.0	0.0	58.4	2	60.8	2	40.6	1	11.2	1	17.2	2	25.2	2	37.2
14	2024.4	230.0	0.0	62.6	2	59.8	2	42.8	1	12.4	1	14.6	2	22.6	2	33.0
15	2023.1	240.0	0.0	63.8	2	75.8	2	47.8	1	19.0	1	11.6	2	19.2	2	33.4
16	2021.4	250.0	0.0	65.2	2	73.0	2	54.0	2	28.8	2	7.8	1	15.2	2	27.4
17	2018.3	260.0	0.0	62.4	2	67.0	2	52.6	2	25.8	2	4.0	1	8.4	2	21.6

18	2017.8	270.0	0.0	65.8	2	71.6	2	57.0	2	28.4	2	10.8	2	12.2	2	23.2	2
19	2013.1	280.0	0.0	65.8	2	71.4	2	56.8	2	28.8	2	11.4	2	7.2	2	19.6	2
20	2009.8	290.0	0.0	62.2	2	68.6	2	58.0	2	28.4	2	13.6	2	7.6	2	18.2	2
21	2008.2	295.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	5.8	1	0.0	0
21	2006.5	300.0	0.0	63.6	2	70.4	2	58.4	2	30.8	2	13.6	2	0.0	0	19.8	2

DEPTH MODEL TABLES for BUV2TB1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

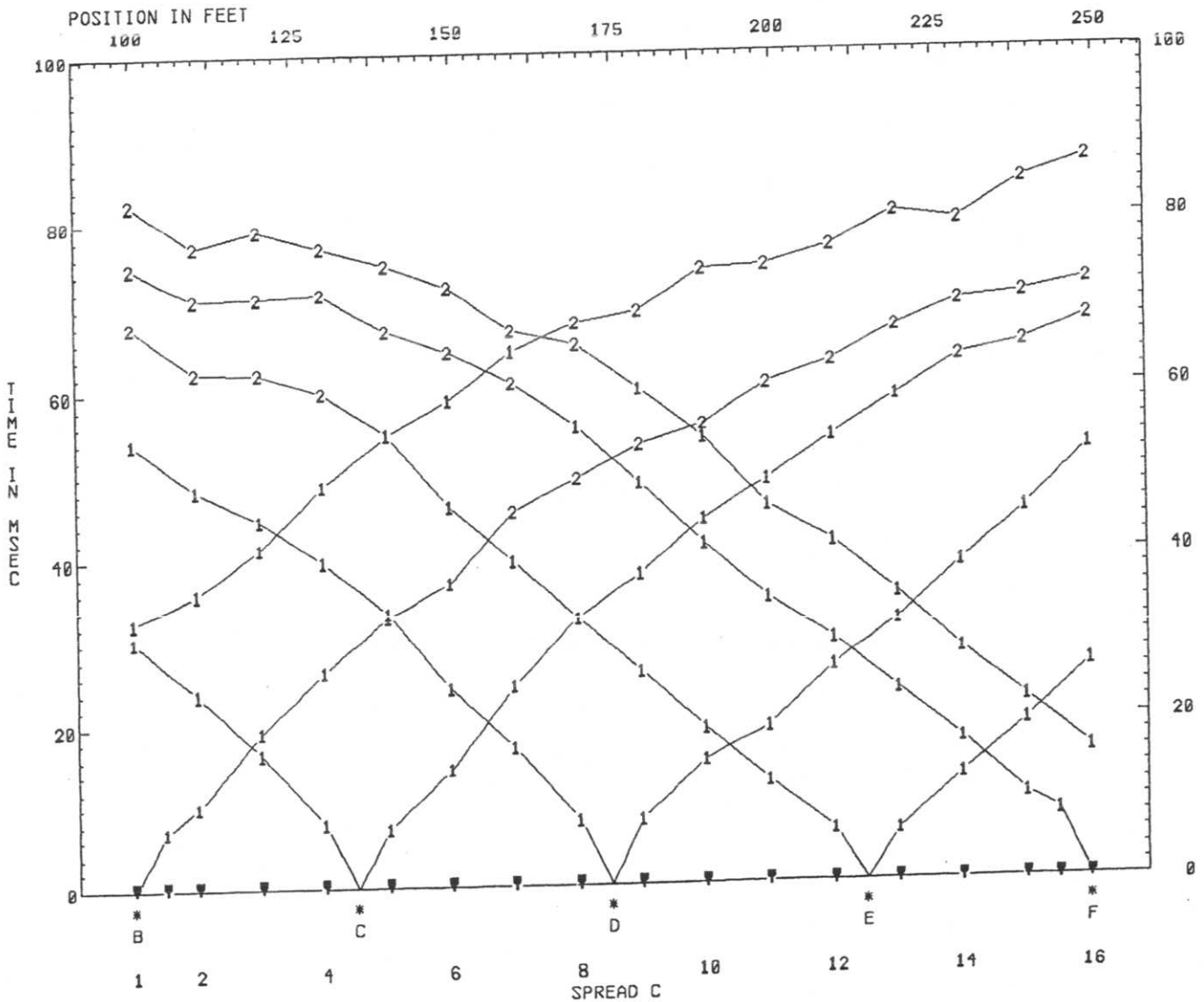
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2007.9	36.1	1971.8
C	143.5	2019.2	42.3	1976.9
D	193.1	2025.0	35.5	1989.5
E	252.6	2019.8	22.9	1996.9
F	295.1	2006.5	8.4	1998.1

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2007.9	36.1	1971.8
-1	104.8	2009.4	36.6	1972.8
2	109.6	2010.6	36.7	1973.9
3	119.3	2013.3	37.3	1976.0
4	128.9	2015.8	39.5	1976.3
5	138.6	2018.3	41.6	1976.7
6	148.4	2020.2	43.1	1977.1
7	158.3	2022.0	44.5	1977.5
8	168.2	2023.2	45.4	1977.8
9	178.1	2024.4	40.6	1983.8
10	188.1	2025.0	37.4	1987.6
11	198.1	2025.0	33.6	1991.4
12	208.1	2025.1	30.3	1994.8
13	218.1	2024.6	27.2	1997.4
14	228.1	2024.4	26.8	1997.6
15	238.0	2023.1	26.7	1996.4
16	247.9	2021.4	24.9	1996.5
17	257.4	2018.3	21.1	1997.2
18	267.4	2017.8	22.2	1995.6
19	276.2	2013.1	19.0	1994.1
20	285.6	2009.8	13.3	1996.5
-21	290.4	2008.2	10.6	1997.6
21	295.1	2006.5	8.4	1998.1

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1533	
Horizontal		5188

FILE BUCOTC1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUCOTC1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUCOTC1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Spreds	Exit	Layrs	Vover	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	Off SP	LDip
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread C, 7 SP's, 18 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2033.5	60.0	0.0	0.0	0.0	0.0	0
B	2036.0	100.0	0.0	0.0	0.0	0.0	1
C	2039.7	135.0	0.0	0.0	0.0	0.0	0
D	2045.9	175.0	0.0	0.0	0.0	0.0	0
E	2050.0	215.0	0.0	0.0	0.0	0.0	0
F	2052.4	250.0	0.0	0.0	0.0	0.0	2
G	2051.0	270.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G	L
1	2036.0	100.0	0.0	32.4	1	0.0	0	30.2	1	54.0	1	68.0	2	74.8	2	82.2	2
-1	2036.4	105.0	0.0	0.0	0	7.0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	2036.9	110.0	0.0	35.8	1	10.0	1	23.8	1	48.2	1	62.4	2	71.0	2	77.2	2
3	2037.9	120.0	0.0	41.2	1	19.2	1	16.4	1	44.6	1	62.2	2	71.2	2	79.0	2
4	2039.1	130.0	0.0	48.6	1	26.4	1	7.8	1	39.6	1	59.8	2	71.6	2	77.0	2
5	2040.3	140.0	0.0	54.6	1	32.8	1	7.2	1	33.4	1	54.8	1	67.2	2	74.8	2
6	2042.5	150.0	0.0	58.8	1	36.8	1	14.4	1	24.2	1	46.0	1	64.6	2	72.2	2
7	2043.9	160.0	0.0	64.6	1	45.4	2	24.4	1	17.0	1	39.4	1	60.8	2	67.0	2
8	2045.2	170.0	0.0	68.0	2	49.2	2	32.6	1	8.0	1	32.4	1	55.4	1	65.4	2
9	2046.6	180.0	0.0	69.2	2	53.2	2	37.8	1	8.0	1	26.0	1	48.6	1	60.0	2
10	2047.7	190.0	0.0	74.0	2	55.6	2	44.2	1	15.2	1	19.0	1	41.2	1	54.0	2
11	2048.6	200.0	0.0	74.4	2	60.4	2	48.8	1	19.2	1	12.4	1	34.6	1	45.8	2
12	2049.6	210.0	0.0	76.6	2	63.0	2	54.0	1	26.4	1	6.4	1	29.6	1	41.4	2
13	2050.4	220.0	0.0	80.4	2	67.0	2	58.8	1	31.8	1	6.2	1	23.4	1	35.0	2
14	2051.0	230.0	0.0	79.4	2	70.0	2	63.4	2	38.6	1	13.0	1	17.4	1	28.2	2
15	2051.6	240.0	0.0	84.2	2	70.8	2	65.0	2	45.0	1	19.4	1	10.4	1	22.2	2
16	2052.0	245.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	8.2	1	0.0	0
16	2052.4	250.0	0.0	86.6	2	72.2	2	68.0	2	52.4	1	26.4	1	0.0	0	16.0	2

DEPTH MODEL TABLES for BUCOTC1.SIP

Spread C Depth and Elev of layers directly beneath SPs and Geos

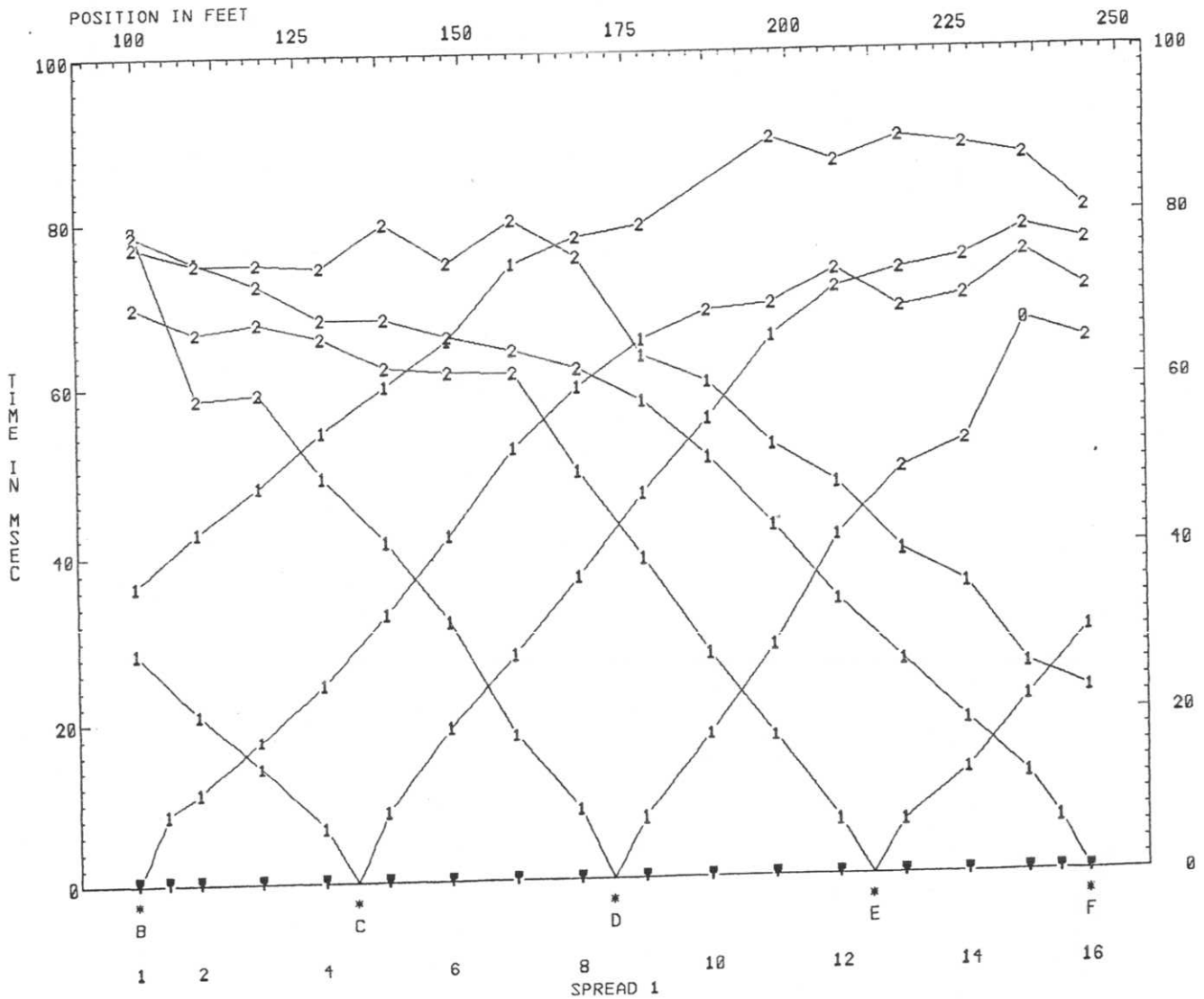
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2036.0	20.2	2015.8
C	134.8	2039.7	22.9	2016.8
D	174.3	2045.9	23.1	2022.8
E	214.1	2050.0	24.7	2025.3
F	249.0	2052.4	23.1	2029.3

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2036.0	20.2	2015.8
-1	105.0	2036.4	20.1	2016.3
2	110.0	2036.9	20.1	2016.8
3	119.9	2037.9	20.4	2017.5
4	129.8	2039.1	22.1	2017.0
5	139.8	2040.3	23.7	2016.6
6	149.5	2042.5	24.4	2018.1
7	159.4	2043.9	23.7	2020.2
8	169.3	2045.2	23.0	2022.2
9	179.2	2046.6	23.2	2023.4
10	189.2	2047.7	23.9	2023.8
11	199.1	2048.6	24.4	2024.2
12	209.1	2049.6	24.8	2024.8
13	219.1	2050.4	24.6	2025.8
14	229.0	2051.0	24.2	2026.8
15	239.0	2051.6	23.4	2028.2
-16	244.0	2052.0	23.2	2028.8
16	249.0	2052.4	23.1	2029.3

Velocities used to formulate the Depth Model

Spread C	Layer 1	Layer 2
Vertical	1221	
Horizontal		3770

FILE BUCOTD1.SIP
BUNCOMBE COUNTY PROPOSED LAND FILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUCOTD1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUCOTD1.SIP

Buncombe County Proposed Land Fill

PROGRAM CONTROL DATA

Sprds	Exit	Layrs	Over	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	Of SP	LDip
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 18 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2018.0	70.0	0.0	0.0	0.0	0.0	0
B	2027.5	100.0	0.0	0.0	0.0	0.0	1
C	2037.2	135.0	0.0	0.0	0.0	0.0	0
D	2045.2	175.0	0.0	0.0	0.0	0.0	0
E	2040.2	215.0	0.0	0.0	0.0	0.0	0
F	2029.0	250.0	0.0	0.0	0.0	0.0	2
G	2020.0	280.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G	L
1	2027.5	100.0	0.0	36.4	1	0.0	0	28.4	1	79.0	0	69.6	2	78.4	2	77.0	2
-1	2028.8	105.0	0.0	0.0	0	8.4	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	2030.1	110.0	0.0	42.6	1	11.2	1	20.8	1	58.4	2	66.4	2	75.0	2	74.8	2
3	2033.1	120.0	0.0	48.0	1	17.6	1	14.2	1	59.0	2	67.6	2	72.2	2	74.8	2
4	2035.9	130.0	0.0	54.4	1	24.4	1	6.8	1	49.0	1	65.6	2	68.0	2	74.2	2
5	2038.6	140.0	0.0	59.8	1	32.8	1	8.6	1	41.4	1	62.0	2	68.0	2	79.6	2
6	2041.3	150.0	0.0	65.2	1	42.0	1	19.0	1	31.8	1	61.4	2	65.6	2	74.6	2
7	2043.3	160.0	0.0	74.4	1	52.2	1	27.8	1	18.0	1	61.2	2	64.0	2	79.8	2
8	2044.8	170.0	0.0	77.6	2	59.4	1	37.0	1	8.6	1	49.4	1	61.6	2	75.2	2
9	2045.9	180.0	0.0	79.0	2	65.0	1	46.6	1	7.4	1	39.0	1	57.6	1	63.0	1
10	2045.5	190.0	0.0	0.0	0	68.4	2	55.4	1	17.8	1	27.6	1	50.8	1	59.8	1
11	2044.2	200.0	0.0	89.6	2	69.2	2	65.2	1	28.4	1	17.4	1	42.6	1	52.2	1
12	2041.1	210.0	0.0	86.6	2	73.2	2	71.0	2	41.4	1	6.8	1	33.8	1	47.6	1
13	2039.4	220.0	0.0	89.6	2	68.6	2	73.2	2	49.2	2	6.6	1	26.4	1	39.6	1
14	2036.4	230.0	0.0	88.6	2	70.0	2	74.6	2	52.4	2	12.8	1	19.0	1	35.6	1
15	2032.8	240.0	0.0	87.2	2	75.2	2	78.2	2	66.8	0	21.8	1	12.2	1	25.8	1
16	2030.9	245.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	6.6	1	0.0	0
16	2029.0	250.0	0.0	80.4	2	70.8	2	76.4	2	64.4	2	30.0	1	0.0	0	22.6	1

DEPTH MODEL TABLES for BUCOTD1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

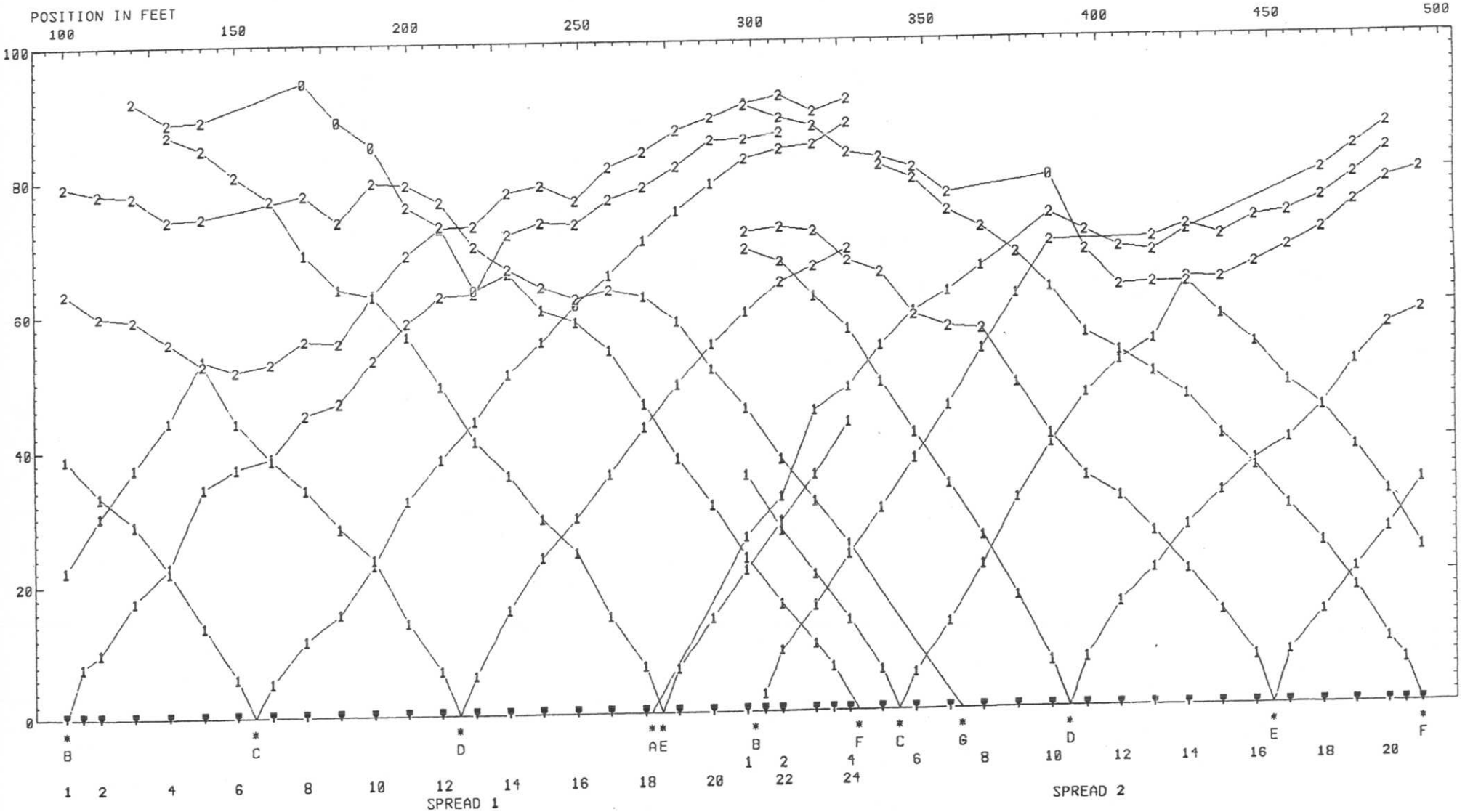
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2027.5	9.0	2018.5
C	133.6	2037.2	19.1	2018.1
D	172.7	2045.2	25.4	2019.8
E	212.0	2040.2	21.9	2018.3
F	245.1	2029.0	7.3	2021.7

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2027.5	9.0	2018.5
-1	104.8	2028.8	10.2	2018.6
2	109.7	2030.1	11.3	2018.8
3	119.2	2033.1	14.6	2018.5
4	128.8	2035.9	17.8	2018.1
5	138.4	2038.6	20.5	2018.1
6	148.1	2041.3	21.8	2019.5
7	157.9	2043.3	23.9	2019.4
8	167.7	2044.8	24.9	2019.9
9	177.7	2045.9	26.2	2019.7
10	187.7	2045.5	25.6	2019.9
11	197.6	2044.2	24.6	2019.6
12	207.1	2041.1	22.4	2018.7
13	216.9	2039.4	21.5	2017.9
14	226.5	2036.4	17.6	2018.8
15	235.8	2032.8	13.1	2019.7
-16	240.4	2030.9	9.4	2021.5
16	245.1	2029.0	7.3	2021.7

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1046	
Horizontal		2523

FILE BUV2TE12.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUV2TE12.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUV2TE12.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Sprds	Exit	Layrs	VOver	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	Off SP
2	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 26 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2030.0	70.0	0.0	0.0	0.0	0.0	0
B	2026.7	100.0	0.0	0.0	0.0	0.0	1
C	2029.5	155.0	0.0	0.0	0.0	0.0	0
D	2035.6	215.0	0.0	0.0	0.0	0.0	0
E	2048.0	275.0	0.0	0.0	0.0	0.0	0
F	2046.8	330.0	0.0	0.0	0.0	0.0	2
G	2039.2	360.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G
1	2026.7	100.0	0.0	22.2	1	0.0	0	38.8	1	63.2	2	0.0	0	0.0	0	79.2
-1	2026.7	105.0	0.0	0.0	0	7.8	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2	2026.6	110.0	0.0	30.2	1	10.0	1	33.2	1	59.8	2	0.0	0	0.0	0	78.0
3	2027.0	120.0	0.0	37.4	1	17.6	1	29.0	1	59.2	2	0.0	0	91.8	2	77.6
4	2026.9	130.0	0.0	44.2	1	22.8	1	22.0	1	55.8	2	86.6	2	88.4	2	74.0
5	2028.5	140.0	0.0	53.2	1	34.4	1	13.8	1	52.4	2	84.6	2	88.8	2	74.4
6	2029.2	150.0	0.0	51.4	2	37.2	1	6.0	1	44.0	1	80.6	2	0.0	0	0.0
7	2029.8	160.0	0.0	52.6	2	38.8	1	5.2	1	38.4	1	77.0	2	0.0	0	0.0
8	2030.4	170.0	0.0	56.0	2	45.0	2	11.6	1	34.0	1	68.8	1	94.4	0	77.6
9	2030.9	180.0	0.0	55.6	2	46.6	2	15.4	1	28.2	1	63.6	1	88.6	0	73.6
10	2032.0	190.0	0.0	62.6	2	53.0	2	22.8	1	23.6	1	62.4	1	84.8	0	79.4
11	2033.6	200.0	0.0	68.6	2	58.4	2	32.2	1	14.0	1	56.4	1	75.8	2	79.0
12	2035.1	210.0	0.0	72.6	2	62.2	2	38.2	1	6.8	1	49.0	1	72.8	2	76.4
13	2036.2	220.0	0.0	72.8	2	62.6	2	43.8	1	6.0	1	40.8	1	63.2	0	69.8
14	2039.0	230.0	0.0	77.8	2	71.6	2	50.6	1	15.8	1	35.8	1	65.6	2	66.2
15	2040.9	240.0	0.0	78.8	2	73.2	2	55.4	1	23.6	1	29.2	1	60.2	1	63.6
16	2042.9	250.0	0.0	76.4	2	73.0	2	61.0	0	29.4	1	24.2	1	58.2	1	61.8
17	2045.1	260.0	0.0	81.4	2	76.6	2	65.2	1	35.8	1	14.6	1	54.0	1	63.0

18	2047.2	270.0	0.0	83.6	2	78.4	2	70.4	1	42.6	1	7.2	1	46.0	1	62.0	1
19	2048.8	280.0	0.0	86.8	2	81.4	2	74.8	1	48.8	1	6.8	1	38.0	1	58.2	1
20	2050.2	290.0	0.0	88.6	2	85.2	2	78.8	1	54.8	1	14.2	1	31.0	1	51.0	1
21	2051.0	300.0	0.0	90.6	2	85.4	2	82.4	2	59.6	1	21.4	1	23.2	1	45.2	1
22	2050.4	310.0	0.0	91.8	2	86.2	2	83.8	2	64.0	2	28.6	1	16.2	1	37.8	1
23	2048.6	320.0	0.0	89.4	2	0.0	0	84.4	2	66.2	2	35.4	1	10.2	1	31.4	1
24	2047.7	325.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	6.8	1	0.0	0
24	2046.8	330.0	0.0	91.2	2	0.0	0	87.6	2	68.8	2	43.0	1	0.0	0	25.0	1

SHOTPOINT AND GEOPHONE DATA

Spread 2, 7 SP's, 23 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2047.2	270.0	0.0	0.0	0.0	0.0	0
B	2051.0	300.0	0.0	0.0	0.0	0.0	1
C	2043.0	345.0	0.0	0.0	0.0	0.0	0
D	2035.5	395.0	0.0	0.0	0.0	0.0	0
E	2041.2	455.0	0.0	0.0	0.0	0.0	0
F	2053.4	500.0	0.0	0.0	0.0	0.0	2
G	2053.0	530.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A		SP B		SP C		SP D		SP E		SP F		SP G	
1	2051.0	300.0	0.0	26.2	1	0.0	0	35.4	1	69.0	2	71.6	2	0.0	0	90.4	2
-1	2050.7	305.0	0.0	0.0	0	2.8	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	2050.4	310.0	0.0	32.2	1	9.4	1	27.2	1	67.0	2	72.2	2	0.0	0	88.4	2
3	2048.6	320.0	0.0	44.8	1	16.0	1	20.6	1	61.8	1	71.6	2	0.0	0	87.2	2
4	2046.8	330.0	0.0	48.2	1	23.6	1	13.8	1	56.8	1	67.0	2	0.0	0	83.2	2
5	2043.6	340.0	0.0	54.2	1	30.2	1	6.2	1	48.8	1	65.2	2	81.2	2	82.4	2
6	2041.5	350.0	0.0	59.4	1	37.6	1	5.8	1	41.4	1	58.8	2	79.2	2	80.8	2
7	2039.2	360.0	0.0	62.2	1	45.2	1	13.2	1	33.8	1	57.0	2	74.4	2	77.0	2
8	2037.3	370.0	0.0	66.0	1	53.6	1	21.8	1	26.0	1	56.6	2	71.8	2	0.0	0
9	2036.2	380.0	0.0	0.0	0	61.8	1	31.6	1	17.0	1	48.4	1	68.0	2	0.0	0
10	2035.6	390.0	0.0	73.8	2	69.6	2	39.6	1	7.2	1	40.8	1	62.6	1	79.4	0
11	2035.4	400.0	0.0	71.0	2	0.0	0	46.8	1	7.6	1	34.6	1	55.8	1	68.2	
12	2035.3	410.0	0.0	68.6	2	0.0	0	51.6	1	15.8	1	31.6	1	53.0	1	62.8	
13	2035.9	420.0	0.0	68.0	2	70.0	2	54.6	1	20.8	1	26.2	1	49.8	1	63.2	
14	2037.0	430.0	0.0	71.0	2	71.8	2	64.0	2	27.2	1	20.6	1	46.4	1	63.2	
15	2038.4	440.0	0.0	0.0	0	70.2	2	63.8	2	32.2	1	14.4	1	40.6	1	58.2	
16	2040.1	450.0	0.0	0.0	0	73.0	2	66.0	2	36.8	1	7.6	1	35.8	1	54.0	
17	2042.3	460.0	0.0	0.0	0	73.6	2	68.4	2	39.8	1	8.2	1	30.0	1	48.2	
18	2044.6	470.0	0.0	80.0	2	75.8	2	71.0	2	44.6	1	14.2	1	24.4	1	44.4	
19	2047.6	480.0	0.0	83.4	2	79.2	2	75.0	2	51.2	1	20.6	1	17.8	1	38.6	
20	2050.4	490.0	0.0	86.6	2	83.0	2	78.4	2	56.6	2	26.4	1	10.0	1	32.0	
21	2051.9	495.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	6.8	1	0.0	
21	2053.4	500.0	0.0	0.0	0	0.0	0	79.8	2	58.8	2	33.6	1	0.0	0	23.6	

DEPTH MODEL TABLES for BUV2TE12.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2026.7	22.4	2004.3
C	154.8	2029.5	30.5	1999.0
D	214.5	2035.6	34.2	2001.4
E	273.1	2048.0	38.4	2009.6
F	330.0	2046.8	32.1	2014.7

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2026.7	22.4	2004.3
-1	105.0	2026.7	22.7	2004.0
2	110.0	2026.6	24.4	2002.2
3	120.0	2027.0	28.4	1998.6
4	130.0	2026.9	29.1	1997.8
5	139.9	2028.5	31.5	1997.0
6	149.8	2029.2	30.9	1998.3
7	159.8	2029.8	30.1	1999.7
8	169.8	2030.4	29.1	2001.3
9	179.8	2030.9	29.3	2001.6
10	189.7	2032.0	31.2	2000.8
11	199.6	2033.6	32.9	2000.7
12	209.5	2035.1	34.5	2000.6
13	219.4	2036.2	34.0	2002.2
14	229.0	2039.0	34.9	2004.1
15	238.8	2040.9	33.8	2007.1
16	248.6	2042.9	34.2	2008.7
17	258.4	2045.1	36.1	2009.0
18	268.2	2047.2	37.4	2009.8
19	278.0	2048.8	39.3	2009.5
20	287.9	2050.2	41.0	2009.2
21	297.9	2051.0	42.1	2008.9
22	307.9	2050.4	41.0	2009.4
23	317.7	2048.6	38.6	2010.0
-24	322.7	2047.7	35.0	2012.7
24	327.6	2046.8	32.1	2014.7

Spread 2 Depth and Elev of layers directly beneath SPs and Geos

SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	300.0	2051.0	42.0	2009.0
C	341.9	2043.0	28.2	2014.8
D	391.3	2035.5	19.2	2016.4
E	450.8	2041.2	17.8	2023.4
F	494.1	2053.4	30.3	2023.1

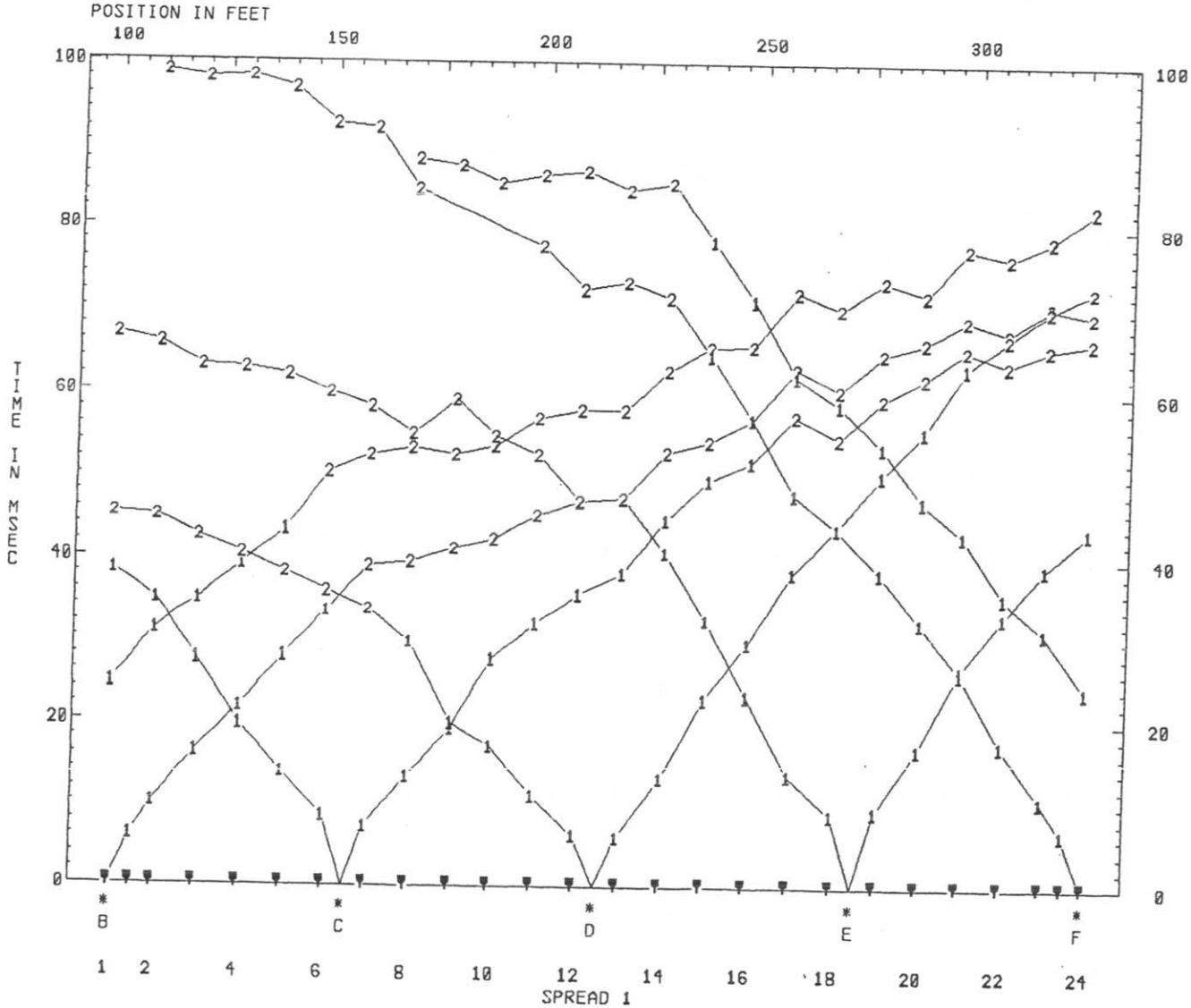
Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	297.9	2051.0	42.1	2008.9
-1	302.9	2050.7	41.6	2009.1
2	307.9	2050.4	41.0	2009.4
3	317.7	2048.6	38.7	2009.9
4	327.6	2046.8	32.3	2014.5
5	337.0	2043.6	28.5	2015.1
6	346.8	2041.5	27.1	2014.4
7	356.6	2039.2	25.0	2014.2
8	366.4	2037.3	23.3	2014.0
9	376.3	2036.2	21.7	2014.5
10	386.3	2035.6	20.6	2015.0
11	396.3	2035.4	17.7	2017.7
12	406.3	2035.3	17.1	2018.2
13	416.3	2035.9	17.8	2018.1
14	426.2	2037.0	18.3	2018.7
15	436.1	2038.4	19.1	2019.3
16	446.0	2040.1	18.8	2021.3
17	455.7	2042.3	16.8	2025.5
18	465.5	2044.6	15.6	2029.0
19	475.0	2047.6	17.7	2029.9
20	484.6	2050.4	28.5	2021.9
-21	489.4	2051.9	29.4	2022.5
21	494.1	2053.4	30.3	2023.1

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1258	
Horizontal		5891

Spread 2	Layer 1	Layer 2
Vertical	1258	
Horizontal		5891

FILE BUCOTF1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUCOTF1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUCOTF1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Spreds	Exit	Layrs	VOver	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	OffSP
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 26 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2017.0	70.0	0.0	0.0	0.0	0.0	0
B	2019.0	100.0	0.0	0.0	0.0	0.0	1
C	2025.6	155.0	0.0	0.0	0.0	0.0	0
D	2031.2	215.0	0.0	0.0	0.0	0.0	0
E	2027.2	275.0	0.0	0.0	0.0	0.0	0
F	2037.6	330.0	0.0	0.0	0.0	0.0	2
G	2035.0	360.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G
1	2019.0	100.0	0.0	24.4	1	0.0	0	38.4	1	45.4	2	66.8	2	0.0	0	0.0
-1	2019.5	105.0	0.0	0.0	0	6.0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2	2020.0	110.0	0.0	31.0	1	10.0	1	34.8	1	45.0	2	65.8	2	98.8	2	0.0
3	2021.0	120.0	0.0	34.8	1	16.2	1	27.4	1	42.6	2	63.0	2	98.0	2	0.0
4	2021.9	130.0	0.0	39.2	1	21.6	1	19.6	1	40.4	2	62.8	2	98.2	2	0.0
5	2023.2	140.0	0.0	43.4	1	27.8	1	13.8	1	38.2	2	62.0	2	96.8	2	0.0
6	2024.7	150.0	0.0	50.4	2	33.4	1	8.4	1	35.8	2	60.0	2	92.4	2	0.0
7	2026.6	160.0	0.0	52.4	2	39.0	2	7.2	1	33.6	2	58.2	2	92.0	2	0.0
8	2028.0	170.0	0.0	53.4	2	39.6	2	13.2	1	29.6	1	55.0	2	84.4	2	88.2
9	2028.7	180.0	0.0	52.6	2	41.2	2	19.2	1	19.8	1	59.2	2	0.0	0	87.4
10	2032.6	190.0	0.0	53.6	2	42.4	2	27.6	1	17.0	1	54.8	2	0.0	0	85.2
11	2032.7	200.0	0.0	57.0	2	45.4	2	32.0	1	11.0	1	52.6	2	77.6	2	86.2
12	2031.8	210.0	0.0	58.0	2	47.0	2	35.6	1	6.2	1	47.0	2	72.4	2	86.8
13	2030.7	220.0	0.0	58.0	2	47.4	2	38.2	1	6.0	1	47.4	2	73.4	2	84.4
14	2028.8	230.0	0.0	62.8	2	53.0	2	44.8	1	13.2	1	40.8	1	71.6	2	85.4
15	2027.1	240.0	0.0	65.6	2	54.2	2	49.6	1	22.8	1	32.4	1	64.6	1	78.4
16	2025.8	250.0	0.0	65.8	2	57.0	2	51.8	1	29.6	1	23.2	1	57.0	1	71.2
17	2026.0	260.0	0.0	72.2	2	63.0	2	57.4	2	38.4	1	13.6	1	48.0	1	62.0

18	2026.7	270.0	0.0	70.2	2	60.4	2	54.6	2	44.0	1	8.8	1	43.8	1	58.6	1
19	2027.6	280.0	0.0	73.6	2	64.8	2	59.4	2	50.2	1	9.2	1	38.4	1	53.6	1
20	2027.9	290.0	0.0	72.0	2	66.2	2	62.0	2	55.6	1	16.8	1	32.2	1	47.2	1
21	2030.8	300.0	0.0	77.6	2	69.0	2	65.4	2	63.2	1	26.4	1	26.0	1	43.0	1
22	2033.2	310.0	0.0	76.4	2	67.4	2	63.6	2	66.8	2	33.0	1	17.4	1	35.4	1
23	2035.9	320.0	0.0	78.6	2	70.6	2	65.6	2	70.2	2	39.0	1	10.6	1	31.0	1
24	2036.6	325.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	6.6	1	0.0	0
24	2037.6	330.0	0.0	82.4	2	69.6	2	66.4	2	72.6	2	43.6	1	0.0	0	24.0	1

DEPTH MODEL TABLES for BUCOTF1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

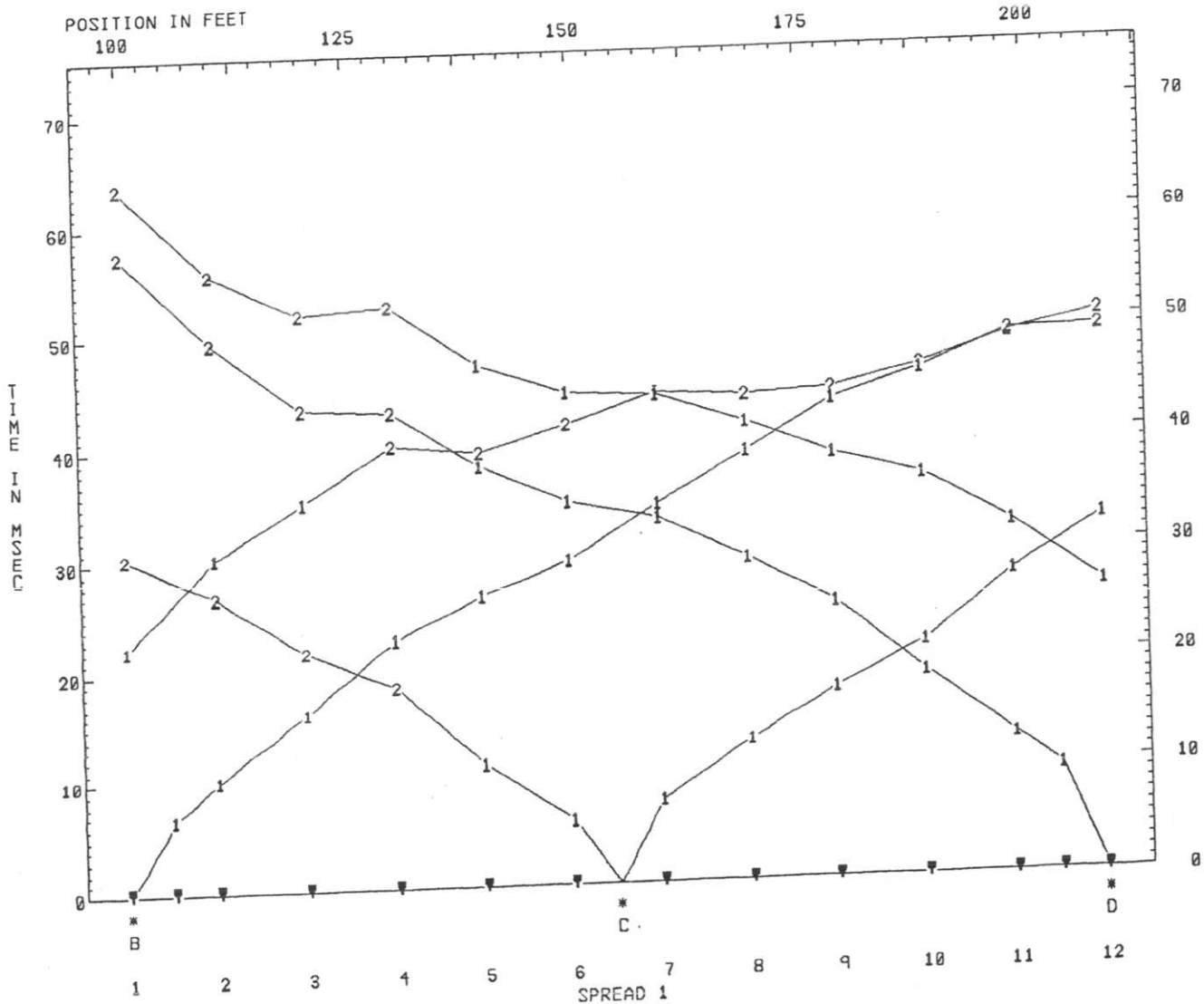
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2019.0	17.7	2001.3
C	154.6	2025.6	32.3	1993.3
D	213.5	2031.2	27.1	2004.1
E	273.0	2027.2	22.5	2004.7
F	326.7	2037.6	32.3	2005.3

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2019.0	17.7	2001.3
-1	105.0	2019.5	17.7	2001.8
2	109.9	2020.0	22.5	1997.5
3	119.9	2021.0	26.0	1995.0
4	129.9	2021.9	29.4	1992.5
5	139.8	2023.2	31.7	1991.5
6	149.7	2024.7	32.0	1992.7
7	159.5	2026.6	32.7	1993.9
8	169.4	2028.0	30.0	1998.0
9	179.4	2028.7	26.5	2002.2
10	188.6	2032.6	26.6	2006.0
11	198.6	2032.7	25.7	2007.0
12	208.5	2031.8	26.5	2005.3
13	218.5	2030.7	27.9	2002.8
14	228.3	2028.8	28.2	2000.6
15	238.1	2027.1	27.2	1999.9
16	248.0	2025.8	26.7	1999.1
17	258.0	2026.0	24.9	2001.1
18	268.0	2026.7	22.3	2004.4
19	278.0	2027.6	22.7	2004.9
20	288.0	2027.9	21.7	2006.2
21	297.5	2030.8	22.4	2008.4
22	307.3	2033.2	22.2	2011.0
23	316.9	2035.9	27.5	2008.4
-24	321.8	2036.6	31.6	2005.0
24	326.7	2037.6	32.3	2005.3

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1255	
Horizontal		5729

FILE BUV3TG1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUV3TG1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUV3TG1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Sprds	Exit	Layrs	VOver	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	OffSP	I I i p
1	6	2	1	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	(

VELOCITY OVERRIDES FOR VERTICAL (Vv) AND HORIZONTAL (Vh) VELOCITIES

L	Spread 1 Vv	Vh
2	5000	5000

SHOTPOINT AND GEOPHONE DATA

Spread 1, 5 SP's, 14 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2024.0	70.0	0.0	0.0	0.0	0.0	0
B	2027.3	100.0	0.0	0.0	0.0	0.0	1
C	2036.2	155.0	0.0	0.0	0.0	0.0	0
D	2045.2	210.0	0.0	0.0	0.0	0.0	2
E	2039.0	240.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L
1	2027.3	100.0	0.0	22.2	1	0.0	0	30.4	2	57.4	2	63.6	2
-1	2028.2	105.0	0.0	0.0	0	6.6	1	0.0	0	0.0	0	0.0	0
2	2029.0	110.0	0.0	30.2	1	10.0	1	26.8	2	49.4	2	55.6	2
3	2030.0	120.0	0.0	35.0	1	16.0	1	21.6	2	43.4	2	51.8	2
4	2031.7	130.0	0.0	40.0	2	22.6	1	18.2	2	43.0	2	52.4	2
5	2033.4	140.0	0.0	39.2	2	26.4	1	11.0	1	38.0	1	47.0	1
6	2035.3	150.0	0.0	41.6	2	29.4	1	5.8	1	34.6	1	44.4	1
7	2037.1	160.0	0.0	44.2	2	34.2	1	7.4	1	33.0	1	44.0	1
8	2039.2	170.0	0.0	43.8	2	38.8	1	12.6	1	29.2	1	41.4	1
9	2042.1	180.0	0.0	44.2	2	43.2	1	17.2	1	25.0	1	38.4	1
10	2044.0	190.0	0.0	46.0	2	45.6	1	21.2	1	18.4	1	36.2	1
11	2045.4	200.0	0.0	48.6	2	48.8	2	27.4	1	12.4	1	31.8	1
12	2045.3	205.0	0.0	0.0	0	0.0	0	0.0	0	9.4	1	0.0	0

12	2045.2	210.0	0.0	50.4	2	49.0	2	32.2	1	0.0	0	26.2	1

DEPTH MODEL TABLES for BUV3TG1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

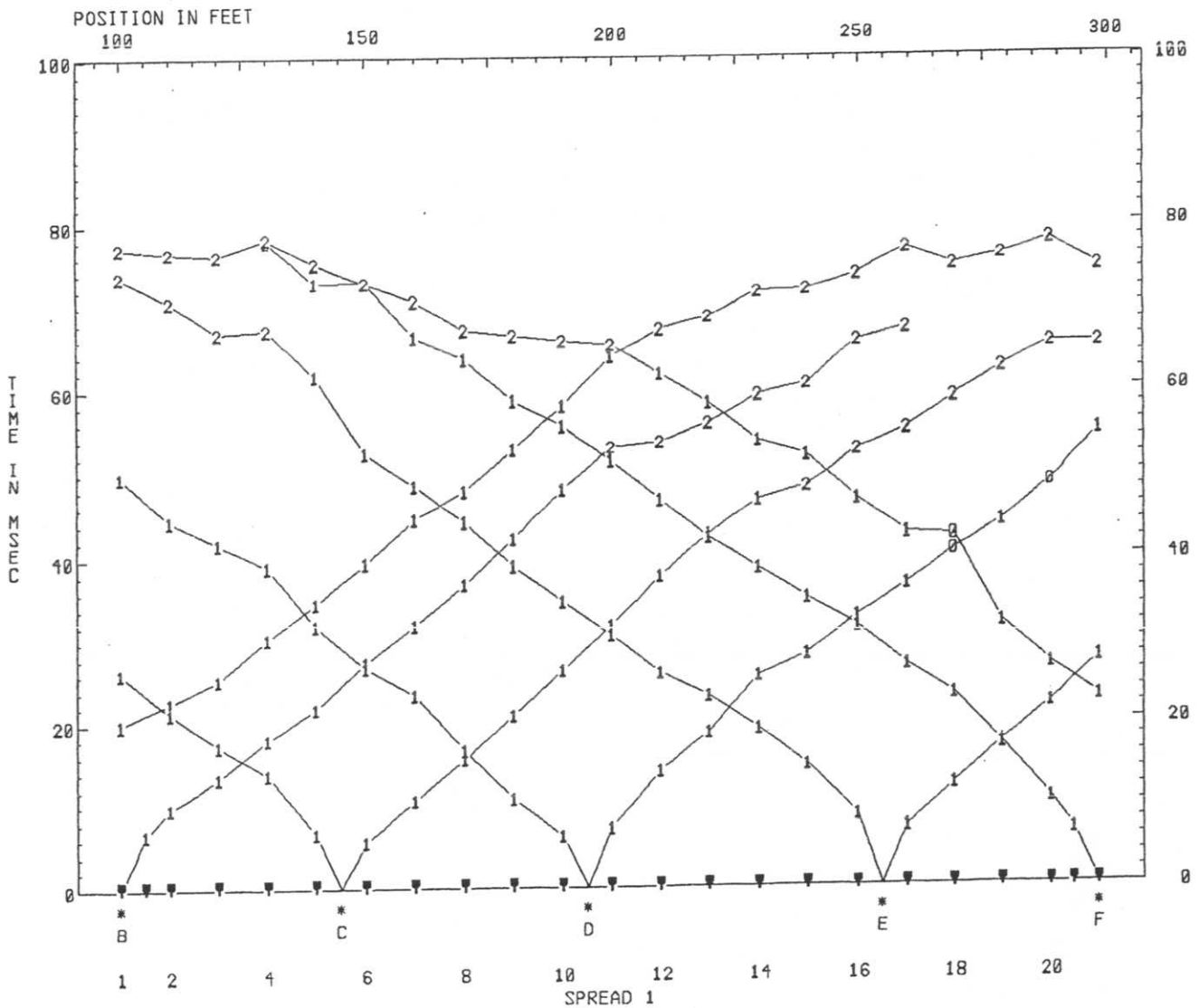
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2027.3	26.1	2001.2
C	154.2	2036.2	20.3	2015.9
D	208.2	2045.2	9.2	2036.0

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2027.3	26.1	2001.2
-1	104.9	2028.2	25.6	2002.6
2	109.9	2029.0	25.6	2003.4
3	119.8	2030.0	26.3	2003.7
4	129.7	2031.7	27.8	2003.9
5	139.5	2033.4	24.7	2008.7
6	149.3	2035.3	21.7	2013.6
7	159.2	2037.1	18.9	2018.2
8	168.9	2039.2	16.3	2022.9
9	178.5	2042.1	14.9	2027.2
10	188.3	2044.0	15.1	2028.9
11	198.2	2045.4	14.3	2031.1
-12	203.2	2045.3	11.7	2033.6
12	208.2	2045.2	9.2	2036.0

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1417	
Horizontal		5000

FILE BUCOTH1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUCOTH1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUCOTH1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Sprds	Exit	Layrs	Over	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM Pt 1 Elev/X	CONTROL Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	OfSP	LDip
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 23 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2042.5	70.0	0.0	0.0	0.0	0.0	0
B	2042.0	100.0	0.0	0.0	0.0	0.0	1
C	2040.7	145.0	0.0	0.0	0.0	0.0	0
D	2035.8	195.0	0.0	0.0	0.0	0.0	0
E	2029.5	255.0	0.0	0.0	0.0	0.0	0
F	2019.0	300.0	0.0	0.0	0.0	0.0	2
G	2013.0	330.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A		SP B		SP C		SP D		SP E		SP F		SP G	
1	2042.0	100.0	0.0	20.0	1	0.0	0	26.2	1	49.8	1	73.8	2	0.0	0	77.2	2
-1	2041.9	105.0	0.0	0.0	0	6.6	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	2041.9	110.0	0.0	22.6	1	9.8	1	21.2	1	44.4	1	70.6	2	0.0	0	76.6	2
3	2041.7	120.0	0.0	25.4	1	13.4	1	17.2	1	41.8	1	66.8	2	0.0	0	76.2	2
4	2041.5	130.0	0.0	30.4	1	18.0	1	13.8	1	39.0	1	67.2	2	78.0	1	78.2	2
5	2041.1	140.0	0.0	34.6	1	21.8	1	6.6	1	32.0	1	61.6	1	72.8	1	75.2	2
6	2040.4	150.0	0.0	39.4	1	27.4	1	5.6	1	26.8	1	52.4	1	73.0	1	72.8	2
7	2039.7	160.0	0.0	44.6	1	32.0	1	10.6	1	23.4	1	48.4	1	66.2	1	70.6	2
8	2038.8	170.0	0.0	47.8	1	36.8	1	15.6	1	16.6	1	44.2	1	63.6	1	67.0	2
9	2037.4	180.0	0.0	52.8	1	42.2	1	20.8	1	10.8	1	39.0	1	58.6	1	66.4	2
10	2036.3	190.0	0.0	58.0	1	48.0	1	26.4	1	6.2	1	34.8	1	55.6	1	65.8	2
11	2035.3	200.0	0.0	63.8	1	53.0	2	31.8	1	7.2	1	30.6	1	51.4	1	65.2	2
12	2033.6	210.0	0.0	67.0	2	53.6	2	37.8	1	14.0	1	26.0	1	46.6	1	61.8	1
13	2032.9	220.0	0.0	68.6	2	55.8	2	42.6	1	18.6	1	23.2	1	42.2	1	58.2	1
14	2031.9	230.0	0.0	71.6	2	59.2	2	46.6	1	25.6	1	19.0	1	38.6	1	53.8	1
15	2030.9	240.0	0.0	71.8	2	60.4	2	48.2	2	28.2	1	14.6	1	35.0	1	52.0	1
16	2030.0	250.0	0.0	73.6	2	65.6	2	52.6	2	32.8	1	8.6	1	31.6	1	46.6	1
17	2028.9	260.0	0.0	76.8	2	67.0	2	55.0	2	36.6	1	7.2	1	26.8	1	42.6	1

18	2025.6	270.0	0.0	74.6	2	0.0	0	58.8	2	40.6	0	12.2	1	23.2	1	42.4	0
19	2023.7	280.0	0.0	76.0	2	0.0	0	62.2	2	44.0	1	17.2	1	17.0	1	32.0	1
20	2021.2	290.0	0.0	77.8	2	0.0	0	65.2	2	48.6	0	22.0	1	10.4	1	26.8	1
21	2020.1	295.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	6.6	1	0.0	0
21	2019.0	300.0	0.0	74.4	2	0.0	0	65.2	2	54.8	1	27.6	1	0.0	0	22.8	1

DEPTH MODEL TABLES for BUCOTH1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

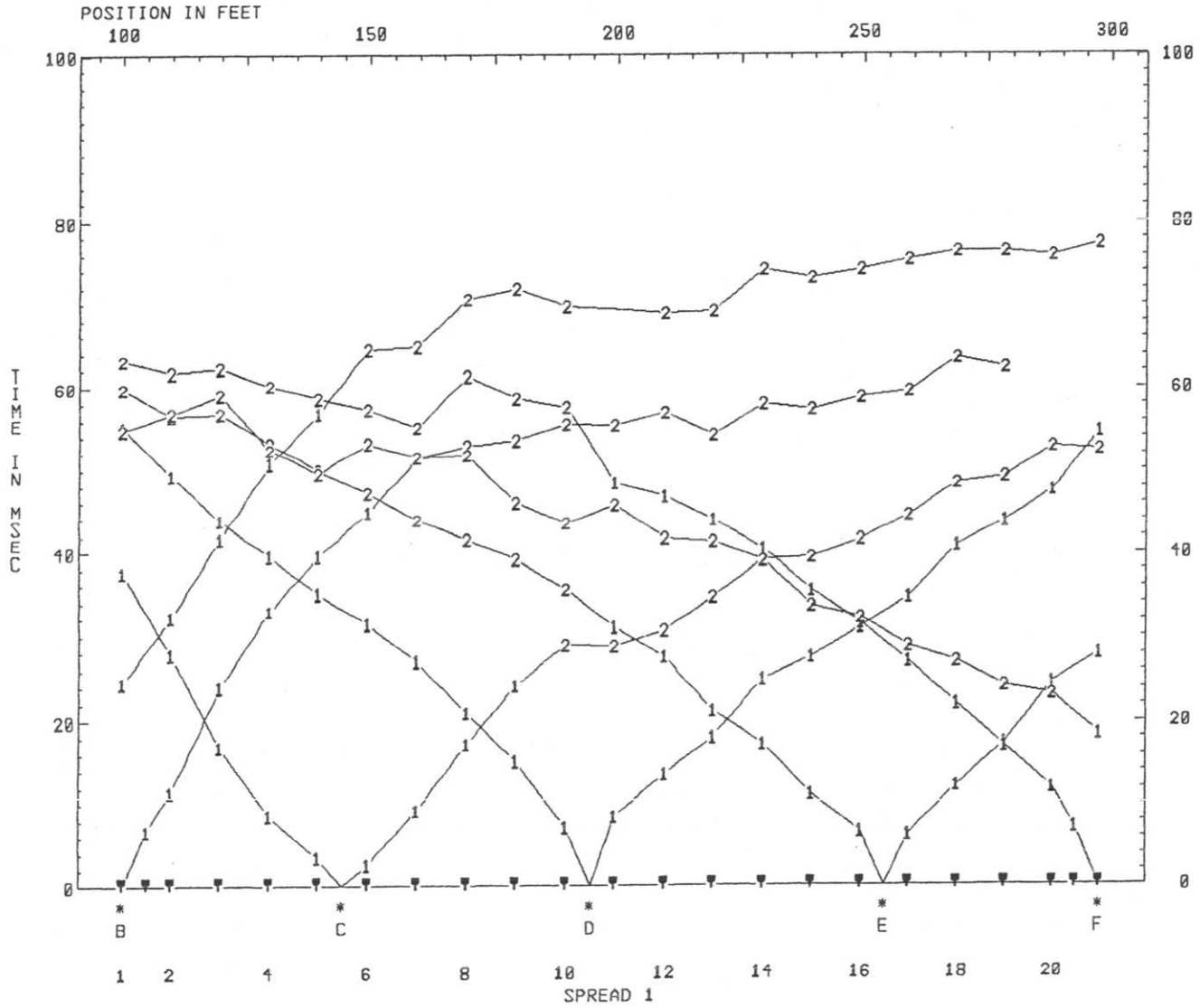
SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2042.0	19.3	2022.7
C	145.0	2040.7	21.6	2019.1
D	194.7	2035.8	28.9	2006.9
E	254.3	2029.5	28.3	2001.2
F	298.0	2019.0	25.3	1993.7

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2042.0	19.3	2022.7
-1	105.0	2041.9	19.9	2022.0
2	110.0	2041.9	21.0	2020.9
3	120.0	2041.7	21.4	2020.3
4	130.0	2041.5	21.7	2019.8
5	140.0	2041.1	21.8	2019.3
6	150.0	2040.4	21.5	2018.9
7	159.9	2039.7	21.1	2018.6
8	169.9	2038.8	24.3	2014.5
9	179.8	2037.4	26.9	2010.5
10	189.7	2036.3	28.2	2008.1
11	199.7	2035.3	29.6	2005.7
12	209.5	2033.6	27.5	2006.1
13	219.5	2032.9	25.5	2007.4
14	229.5	2031.9	25.9	2006.0
15	239.4	2030.9	26.8	2004.1
16	249.4	2030.0	28.0	2002.0
17	259.3	2028.9	28.5	2000.4
18	268.8	2025.6	26.7	1998.9
19	278.6	2023.7	27.6	1996.1
20	288.3	2021.2	26.3	1994.9
-21	293.1	2020.1	25.8	1994.3
21	298.0	2019.0	25.3	1993.7

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1635	
Horizontal		4504

FILE BUCOTJ1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL - RAW ARRIVAL TIMES



INPUT DATA FILE for BUCOTJ1.SIP

TITLE FOR SIPT2/SIPLUS INPUT DATA SET for BUCOTJ1.SIP

Buncombe County Proposed Landfill

PROGRAM CONTROL DATA

Spreds	Exit	Layrs	VOver	PRINTER PLOT SCALES Elev ft/col	Horiz ft/row	Time ms/col	DATUM CONTROL Pt 1 Elev/X	Pt 2 Elev/X	PLOT CONTROL Elevations Top	Bottom	BLim	TLim	Trace	OfSP	LDip
1	6	2	0	0.0	0.0	0.0	0.0 0.0	0.0 0.0	2060	1900	0.5	10.0	0	0	0

SHOTPOINT AND GEOPHONE DATA

Spread 1, 7 SP's, 23 Geo's, X-Shift = 0.0, X-True = 0, Units: Feet.

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
A	2026.0	70.0	0.0	0.0	0.0	0.0	0
B	2028.9	100.0	0.0	0.0	0.0	0.0	1
C	2033.5	145.0	0.0	0.0	0.0	0.0	0
D	2034.4	195.0	0.0	0.0	0.0	0.0	0
E	2029.6	255.0	0.0	0.0	0.0	0.0	0
F	2017.6	300.0	0.0	0.0	0.0	0.0	2
G	2005.0	330.0	0.0	0.0	0.0	0.0	0

ARRIVAL TIMES AND LAYERS REPRESENTED

Geo	Elev	X-Loc	Y	SP A	L	SP B	L	SP C	L	SP D	L	SP E	L	SP F	L	SP G	L
1	2028.9	100.0	0.0	24.4	1	0.0	0	37.6	1	55.2	1	59.8	2	63.2	2	54.8	2
-1	2029.6	105.0	0.0	0.0	0	6.8	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	2030.3	110.0	0.0	32.2	1	11.4	1	27.8	1	49.4	1	56.6	2	61.8	2	56.8	2
3	2031.8	120.0	0.0	41.6	1	24.0	1	16.8	1	43.8	1	56.8	2	62.2	2	59.0	2
4	2032.6	130.0	0.0	50.8	1	33.0	1	8.6	1	39.6	1	53.2	2	60.2	2	52.4	2
5	2033.3	140.0	0.0	56.8	1	39.6	1	3.6	1	35.0	1	50.0	2	58.6	2	49.6	2
6	2033.7	150.0	0.0	64.6	2	44.8	1	2.6	1	31.4	1	47.2	2	57.4	2	53.2	2
7	2034.2	160.0	0.0	65.0	2	51.4	2	9.2	1	27.0	1	44.0	2	55.2	2	51.6	2
8	2034.6	170.0	0.0	70.6	2	53.0	2	17.2	1	21.0	1	41.6	2	61.4	2	51.8	2
9	2034.6	180.0	0.0	72.0	2	53.6	2	24.2	1	15.2	1	39.2	2	58.6	2	46.0	2
10	2034.4	190.0	0.0	69.8	2	55.6	2	29.0	2	7.2	1	35.6	2	57.6	2	43.6	2
11	2034.4	200.0	0.0	0.0	0	55.4	2	28.8	2	8.4	1	31.0	1	48.4	1	45.8	2
12	2034.5	210.0	0.0	69.0	2	57.0	2	30.6	2	13.6	1	27.6	1	46.8	1	41.8	2
13	2034.5	220.0	0.0	69.2	2	54.2	2	34.6	2	18.0	1	21.2	1	44.0	1	41.4	2
14	2034.0	230.0	0.0	74.2	2	58.0	2	39.2	2	25.0	1	17.2	1	40.4	1	39.0	2
15	2032.6	240.0	0.0	73.2	2	57.4	2	39.4	2	27.6	1	11.2	1	35.4	1	33.6	2
16	2031.0	250.0	0.0	74.2	2	58.8	2	41.6	2	31.0	1	6.6	1	31.6	1	32.2	2
17	2028.3	260.0	0.0	75.4	2	59.6	2	44.4	2	34.6	1	6.2	1	27.0	1	28.8	2

18	2026.2	270.0	0.0	76.4	2	63.6	2	48.4	2	40.8	1	12.2	1	22.0	1	27.0	2
19	2023.9	280.0	0.0	76.4	2	62.4	2	49.2	2	43.8	1	17.4	1	17.0	1	24.2	2
20	2020.8	290.0	0.0	76.0	2	0.0	0	52.8	2	47.6	1	24.6	1	12.0	1	23.2	2
21	2019.2	295.0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	7.2	1	0.0	0
21	2017.6	300.0	0.0	77.4	2	0.0	0	52.4	2	54.6	1	28.0	1	0.0	0	18.4	1

DEPTH MODEL TABLES for BUCOTJ1.SIP

Spread 1 Depth and Elev of layers directly beneath SPs and Geos

SP	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
B	100.0	2028.9	31.7	1997.2
C	144.7	2033.5	31.3	2002.2
D	194.7	2034.4	30.7	2003.7
E	254.3	2029.6	27.6	2002.0
F	297.6	2017.6	23.9	1993.7

Geo	Surface X-Loc	Surface Elev	Layer 2 Depth	Layer 2 Elev
1	100.0	2028.9	31.7	1997.2
-1	105.0	2029.6	32.1	1997.5
2	109.9	2030.3	32.7	1997.6
3	119.8	2031.8	34.1	1997.7
4	129.8	2032.6	33.2	1999.4
5	139.7	2033.3	32.3	2001.0
6	149.7	2033.7	30.4	2003.3
7	159.7	2034.2	32.6	2001.6
8	169.7	2034.6	34.0	2000.6
9	179.7	2034.6	33.8	2000.8
10	189.7	2034.4	31.4	2003.0
11	199.7	2034.4	29.9	2004.5
12	209.7	2034.5	29.7	2004.8
13	219.7	2034.5	29.5	2005.0
14	229.7	2034.0	29.2	2004.8
15	239.6	2032.6	28.1	2004.5
16	249.5	2031.0	27.5	2003.5
17	259.1	2028.3	27.9	2000.4
18	268.9	2026.2	28.6	1997.6
19	278.6	2023.9	28.5	1995.4
20	288.1	2020.8	26.1	1994.7
-21	292.8	2019.2	24.9	1994.3
21	297.6	2017.6	23.9	1993.7

Velocities used to formulate the Depth Model

Spread 1	Layer 1	Layer 2
Vertical	1398	
Horizontal		6501

	Hutchinson & Biggs Coordinate	NAEVA Coordinate	Hutchinson & Biggs Coordinate	NAEVA Coordinate	
Line A	A 0+00	100N	B 0+00	100E	Line B
	A 0+10	110N	B 0+10	110E	
	A 0+20	120N	B 0+20	120E	
	A 0+30	130N	B 0+30	130E	
	A 0+40	140N	B 0+40	140E	
	A 0+50	150N	B 0+50	150E	
	A 0+60	160N	B 0+60	160E	
	A 0+70	170N	B 0+70	170E	
	A 0+80	180N	B 0+80	180E	
	A 0+90	190N	B 0+90	190E	
	A 1+00	200N	B 1+00	200E	
	A 1+10	210N	B 1+10	210E	
	A 1+20	220N	B 1+20	220E	
	A 1+30	230N	B 1+30	230E	
	A 1+40	240N	B 1+40	240E	
	A 1+50	250N	B 1+50	250E	
	A 1+60	260N	B 1+60	260E	
	A 1+70	270N	B 1+70	270E	
	A 1+80	280N	B 1+80	280E	
	A 1+90	290N	B 1+90	290E	
	A 2+00	300N	B 2+00	300E	
Line C	C 0+00	100N	D 0+00	100E	Line D
	C 0+10	110N	D 0+10	110E	
	C 0+20	120N	D 0+20	120E	
	C 0+30	130N	D 0+30	130E	
	C 0+40	140N	D 0+40	140E	
	C 0+50	150N	D 0+50	150E	
	C 0+60	160N	D 0+60	160E	
	C 0+70	170N	D 0+70	170E	
	C 0+80	180N	D 0+80	180E	
	C 0+90	190N	D 0+90	190E	
	C 1+00	200N	D 1+00	200E	
	C 1+10	210N	D 1+10	210E	
	C 1+20	220N	D 1+20	220E	
	C 1+30	230N	D 1+30	230E	
	C 1+40	240N	D 1+40	240E	
	C 1+50	250N	D 1+50	250E	

Line E

Hutchinson & Biggs Coordinate	NAEVA Coordinate
E 0+00	100N
E 0+10	110N
E 0+20	120N
E 0+30	130N
E 0+40	140N
E 0+50	150N
E 0+60	160N
E 0+70	170N
E 0+80	180N
E 0+90	190N
E 1+00	200N
E 1+10	210N
E 1+20	220N
E 1+30	230N
E 1+40	240N
E 1+50	250N
E 1+60	260N
E 1+70	270N
E 1+80	280N
E 1+90	290N
E 2+00	300N
E 2+10	310N
E 2+20	320N
E 2+30	330N
E 2+40	340N
E 2+50	350N
E 2+60	360N
E 2+70	370N
E 2+80	380N
E 2+90	390N
E 3+00	400N
E 3+10	410N
E 3+20	420N
E 3+30	430N
E 3+40	440N
E 3+50	450N
E 3+60	460N
E 3+70	470N
E 3+80	480N
E 3+90	490N
E 4+00	500N

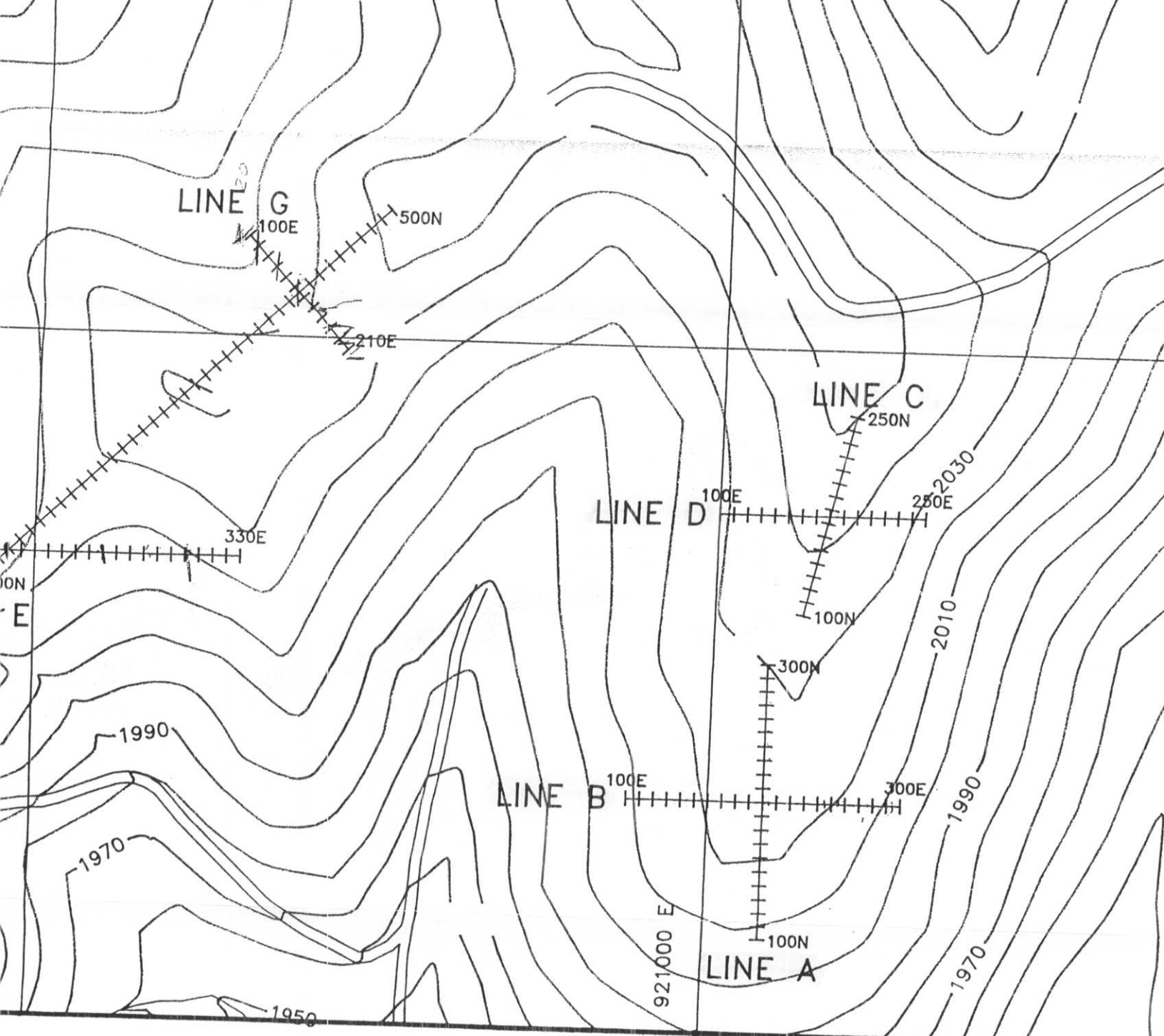
Line F

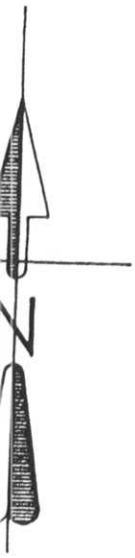
Hutchinson & Biggs Coordinate	NAEVA Coordinate
F 0-30	100E
F 0-20	110E
F 0-10	120E
F 0+00	130E
F 0+10	140E
F 0+20	150E
F 0+30	160E
F 0+40	170E
F 0+50	180E
F 0+60	190E
F 0+70	200E
F 0+80	210E
F 0+90	220E
F 1+00	230E
F 1+10	240E
F 1+20	250E
F 1+30	260E
F 1+40	270E
F 1+50	280E
F 1+60	290E
F 1+70	300E
F 1+80	310E
F 1+90	320E
F 2+00	330E

Line G

Hutchinson & Biggs Coordinate	NAEVA Coordinate
G 0+00	100E
G 0+10	110E
G 0+20	120E
G 0+30	130E
G 0+40	140E
G 0+50	150E
G 0+60	160E
G 0+70	170E
G 0+80	180E
G 0+90	190E
G 1+00	200E
G 1+10	210E

	Hutchinson & Biggs Coordinate	NAEVA Coordinate	Hutchinson & Biggs Coordinate	NAEVA Coordinate	
Line H	H 0+00	100N	J 2+00	100E	Line J
	H 0+10	110N	J 1+90	110E	
	H 0+20	120N	J 1+80	120E	
	H 0+30	130N	J 1+70	130E	
	H 0+40	140N	J 1+60	140E	
	H 0+50	150N	J 1+50	150E	
	H 0+60	160N	J 1+40	160E	
	H 0+70	170N	J 1+30	170E	
	H 0+80	180N	J 1+20	180E	
	H 0+90	190N	J 1+10	190E	
	H 1+00	200N	J 1+00	200E	
	H 1+10	210N	J 0+90	210E	
	H 1+20	220N	J 0+80	220E	
	H 1+30	230N	J 0+70	230E	
	H 1+40	240N	J 0+60	240E	
	H 1+50	250N	J 0+50	250E	
	H 1+60	260N	J 0+40	260E	
	H 1+70	270N	J 0+30	270E	
	H 1+80	280N	J 0+20	280E	
	H 1+90	290N	J 0+10	290E	
	H 2+00	300N	J 0+00	300E	





NORTH AMERICAN EXPLORATIO
P.O. BOX 7584 CHARLOTTESV
NAEVA
(804) 973-
(804) 973-

CLIENT: **GEI**

SEISMIC REFRAC
SURVEY

Proposed Buncombe
Municipal Solid Waste
Buncombe Co. North

LINE A

FILE BUV2TA1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

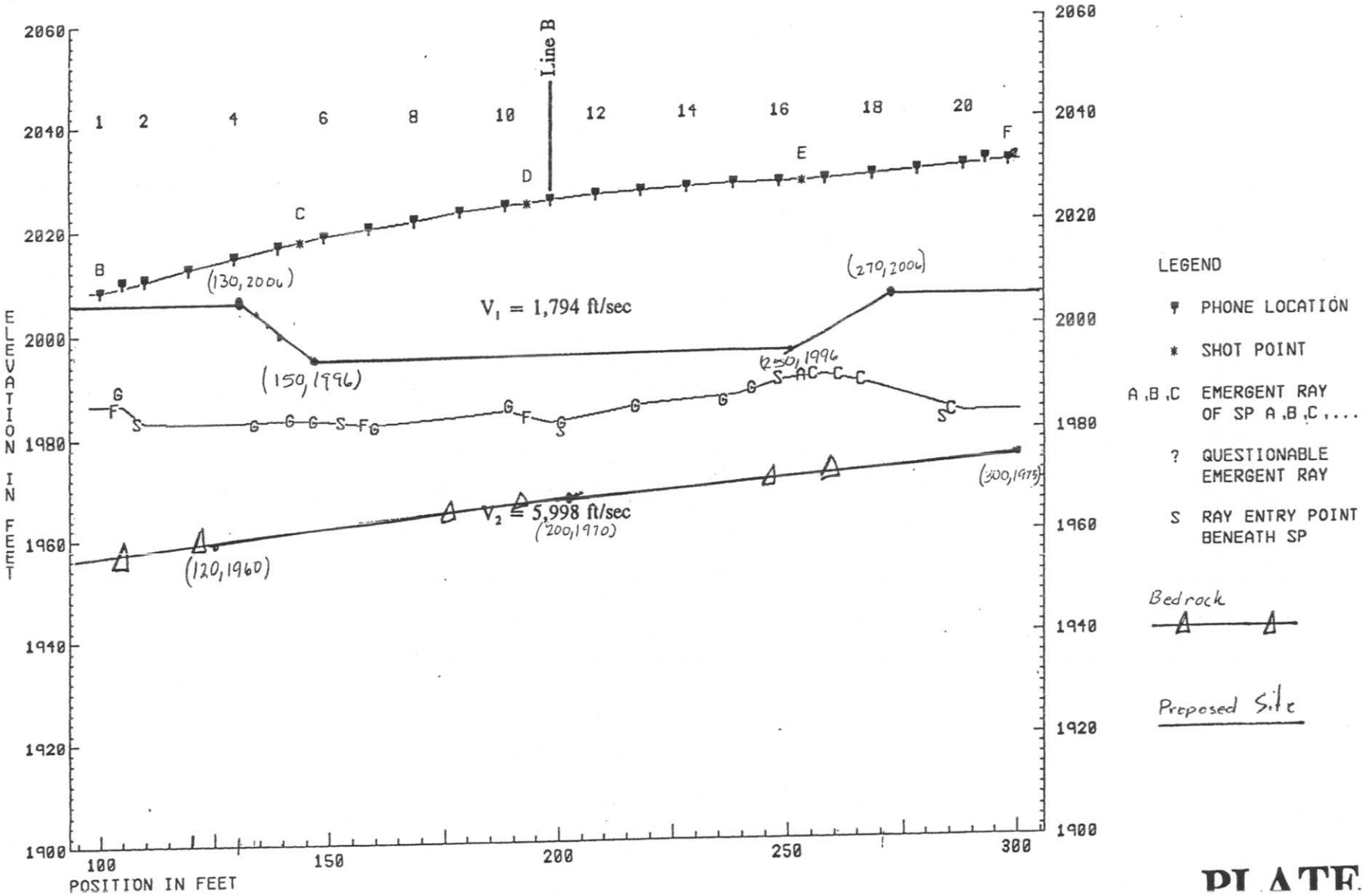


PLATE 2

LINE B

FILE BUV2TB1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

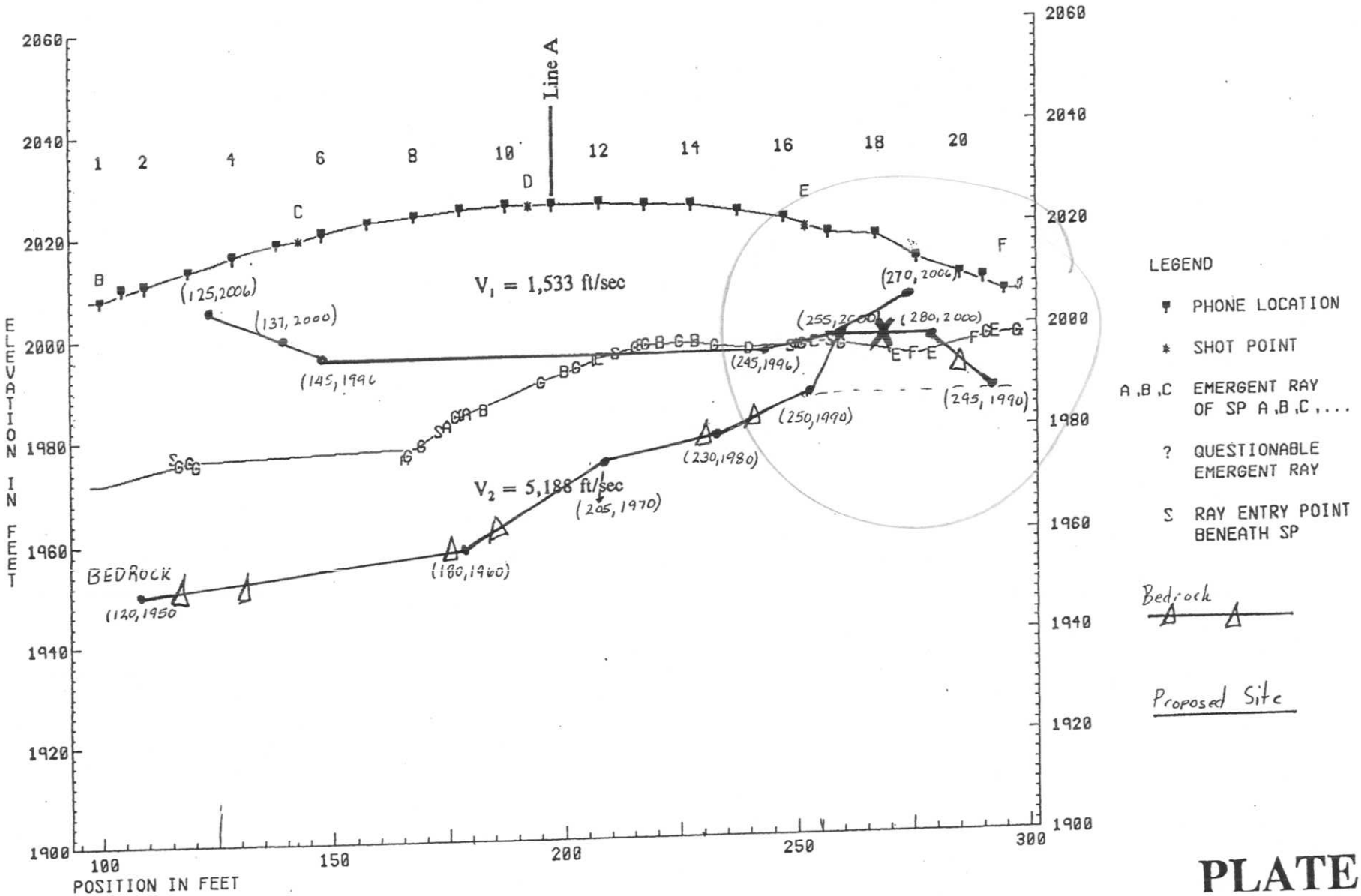


PLATE 3

LINE C

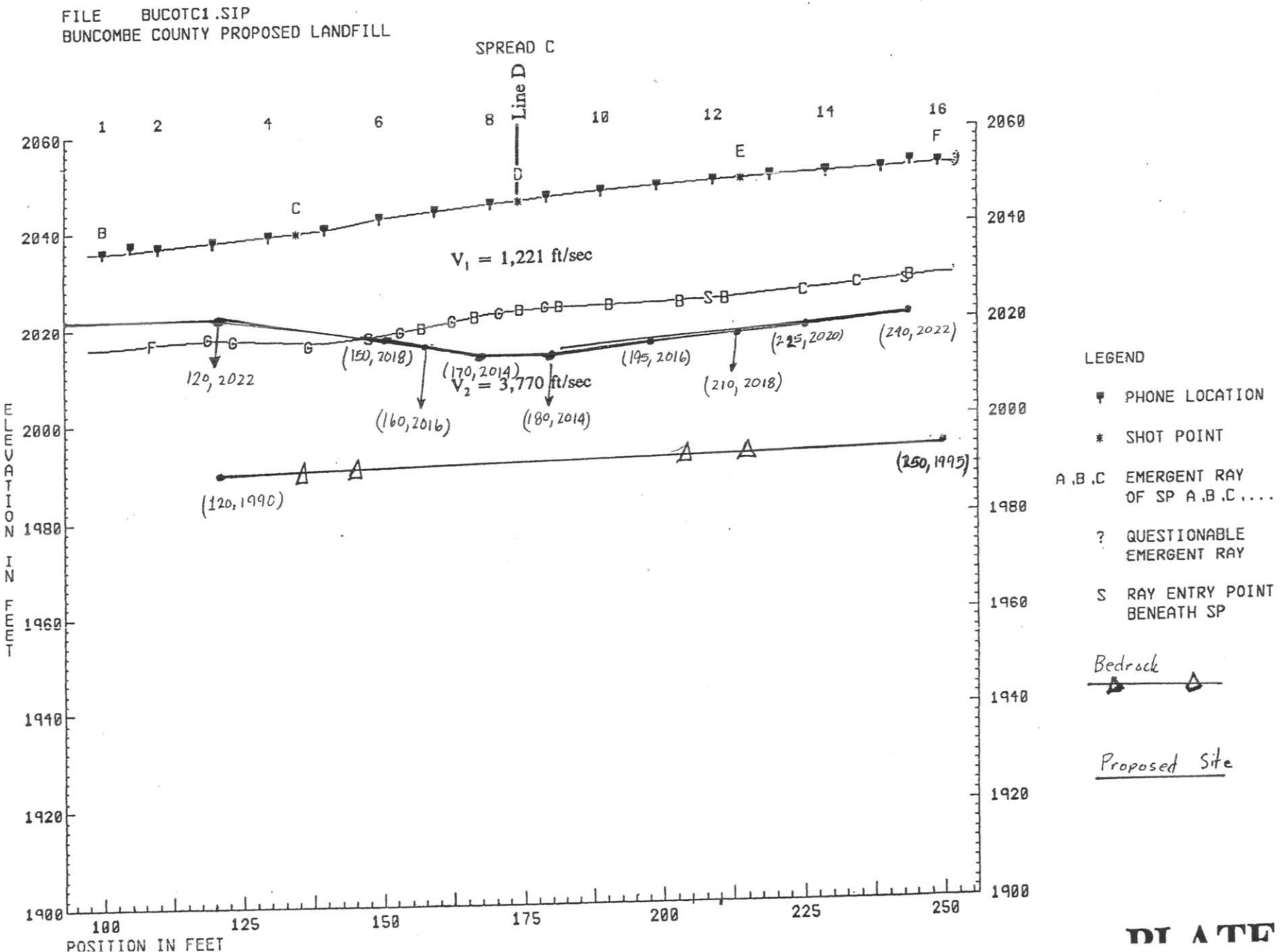


PLATE 4

LINE D

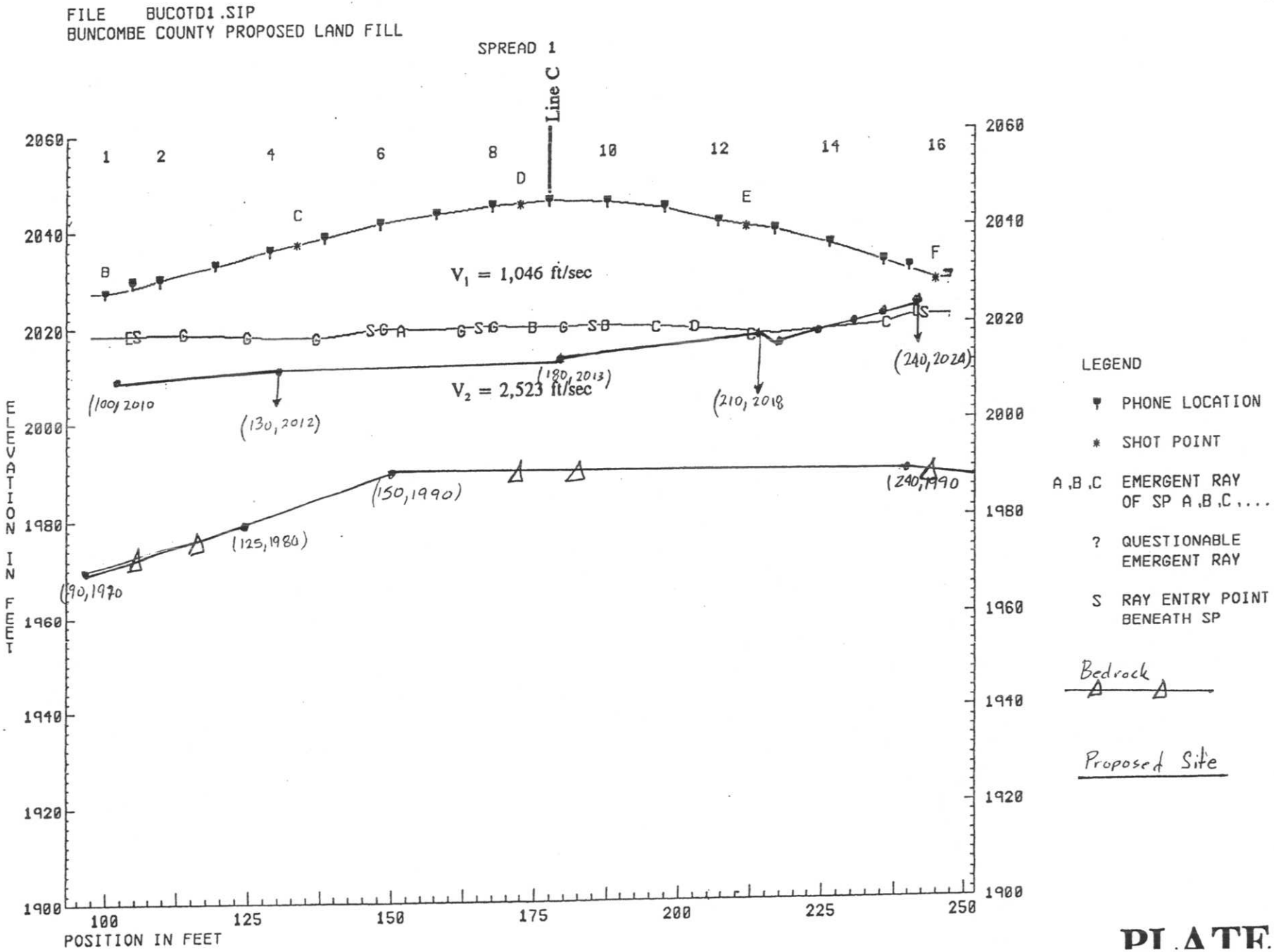
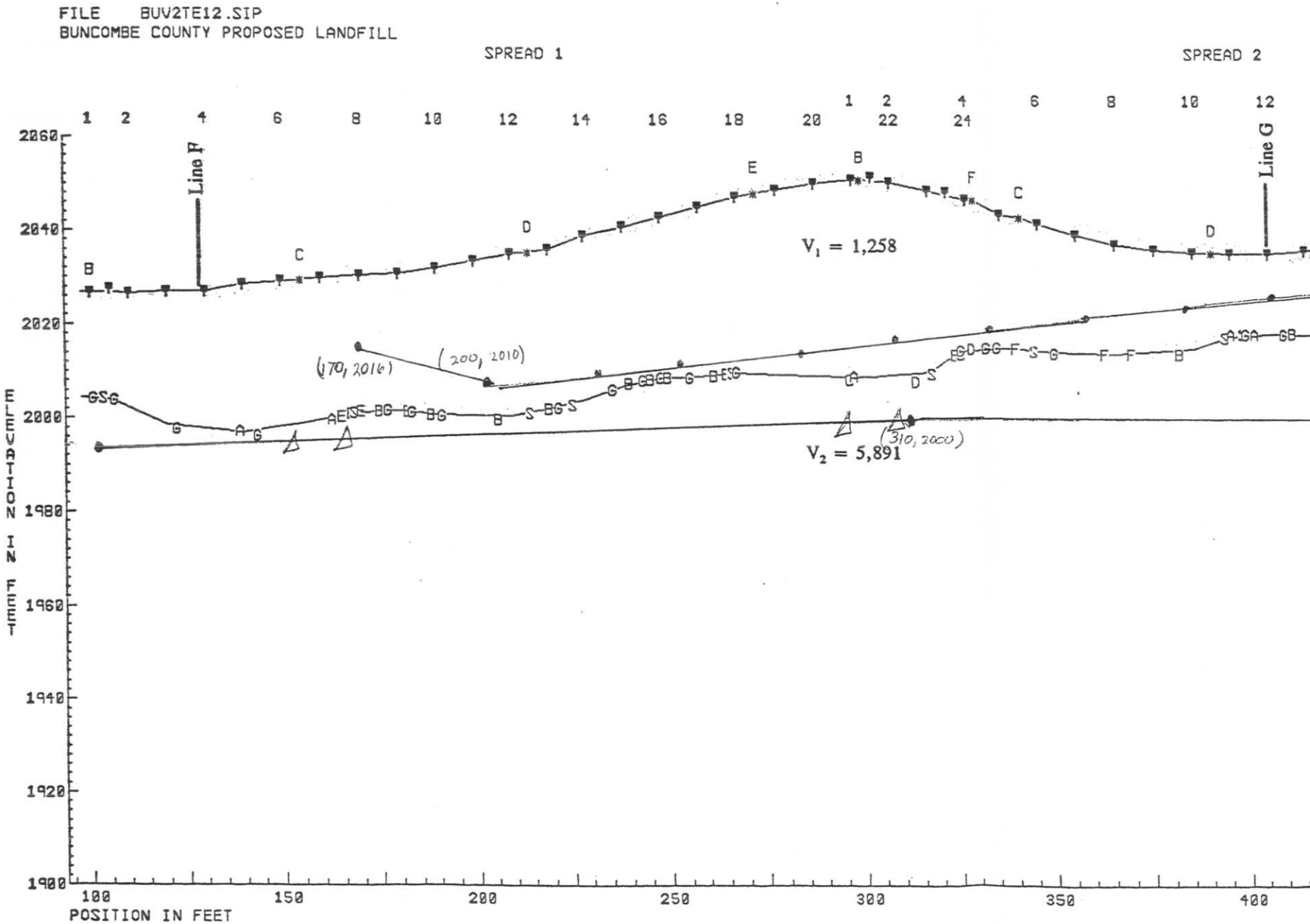


PLATE 5

LINE E


FILE BUV2TE12.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL
SPREAD 1
SPREAD 2
Line F
Line G
V1 = 1,258
V2 = 5,891
(170, 2016)
(200, 2010)
(310, 2000)
ELEVATION IN FEET
POSITION IN FEET

LINE F

FILE BUCOTF1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

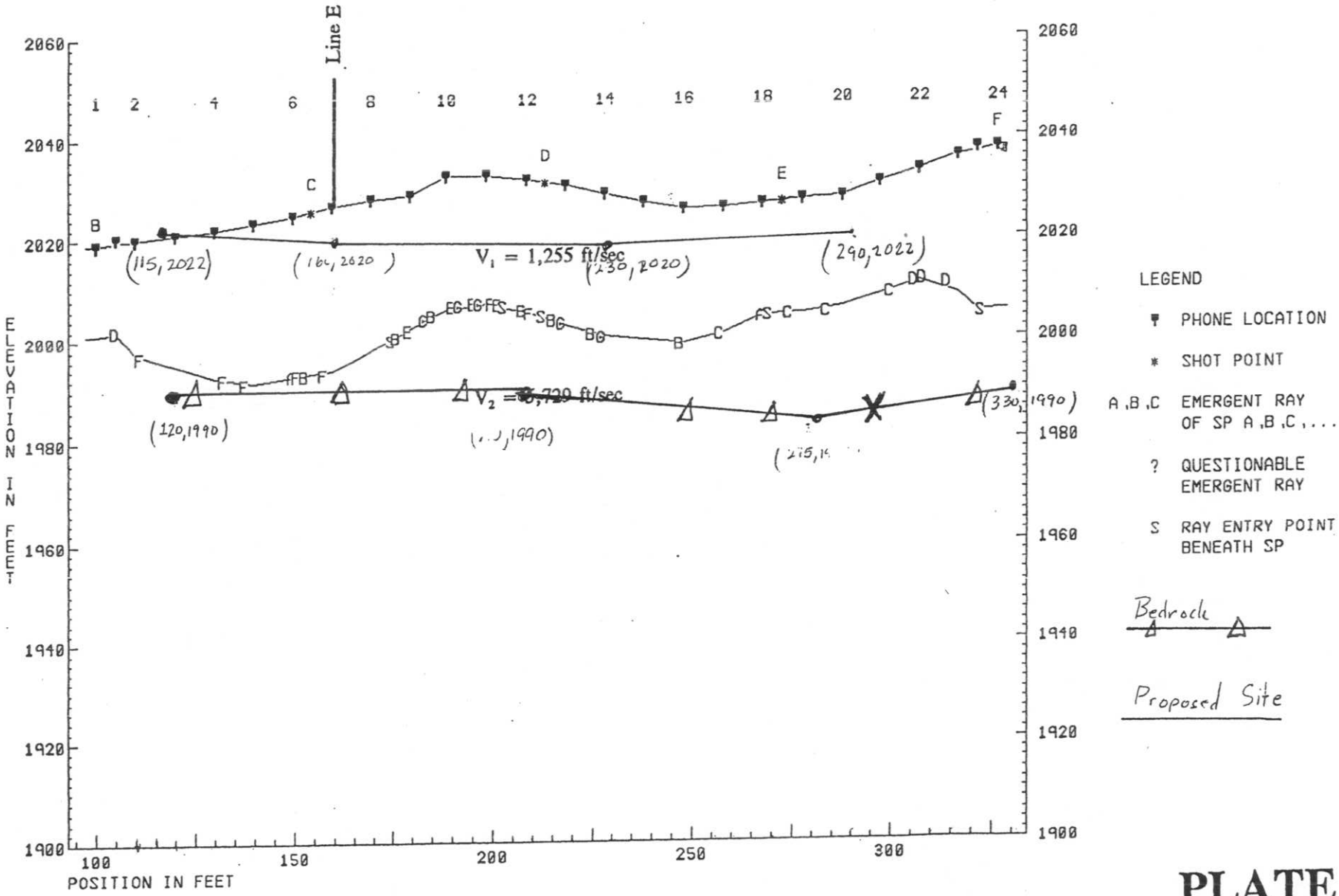


PLATE 7

LINE G

FILE BUV3TG1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

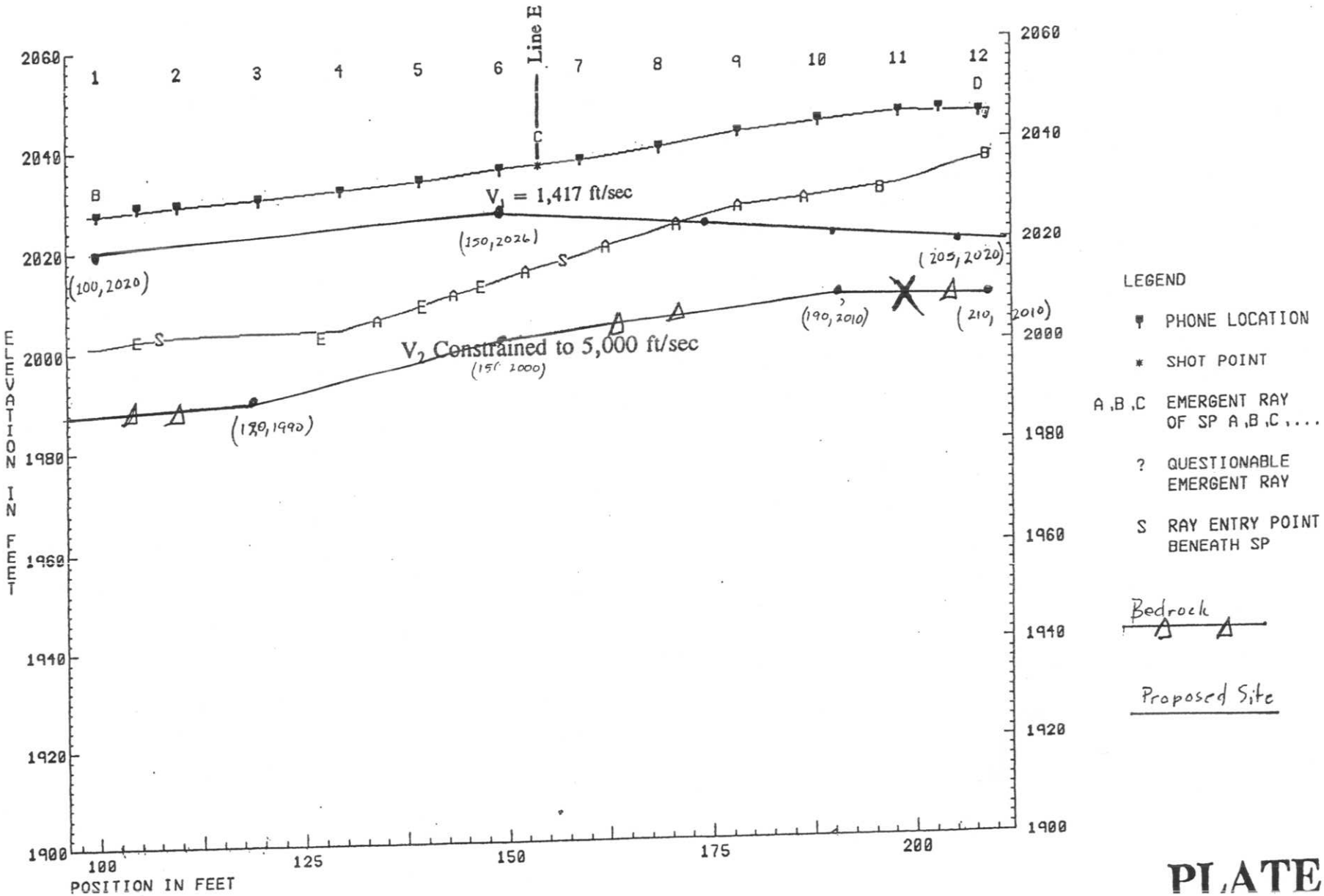


PLATE 8

LINE H

FILE BUCOTH1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

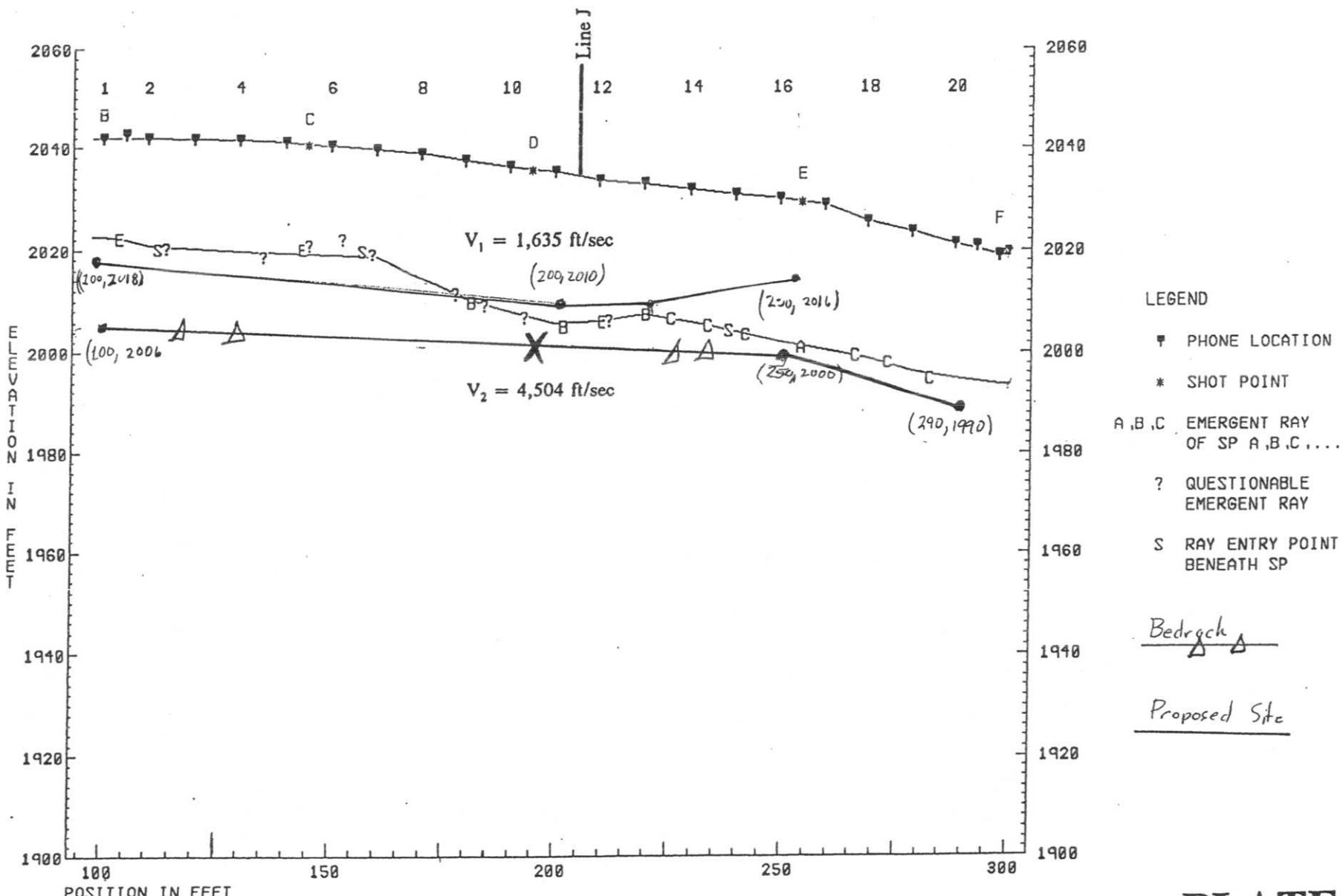


PLATE 9

LINE J

FILE BUCOTJ1.SIP
BUNCOMBE COUNTY PROPOSED LANDFILL

SPREAD 1

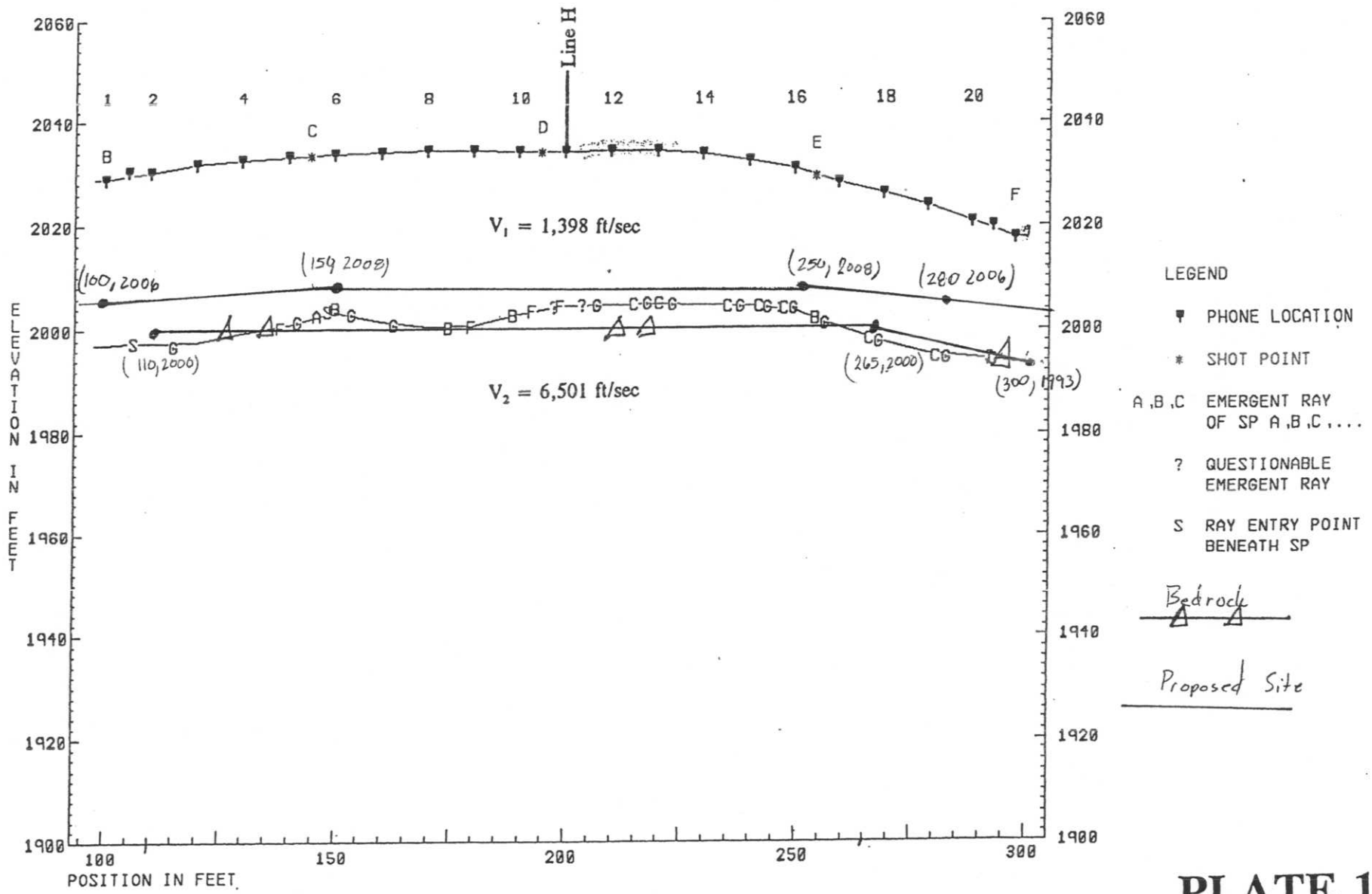
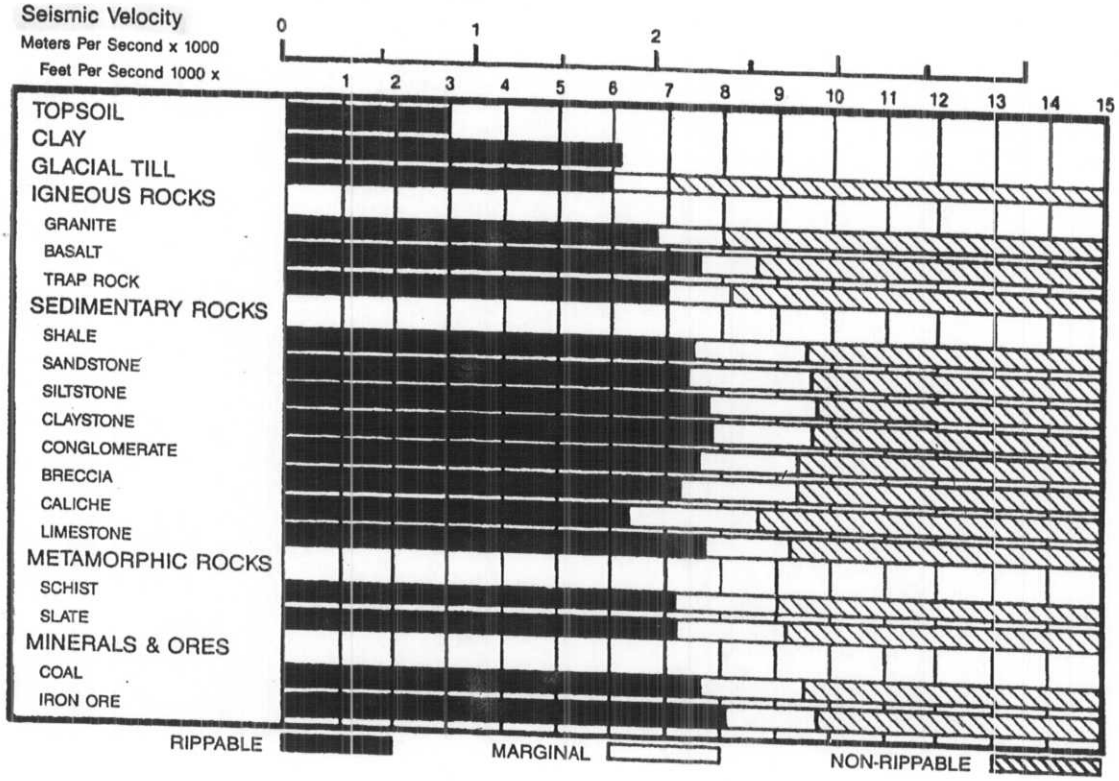
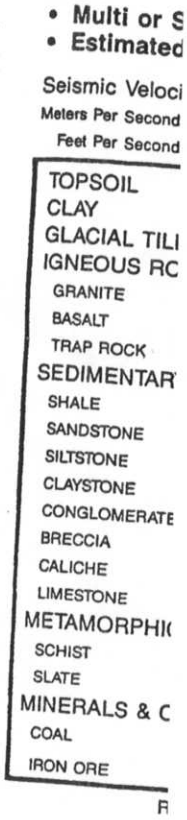


PLATE 10

D9N
- **Multi or Single Shank No. 9 Ripper**
- **Estimated by Seismic Wave Velocities**

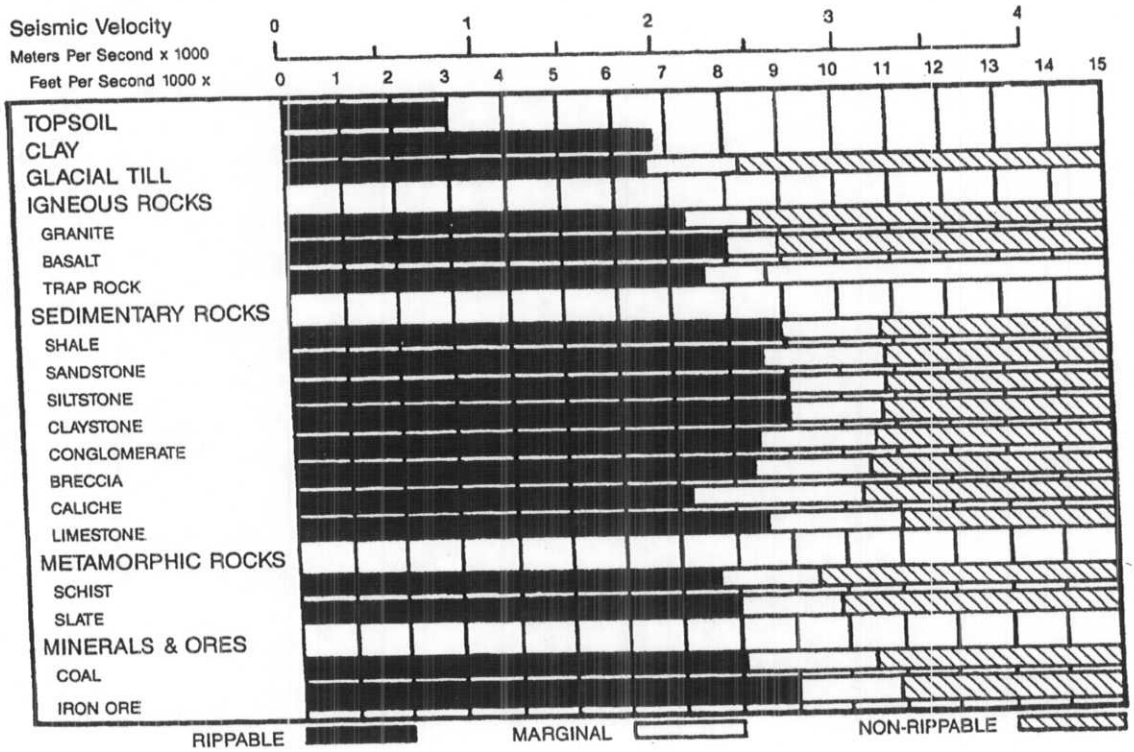


D10N
- **Multi or S**
- **Estimated**

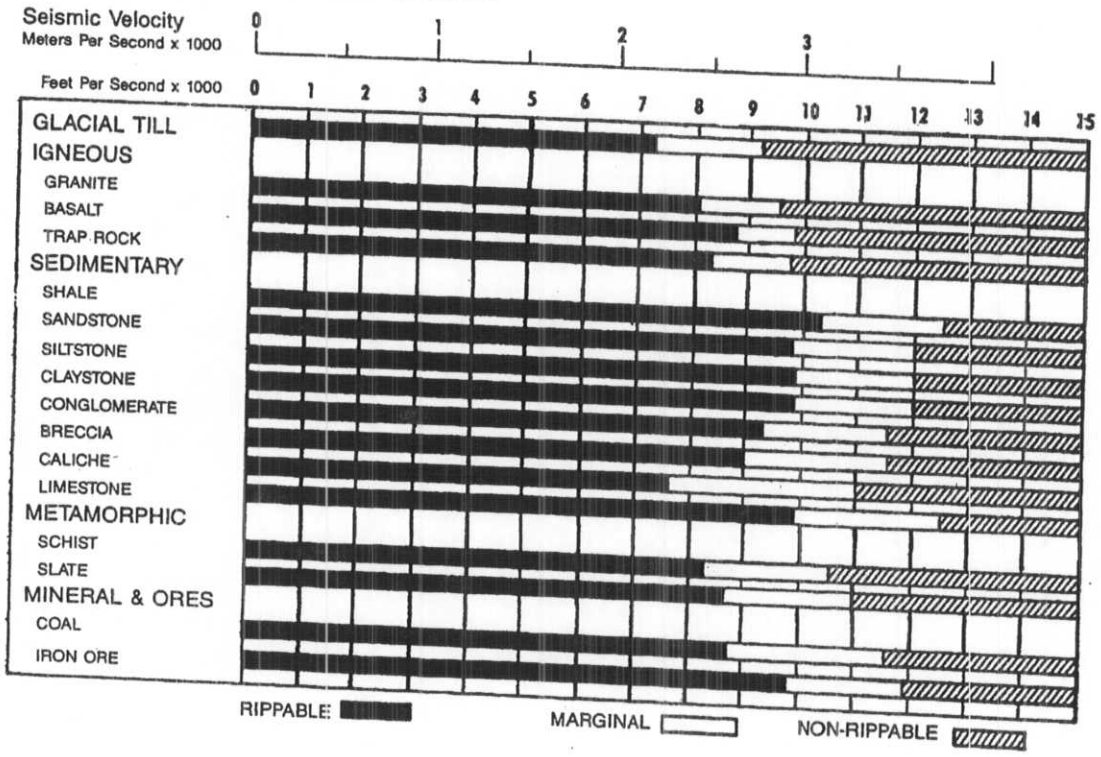


D10N

- **Multi or Single Shank No. 10 Ripper**
- **Estimated by Seismic Wave Velocities**

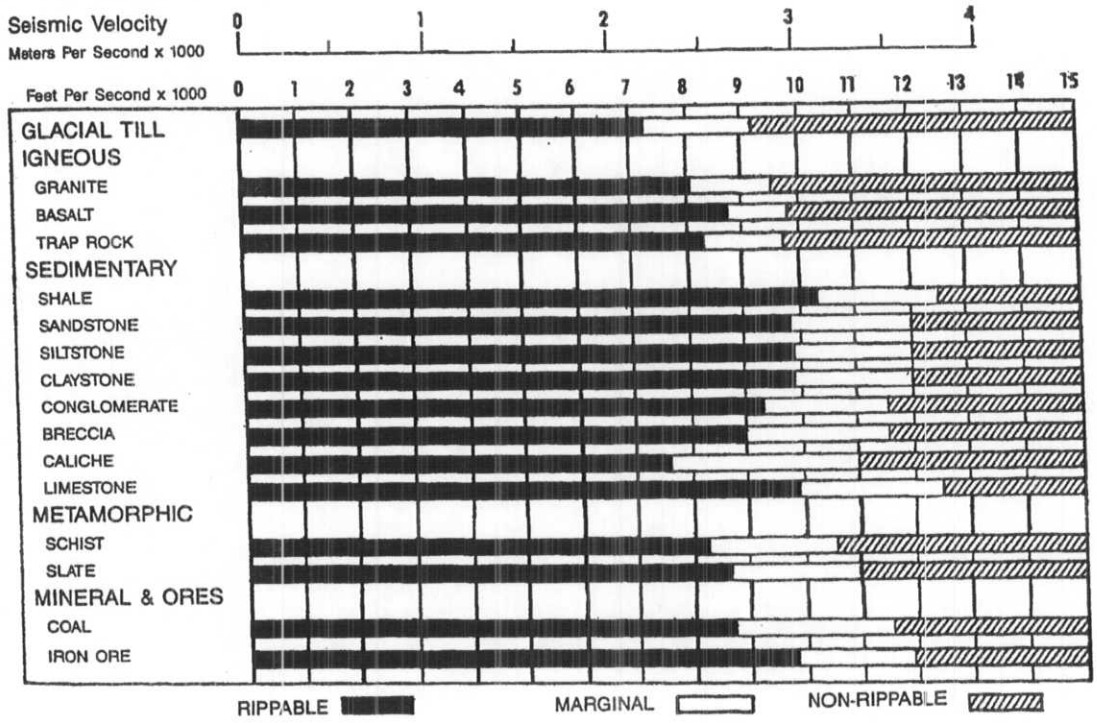


D10N
- **Single Shank Impact Ripper**
- **Estimated by Seismic Wave Velocities**



D11N

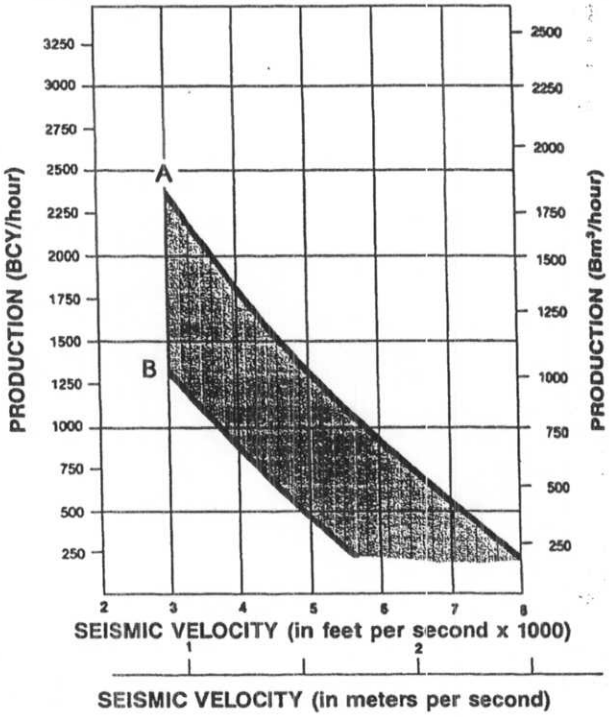
- **Multi or Single Shank No. 11 Ripper**
- **Estimated by Seismic Wave Velocities**



CONSIDERATIONS FOR USING PRODUCTION ESTIMATED GRAPHS:

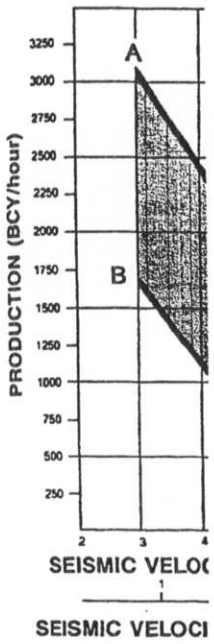
- Machine rips full-time — no dozing.
- Power shift tractors with single shank rippers.
- 100% efficiency (60 min hour).
- Charts are for all classes of material.
- In igneous rock with seismic velocity of 8000 fps or higher for the D11N, and 6000 fps or higher for the D10N and D9N, the production figures shown should be reduced by 25%.
- Upper limit of charts reflect ripping under ideal conditions only. If conditions such as thick lamination, vertical lamination or any factor which would adversely affect production are present, the lower limit should be used.

D9N WITH SINGLE SHANK

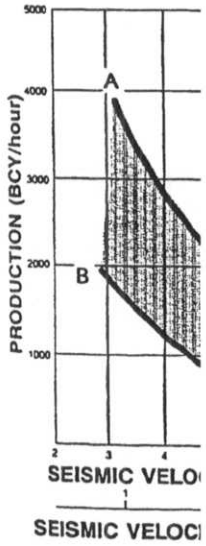


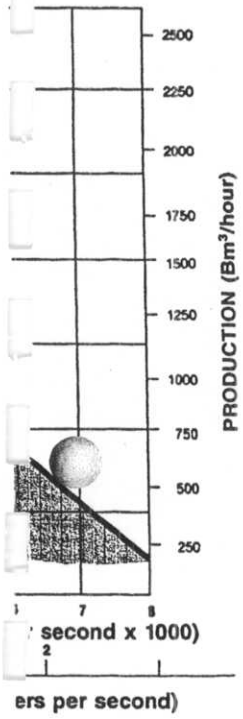
KEY
A — IDEAL
B — ADVERSE

D10N V



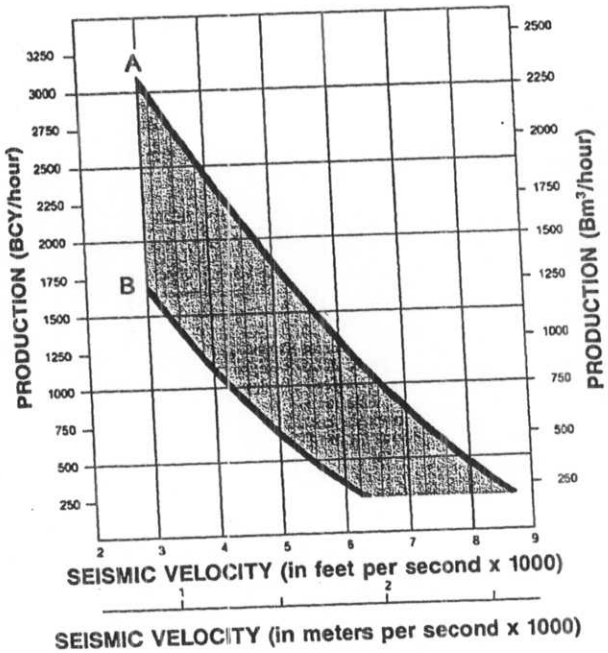
D11N V



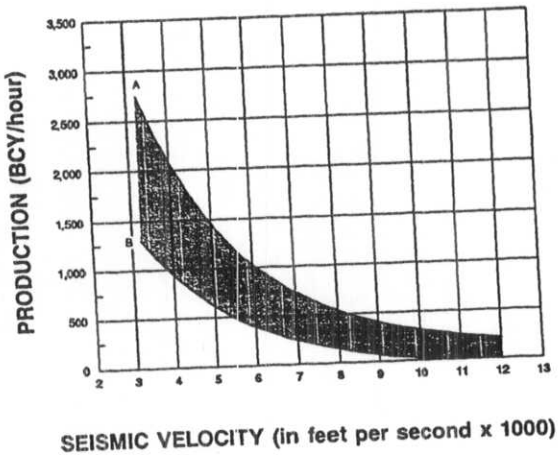


KEY
A — IDEAL
B — ADVERSE

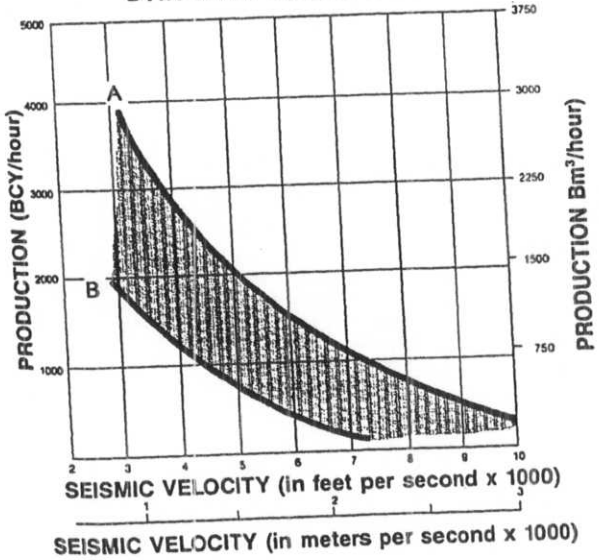
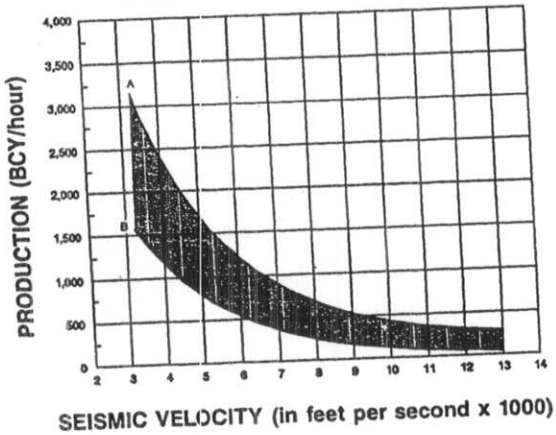
D10N WITH SINGLE SHANK



D10N WITH IMPACT RIPPER



D11N WITH SINGLE SHANK



D11N WITH IMPACT RIPPER