# Northern Gold NL

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# EL 8161
# FINAL REPORT

## to 9th July, 1997

## Pine Creek 1:100,000 Map Sheet

## Title Holders:- Territory Goldfields N.L.
## Managed by:- Northern Gold N.L.


Author:- L. Cahir


NTDME

Northern Gold N.L., Adelaide River

Northern Gold N.L., Perth Office

# SUMMARY

EL 8161 is located approximately 100 kilometres south - east of Darwin, on the Pine Creek 1:100,000 scale map sheet and the Union Reef (14/6-1) 1:50,000 scale map sheet.

The licence is dominated by Lower Proterozoic rocks of the Mt Bonnie Formation and Gerowie Tuff with minor Burrell Creek Formation sediments in a north - west plunging anticlinal fold structure.

The licence was granted to Northern Territory Gold Mines N.L. on the 20th of September 1993 for a period expiring on the 14th of September 1999. EL 8161 is now held by Territory Goldfields N.L. and managed by Northern Gold N.L.

Landsat Imagery, SPOT Imagery and AGSO mapping were obtained and used in conjunction with aerial mapping to determine the best method of gold exploration to be used on the licence.

A regional soil sampling program was conducted over five lines, 500 metres in length, with a line spacing of 400 metres. A total of 26 samples, including duplicates, were collected.

The results were disappointing, with the highest value returned being 1.6 ppb Au.

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# 1.0 INTRODUCTION

EL 8161 is located approximately 100 kilometres south - east of Darwin and 26 kilometres north of Pine Creek on the Union Reef (14/6-1) 1:50,000 scale and Pine Creek 1:100,000 scale map sheets.

The licence consists of one graticular block, 3 square kilometres in area, lying between latitudes 13°36' south and 13°37' south and longitudes 131°48' east and 131°49' east (Figure 1). EL 8161 is situated within Perpetual Pastoral Lease No. 1111, Ban Ban Springs, held by Ban Ban Springs Station Pty. Ltd. and Pastoral Lease No. 815, Mary River West, held by Equest Pty. Ltd.

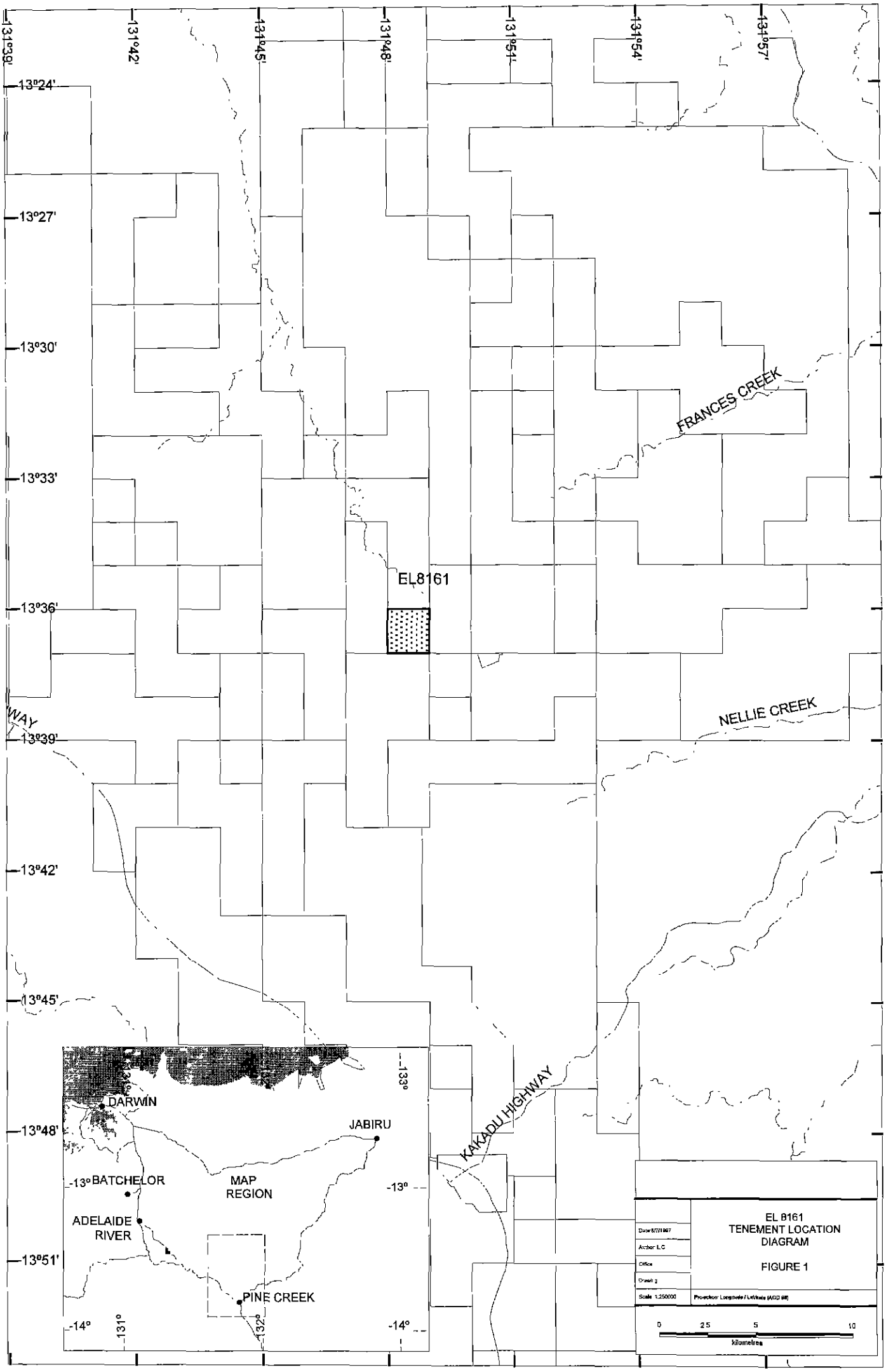
Access is via the Stuart Highway to Pine Creek then via the Frances Creek Road and pastoral tracks.

The tenement was granted to Northern Territory Gold Mines N.L. on 20th September 1993 for a period expiring on the 14th of September 1999. Territory Goldfields N.L., which is now managed by Northern Gold N.L., acquired the tenement in 1995.

Landsat Imagery, SPOT Imagery and AGSO mapping were obtained and used in conjunction with aerial mapping to determine the best method of gold exploration to be used on the licence (Socic 1996).

A regional soil sampling program was conducted over five lines, 500 metres in length, with a line spacing of 400 metres. A total of 26 samples, including duplicates, were collected.

The results were disappointing, with the highest value returned being 1.6 ppb Au.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131°42'
131°45'
131°48'
131°51'
131°54'
131°57'
13°24'
13°27'
13°30'
13°33'
13°36'
13°39'
13°42'
13°45'
13°48'
13°51'
FRANCES CREEK
EL8161
NELLIE CREEK
KAKADU HIGHWAY
DARWIN
JABIRU
BATCHELOR
ADELAIDE RIVER
PINE CREEK
MAP REGION
-13°
-14°
131°
132°
133°
EL 8161
TENEMENT LOCATION DIAGRAM
FIGURE 1
Date: 8/7/1997
Author: LC
Office
Drawn: g
Scale: 1:250000
Projection: Longitude / Latitude (AGD 66)
0
2.5
5
10
kilometres

# 2.0 GEOLOGY

## 2.1 Regional Geology

EL 8161 is situated within the Pine Creek Geosyncline, a tight to isoclinally folded sequence of mainly pelitic and psammitic Lower Proterozoic with interlayered tuff units. All rocks in the area have been metamorphosed to low, and in places medium grade, metamorphic assemblages. For the purposes of this report the prefix "meta" is implied, but omitted from the rock names and descriptions.

The sequence has been intruded by pre-orogenic sills of the Zamu Dolerite and a number of late syn-orogenic to post-orogenic Proterozoic granitoids. Largely undeformed Middle and Late Proterozoic, Palaeozoic and Mesozoic strata as well as Cainozoic sediments and laterite overlie the Pine Creek Geosyncline rocks.

## 2.2 Local Geology

EL 8161 consists predominantly of sediments of the Mt Bonnie Formation which occupies the majority of the central and eastern portion of the licence area. The overlying Burrell Creek Formation occupies a small portion of the licence along its western boundary. Gerowie Tuff is present in the south - east portion of the tenement in the axis of an anticline.

The main lithologies present include metamorphosed shale, siltstone, greywacke, chert, banded iron formation, vitric and lithic tuffs.

The rocks have undergone tight to isoclinal folding about north - northwest to south - southeast axes that are subhorizontal and plunge mainly to the north.

# 3.0 PREVIOUS EXPLORATION

The highlights of previous exploration activities are summarised below. In this work, the results of 1:100,000 scale geological mapping by the BMR have been used as the starting point by most previous explorers for large amounts of stream-sediment, soil and rock geochemistry, followed by limited drilling in some cases. While low-order geochemical anomalies have been quite commonplace in the past, none has led to intensive drill testing, except for prospects to the north of Mount Porter (Fawcett, 1995).

The multi-client, high resolution, airborne geophysical survey flown by Aerodata in 1988 (with additions in 1991 and 1992) covers only a small portion of the total area (Fawcett, 1995).

**EL 4752 - R.G.C. Exploration Pty. Ltd.**

- extensive program completed in Mount Porter locality involving detailed geological mapping, rock chip sampling, costeaning, and drilling (percussion and core).
- encouraging surface and costean sample results were not confirmed by core drilling.
- Mount Porter and Western anticlines were the principal foci of the exploration.

**EL 4759 - Kable Resources Pty. Ltd. and Dominion Mining Ltd.**

- extensive costeaning to north north - west and south south - east of old Watts Creek alluvial diggings by Kable plus follow-up mapping, sampling and reverse circulation drilling by Dominion of low-grade, stockwork-type Au mineralisation (Hosking, 1994).
- Southern Stockwork Zone (SSZ), Watts Creek North and Watts Creek South prospects.

**EL 5064 - Western Gulf Oil and Mining Ltd.**

- rock chip and soil (eluvial) sampling along selected traverses
- initial anomalous values not enhanced by follow-up sampling
- best values from initial sampling of 0.94g/t Au and 4.35% As (Fawcett, 1995)

**EL 6222 and EL 6335 - Billiton Australia**

- discouraging results from stream sediment (including BCL type), soil and rock chip sampling, geological mapping, ground magnetic surveying and interpretation of aeromagnetic data (Hosking, 1994).
- most significant results obtained were:

  **EL 6222**

  - 1.29g/t Au (rock chip sampling)
  - 0.4ppb Au (BCL stream sediment sampling)
  - magnetic anomalies due to presence of pyrrhotite and magnetite in hornfels adjacent to granite.

  **EL 6335**

  - 0.1g/t Au (rock chip sampling)
  - 0.13ppb Au (BCL stream sediment sampling)

**EL 6653 - Robert Johnston**

- discouraging results from geochemical sampling and geological mapping.

**EL 6702 - Rosequartz Mining N.L.**

- geological reconnaissance and rock chip sampling completed, with emphasis on gossanous quartz stockworks and breccias.
- only one small area located with slightly anomalous gold values which were deemed to be insignificant.

**EL 7316 - Northern Gold N.L**

- discouraging results from stream sediment and soil sampling plus geological mapping, with no anomalies defined for follow-up work.

**EL 8056 - Territory Goldfields N.L.**

- research of available geological and exploration-related data, acquisition and digitising of colour aerial photography and establishment of a Geographic Information System (Fawcett, 1995).

The principal findings of past mineral exploration programs within and/or close to the present licence areas are, (Fawcett, 1995):-

1. a close association of tin and gold has been demonstrated in quartz and quartz-haematite (ex-sulphide) veins which are invariably related to faulting or shearing.
2. the Koolpin Formation and to a lesser extent, the Zamu Dolerite, have received much exploration for syngenetic, stratiform-stratabound and epigenetic, discordant (structurally controlled) types of Au mineralisation respectively, mostly for bulk-tonnage, low grade deposits.
3. past exploration detected subeconomic Au mineralisation using BLEG, silt and pan-concentrate types of stream sediment and/or soil samples.
4. tourmaline is a common accessory in known tin-gold mineralisation
5. higher gold values in the ferruginous cappings of quartz-sulphide veins and sulphidic metasediments point to a considerable degree of surficial enrichment during oxidation and weathering.
6. sulphidic-carbonaceous units are common throughout the South Alligator Group, with the greatest concentrations being in the Mundogie Sandstone and Koolpin Formation.

# 4.0 1995/96 EXPLORATION COMPLETED

During the 1995/96 field season Northern Gold N.L. carried out a work program based on digital data studies and a regional soil sampling program.

## 4.1 GIS and Remote Sensing Studies

Northern Gold N.L. completed a work program involving digital data acquisition and manipulation. Landsat Imagery, SPOT Imagery and AGSO mapping were obtained and used in conjunction with aerial mapping and site visits to determine the best method of exploration to be used on the licence.

GIS and satellite imagery were used to log soil types, indicating that the region comprises mainly lateritised lower saprolite (Socic 1996).

## 4.2 Regional Soil Sampling Program

During the 1995/96 year of tenure, Northern Gold N.L. completed a regional soil sampling program over EL 8161. The soil sampling program consisted of five 500 metre long by 400 metre spaced lines. Samples were collected at 25 metre intervals and composited to 100 metres. A total of 26 samples (Sample Nos. 144331 - 144356), including duplicates were collected and sieved to -6 millimetre

fraction. All samples were submitted to Assaycorp, in Pine Creek, for BLEG assay technique and analysed for Au, As, Pb, Cu and Zn.

The regional soil sampling program sample locations are shown in Appendix 1.

### 4.2.1 Regional Soil Sampling Results

The results from the regional soil sampling program were generally disappointing with the highest value returned being 1.6 ppb Au (Sample No. 144353, 8494520N : 803356E). The results for all other elements analysed were poor.

The assay results for Au, As, Cu, Pb, and Zn are given in Appendix 1.

### 4.2.2 Statistical Analysis of the Regional Soil Sampling Results

Summary statistics for each element analysed in the soil sampling program are as follows:-

**Table 1 Summary Statistics for the Regional Soil Sampling Program**

| | Au | Cu | Zn | As | Pb |
|---|---|---|---|---|---|
| **Samples** | 26 | 26 | 26 | 26 | 26 |
| **Minimum** | 0.200 | 14.000 | 30.000 | 1.000 | 13.000 |
| **Maximum** | 1.600 | 26.000 | 105.000 | 19.000 | 173.000 |
| **Class Int.** | 0.200 | 2.000 | 10.000 | 1.500 | 10.000 |
| **Median** | 0.600 | 19.000 | 56.000 | 4.000 | 27.000 |
| **Mean** | 0.715 | 19.692 | 54.808 | 6.000 | 33.769 |
| **Variance** | 0.141 | 8.781 | 443.681 | 24.800 | 951.145 |
| **Std. Dev.** | 0.375 | 2.963 | 21.064 | 4.980 | 30.841 |
| **95th Percentile** | 1.500 | 24.500 | 86.000 | 12.500 | 69.000 |
| **99th Percentile** | 1.650 | 27.500 | 108.000 | 15.650 | 151.000 |

Both histograms and log probability plots were calculated for Au, Cu, Zn, As, and Pb.

The histograms for each of the elements, indicate that the populations are log normal. However at least two populations can be defined for all the elements analysed.

This is supported by the log probability plots. The data plot as two separate populations, indicating anomalous zones, deviating at a point of inflection. It is inferred that the lower population represents the natural background for each element for the Pine Creek Geosyncline.

Deviations from the line in the upper 1% of the Au, Cu, As and Zn, and upper 4% of the Pb, and in the lower 4% of the Au and 12% of the As probability plots, may be the result of problems with accurately plotting data or may represent a deviation from the interpreted population.

Histograms and log probability plots for Au, Cu, As, Pb, and Zn are given in Appendix 2.

# 5.0 REFERENCES

FAWCETT, C., (1995). EL 8161 - Watts Creek South, Annual Report, Year Two of Tenure, 20.09.94 - 14.09.95. Unpublished report by Territory Goldfields N.L. for the NTDME.

HOSKING, A. J., (1994). Northern Territory Gold Mines NL, Exploration Licences 8056/8161, Watts Creek. First Annual Report for Year Ending 14/09/93. Unpublished company report to the NTDME.

SOCIC, N., (1997). EL 8161, 1996/97 Annual Report, 20.09.95 - 19.09.96.

Unpublished report by Northern Gold N.L. for the NTDME.

# APPENDIX 1

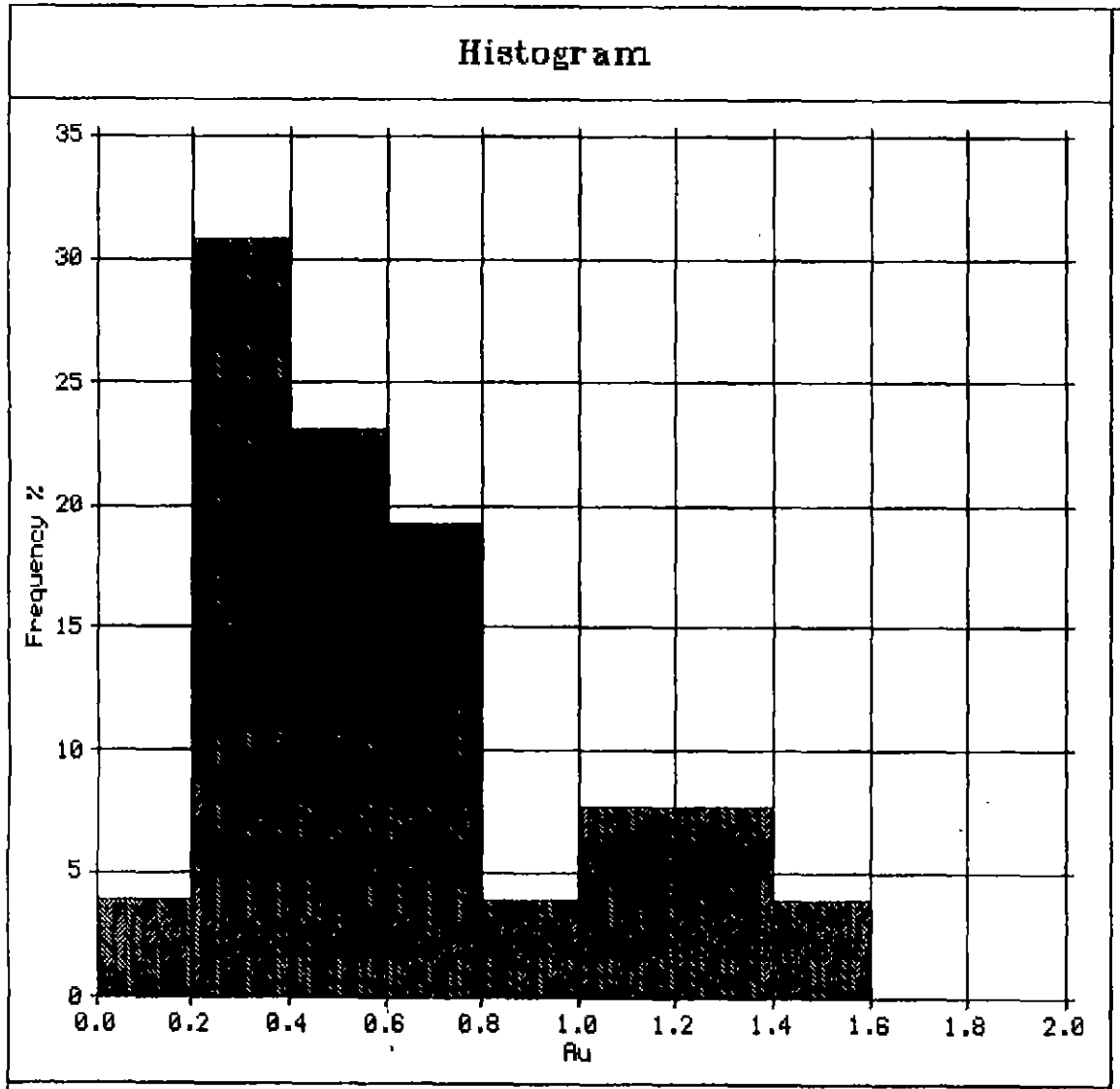
## Regional Soil Sampling Program Sample Locations and Assay Results

EL 8161 Soil Sampling Results

| SAMPLE | EASTING | NORTHING | Au | As | TYPE | Cu | Pb | Zn |
|---|---|---|---|---|---|---|---|---|
| 144331 | 803440 | 8492919 | 1.4 | 14 | BLEG | 26 | 62 | 92 |
| 144332 | 803340 | 8492920 | 0.2 | 8 | BLEG | 24 | 55 | 60 |
| 144333 | 803240 | 8492921 | 0.4 | 9 | BLEG | 17 | 26 | 30 |
| 144334 | 803140 | 8492922 | 0.8 | 9 | BLEG | 23 | 27 | 64 |
| 144335 | 803040 | 8492923 | 1 | 17 | BLEG | 25 | 33 | 84 |
| 144336 | 803444 | 8493319 | 0.4 | 6 | BLEG | 19 | 25 | 56 |
| 144337 | 803344 | 8493320 | 0.4 | 4 | BLEG | 17 | 28 | 61 |
| 144338 | 803244 | 8493321 | 0.4 | 3 | BLEG | 17 | 19 | 36 |
| 144339 | 803144 | 8493322 | 0.8 | 4 | BLEG | 18 | 28 | 69 |
| 144340 | 803044 | 8493323 | 1.2 | 13 | BLEG | 23 | 38 | 84 |
| 144341 | 803044 | 8493323 | 0.8 | 19 | BLEG | 24 | 40 | 83 |
| 144342 | 803448 | 8493719 | 1.2 | 4 | BLEG | 16 | 26 | 43 |
| 144343 | 803348 | 8493720 | 0.5 | 3 | BLEG | 14 | 26 | 35 |
| 144344 | 803248 | 8493721 | 0.6 | 9 | BLEG | 20 | 17 | 56 |
| 144345 | 803148 | 8493722 | 0.4 | 5 | BLEG | 18 | 18 | 33 |
| 144346 | 803048 | 8493723 | 0.8 | 7 | BLEG | 19 | 24 | 60 |
| 144347 | 803452 | 8494119 | 0.4 | 4 | BLEG | 20 | 46 | 64 |
| 144348 | 803352 | 8494120 | 0.6 | 2 | BLEG | 21 | 29 | 47 |
| 144349 | 803252 | 8494121 | 0.4 | 3 | BLEG | 18 | 31 | 34 |
| 144350 | 803152 | 8494122 | 0.4 | 1 | BLEG | 19 | 14 | 37 |
| 144351 | 803052 | 8494123 | 0.6 | 1 | BLEG | 21 | 18 | 36 |
| 144352 | 803456 | 8494519 | 0.5 | 1 | BLEG | 19 | 29 | 46 |
| 144353 | 803356 | 8494520 | 1.6 | 3 | BLEG | 17 | 173 | 105 |
| 144354 | 803256 | 8494521 | 0.8 | 3 | BLEG | 20 | 18 | 40 |
| 144355 | 803156 | 8494522 | 1.4 | 2 | BLEG | 18 | 15 | 36 |
| 144356 | 803056 | 8494523 | 0.6 | 2 | BLEG | 19 | 13 | 34 |

# Appendix 2

# Summary Statistics Histograms and Log Probability Plots for the Regional Soil Sampling Program



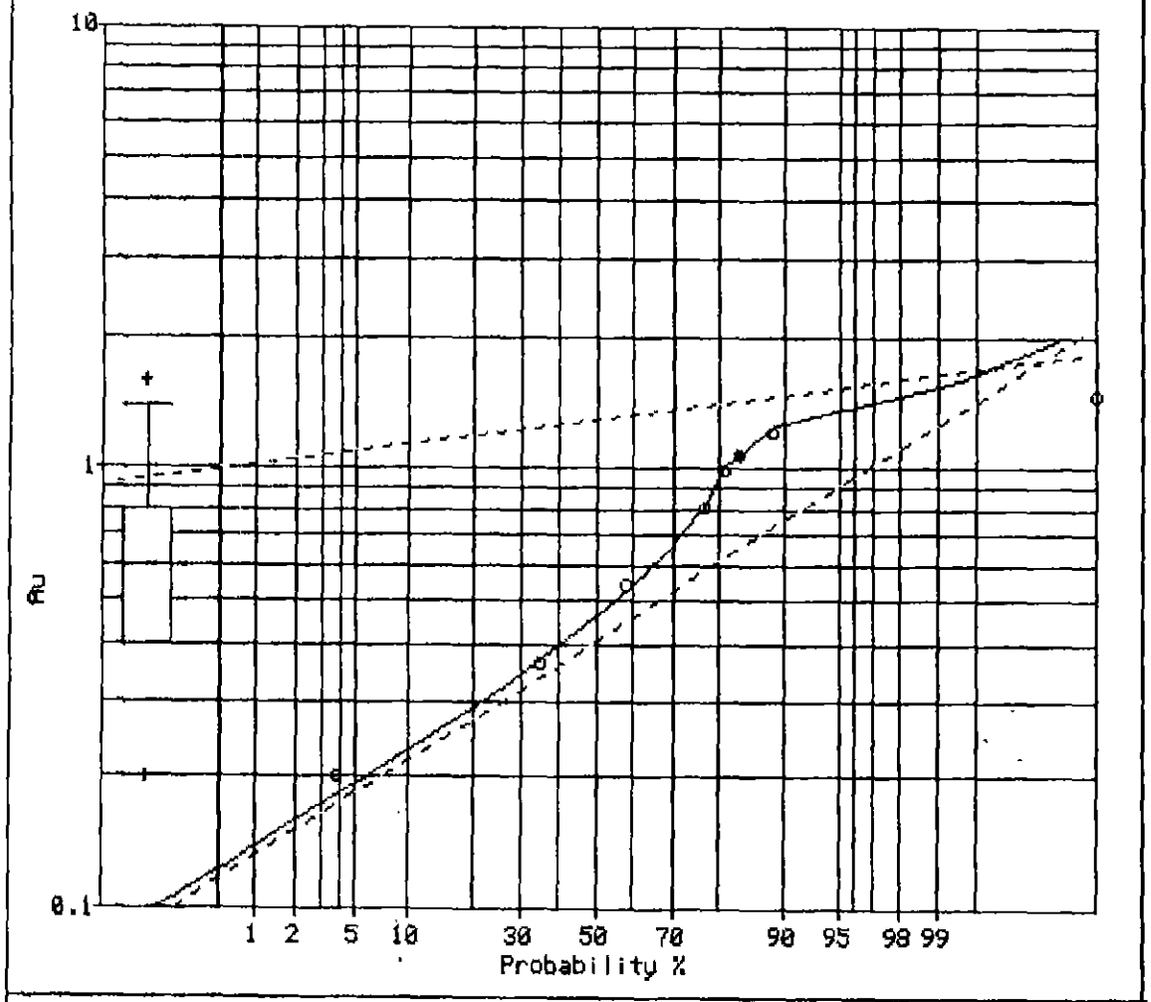

DATA
File 8161SL96
Variable Au

NORMAL STATISTICS
Samples 26
Minimum 0.200
Maximum 1.600
Class Int 0.200
Median 0.600
Mean 0.715
Variance 0.1406
Std Dev 0.3749

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.100
Mean 0.631
Mean of logs -0.461
Log variance 0.2623
Log Std Dev 0.5121

SICHEL STATISTICS
Sichel's Mean 0.714
Sichel's V 0.252
Sichel's Gamma 1.131

# Log Probability Plot




DATA
File 8161SL96
Variable Au

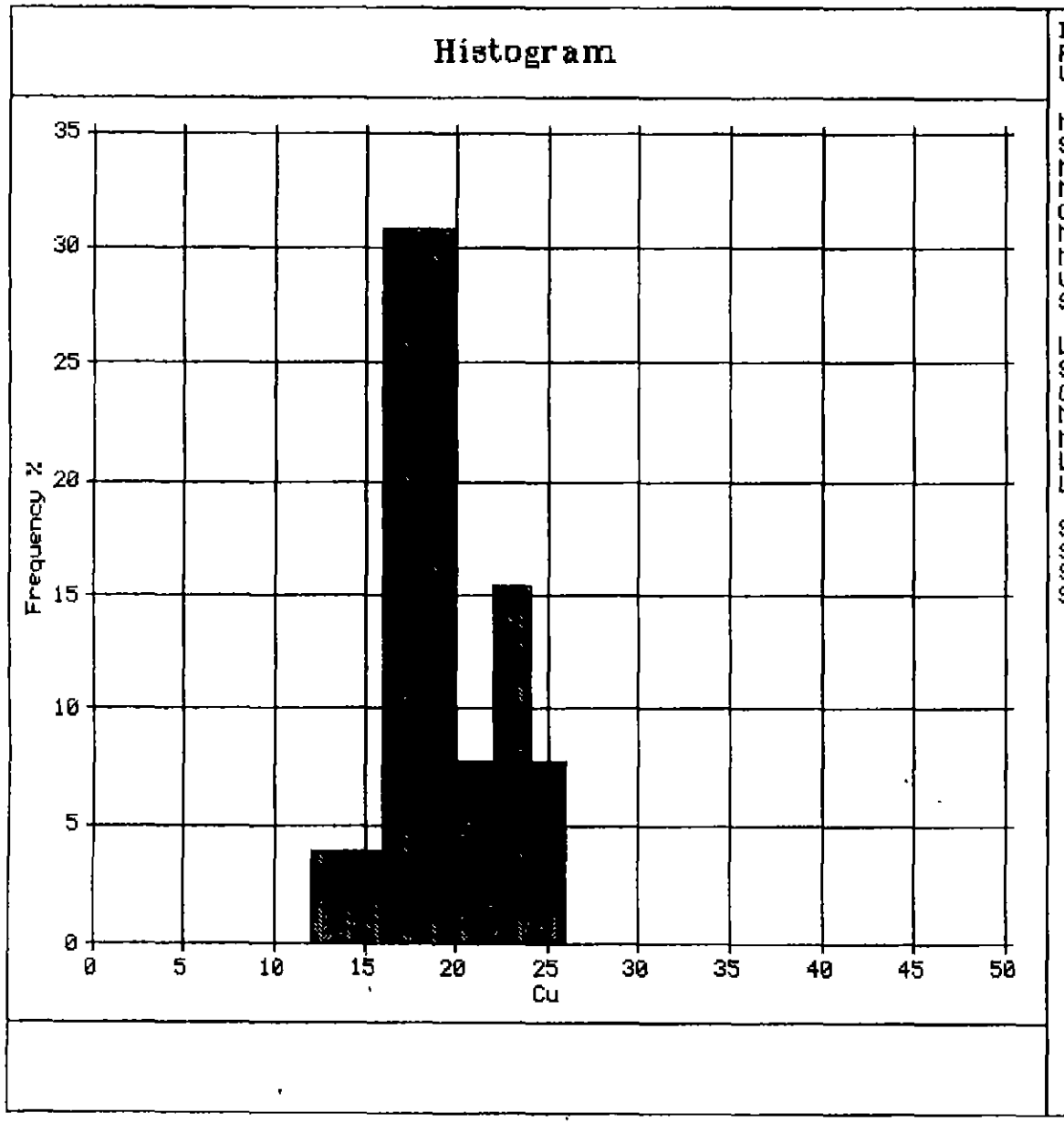
NORMAL STATISTICS
Samples 26
Minimum 0.200
Maximum 1.600
Class Int 0.200
Median 0.600
Mean 0.715
Variance 0.1406
Std Dev 0.3749

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.200
Mean 0.631
Mean of logs -0.461
Log variance 0.2623
Log Std Dev 0.5121

SICHEL STATISTICS
Sichel's Mean 0.714
Sichel's V 0.252
Sichel's Gamma 1.131

Upper Population 16.63%
Mean 1.300 (Ln 0.262)
S Dev 1.108 (Ln 0.103)

Lower Population 83.37%
Mean 0.409 (Ln -0.893)
S Dev 1.626 (Ln 0.486)

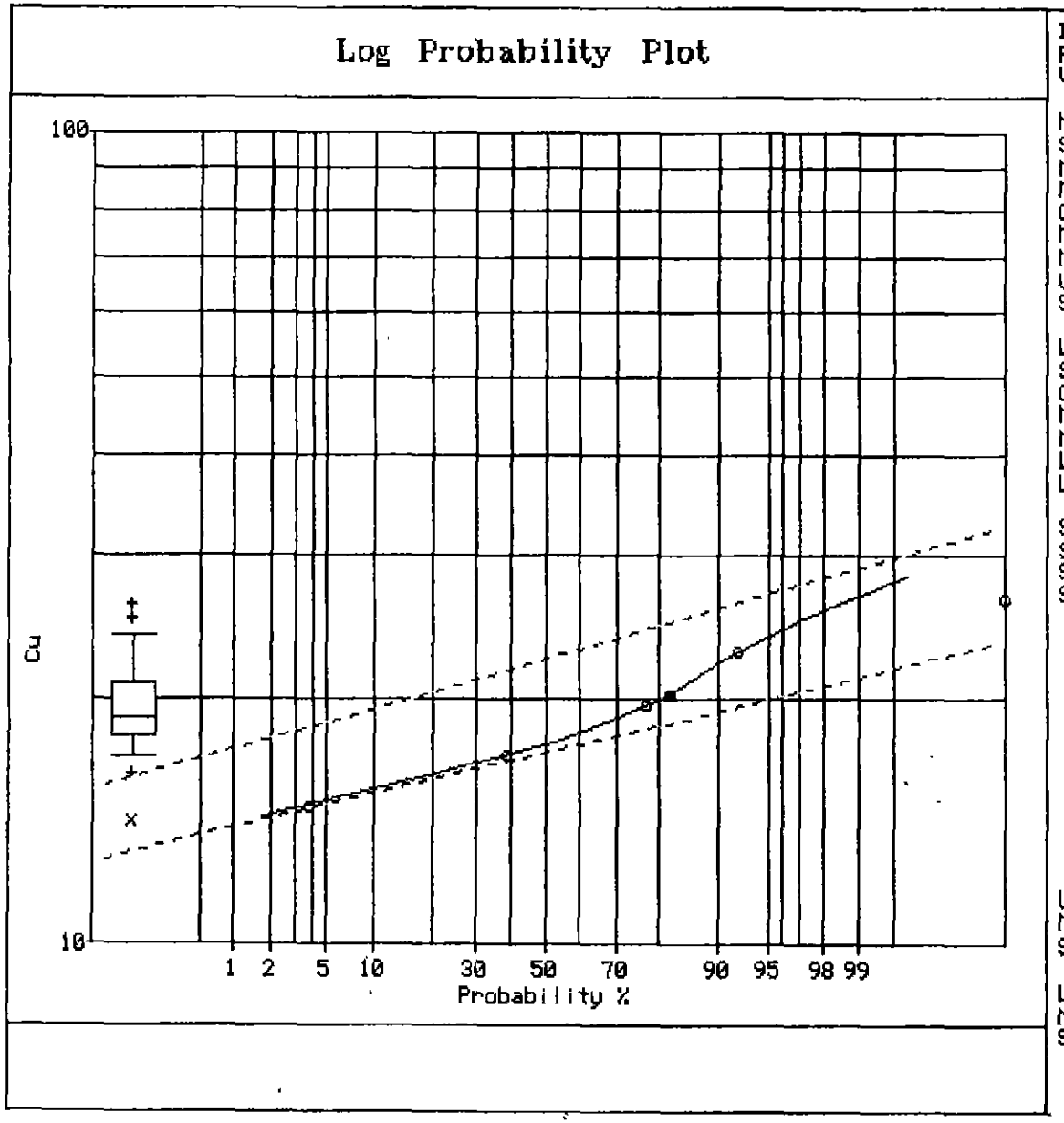



DATA
File 8161SL96
Variable Cu

NORMAL STATISTICS
Samples 26
Minimum 14.000
Maximum 26.000
Class Int 2.000
Median 19.000
Mean 19.692
Variance 8.7815
Std Dev 2.9634

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.100
Mean 19.483
Mean of logs 2.970
Log variance 0.0221
Log Std Dev 0.1485

SICHEL STATISTICS
Sichel's Mean 19.678
Sichel's V 0.021
Sichel's Gamma 1.010




DATA
File 8161SL96
Variable Cu

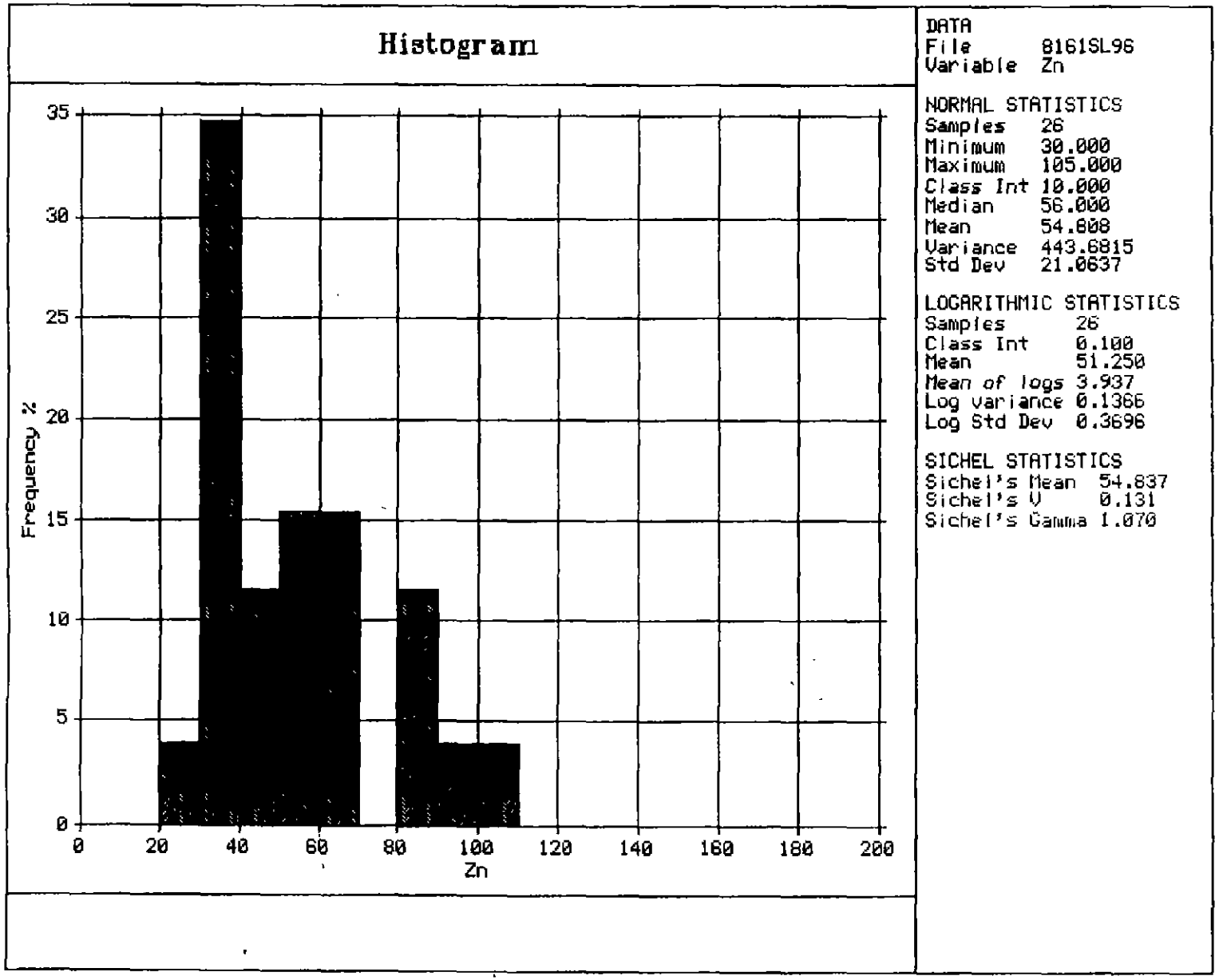
NORMAL STATISTICS
Samples 26
Minimum 14.000
Maximum 26.000
Class Int 2.000
Median 19.000
Mean 19.692
Variance 8.7815
Std Dev 2.9634

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.150
Mean 19.483
Mean of logs 2.970
Log variance 0.0221
Log Std Dev 0.1485

SICHEL STATISTICS
Sichel's Mean 19.678
Sichel's V 0.021
Sichel's Gamma 1.010

Upper Population 18.17%
Mean 22.423 (Ln 3.110)
S Dev 1.117 (Ln 0.111)

Lower Population 81.83%
Mean 17.106 (Ln 2.839)
S Dev 1.099 (Ln 0.094)

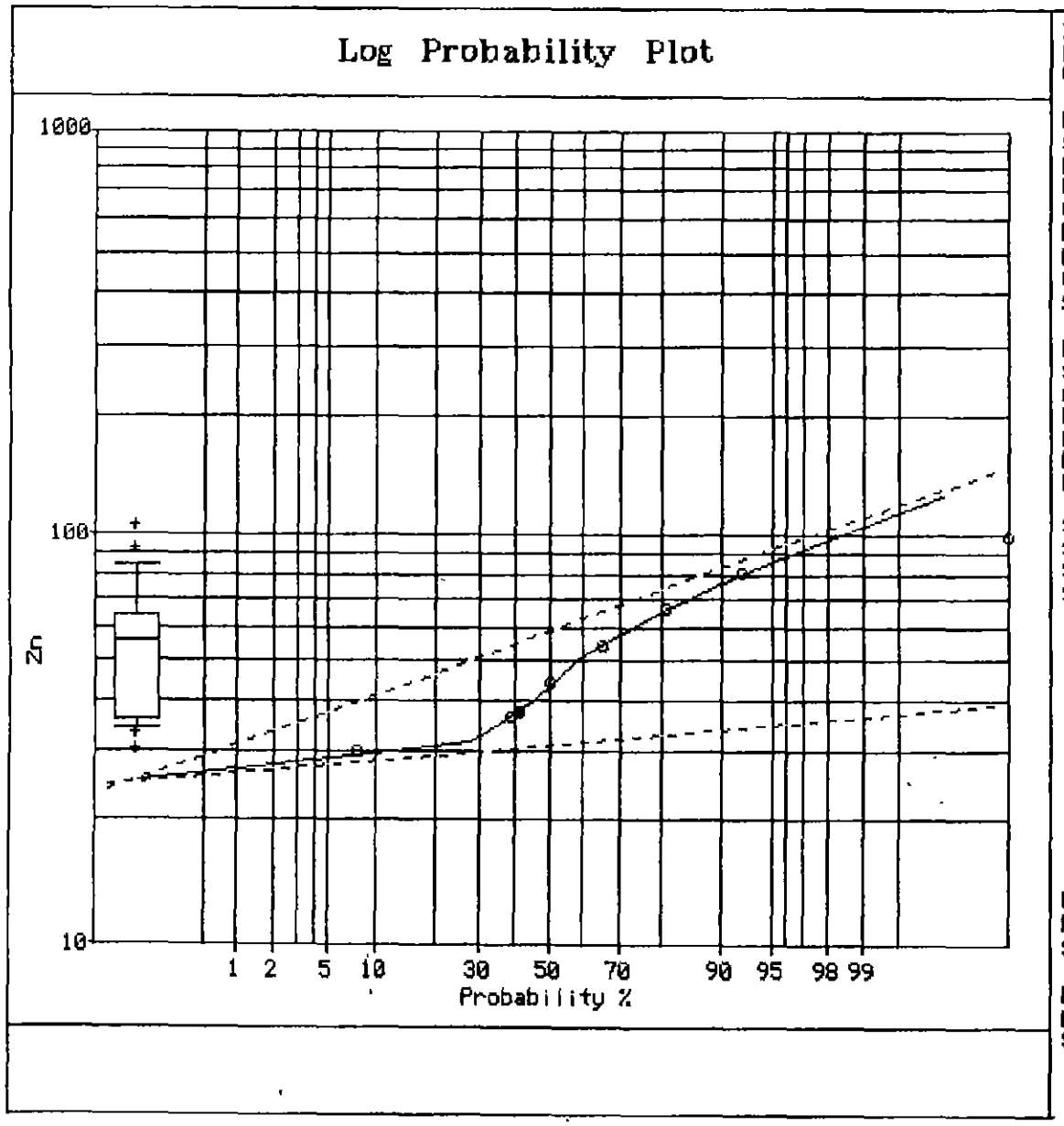



DATA
File 8161SL96
Variable Zn

NORMAL STATISTICS
Samples 26
Minimum 30.000
Maximum 105.000
Class Int 10.000
Median 56.000
Mean 54.808
Variance 443.6815
Std Dev 21.0637

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.100
Mean 51.250
Mean of logs 3.937
Log variance 0.1366
Log Std Dev 0.3696

SICHEL STATISTICS
Sichel's Mean 54.837
Sichel's V 0.131
Sichel's Gamma 1.070

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File 8161SL96
Variable Zn

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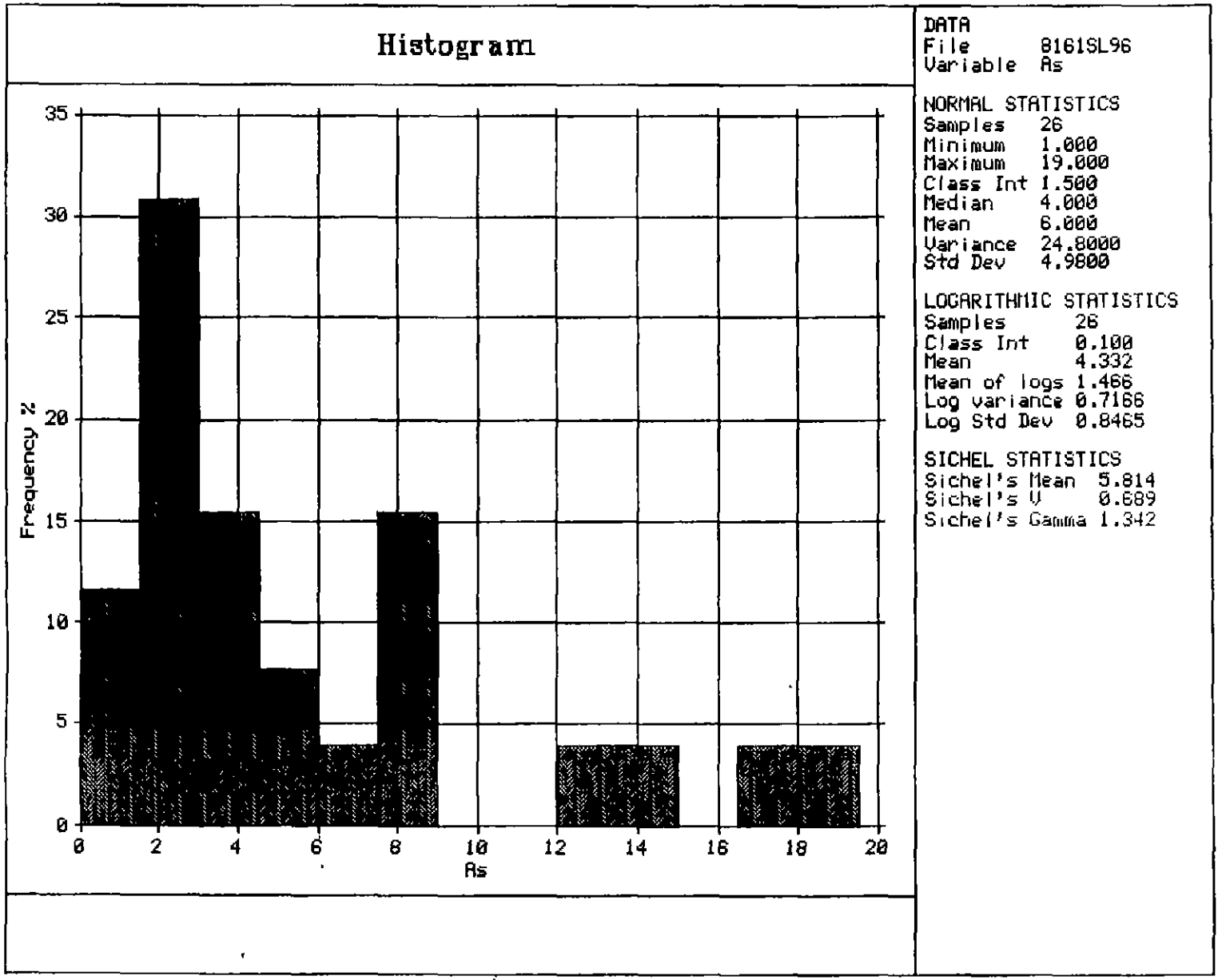
Samples 26
Minimum 30.000
Maximum 105.000
Class Int 10.000
Median 56.000
Mean 54.808
Variance 443.6815
Std Dev 21.0637

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.200
Mean 51.250
Mean of logs 3.937
Log variance 0.1366
Log Std Dev 0.3696

SICHEL STATISTICS
Sichel's Mean 54.837
Sichel's V 0.131
Sichel's Gamma 1.070

Upper Population 59.13%
Mean 58.450 (Ln 4.068)
S Dev 1.316 (Ln 0.274)

Lower Population 40.87%
Mean 30.708 (Ln 3.425)
S Dev 1.072 (Ln 0.070)



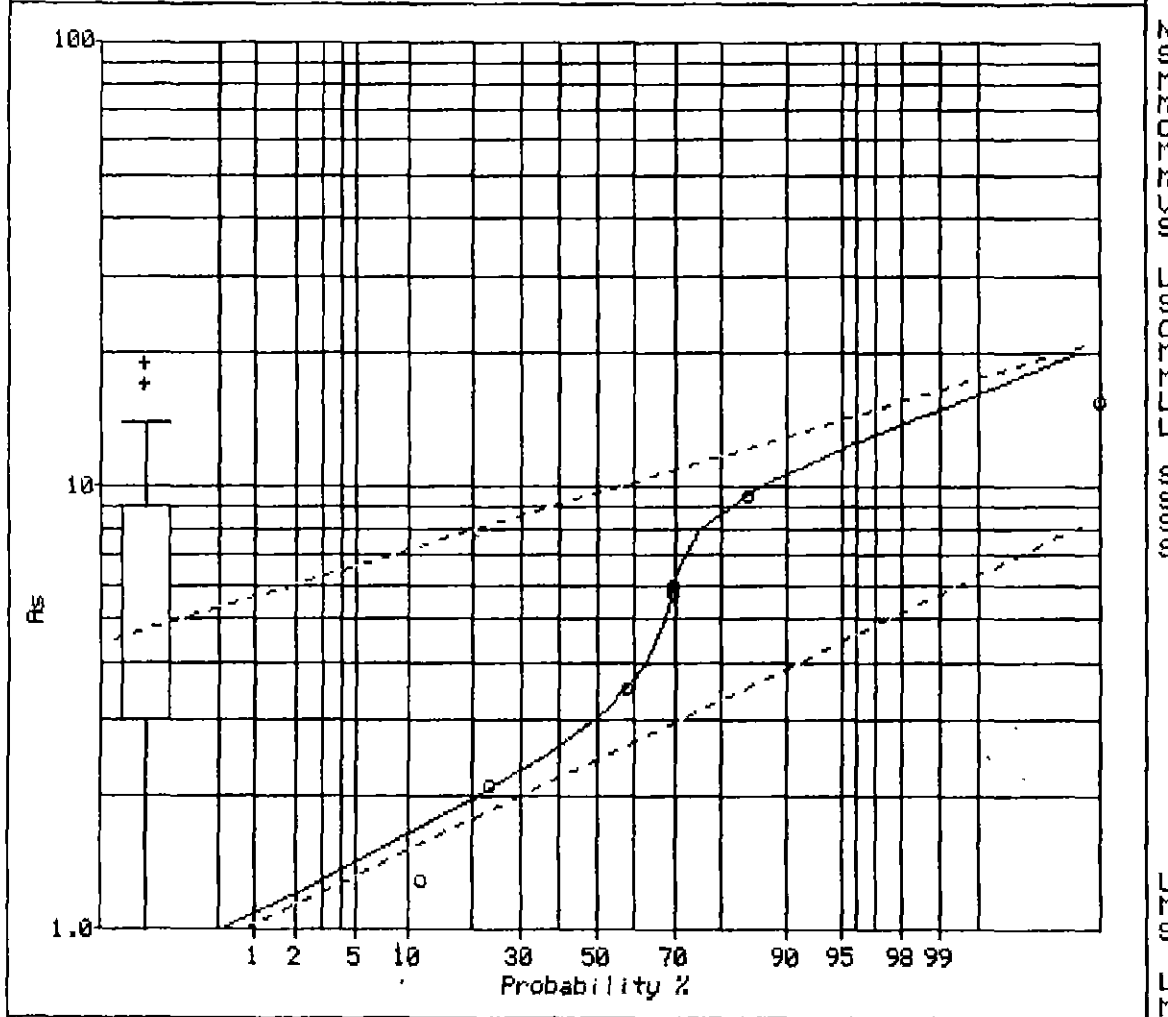

DATA
File 8161SL96
Variable As

NORMAL STATISTICS
Samples 26
Minimum 1.000
Maximum 19.000
Class Int 1.500
Median 4.000
Mean 6.000
Variance 24.8000
Std Dev 4.9800

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.100
Mean 4.332
Mean of logs 1.466
Log variance 0.7166
Log Std Dev 0.8465

SICHEL STATISTICS
Sichel's Mean 5.814
Sichel's V 0.689
Sichel's Gamma 1.342

# Log Probability Plot




DATA
File 8161SL96
Variable As

NORMAL STATISTICS
Samples 26
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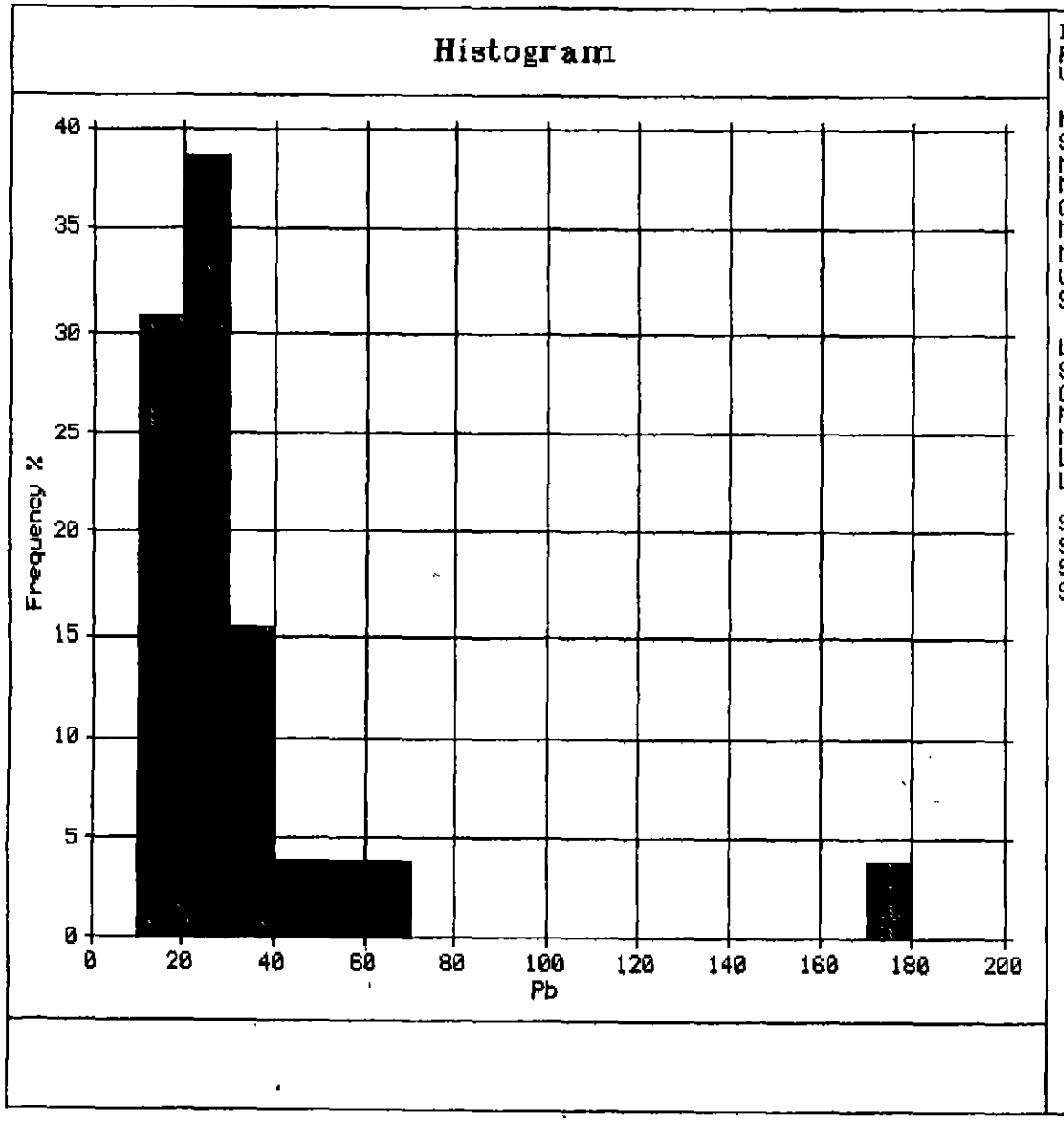
Maximum 19.000
Class Int 1.500
Median 4.000
Mean 6.000
Variance 24.8000
Std Dev 4.9800

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.500
Mean 4.332
Mean of logs 1.466
Log variance 0.7166
Log Std Dev 0.8465

SICHEL STATISTICS
Sichel's Mean 5.814
Sichel's U 0.689
Sichel's Gamma 1.342

Upper Population 30.53%
Mean 9.713 (Ln 2.273)
S Dev 1.261 (Ln 0.232)

Lower Population 69.47%
Mean 2.427 (Ln 0.887)
S Dev 1.447 (Ln 0.369)



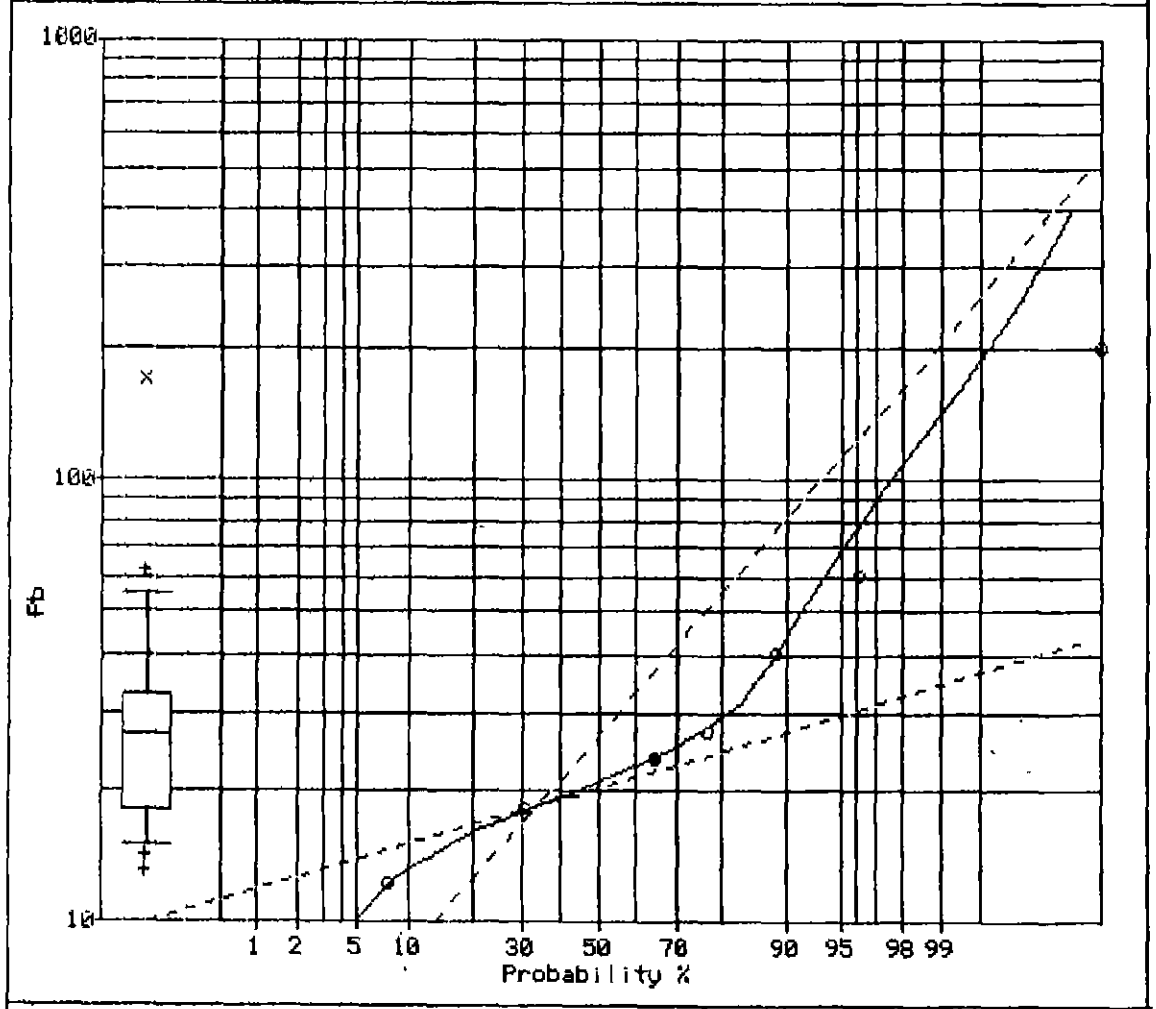

DATA
File 8161SL96
Variable Pb

NORMAL STATISTICS
Samples 26
Minimum 13.000
Maximum 173.000
Class Int 10.000
Median 27.000
Mean 33.769
Variance 951.1446
Std Dev 30.8406

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.100
Mean 27.960
Mean of logs 3.331
Log variance 0.2964
Log Std Dev 0.5444

SICHEL STATISTICS
Sichel's Mean 32.181
Sichel's V 0.285
Sichel's Gamma 1.151

# Log Probability Plot




DATA
File 8161SL96
Variable Pb

NORMAL STATISTICS
Samples 26
Minimum 13.000
Maximum 173.000
Class Int 10.000
Median 27.000
Mean 33.769
Variance 951.1446
Std Dev 30.8406

LOGARITHMIC STATISTICS
Samples 26
Class Int 0.400
Mean 27.960
Mean of logs 3.331
Log variance 0.2964
Log Std Dev 0.5444

SICHEL STATISTICS
Sichel's Mean 32.181
Sichel's V 0.285
Sichel's Gamma 1.151

Upper Population 35.60%
Mean 26.610 (Ln 3.281)
S Dev 2.410 (Ln 0.880)

Lower Population 64.40%
Mean 20.207 (Ln 3.006)
S Dev 1.260 (Ln 0.231)