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Malm/metall	Sulfid	

Sammendrag

ORKLA INDUSTRIER A/S

SEISMIC PROSPECTING FOR SULPHIDE ORE AT LØKKEN WEST, 1982

Report 4034.07 Oslo, 11 Nov. 1982

Prepared by
A/S GEOTEAM
Wm. Thranesgt. 98
Oslo 1
NORWAY

REPORT 4034.07

ORKLA INDUSTRIER A/S

SEISMIC PROSPECTING FOR
SULPHIDE ORE AT LØKKEN WEST, 1982

11 NOVEMBER 1982

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1. INTRODUCTION

The 1982 seismic prospecting program at Løkken West consisted of two seismic lines south of the area previously covered in 1979-1981.

Downhole seismic velocity measurements were carried out in the second diamond drilling, denoted Borehole 2 in this report.

Laboratory measurements of sonic velocities and densities carried out at The Technical University of Norway (NTH) are also reported.

2.DATA ACQUISITION

2.1 Reflection Seismic Lines

Two seismic lines have been measured, extending southwards from lines 79 III and 80 III respectively, see overviewmap, Appendix 2.1.

Recording instruments, field techniques and field parametres were similar to those previously applied in Løkken West (A/S Geoteam reports 4034.05 and 4034.06).

The lines are denoted Line 82 I and 82 II.

Line 82 I consist of 57 new stations and 13 stations along the southern termination of Line 79 III.

Line 82 II is likewise composed of 69 new stations and 9 stations along Line 80 III at the southern termination.

Altogether 46 shots were fired along Line 82 I, whereas 61 shots were fired along Line 82 II.

The actual data acquisition was carried out in June 1982. The recording along Line 82 I was partly exposed to noise from nearby agricultural activity, however, we do not believe that the noise experienced is significant with respect to the main result reported.

2.2 Seismic Velocity Logging

Borehole 2 in Sugustadmarka was subjected to downhole seismic velocity measurements, subsequent to the reflection seismic measurements along Lines 82 I and 82 II. One record was taken every 10 metres from top of hole down to the bottom, which was encountered at 974 m measured with the borehole geophone lead.

Borehole 2 is located on Line 80 III, and the drilling target was the seismic discontinuity at about 300 milliseconds twt (two-way-time) found in the seismic section at line metres 800.

The recording layout was equivalent to the layout used for logging of Borehole 1 in 1981, Report 4034.06.

3. DATA PROCESSING AND RESULTS

3.1 Processing of Data

Processing of data has been carried out at A/S GEOTEAM's processing centre applying Disco seismic processing programs installed in a VAX 11/780 computer.

The crooked line option for data acquisition geometry was utilized prior to CDF (common-depth-family) gathering of traces.

3.2 Seismic Line Identification

The seismic lines are displayed in Appendix 2.2. This appendix also shows the seismic lines previously measured in the years 1979-1981.

A projecting direction is defined by a starting-point and an end-point:

Line 82 I : Start point at CDP 1:

x=-750 y=406

End point:

x=102 y=406

Line 82 II: Start point at CDP 10:

x=-214 y=1067

End point:

x=457 y=630

The CDP-families are defined according to the crooked line option of the geometry program, which gathers all reflection points whose normal projection to the selected line falls within a 5m interval.

3.3 Seismic Section

Filtered stacks of Lines 82I and 82II are shown in Appendices 3.1 and 3.2 respectively.

The sections do not show reflectivity of significant continuity within the area and depth range of main interest, except for a very shallow reflector from about CDP 77 - CDP 100, twt 70-85 milliseconds.

During processing, however, we have found that many CDF's (Common Depth Families) show line-up of reflected events which may be followed through 3-4 CDF's.

The reflected events appear at different times unconformable with continous reflecting interfaces.

Appendix 3.3 and 3.4 show examples of these "short-duration" reflections.

The origin of reflected energy found on CDF-level is most likely associated with point reflectors or reflectors of lateral extent of the order of a few tens of metres.

After stack, the continuity of reflected energy is no longer distinguishable from the continuity of background noise.

3.4 Velocities Based on Seismic Velocity Logging, Borehole 2

The data recorded in Borehole 2 are plotted in a depth-versus-time frame in Appendix 3.5.

First arrivals are identifiable with dereasing signal-to-noise ratio from top of the hole.

Secondary phases with velocities corresponding to sound in water are clearly visible, however, the origin of these phases are uninterpretable as related to geology.

The velocities determined from first arrivals reveal a much more complex model than previously found in Borehole 1.

Borehole 2 may be interpreted as composed of 4 velocity intervals as indicated in Appendix 3.5.

The interval velocity 0-890 m applies as an average velocity for depth calculations of the marked reflector found in Line 80 III, line metres 800, 300 milliseconds twt.

The average velocity down to depth 890 m in Borehole 2 is 3-4% higher than the corresponding average velocity found in Borehole 1.

3.5 Impedance Contrasts from Borehole Samples

Laboratory testing including sonic velocity- (54 kHz) and density measurements have been carried out at The Technical University of Norway (NTH), Trondheim.

Three sets of samples are reported here, two sets from Borehole 1 and one set from Borehole 2.

Borehole 1 - Samples

The two sets of samples cover the depth range 379-440 m and 992-1029 m respectively.

Density, velocity and seismic impedance as function of depth in the borehole are displayed in Appendix 3.6. This appendix also includes equivalent information from the depth range 670-680 m, previously reported in A/S GEOTEAM's report 4034.06.

The sets of samples analyzed and displayed all show an impedance variation that would be expected according to the seismic model implied by the seismic sections at Borehole 1, presented in A/S GEOTEAM's report 4034.05.

Borehole 2 - Samples

The samples analyzed cover the depth interval 840-930 m.

Density, velocity and seismic impedance as function of depth of hole are shown in Appendix 3.7.

The impedance contrast shown represents the most marked constrast encountered in the Løkken West area. The corresponding reflection coefficient is -0.13 (laboratory measured data).

Applying in-situ measured velocities of Appendix 3.5, and the laboratory measured densities of Appendix 3.7, the corresponding reflection coefficient is -0.09.

4. INTERPREATION AND CONCLUSIONS

Seismic Prospecting Lines

The seismic sections of Lines 82 I and 82 II seem to indicate that few high density-velocity contrast of significant magnitude exists in the area covered and depth range 300-1500 m.
However, apparent reflections which are continous across 3-4 common-depth-families are commonly found, see Appendices 3.3 and 3.4.

Due to the very short spatial duration of these reflections, they are indistinguishable against background noise in the seismic sections. The origin of these reflections may be point sources or near point sources of lateral extent of the order of a few tens of metres, positioned at varying distance from the surface.

In broad, Lines 82 I and 82 II seem to support the impression of the southern termination of Lines 79 III and 80 III, which shows reflections fading out southwards.

A shallow reflector appears at CDP 77 - CDP 100 of Line 82 II, probably extending to the end of the line.

The reflector dips about 25 degrees to the north. A two-dimensional (in-line) interpretation is given in Appendix 4.1, displaying the broad outline of the reflector and its probable extension.

It should be remembered, however, that shallow reflectors in the depth range 0-300 metres in general may be overlooked by the seismic technique applied due to decreasing signal-to-noise ratio. To cover the shallow depth interval 0-300 m it is therefore adviseable to apply some other geophysical technique, as for instance IP-measurements.

Borehole Information

The seismic velocity logging carried out in Borehole 2 reveals a highly varying seismic velocity with depth.

In particular the 6800 m/s velocity found for the depth interval 770-890 m is interesting from a geophysical point of view. We believe that the dyke consentration indicated by the geologic log for this hole accounts for this high velocity.
The 6800 m/s interval velocity brings the average velocity up to 6350 m/s from surface to the depth 890 m. The outstanding impedance contrast corresponding to the seismic target was found at this depth.

Pre-drilling estimates of depth to the reflector was about 830 metres, applying a seismic velocity of 6000 m/s. The difference between estimated and real depth found by drilling is explained by the difference in velocity of about 6%.

Impedance versus depth calculated from laboratory measurements of sonic velocity and density are all in accordance with reflectors found in the seismic sections.

It is reason to believe that the sonic velocities measured on small samples are lower and show greater variaton across the reflecting interfaces that the in-situ velocities determined by borehole seismic logging.

The estimated reflection coefficient determined from laboratory tests are -0.13 for the particular boundary in Borehole 2, and -0.09 according to the in-situ velocity and laboratory determined densities.

In conclusion, these values for reflection coefficients across rock-type boundaries in the crystalline rocks at Løkken West are higher that previously anticipated. This fact encourages the use of the reflection seismic method for structural mapping and geological model building in crystalline rocks in general and in Løkken West in particular.

Oslo, 1 desember 1982

for A/S G E O T E A M

Anders Dahle

AKKA
5330

LINE I

STATIONS LOCATIONS,
COORDINATES

	X	Y	Z
STATION 1	-853.8	413.1	244
STATION 2	-838.2	411.2	245
STATION 3	-828.3	404.3	248.4
STATION 4	-815.2	412.5	248.2
STATION 5	-806.9	422.1	248.8
STATION 6	-793.9	432.3	249.5
STATION 7	-787.6	436.9	250.5
STATION 8	-774.5	436.1	251.5
STATION 9	-760.9	434.1	251.5
STATION 10	-745.8	433.8	252.4
STATION 11	-705.0	432.6	256.6
STATION 12	-692.8	434.5	258.5
STATION 13	-668.1	431.9	260.0
STATION 14	-653.6	424.3	264.5
STATION 15	-648.5	426.3	264.7
STATION 16	-642	410	269.8
STATION 17	-625.7	411.2	269.8
STATION 18	-625.3	411.3	270.6
STATION 19	-606.1	399.2	271.4
STATION 20	-591.4	391.5	270.5
STATION 21	-577.1	390.3	268.9
STATION 22	-559	397.4	266.8
STATION 23	-543.2	399.5	264
STATION 24	-534.6	398.5	262.5
STATION 25	-519.1	397.2	260.9
STATION 26	-507.2	399.1	259.4
STATION 27	-495.1	406.7	258.1
STATION 28	-481.7	403.9	258
STATION 29	-455	391.2	258.4
STATION 30	-446.1	389.8	261.2
STATION 31	-437.9	385.7	264.7
STATION 32	-443.8	397	260.9
STATION 33	-422	398.8	262
STATION 34	-406.4	410.2	265
STATION 35	-397	404.5	265.1
STATION 36	-389.7	403.7	265.4
STATION 37	-375.6	402.	267.1
STATION 38	-362.4	404.4	267.9
STATION 39	-350.9	404.9	268
STATION 40	-341.1	406.1	269.4
STATION 41	-329	413.9	269.9
STATION 42	-314.4	424.5	273.8
STATION 43	-305	423.4	276.9
STATION 44	-298.	427	278.4
STATION 45	-287.6	432.3	279
STATION 46	-272.3	431.8	281.6
STATION 47	-262.2	433.7	281.5
STATION 48	-251.6	445	278.6
STATION 49	-239.7	443.4	278.9
STATION 50	-220.8	445.	278
STATION 51	-207	441.8	276.1
STATION 52	-192.3	451.6	275.6
STATION 53	-175	454.8	274
STATION 54	-168.1	460.1	273.6
STATION 55	-152.8	464.3	272.5
STATION 56	-140.9	464.4	271.3
STATION 57	-129.2	467.9	269.2
STATION 58	-120	470	269.2
STATION 59	-110	472	269.2
STATION 60	-100	474	269.2

STATION 61	8.1	373	265
STATION 62	32.2	375.8	269
STATION 63	38.1	364.1	271
STATION 64	43.8	357.	273.5
STATION 65	55.2	357.3	274
STATION 66	66.8	362	274
STATION 67	72.5	346.6	274.3
STATION 68	75.8	341	274.4
STATION 69	120.4	330	273.2
STATION 70	160.8	354	277.4

INE II

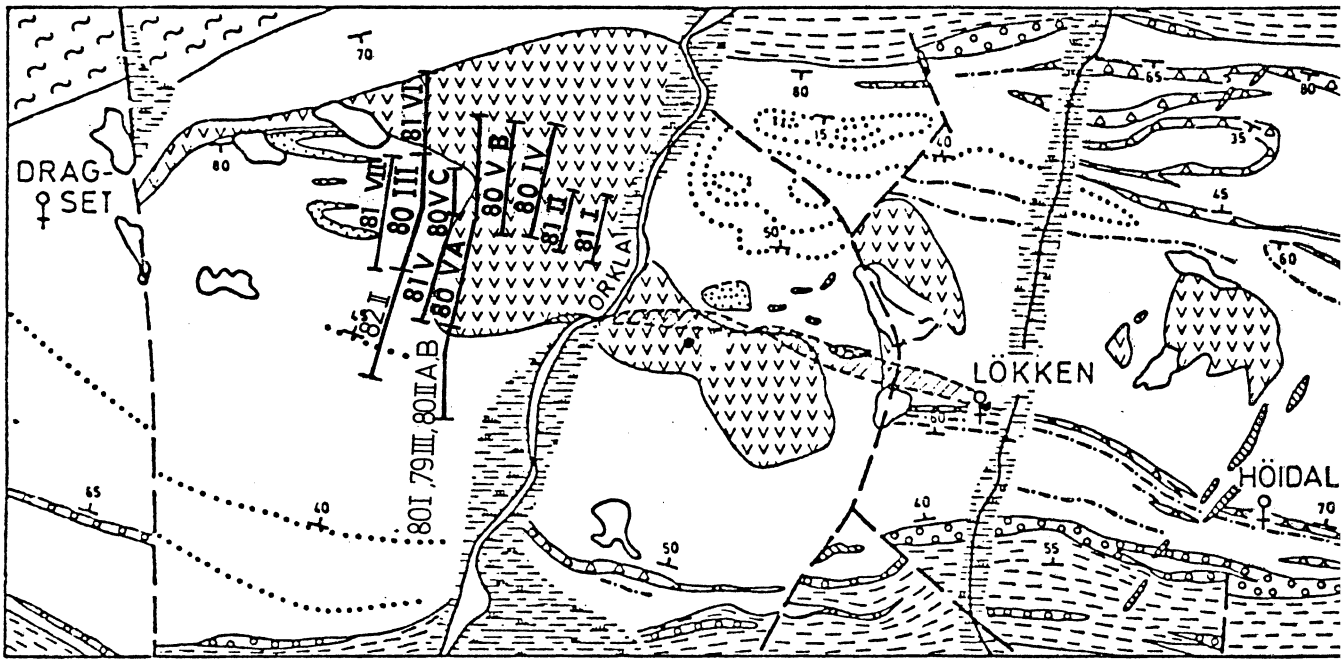
	X	Y	Z
STATION 1	-380.7	1096.8	327.7
STATION 2	-357.8	1091.4	329.6
STATION 3	-345.8	1085.4	329.3
STATION 4	-326.2	1078.5	330.1
STATION 5	-307.5	1073.3	332.1
STATION 6	-301.6	1057.2	332.6
STATION 7	-287.2	1054.5	334.4
STATION 8	-283.5	1043.1	333.9
STATION 9	-272.4	1030.7	331.5
STATION 10	-257.9	1025.1	332.4
STATION 11	-241.8	1016	331.6
STATION 12	-224.7	1003.4	330.5
STATION 13	-202.3	1001.7	330.5
STATION 14	-182.5	992	329.4
STATION 15	-171.9	988	329.9
STATION 16	-151.1	983.9	332.7
STATION 17	-134.1	973.3	332.8
STATION 18	-128.1	958.9	331.4
STATION 19	-110.7	954.5	331.9
STATION 20	-108.3	946.6	330.3
STATION 21	-100.5	940.2	326.2
STATION 22	-88.6	933.7	324.6
STATION 23	-61.1	924.7	321.6
STATION 24	-51.9	914	319.2
STATION 25	-39.9	909.1	318.1
STATION 26	-28.2	903	318.9
STATION 27	-16.1	902	321.8
STATION 28	1.7	897	321.9
STATION 29	16	895.5	321.4
STATION 30	31.3	893.8	320.4
STATION 31	45.9	887.8	317.5
STATION 32	54.2	875.9	311.2
STATION 33	58.3	866.4	306.5
STATION 34	77.5	854	299.8
STATION 35	88.2	849	298.8
STATION 36	102.5	848.7	297.4
STATION 37	116.2	846.4	294.2
STATION 38	121	853	293.9
STATION 39	141.9	836.1	297.1
STATION 40	150	834	299.2
STATION 41	160.1	828.2	303.9
STATION 42	169.8	819.1	306.
STATION 43	174.9	811.7	307.5
STATION 44	192.0	810.4	309.1
STATION 45	200.4	799.8	308
STATION 46	207.7	784.5	308.1
STATION 47	207.4	771.2	307.9
STATION 48	215.3	753.3	309.4
STATION 49	219.8	741.1	311.8
STATION 50	229.1	744.2	313
STATION 51	253.9	746.6	309
STATION 52	266.8	750.9	309.4
STATION 53	272.2	754.3	311.7
STATION 54	297.9	752.7	314.9
STATION 55	316.6	764.9	320.7
STATION 56	323.7	746.8	319
STATION 57	325.5	724.6	316.6
STATION 58	340.4	721.1	320.4
STATION 59	348.2	715.3	322.5
STATION 60	355.9	710	323.1
STATION 61	361.9	705.5	324.8

STATION 62	368	703.9	329.4
STATION 63	363.3	692.9	325.1
STATION 64	365.2	683.6	325.7
STATION 65	365.7	673.7	328.6
STATION 66	371.1	662.4	330.2
STATION 67	368.2	653.4	327.4
STATION 68	373.9	639.3	330.5
STATION 69	375.8	622.5	330.1
STATION 70	397.1	623.6	330.9
STATION 71	409.8	624	333.6
STATION 72	416.9	620.6	333.7
STATION 73	442.7	609.2	333.9
STATION 74	434.1	609.5	335.4
STATION 75	443.2	617.9	337
STATION 76	465.7	612.3	336.8
STATION 77	465.2	604.8	335.6
STATION 78	476.6	602.7	334.3

Appendix no.: 2.1

Project no.: 4034.07

Reflection Seismic Lines Løkken West
Approximate Location



- Metasediments (L.Hovin)
- Conglomerate
- Undifferentiated greenstones
- Volcaniclastic sediments
- Felsite
- Jasper/chert horizons
- "Vasskis" horizons
- Metagabbro
- Strongly folded metasediments
- Porphyrite
- Cover
- Faults
- Projection of Lökken deposit

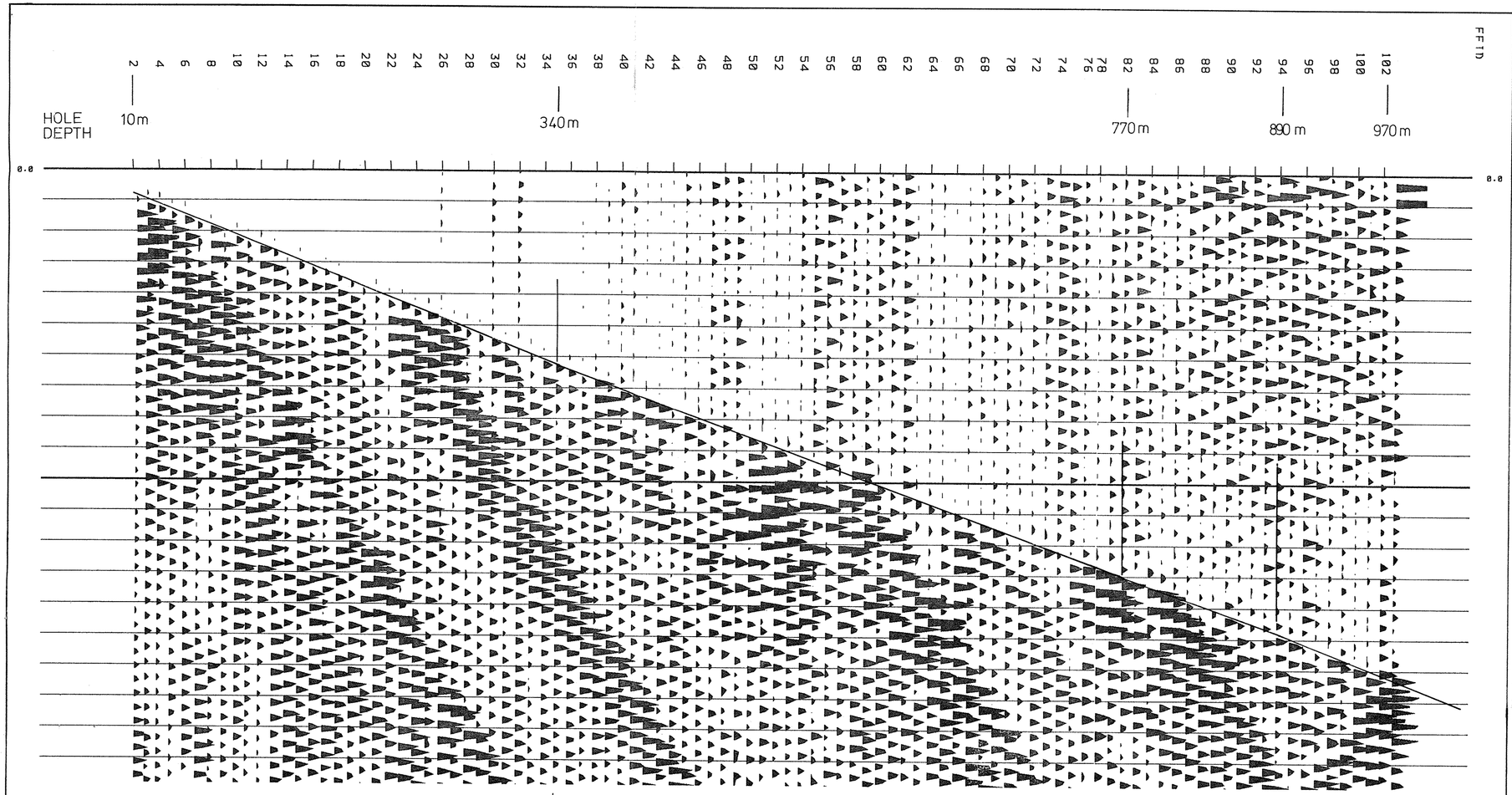
N

Scale

1 0 1 2 3

kilometres

79 III Seismic line



6000 m/s	6500 m/s	6800 m/s	6100 m/s

AVERAGE VELOCITY 6350 m/s

BOREHOLE 2
LOEKKEN WEST

RECORDING PARAMETERS

SHOT BY : A/S GEOTEAM
DATE SHOT : JUNE 1981

ENERGY SOURCE : C4 EXPLOSIVES
RECORDING SYSTEM : DFS-V
RECORD LENGTH : 1.0 S
SAMPLE RATE : 1 MS

FILTER : HIGH CUT 256HZ

TYPE OF GEOPH.: HSJLP3D
RECORDING INTERVAL: 10 M

CLIENT:
ORKLA INDUSTRIER A/S

PROCESSING SEQUENCE

PROCESSED BY : A/S GEOTEAM
DATE PROCESSED : OKT/NOV 1982

BP FILTER : 120-250HZ SLOPE 24/36

DISPLAY

SCALING : AGC, GATE: 150
VERTICAL SCALE : 40CM PR SEC
HORIZONTAL SCALE : 1 TRACE PR.METER
POLARITY NORMAL

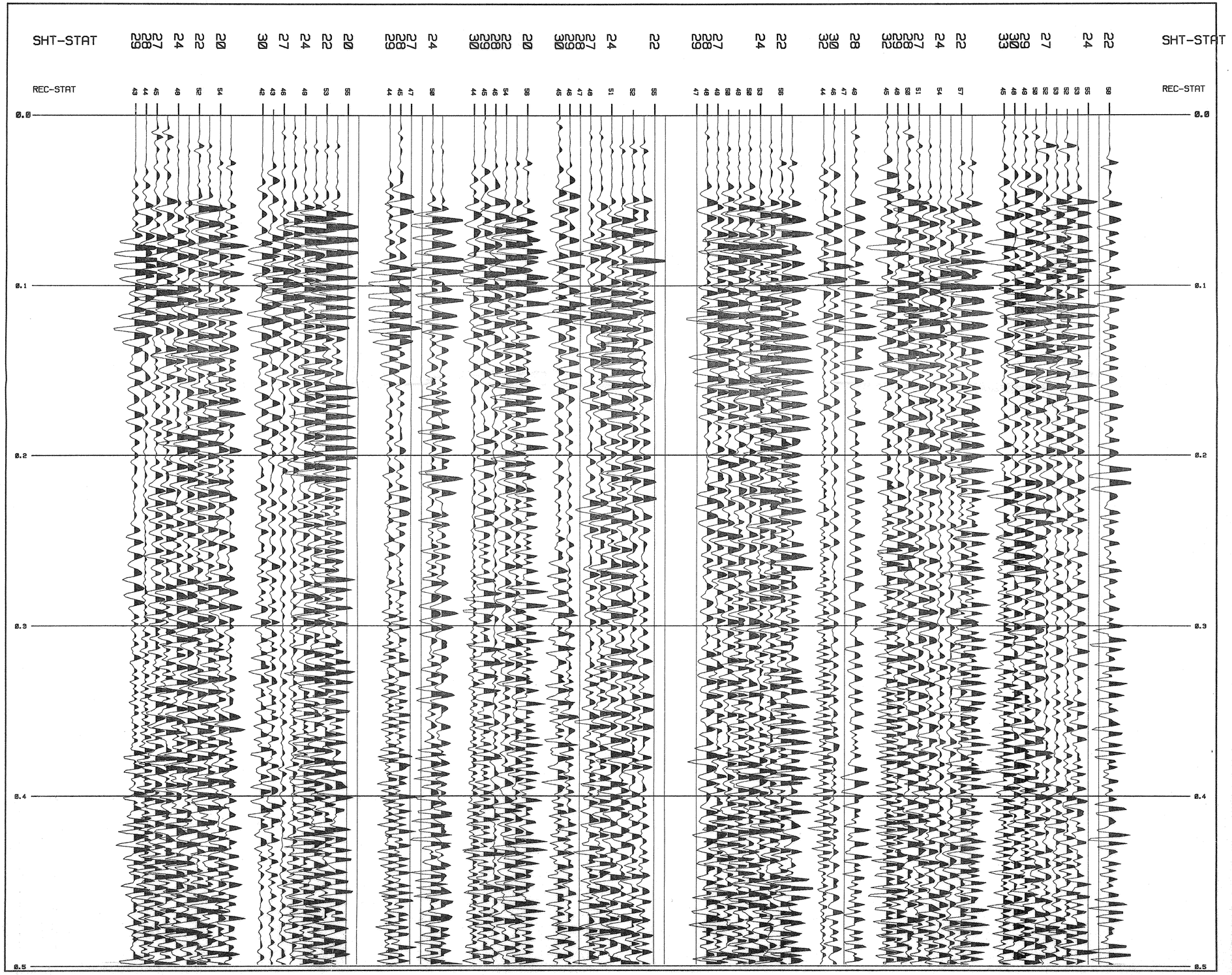
PLOTTED BY A/S GEOTEAM

GEOTEAM

DATA DISPLAY OF
SEISMIC VELOCITY LOGGING
BOREHOLE 2

Client
ORKLA INDUSTRIER A/S

Measured JUNE 1982	Map no	Scale	
Calculated OCT./NOV. 1982		Project no 4034.07	
Drawn NOV. 1982		Appendix no 3.5	
Controlled			



LINE ORKLA 82 II
CDF 85-93
LOEKKEN WEST

RECORDING PARAMETERS

SHOT BY : A/S GEOTEAM
DATE SHOT : JUNE 1982

ENERGY SOURCE :C4 EXPLOSIVES
SHOT POINT INTERVAL:10 METERS
CROOCKED LINE SHOOTING

FILTER : HIGH CUT 256HZ
NO OF GROUPS : 24
NO OF GEOPH.PR.GROUP: 1
TYPE OF GEOPH.: SM-7/50HZ
GEOPHONE SPACING:10 METERS

RECORDING SYSTEM : DFS-V
RECORD LENGTH : 1.0 S
SAMPLE RATE : 1 MS

CLIENT:
ORKLA INDUSTRIER A/S

PROCESSING SEQUENCE

PROCESSED BY : A/S GEOTEAM
DATE PROCESSED : OCT/NOV 1982

DEMULTIPLEX
EDIT:REMOVAL OF NOISY TRACES
AND SPIKES IN THE DATA
SPHERICAL SPREADING COMPENSATION
AGC: GATE=150 MSEC
SORTING AND CDF SELECTION
NMO CORRECTIONS
FIELD STATICS:DATUM 290.DATUM VELOCITY=5000
BP FILTER: 120-250 HZ SLOPE 24/36 DB/OCT
TRACE BALANCE

STACKING VEL.	
TIME	VEL
0	5000
50	6400
200	6400
1000	6400
MSEC	M/SEC

DISPLAY

SCALING : AGC. GATE:1000 MSEC
VERTICAL SCALE : 40CM PR SEC
HORIZONTAL SCALE : 2 TRACES PR CM
POLARITY NORMAL

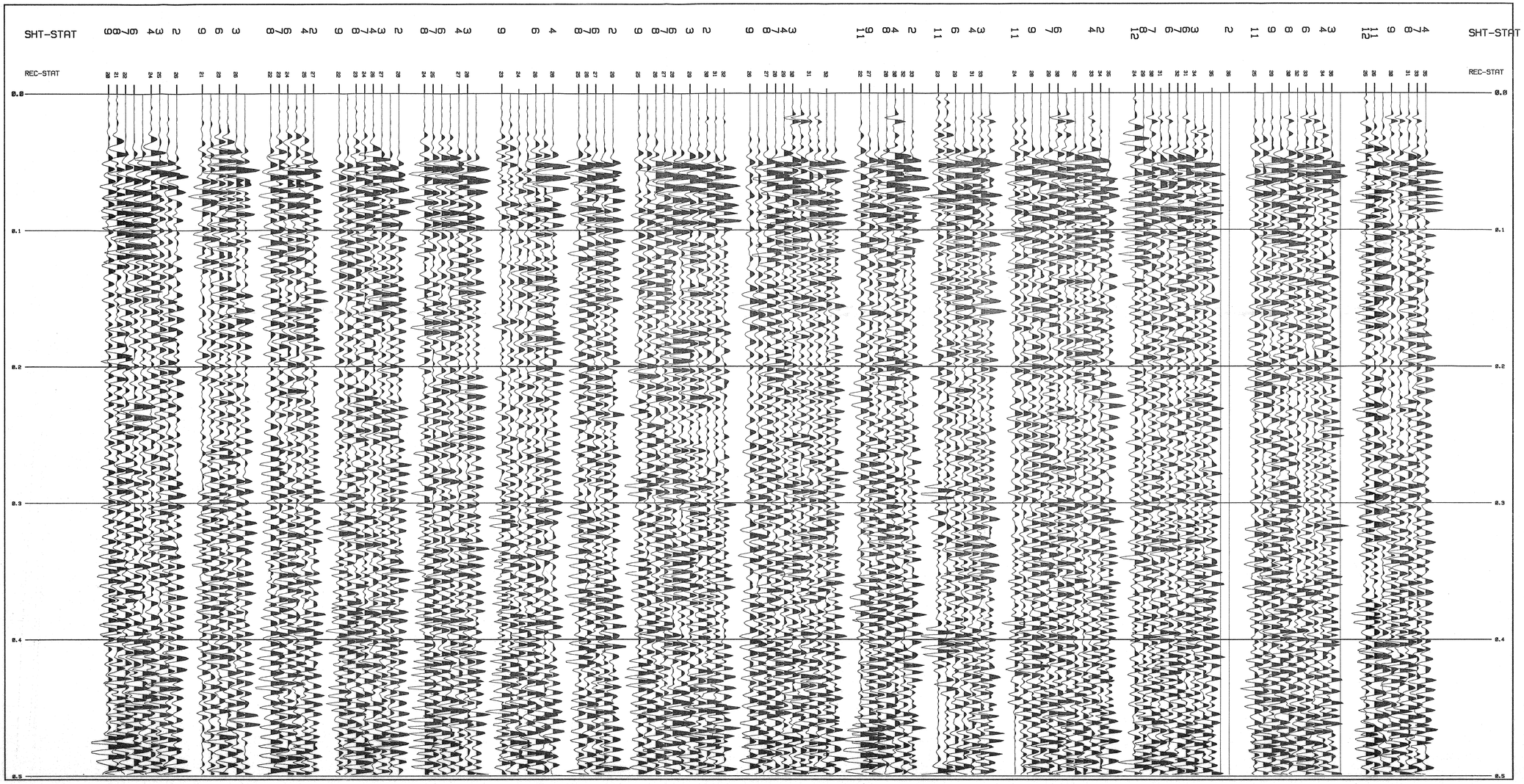
PLOTTED BY A/S GEOTEAM

GEOTEAM

LINE 82 II LÖKKEN WEST
COMMON DEPTH FAMILIES

Client
ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT./NOV. 1982		Project no 4034.07
Drawn	NOV. 1982		Appendix no 3.4
Controlled			



LINE ORKLA 82 I
CDF 16-30
LOEKKEN WEST

RECORDING PARAMETERS

SHOT BY : A/S GEOTEAM
DATE SHOT : JUNE 1982

ENERGY SOURCE :C4 EXPLOSIVES
SHOT POINT INTERVAL:10 METERS
CROOCKED LINE SHOOTING

RECORDING SYSTEM : DFS-V
RECORD LENGTH : 1.0 S
SAMPLE RATE : 1 MS

FILTER : HIGH CUT 256HZ
NO OF GROUPS : 24
NO OF GEOPH.PR.GROUP: 1
TYPE OF GEOPH.: SM-7/50HZ
GEOPHONE SPACING:10 METERS

CLIENT:
ORKLA INDUSTRIER A/S

PROCESSING SEQUENCE

PROCESSED BY : A/S GEOTEAM
DATE PROCESSED : OCT/NOV 1982

DEMULTIPLEX
EDIT:REMOVAL OF NOISY TRACES
AND SPIKES IN THE DATA
SPHERICAL SPREADING COMPENSATION
AGC: GATE=150 MSEC
SORTING AND CDF SELECTION
NMO CORRECTIONS
FIELD STATICS:DATUM 240.DATUM VELOCITY=5000
BP FILTER: 120-250 HZ SLOPE 24/36 DB/OCT
TRACE BALANCE

STACKING VEL.	
TIME	VEL
0	5000
50	6400
200	6400
1000	6400
MSEC	M/SEC

DISPLAY

SCALING : AGC. GATE:1000 MSEC
VERTICAL SCALE : 40CM PR SEC
HORIZONTAL SCALE : 2 TRACES PR CM
POLARITY NORMAL

PLOTTED BY A/S GEOTEAM

GEOTEAM

LINE 82 I LÖKKEN WEST
COMMON DEPTH FAMILIES

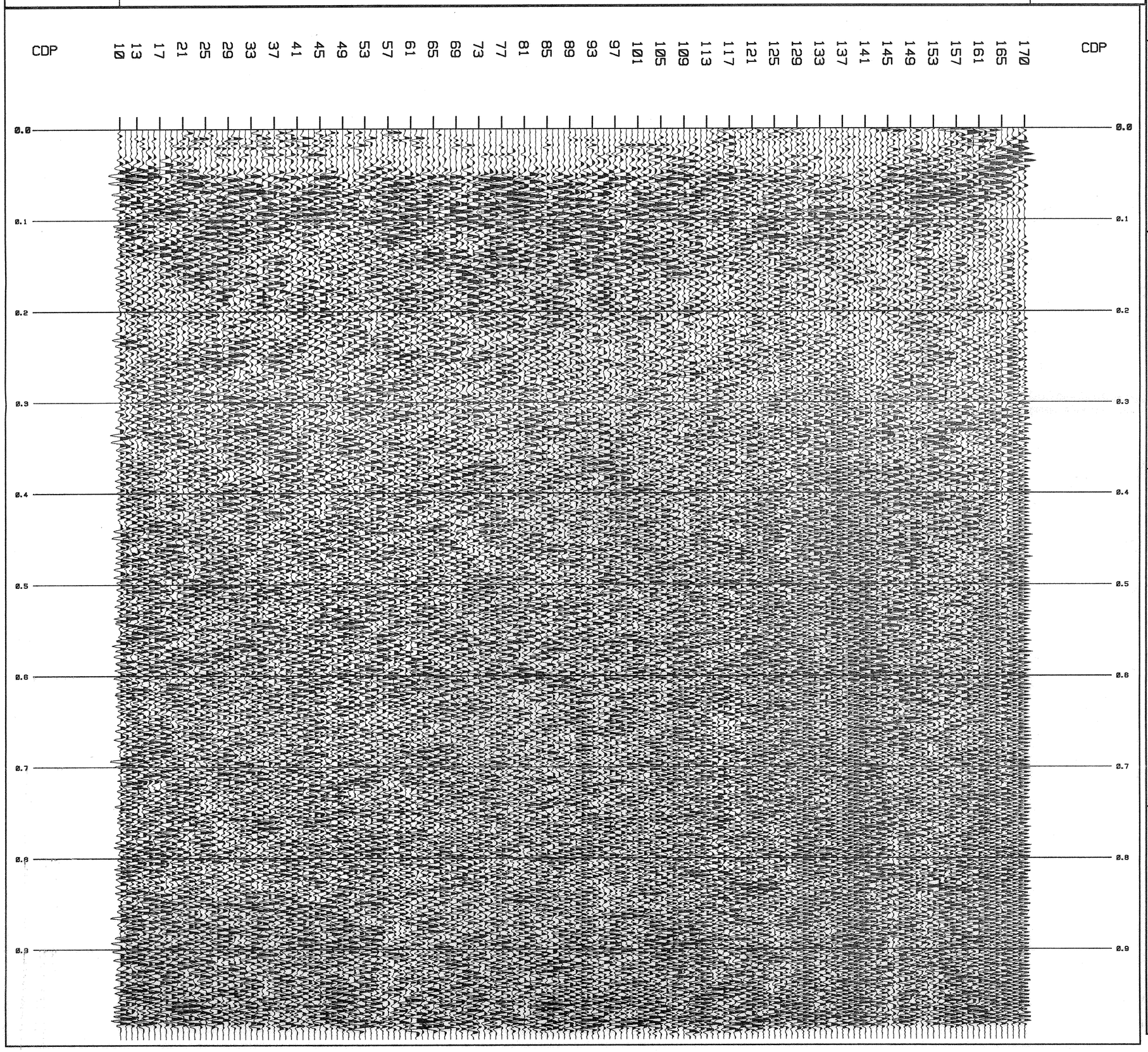
Client
ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT./NOV.1982		Project no 403407
Drawn	NOV 1982		Appendix no 3.3
Controlled			

ORKLA 82 II

COORD.
1042.0
-176.4

COORD.
630.2
456.5



LINE ORKLA 82 II
LOEKKEN WEST

RECORDING PARAMETERS

SHOT BY : A/S GEOTEAM
DATE SHOT : JUNE 1982

ENERGY SOURCE :C4 EXPLOSIVES
SHOT POINT INTERVAL:10 METERS
CROOCKED LINE SHOOTING

RECORDING SYSTEM : DFS-V
RECORD LENGTH : 1.0 S
SAMPLE RATE : 1 MS

FILTER : HIGH CUT 256HZ
NO OF GROUPS : 24
NO OF GEOPH.PR.GROUP: 1
TYPE OF GEOPH.: SM-7/50HZ
GEOPHONE SPACING:10 METERS

CLIENT:
ORKLA INDUSTRIER A/S

PROCESSING SEQUENCE

PROCESSED BY : A/S GEOTEAM
DATE PROCESSED : OCT/NOV 1982

DEMULTIPLEX
EDIT:REMOVAL OF NOISY TRACES
AND SPIKES IN THE DATA
SPHERICAL SPREADING COMPENSATION
AGC: GATE=150 MSEC
SORTING AND CDF SELECTION/CDP INCR.: 5 METERS
NMO CORRECTIONS
FIELD STATICS:DATUM 290,DATUM VELOCITY=5000
STACK:MAXFOLD 15
BP FILTER: 120-250 HZ SLOPE 24/36 DB/OCT
TRACE BALANCE

STACKING VEL.

TIME	VEL
0	5000
50	6400
200	6400
1000	6400
MSEC	M/SEC

DISPLAY

SCALING : AGC, GATE:1000 MSEC
VERTICAL SCALE : 40CM PR SEC
HORIZONTAL SCALE : 4 TRACES PR CM
POLARITY NORMAL

PLOTTED BY A/S GEOTEAM

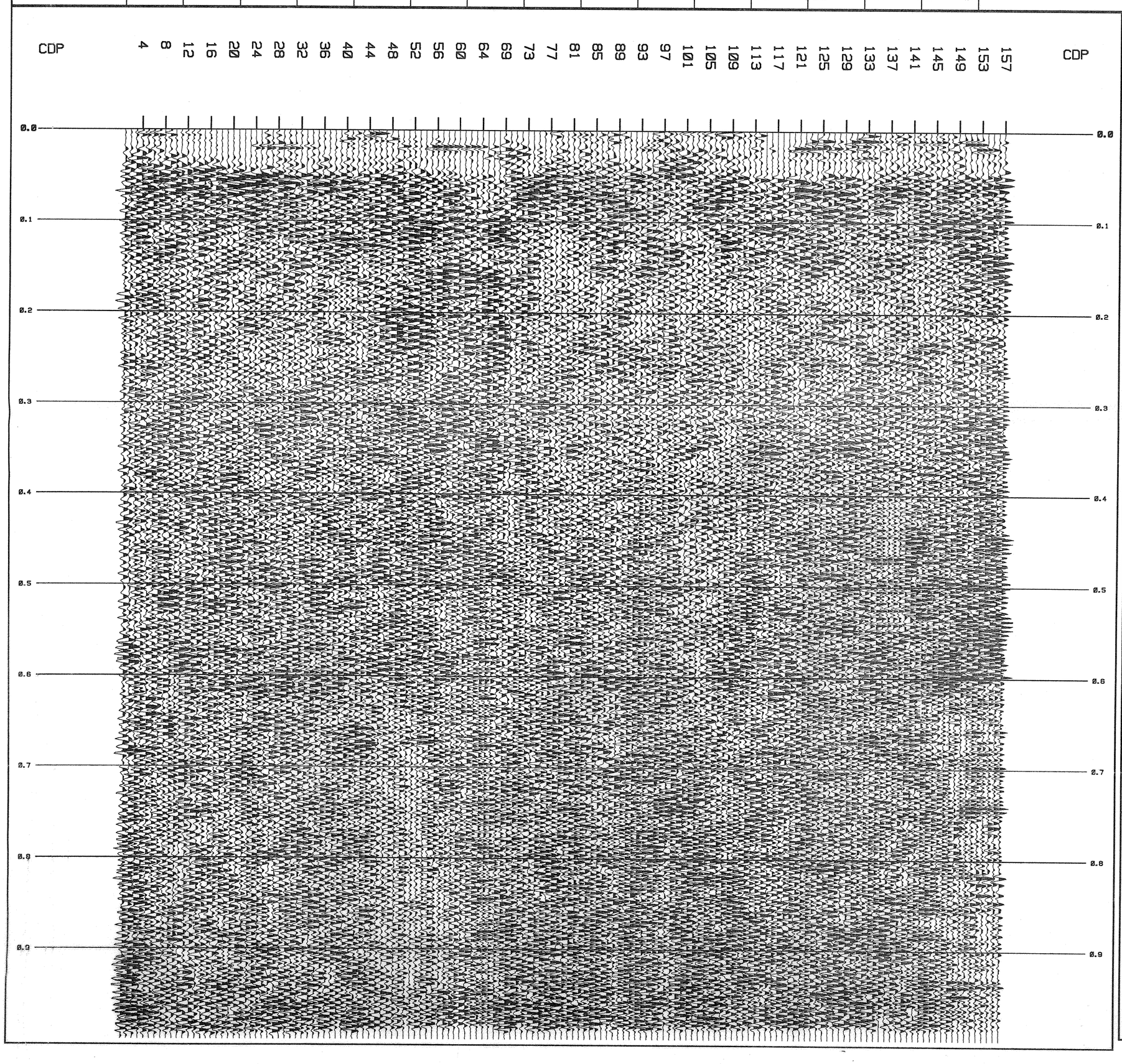
GEOTEAM

LINE 82 II LÖKKEN WEST
FILTERED STACK

Client
ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT./NOV. 1982		Project no 4034.07
Drawn	NOV. 1982		Appendix no 3.2
Controlled :			

ORKLA 82 I



LINE ORKLA 82 I
LOEKKEN WEST

RECORDING PARAMETERS

SHOT BY : A/S GEOTEAM
DATE SHOT : JUNE 1982

ENERGY SOURCE :C4 EXPLOSIVES
SHOT POINT INTERVAL:10 METERS
CROOCKED LINE SHOOTING

RECORDING SYSTEM : DFS-V
RECORD LENGTH : 1.0 S
SAMPLE RATE : 1 MS

FILTER : HIGH CUT 256HZ
NO OF GROUPS : 24
NO OF GEOPH.PR.GROUP: 1
TYPE OF GEOPH.: SM-7/50HZ
GEOPHONE SPACING:10 METERS

CLIENT:
ORKLA INDUSTRIER A/S

PROCESSING SEQUENCE

PROCESSED BY : A/S GEOTEAM
DATE PROCESSED : OCT/NOV 1982

DEMULTIPLEX
EDIT:REMOVAL OF NOISY TRACES
AND SPIKES IN THE DATA
SPHERICAL SPREADING COMPENSATION
AGC: GATE=150 MSEC
SORTING AND CDF SELECTION/CDP INCR.:5 METERS
NMO CORRECTIONS
FIELD STATICS:DATUM 240,DATUM VELOCITY=5000
STACK:MAXFOLD 15
BP FILTER: 120-250 HZ SLOPE 24/36 DB/OCT
TRACE BALANCE

STACKING VEL.

TIME	VEL
0	5000
50	6400
200	6400
1000	6400
MSEC	M/SEC

DISPLAY

SCALING : AGC, GATE:1000 MSEC
VERTICAL SCALE : 40CM PR SEC
HORIZONTAL SCALE : 4 TRACES PR CM
POLARITY NORMAL

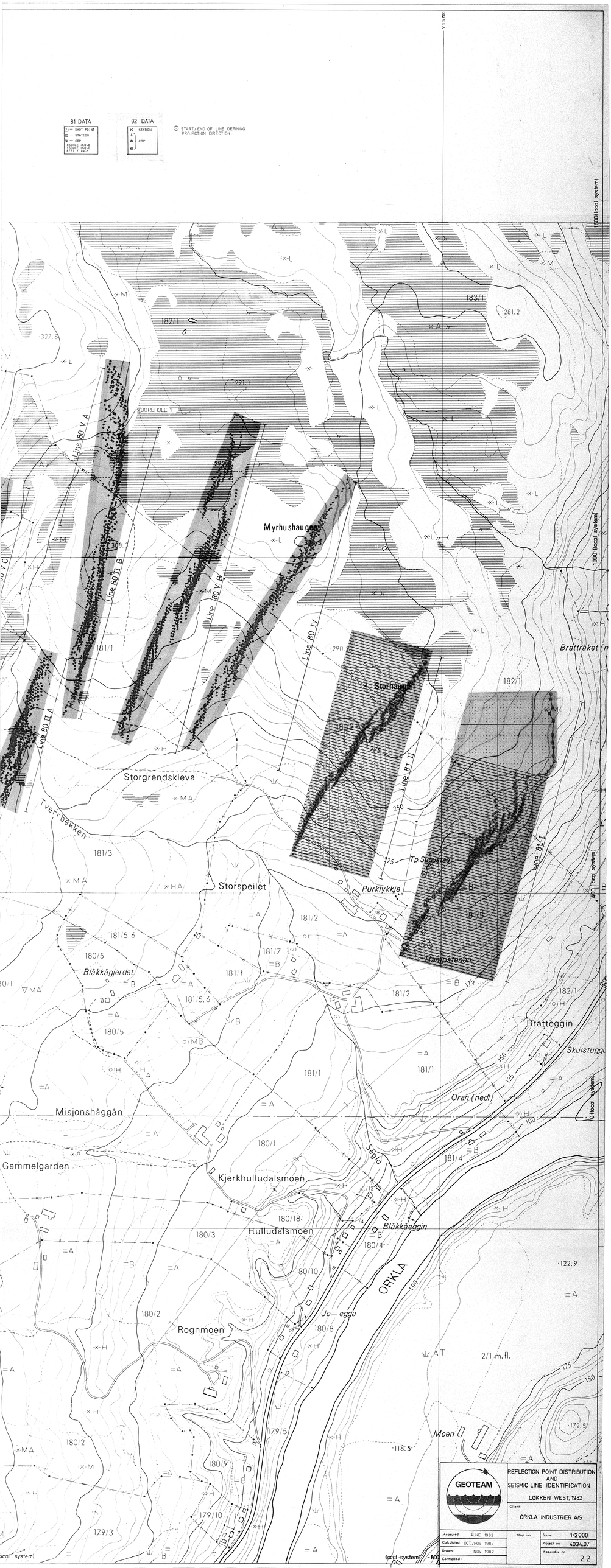
PLOTTED BY A/S GEOTEAM

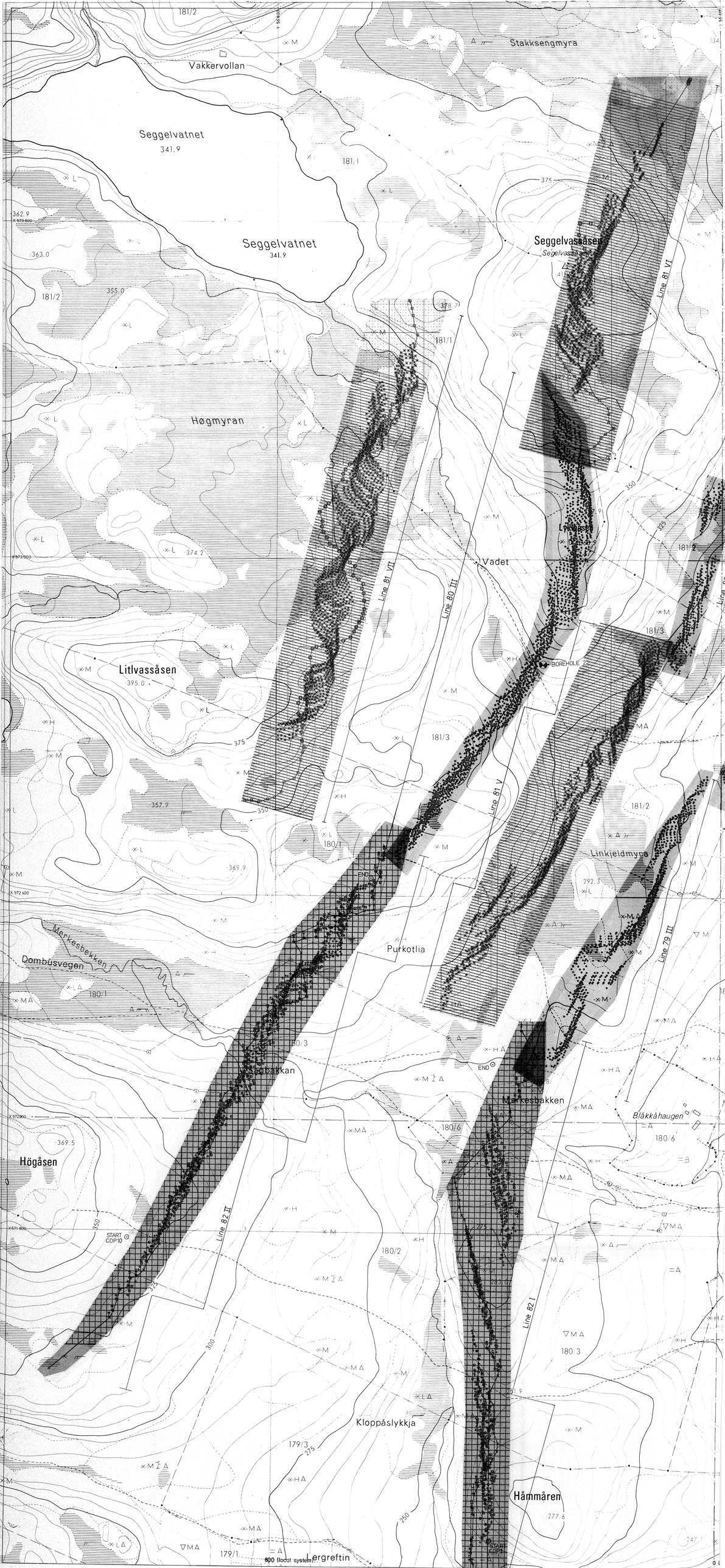
GEOTEAM

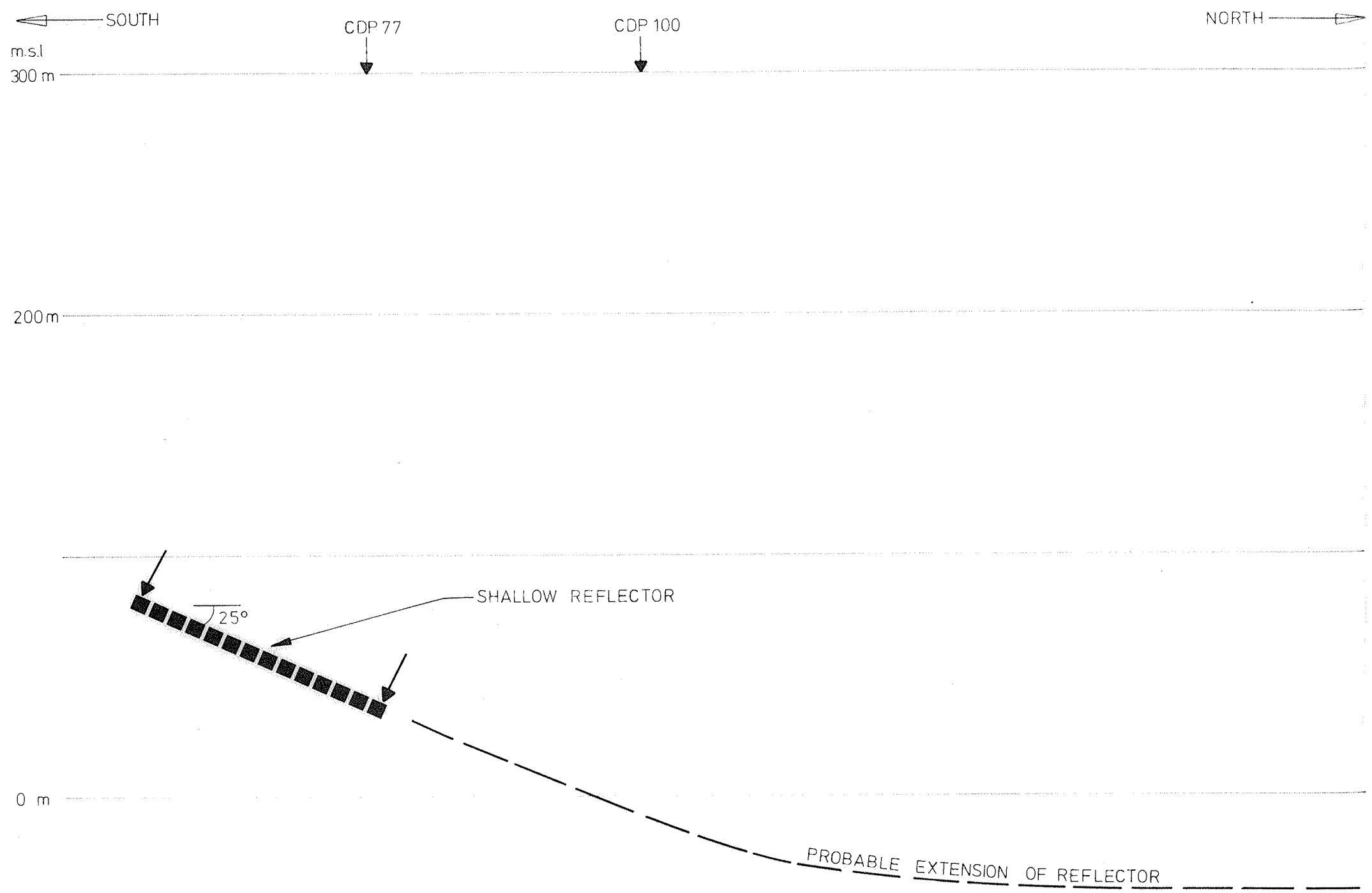
LINE 82I LÖKKEN WEST
FILTERED STACK

Client
ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT/NOV 1982		Project no 4034.07
Drawn	NOV 1982		Appendix no 3.1
Controlled			


81 DATA
SHOT POINT
STATION
CDP
SCALE 1:50.0
FEET / INCH
82 DATA
STATION
CDP
START / END OF LINE DEFINING PROJECTION DIRECTION
Y 5 5 200
1600 (local system)
1000 (local system)
400 (local system)
0 (local system)
-800 (local system)
BOREHOLE 1
Line 80 V A
Line 80 II B
Line 80 V B
Line 80 IV
Line 80 II A
Line 81 II
Line 81 I
Myrhushaugen
Storhaugen
Storgrendskleva
Tverrbekken
Storspeilet
Purklykkja
Tp Sunndal
Hampstenen
Bratteggin
Skuistuggu
Bratråket (n
Blåkkågjerdet
Misjonshåggån
Gammelgarden
Kjerkhulludalsmoen
Hulludalsmoen
Blåkkåeggin
Seglo
Oran (nedl)
Jo-egga
Rognmoen
ORKLA
Moen
2/1 m. fl.
183/1
182/1
181/1
181/2
181/3
181/4
181/5.6
181/7
180/1
180/2
180/3
180/4
180/5
180/8
180/9
180/10
180/18
179/3
179/5
179/10
281.2
291.1
327.8
300
290
275
250
225
175
150
125
100
122.9
172.5
118.5
GEOTEAM
REFLECTION POINT DISTRIBUTION AND SEISMIC LINE IDENTIFICATION
LØKKEN WEST, 1982
Client
ORKLA INDUSTRIER A/S
Measured JUNE 1982
Calculated OCT./NOV. 1982
Drawn NOV. 1982
Controlled
Map no
Scale 1:2000
Project no 4034.07
Appendix no 2.2


Vakkervollan
Stakksengmyra
Seggelvatnet
341.9
Seggelvatnet
341.9
Seggelvassåsen
Seglvassåsen
Line 81 VI
Høgmyran
Lykkjeåsen
Vadet
Line 81 VII
Line 80 III
BOREHOLE 23
Litlvassåsen
395.0
Line 81 V
Linkjeldmyra
Line 79 III
Merkesbekken
Dombusvegen
Purkotlia
END
Merkesbakken
Blåkkåhaugen
Høgåsen
START CDP10
Line 82 II
Line 82 I
Kloppåslykkja
Håmmåren
Lergreftin
800 (local system)

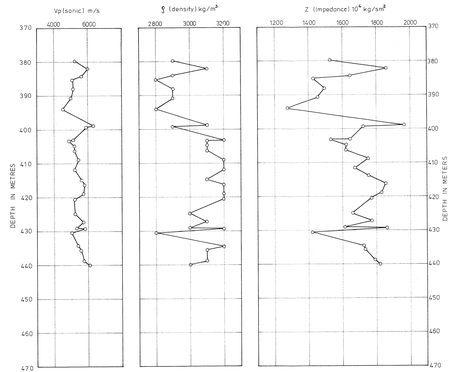


GEOTEAM

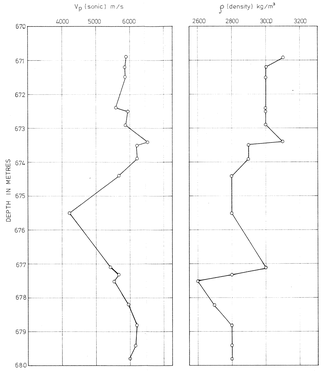
LINE 82 II LÖKKEN WEST
INTERPRETATION OF SHALLOW REFLECTOR
SEISMIC VELOCITY 6350 m/s

Client
ORKLA INDUSTRIER A/S

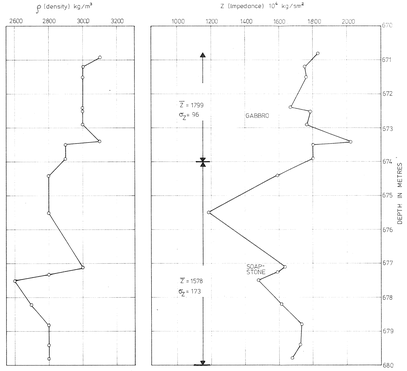
Measured	JUNE 1982	Map no	Scale 1: 2000
Calculated	OCT/NOV 1982		Project no 4034.07
Drawn	NOV 1982		Appendix no 4.1
Controlled :			



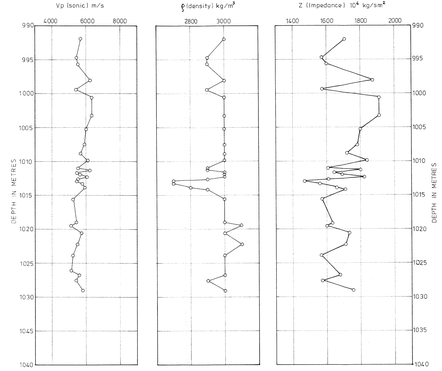
SCALE 1:500



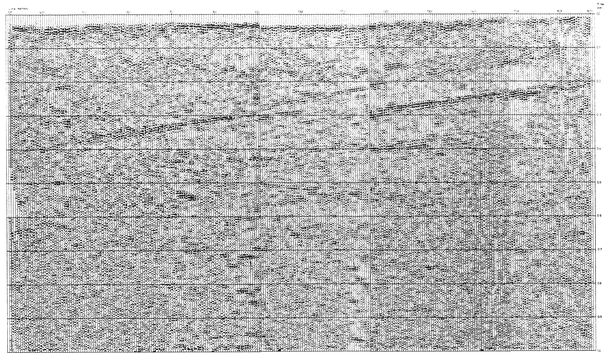
SCALE 1:50



COMPUTED REFLECTION COEFFICIENT
$\bar{r} = -0.07$



SCALE 1:250

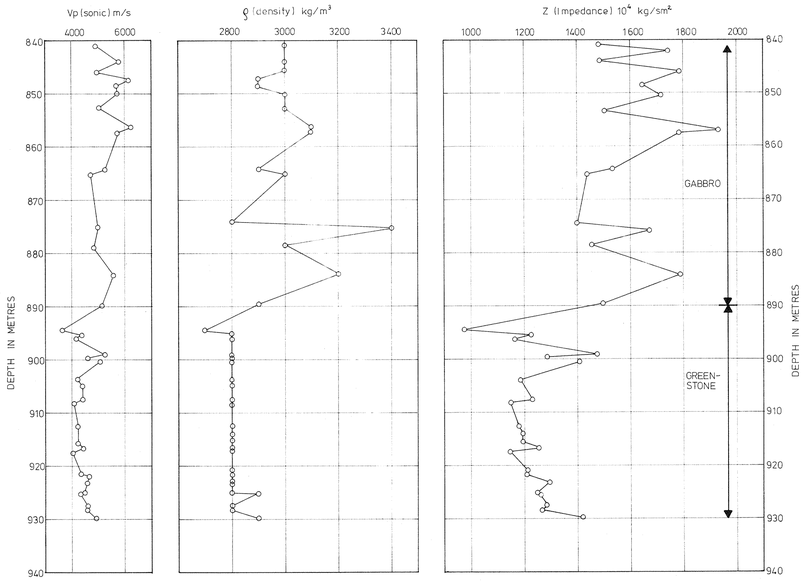


GEOTEAM

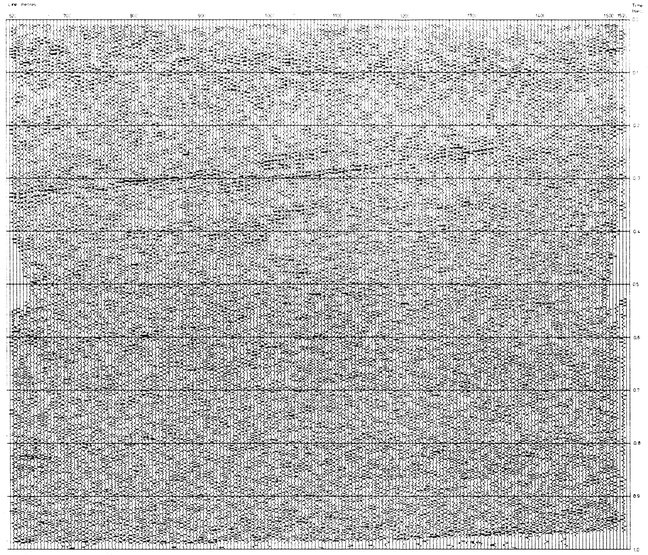
LABORATORY MEASURED IMPEDANCES
BOREHOLE 1

Client
ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT./NOV 1982		Project no 4034.07
Drawn	NOV. 1982		Appendix no 3.6
Controlled			



SCALE 1:500



GEOTEAM

LABORATORY MEASURED IMPEDANCES

BOREHOLE 2

Client

ORKLA INDUSTRIER A/S

Measured	JUNE 1982	Map no	Scale
Calculated	OCT / NOV 1982		Project no 4034.07
Drawn	NOV 1982		Appendix no
Controlled			3.7