



elf aquitaine norge a/s

**FRIGG FIELD
TCP2 COMPRESSION
FINAL REPORT**

volume 3
COST REPORT

STAVANGER

NOVEMBER 1981

FINAL COST REPORT

TCP2 COMPRESSION

SEPTEMBER 1981

H. HAUGEN

PREFACE

This cost report has been put together upon the completion of the TCP 2 Compression project, July, August 1981.

The figures presented are actual, based on invoice payments. The intention of this report has merely been to present a cost summary of this project, without trying to make a thorough explanation as to why and how events have influenced the project cost.

In order to work with unified cost-data Norwegian kroner (NOK) has been used as a unit. Whenever necessary currency conversion has been done according to the fixed project currency conversion figures (Appendix A).

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1. INTRODUCTION

1.1. Compression facilities on TCP 2 platform

1.2. Budget development.

1.3. Cost and Budget development.

1.4. Total project development.

1.5. Supply by nationality.

1.6. Principal contractors.

1.1. COMPRESSION FACILITIES ON TCP2
PLAFORM

A general description of the TCP2 Compression facilities, included a flow chart and area view as given in Frigg Field TCP2 Compression final report - design synopsis vol. 1.

1.2. Budget development and overall schedule

A graph attached shows the overall development of the TCP2 Compression budget. The budget was revised twice a year, spring and fall. The budget issued 1975 is shown here in the overall presentation, however, in regards to both content and budget split it is not comparable with the later development.

At the bottom of the graph budget split development is showing only the major budget items: Engineering, main equipment, bulk equipment, construction and Hook-up. For further details on this see next table.

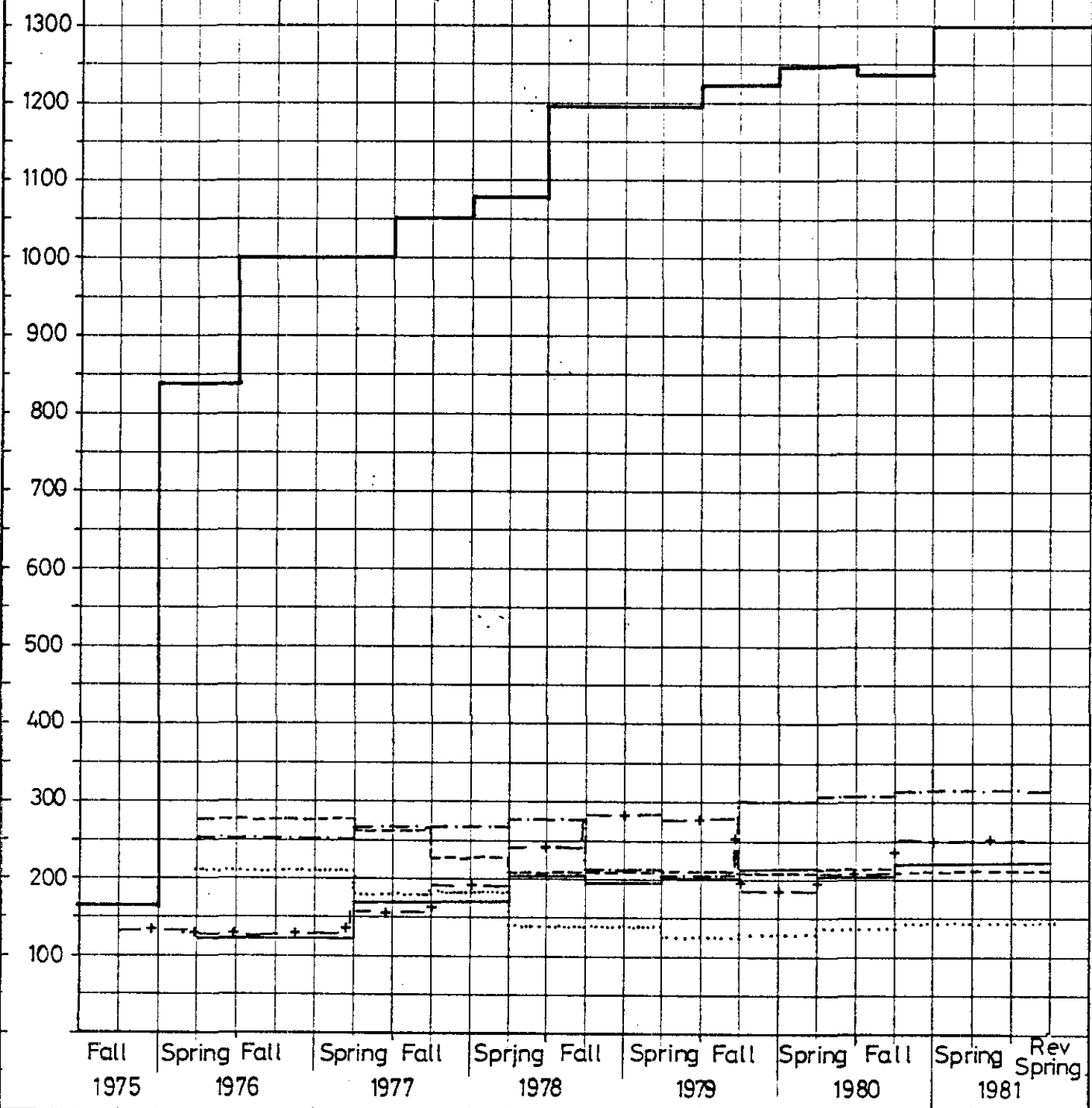
The overall schedule is attached. The engineering is not showing the time spent on Trouble Shooting diagramme work, Procurement schedule only covers the major equipment skidding, Sea transport and lifting lasted approx. 2 months, whilst the actual lifting took less than 1 week.

Commissioning and Start-Up continued after July 1st 1981, but was covered by other budgets.

BUDGET DEVELOPMENT TCP-2 COMPRESSION

NOK
10⁶

- Budget (Total)
- Engineering
- - - Main Equipment
- Bulk
- - - Construction
- - - Hook-Up



Rev
Spring

BUDGET DEVELOPMENT

TCP-2 COMPRESSION

COST CODE	COST CODE	Fall 1975		Spring 1976		Fall 1977		Spring 1978		Fall 1978		Spring 1979		Fall 1979		Spring 1980		Fall 1980		Spring 1981		Fall 1981	
		1)	1976	1)	1977	1)	1978	1)	1979	1)	1980	1)	1981	1)	1982	1)	1983	1)	1984	1)	1985	1)	1986
Engineering	236110		75		120		120		120		155		147		152		165		156		172		173
Main Equipment	236111	163	229	677	214		180		160		160		160		160		161		166		162		162
Bulk Equipment	236112,13		161		131		133		90		90		90		77		81		88		95		93
Construction	236114,30																						
Logistic	31,32,	-	205	-	218		220		230		230		165		158		253		259		264		264
Commissioning	236115	-	100	51	100		100		120		120		136		155		154		131		131		133
Hook-up	236116	-	78	83	108		140		195		195		235		230		138		160		200		199
Miscellaneous & Contingencies	236117	-	-	-	-		-		80		80		80		78		71		58		64		64
Control Assist.	236120	8	24	9	32		52		75		75		111		120		146		132		130		133
Safety Training	236133,34	-	35	-	-		-		-		-		-		-		10		15		10		10
Strike Consequences	236135	-	-	-	-		-		-		-		-		-		-		20		20		20
Overhead					35		35		20		20		20		45		42		46		49		48
Contingency	236199	-	100	26	100		100		75		75		56		50		24		10		5		0
TOTAL		171	846	1,007	1,058		1,080		1,200		1,200		1,200		1,225		1,245		1,240		1,300		1,296

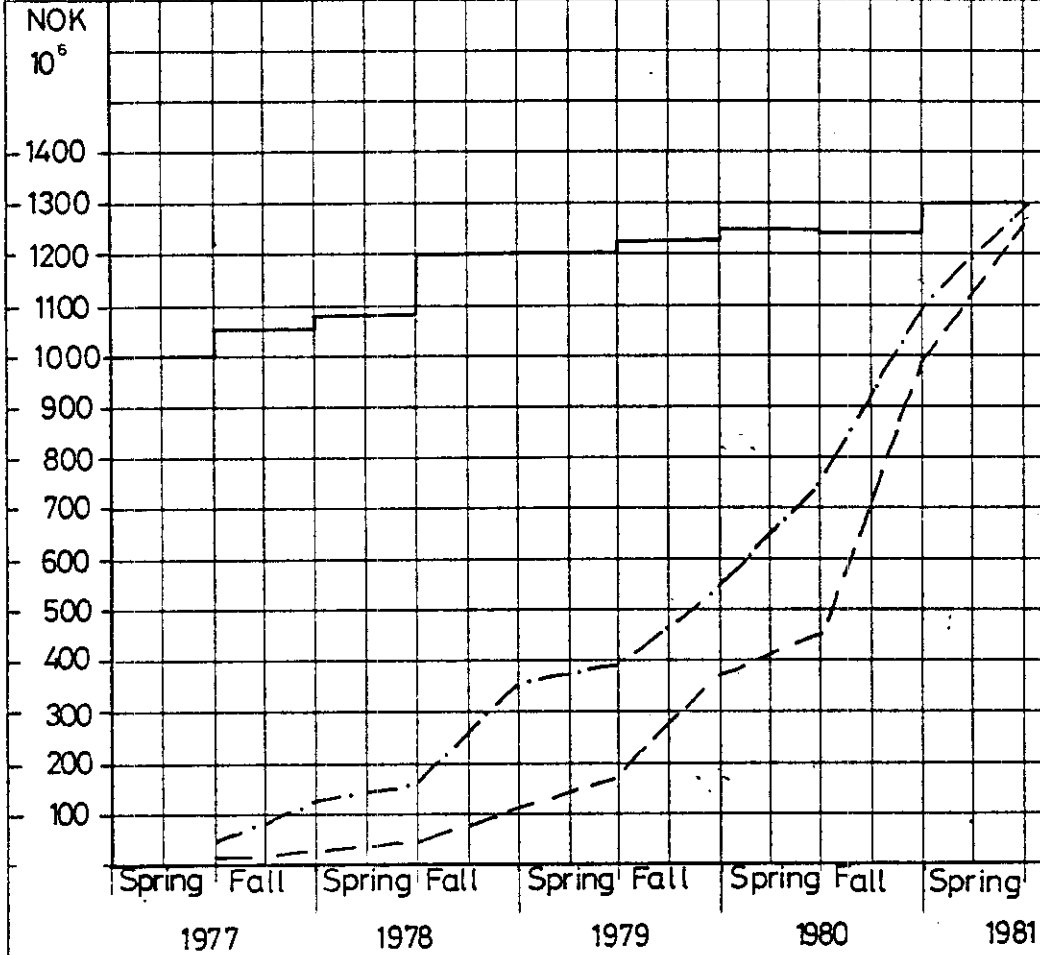
1) OVERALL BUDGET AND BUDGET SPLIT NOT COMPATIBLE WITH FINAL BUDGET

1.3. Cost and budget development.

The attached curves show the development in terms of commitment, cost (invoices paid) and the overall budget. For practical reasons these curves start spring 1977.

The commitments were recorded as the orders were placed, similar with any revisions to the orders.

COST AND BUDGET DEVELOPMENT TCP-2 COMPRESSION



- - - - Actual cost
 - · - · - Commitments
 ——— Budget

NOK 10⁶

	Spring Fall 1977		Spring Fall 1978		Spring Fall 1979		Spring Fall 1980		Spring 1981
ACTUAL COST	14	30	49	111	178	373	469	991	1262
COMMITMENTS	39	125	161	356	396	541	741	1090	1287
BUDGET	1006	1058	1080	1200	1200	1225	1245	1240	1300

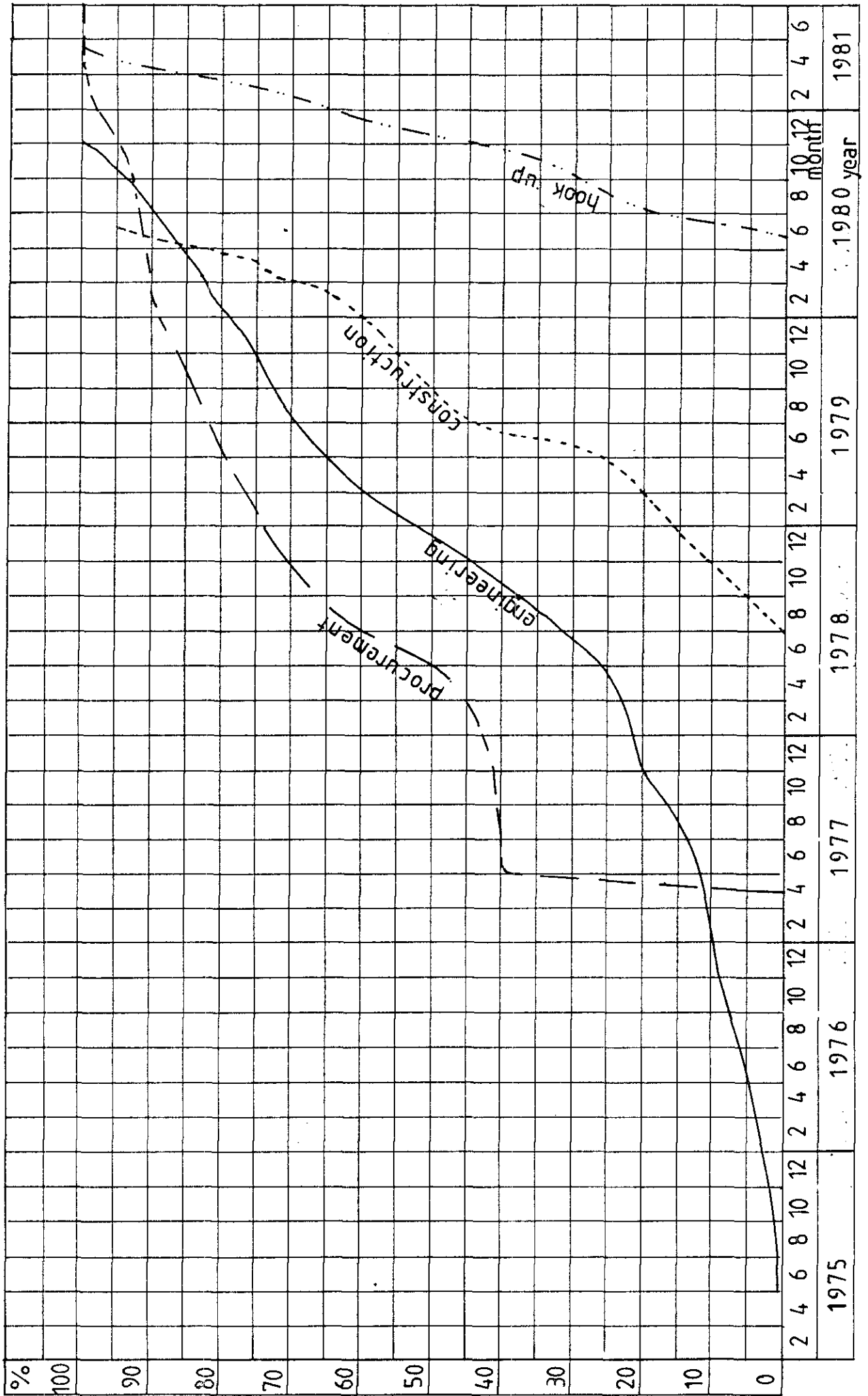
1.4 TOTAL PROJECT DEVELOPMENT

The following graph shows the phase lag in time between engineering procurement, construction and hook-up. All curves are based on percentage of final monetary value.

The engineering curve is here consisting of several phases: (Where engineering contractor (KE/TP) was participating) pre-engineering, detail engineering, procurement, yard supervision and hook-up.

The procurement curve comprises procurement during construction, onshore - offshore and some extent Commissioning/start-up. This curve is based on orders placed and therefore not works value, which is the case for the other curve, which is the case for the other curves. Most equipment was delivered during construction onshore 1978 - 1979.

TOTAL PROJECT DEVELOPMENT % COMPLETED OF EACH PHASE



1.5. Supply by nationality.

The attached table is based on actual currency payments and shows an overall supply by nationality.

However, in some cases the physical supply may reflect a different composition.

SUPPLY BY NATIONALITY

<u>COUNTRY</u>		<u>AMOUNT</u>	PERCENTAGE: ¹⁾
NORWAY	NOK	1.033.485.586	80
FRANCE	FRF	153.884.821	14
USA ³⁾	USD	10.839.101	4
GREAT BRITAIN	GBP	1.862.691	1.5
GERMANY	DEM	1.206.079	0.1 2)
NETHERLAND	NLG	1.100.095	0.1 2)
BELGIUM	BEF	3.824.564	0.1 2)
ITALY	ITL	10.673.200	0.1 2)
OTHER (SWEEDEN, DENMARK)	?	16.965	0.1 2)

1) Based on invoice records, but converted at a fixed currency rate, for exchange rate history see appendix A.

2) Less than 0.1 %

3) Include Japanese company: Sumitomo USD 645.113

1.6 PRINCIPAL CONTRACTORSMAIN CONTRACTOR

<u>DESCRIPTION</u>	<u>ENGINEERING</u>	<u>CONSTRUCTION</u>	<u>VALUE MILL. NOK</u>
<u>EQUIPMENT:</u>			
Turbines	KE/TP	UTI	} 83
Compressors	KE/TP	ACB	
Turbines	KE/TP	STAL LAVAL	} 33.6
Generators	KE/TP	ASEA	
Emergency Diesel	KE/TP	SACM	1.8
Fuelgas package	KE/TP	ACB	9
<u>CONSTRUCTION:</u>			
Yard 1	KE/TP	SBV-ORKANGER	176
Yard 2	KE/TP	OIS-KRISTIANSAND	21.7
Yard 3	KE/TP	OIS-GRIMSTAD	20.4
Transport & lifting	HEEREMA	HEEREMA	20
Hook Up and commissioning	E.A.N.	UIE NORGE	209.5

2. ENGINEERING

- 2.1. Engineering contract summary.
- 2.2. Main engineering contractor:
KVAERNER/TECHNIP contract summary.
- 2.3. KVAERNER/TECHNIP contract summary.
- 2.4. KVAERNER/TECHNIP - Manhours and
payment summary.
- 2.5. KVAERNER/TECHNIP yearly payments
and ratios by company.
- 2.6. KVAERNER/TECHNIP split in payments,
manhours, escalation and reimbursable.
- 2.7. Engineering effort.

2.1. Engineering contract summary.

The term engineering here is used with broad reference in that, in the following list, all companies that have carried out engineering work, are listed.

The main engineering contractor is KVAERNER/TECHNIP PRODUCTION joint venture (KE/TP). For this reason most of cost studies are concentrated on the KE/TP - contract.

ENGINEERING SUMMARY

NAME	DESCRIPTION	RATE NOK/HR LUMP SUM	TOTAL
ALSTHOM ATLANTIQUE	Water hammer study of the main cooling sea water network.	Lump sum	FRF 87.065
BAARØY	Design model.	100 + diett and lodge	NOK 1.286.772
FORGES ET FONDERIES DE HAUTE RESISTANCE	Profiled sleeves for sea-water rejection holes.	Lump sum	FRF 69.200
HUDSON ENGINEERING CORPERATION	Frigg Field TCP2 Compression study (preliminary)	Unitrate	USD 92.822
KE/TP	Detail Engineering	See attachments	
LABORATOIRE CENTRAL D'HYDRAULIQUE DE FRANCE	Seawater network & rejection Shaft - Physical model	Lump sum	FRF 298.590
	Seawater network & rejection shaft - Mathematical model	Lump sum	FRF 85.000
MATRAVIB	Study of seawater outfall pipes and connections	Lump sum	FRF 34.000
	Vibration study of the compression part of the TCP2 Compression (Phase one)	Lump sum	FRF 710.844
SNEA (P)	Various studies	Lump sum (internal services)	FRF 4.337.000
			19.

ENGINEERING SUMMARY - 1

NAME	DESCRIPTION	RATE NOK/HR LUMP SUM	TOTAL
SOFRESID	Calculation of center of gravity about axis x, y, z for modules: 30,31,32,33 pancakes: 40,41,44,42,43,45,46. 2 studies	Lump sum	FRF 285.000
SØRENSEN & BAILY	Internal seafastening	Lump sum	FRF 155.000
TECHNIP GEOPRODUCTION	Engineering Services Piping and Hook up	245	NOK 1.990.094
	Programming of programmable logic controller	Lump sum	FRF 115.000

2.2 MAIN ENGINEERING CONTRACTOR:
KVAERNER/TECHNIP CONTRACT SUMMARY

This main engineering contract was placed with a joint venture between Kvaerner Engineering (Oslo) and Technip Production (Paris).

The design work started in 1975 and was concluded in mid. 1980 (1). After 1979 the contractor performed follow-up work in addition to the work on the trouble shooting diagramme. Outside the mere engineering services the contractor also provided supervisors during the construction work both onshore and offshore.

Apart from a lump sum (NOK 26,4 mill.) phase the contract was based on reimbursement unit rates.

Work location was to begin with in Paris then in Oslo, but was later moved to Stavanger.

COST SUMMARY:

	MANHOURS	MILL. NOK
Design engineering 2):	524932	137.6
Procurement and inspection:	74110	15.2
Construction supervision:	89361	22

(1) From a contract point of view the engineering work has ended in December 1979 (end lump sum work)

(2) Including Hook-up preparation

As regards to the split by discipline, the approximate percentages are as follows. (Including the lump sum work).

Management ¹⁾	22%
Structural	12%
Piping	18%
Electrical	10%
Instrumentation	15%
Drawing preparation	10%
Hook-up preparation	6%
Other	7%

- The split between onshore/offshore construction supervision is 80/20
- The split between specialist and draftsman was 50/50

1) Management included:

Detail design management
Procurement
Yard supervision
Cost control assistance

2.3. KVAERNER/TECHNIP contract development.

The original contract was signed back in 1975 outlining the scope of work.

Amendments 1 and 2 were for change orders whilst amendment 3 covered procurement fee.

A major revision was carried through the amendment 4, also covering the lump sum agreement.

Amendments 5 through 9 covers rate adjustments.

The attached summary gives further details to the above.

MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK
S. 139.0	<p>Scope of work:</p> <ul style="list-style-type: none"> - Study the ultimate compression requirements and prepare general layout drawings of the successive phases. - Perform the complete engineering of phase I - Procurement of all material and equipment for phase I on behalf of Elf-Norge including expediting and inspection. - Construction management and supervision. - Overall project management including planning, progress reports, budget and cost control. <p>Estimate given in contract 112.700 HRS</p>	16.405.300

MAIN ENGINEERING: KVAERNER/TECHNIP J. V. - CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK
S. 139.1	<p>Additional manhours and costs mutually agreed upon in order to carry out the modified and extra work requested by Elf-Norge: Design of a two - line scheme for compression facilities of TCP 2., modification of contractual time schedule, manhours and costs.</p>	8.610.587
S. 139.2	<ul style="list-style-type: none"> - Study and design electrical interconnection of the Frigg Field - Adapt the generator power and control requirements in regard to the interconnection of the field. 	2.234.080
S. 139.3	<p>Change of article VI, paragraph G, clause 2: Shall read: on presentation of vendors and subcontractor's invoices to company against purchase orders which have been placed by contractor for and on behalf of Elf-Norge a fee of one half of one percent shall be applied against the sum total of such invoices presented in the course of each calendar month and billed by contractor to company as a separate monthly invoice.</p>	

MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK
S. 139.4	<p>- Lump sum NOK 24 mill. for all engineering work after February 25, 1979 of Engineering services necessary to ensure that the compression facilities are designed, built, transported, placed in service maintained in proper functioning condition. Claim settlement NOK 2.4 mill</p> <p><u>Article I - Scope of Services</u></p> <p>"b. Perform complete engineering of all structures and systems necessary for the complete fabrication and functioning of the Phase I installation in full accordance with Company's and NPD requirements. These systems shall include but not necessarily be limited to:</p> <ul style="list-style-type: none"> - Product gas/Fuel gas - Electric power and lighting/Saltwater and fresh water cooling/Air and hydraulic control/Heating, Ventilation and Air Conditioning/Telephone, interphone, public address/ESD-Fire and gas detection and alarm/Fire extinguishing/Safety - Mterial handling equipment 	26.400.000

MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK
	<p>"c. Engineering work shall include but not necessarily be limited to:</p> <ul style="list-style-type: none"> - Detailed layouts including Area classifications/Process engineering/Mechanical Flow Sheets/P. & I.D., Electrical and Utilities/Weight Distribution drawings/Main structural drawings/Complete Specifications for all material and equipment/ All test specifications including full load tests of Turbo-compressors and generators/Safety concepts/Follow-up of all Engineering activities during the Construction and hook-up phases/Operating and Maintenance manuals/Hook-up preparation/ As Built drawings <p>For further details on scope of work, see contract S. 139. Add.4.</p> <ul style="list-style-type: none"> - Engineering follow-up team. After the completion of lump sum work, a team of contractor's personnel to be located in Stavanger and work with questions arising from fabrication at yards, reimbursed at contracted rates: <p>Subject to the following escalation formulas</p> <p>Kvaerner Engineering: $R_n = R_0 \left(0.10 + 0.90 \frac{\ln I_n}{10} \right)$</p> <p>Technip Geoproduction: $P = P_0 \left(0.10 + 0.15 \frac{PSDa}{PSDa_0} + 0.75 \frac{S}{S} \right)$</p>	

MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK																																																				
S. 139.4	<table border="1"> <thead> <tr> <th data-bbox="414 582 510 716">Code</th> <th data-bbox="414 716 510 896">Category</th> <th data-bbox="414 896 510 1030">FF/Hour</th> <th data-bbox="414 1030 510 1164">Nkr/hour</th> </tr> </thead> <tbody> <tr> <td data-bbox="510 582 574 716">1</td> <td data-bbox="510 716 574 896">Project Manager</td> <td data-bbox="510 896 574 1030">372</td> <td data-bbox="510 1030 574 1164">368</td> </tr> <tr> <td data-bbox="574 582 638 716">2</td> <td data-bbox="574 716 638 896">Assist. Proj. Manager</td> <td data-bbox="574 896 638 1030">339</td> <td data-bbox="574 1030 638 1164">330</td> </tr> <tr> <td data-bbox="638 582 702 716">3</td> <td data-bbox="638 716 702 896">Norwegian Authorities Coordinator</td> <td data-bbox="638 896 702 1030">287</td> <td data-bbox="638 1030 702 1164">274</td> </tr> <tr> <td data-bbox="702 582 766 716">5</td> <td data-bbox="702 716 766 896">Cost & Schedule Sen.Engineer</td> <td data-bbox="702 896 766 1030">268</td> <td data-bbox="702 1030 766 1164">255</td> </tr> <tr> <td data-bbox="766 582 829 716">6</td> <td data-bbox="766 716 829 896">Cost & Schedule Engineer</td> <td data-bbox="766 896 829 1030">223</td> <td data-bbox="766 1030 829 1164">205</td> </tr> <tr> <td data-bbox="829 582 893 716">9</td> <td data-bbox="829 716 893 896">Expert Eng. Supervisors</td> <td data-bbox="829 896 893 1030">339</td> <td data-bbox="829 1030 893 1164">330</td> </tr> <tr> <td data-bbox="893 582 957 716">10</td> <td data-bbox="893 716 957 896">Projects and Sen.Engineers</td> <td data-bbox="893 896 957 1030">287</td> <td data-bbox="893 1030 957 1164">274</td> </tr> <tr> <td data-bbox="957 582 1021 716">11</td> <td data-bbox="957 716 1021 896">Engineers</td> <td data-bbox="957 896 1021 1030">231</td> <td data-bbox="957 1030 1021 1164">214</td> </tr> <tr> <td data-bbox="1021 582 1085 716">13</td> <td data-bbox="1021 716 1085 896">Drafting supervisors and coordinators</td> <td data-bbox="1021 896 1085 1030">245</td> <td data-bbox="1021 1030 1085 1164">228</td> </tr> <tr> <td data-bbox="1085 582 1149 716">14</td> <td data-bbox="1085 716 1149 896">Sen. designer, group leader, checker</td> <td data-bbox="1085 896 1149 1030">221</td> <td data-bbox="1085 1030 1149 1164">203</td> </tr> <tr> <td data-bbox="1149 582 1212 716">15</td> <td data-bbox="1149 716 1212 896">Designers</td> <td data-bbox="1149 896 1212 1030">181</td> <td data-bbox="1149 1030 1212 1164">158</td> </tr> <tr> <td data-bbox="1212 582 1276 716">16</td> <td data-bbox="1212 716 1276 896">Material take-off engineer</td> <td data-bbox="1212 896 1276 1030">194</td> <td data-bbox="1212 1030 1276 1164">173</td> </tr> </tbody> </table>	Code	Category	FF/Hour	Nkr/hour	1	Project Manager	372	368	2	Assist. Proj. Manager	339	330	3	Norwegian Authorities Coordinator	287	274	5	Cost & Schedule Sen.Engineer	268	255	6	Cost & Schedule Engineer	223	205	9	Expert Eng. Supervisors	339	330	10	Projects and Sen.Engineers	287	274	11	Engineers	231	214	13	Drafting supervisors and coordinators	245	228	14	Sen. designer, group leader, checker	221	203	15	Designers	181	158	16	Material take-off engineer	194	173	28.
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MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

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MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

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<u>Code</u>	<u>Category</u>	<u>FF/hour</u>	<u>Nkr/hour</u>							
32	Start-up supervisors and ass. experts	245	228							
S. 139.5	Final settlement of lump sum work and services change order - settlement.									
S. 139.6	Offshore rates: All KE personnel daily rate NOK 3500,-									

MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

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MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

CONTRACT NO.	DESCRIPTION	AMOUNT NOK
	<p>All rates are firm and non revisable 1980. For personnel going offshore on a short term assignment (less than 14 days):</p> <p>KE personnel NOK 275/HR</p> <p>TP personnel NOK 200/day in addition to normal onshore rate</p> <p>2: Adjustment to "Additives to hourly rates" add. 4 the rates were revised:</p> <p>KE personnel Stavanger area NOK 13.780 / month</p> <p>KE personnel other area NOK 10.580 / month</p> <p>TP personnel NOK 7.600 / month</p>	
S. 139.7	<p>A new rate was agreed to:</p> <p>Code: 33 Title: Hook-up specialist FRF 300/Hour</p>	
S. 139.8	<p>Stated the completion of the follow-up team, by finalysing the engineering and vendor drawing lists. A demobilization list was attached.</p>	
S. 139.9	<p>Revision of rates: Engineering follow-up and offshore work:</p>	32.

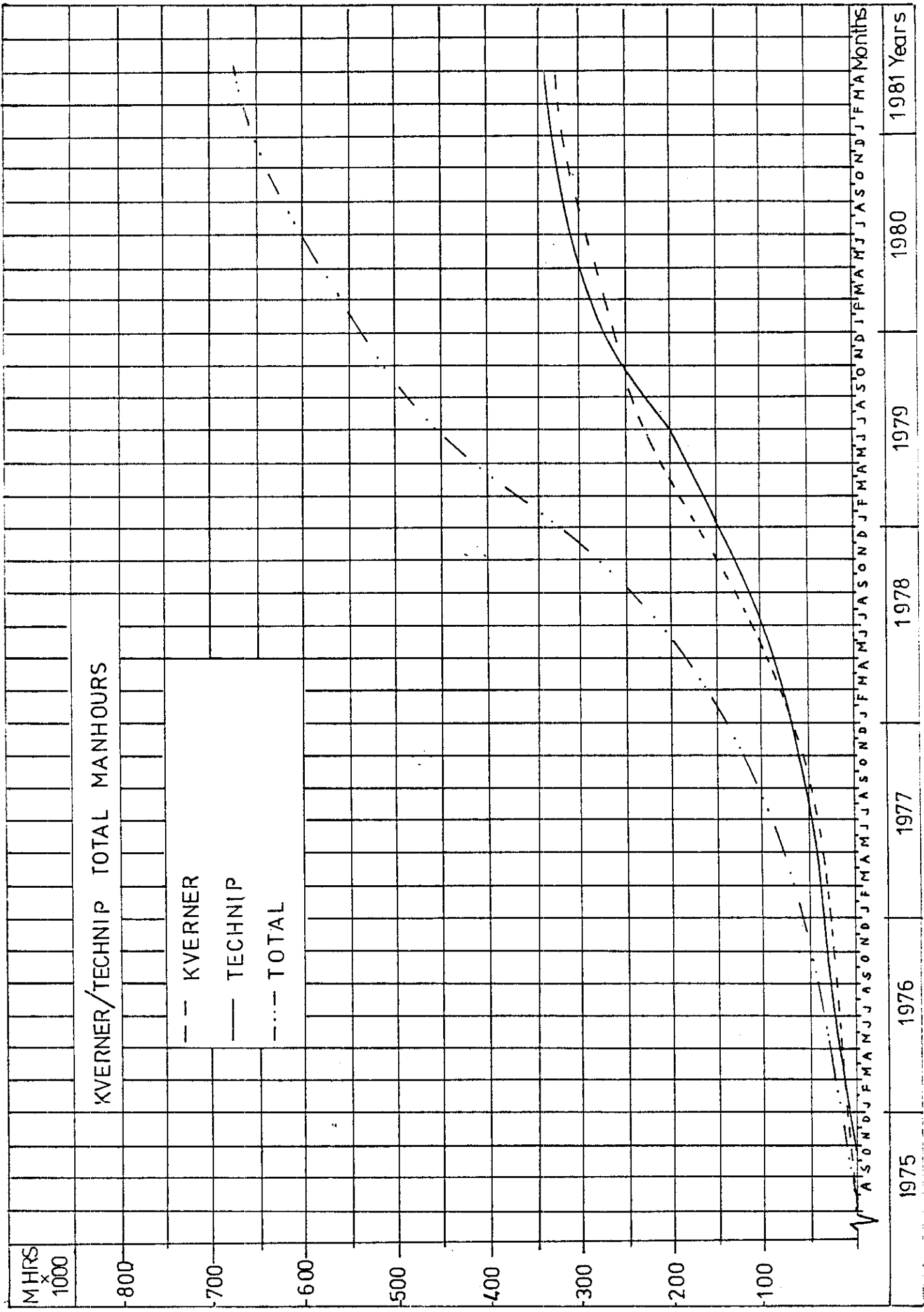
MAIN ENGINEERING: KVAERNER/TECHNIP J.V.-CONTRACT DEVELOPMENT

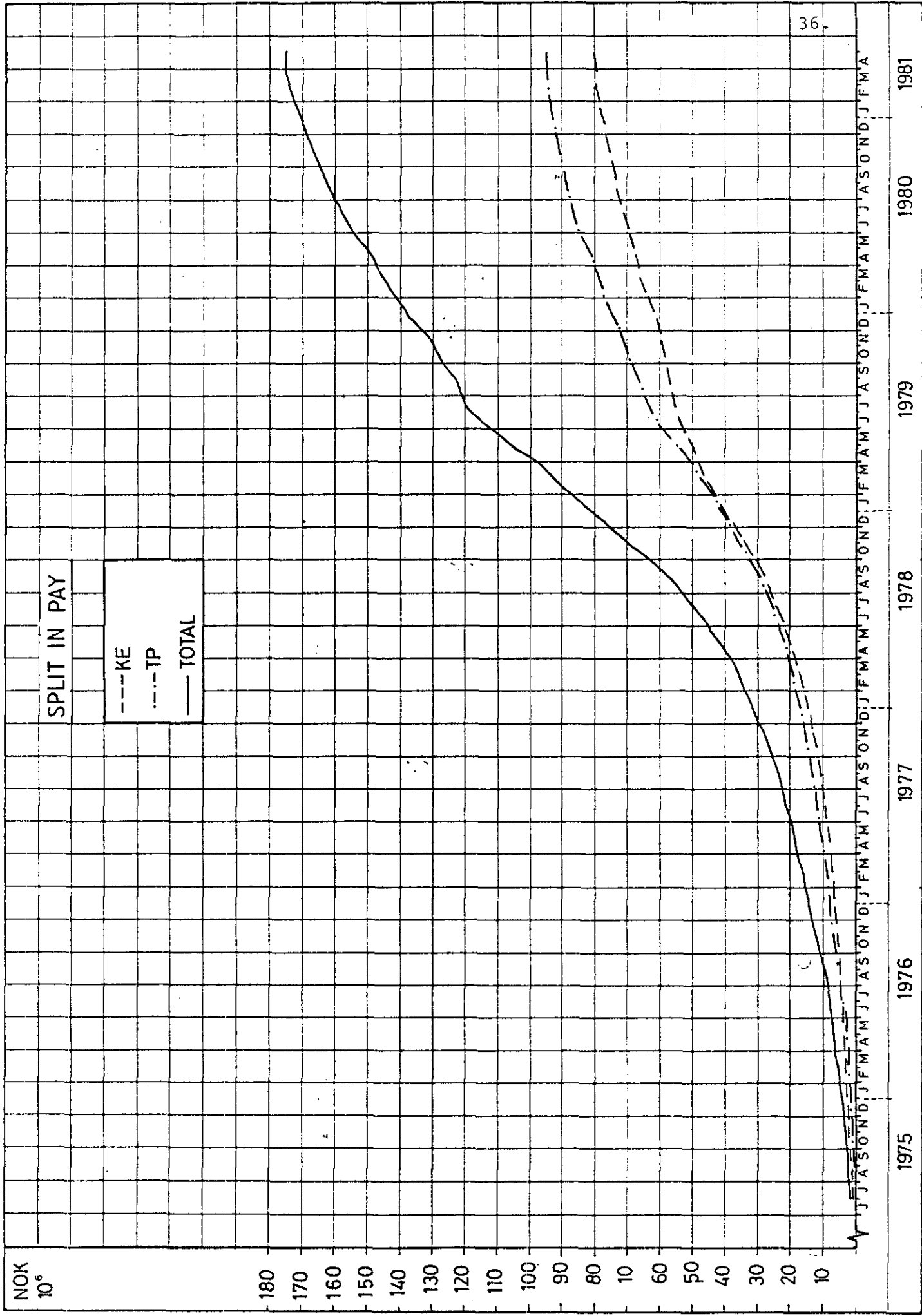
CONTRACT NO.	DESCRIPTION	AMOUNT NOK
	<p>For personnel going offshore less than 14 days:</p> <p>KE personnel NOK 310/hr</p> <p>TP personnel NOK 225/day in addition to normal onshore rate</p> <p>Adjustment to "Additives to hourly rates"</p> <p>KE personnel NOK 15.585/month</p> <p>TP personnel NOK 11.966/month</p>	

2.4. KVAERNER/TECHNIP manhours/payment
summary.

The first attached graph shows the total summary of manhours based on invoiced data. As no manhours were given for the lump sum agreement an estimation has been done, based on average unit rates for each company. (Approx. 120.000 hours).

The second graph shows the works value development over time by each company. For currency conversion TP-value is converted to NOK value at a rate of 1 FRF = 1.20 NOK. Here the total work value includes manhours, escalation and living allowance.





2.5 KVAERNER/TECHNIP YEARLY PAYMENTS
AND RATIES BY COMPANY

The attached table shows a summary of manhours and payments enabling this average unit rate to be extracted for each company.

The hours resulting from the lump sum agreement are estimated.

Within these total figures lie the hours and nence the value of the construction supervision assistance. In particular rates for 1980 is affected by the offshore agreement, signed to in addendum 6.

KVAERNER

HOURLY RATES

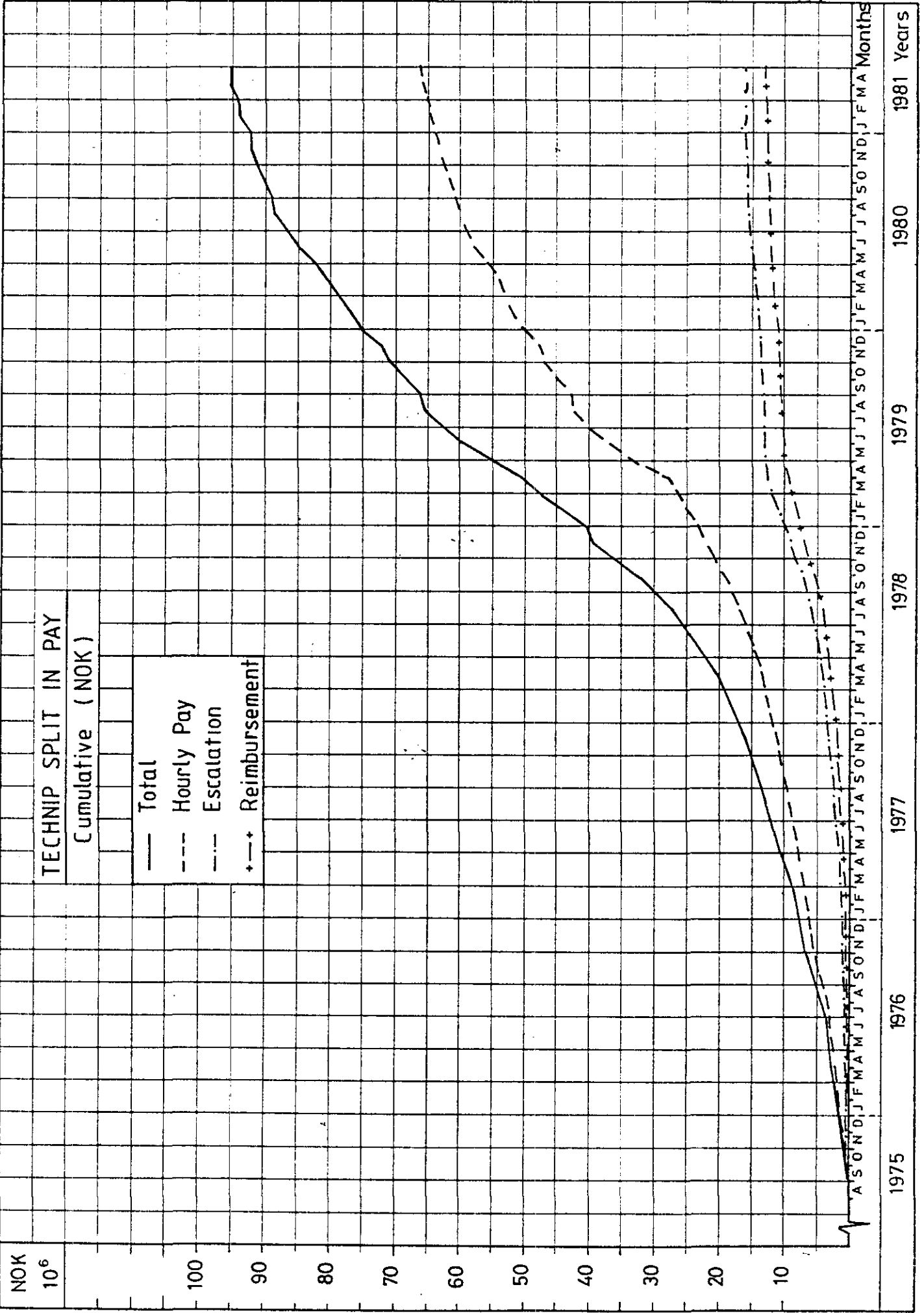
KE	1975	1976	1977	1978	1979	1980	1981	TOTAL
TOTAL HOURS ANNUALLY	13.045	17.285	40.594	103.303	98.850 x	56.315	7.293	335.685
TOTAL COST KNOK	2.496	4.202	7.987	25.825	21.769	15.878	2.121	80.276
AVERAGE NOK/HOUR	207	236	197	250	220	282	291	239
TECHNIP								
TOTAL HOURS ANNUALLY	6.923	25.202	38.811	87.226	129.573 x	59.134	5.849	352.718
TOTAL COST KNOK	1.667	6.182	9.740	22.714	35.049	17.741	2.071	95.164
AVERAGE NOK/HOUR	241	245	251	260	270	300	354	270

x LUMP SUM HOURS ESTIMATED = 120.000

2.6. KVAERNER/TECHNIP SPLIT IN PAYMENTS,
MANHOURS ESCALATION AND REIMBURSABLES

Attached 2 graphs (one for each company) are showing the work value split in direct manhours, escalation which is based on manhours and finally the reimbursables. The later here includes special living compensation as the team was moved from Oslo to Stavanger. Travel expenses also fall into this category.

Following the signing of amendment 4 to the contract, the escalation was realigned. Starting with 1st quarter 1979 base index was 4th quarter 1978, and the basic rates were "lifted" up.



2.7. ENGINEERING EFFORT

The scope of work has been given under chapter 2.3. based on the contract. The final status is that this has been generally fulfilled by the contractor except for operating manual and cathodic protection study which have not been done.

Outside the issue of drawings ¹⁾ and special studies¹⁾ the contractor has assisted EAN management with the supervision of on-shore/offshore construction²⁾ (project services contractor). Most of the equipment was procured by the contractor on behalf of EAN.

Any comments as regards to the overall productivity are impossible. However, one should keep in mind when trying to assess this point: The Offices were located at 3 different places, Oslo, Paris and Stavanger. At one point in time the whole team was moved from Oslo to Stavanger.

The limited degree of specifications that were available at the early stage of the project, after all the Frigg Field started production in 1977.

1) Summary of drawing and reports

DISCIPLINE	NO. OF DRAWINGS APPROVED FOR CONSTRUCTION
General	101
Piping	109
Structure	349
Heat and ventilation	45
Electrical +	257
Instrument	417
TOTAL	1 278

+) One drawing number covers several sheets, total sheets: 6 418, vendor drawings excluded (2 711)

Several reports/studies were issued throughout the period, main reports:

- Dismantling report
- Vendor data books

2) SUPERVISION PERSONNEL

Phase	No of people	man months
Procurement	10	103
Yard 1	12	164
Yard 2	4	84
Yard 3	5	43
Hook up	15	117

3. EQUIPMENT

"

- 3.1. Total equipment value
- 3.2. Summary by nationality and cost code
- 3.3. Vendor assistance
- 3.4. Equipment list by nationality

3.1. Total equipment value.

The attached graph shows the placing of orders for equipment in time. Most of the equipment has been delivered to the yards during the construction phase late 1978 and 1979.

Also included in this curve is the offshore vendor assistance when commissioning the equipment and during start up.

The exchange rate conversion is done according to the project fixed exchange rates.

3.2. Summary by nationality and cost code.

The first table shows the composition by nationality based on country of origin. The figures here must not be compared to the overall supply by nationality, chapter 1.5., as the latter refers to the overall project.

Second part of the first table is the overall summary by cost code. A detail of this summary follows on next table. The apparent difference between committed and final cost is that the cut off date for this report was before all invoices had been processed. Mostly this reflects offshore vendor assistance. (See chapter 3.4. on vendor assistance)

Most of bulk equipment was supplied onshore, whilst some offshore during hook-up. However, during the hook-up and commissioning phase a new bulk equipment cost code was opened, not shown here. Basically the bulk equipment supplied during this later stage (and covered under a separate cost code) was of a consumption nature, and therefore not part of permanent installation. No doubt some bulk equipment could in this context have been recorded under the wrong account.

SUMMARY OF MAIN EQUIPMENT

BY NATIONALITY

NATIONALITY	VALUE (NOK)	%
Norwegian companies	109 639 841 78	44.80%
French companies	58 815 196 16	24.03%
American companies	56 308 521 31	23.01%
British companies	15 712 216 72	6.42%
German companies	2 609 305 38	1.07%
Dutch companies	1 229 363 53	0.50%
Belgian companies	338 753 37	0.14%
Italian companies	73 965 28	0.03%
TOTAL	244 727 163 53	100 %

BY COST

COST CODE	DESCRIPTION	TOTAL COMMITMENTS	%	FINAL COST FORECAST	%
11	Main equipment	170 312 063	55.45%	162 120 000	63.40%
11A	Turbo compressor	86 059 024	33.58%	83 000 000	32.46%
11B	El. Generator	34 518 589	13.47%	33 600 000	13.14%
11C	Pumps	14 484 378	5.65%	14 200 000	5.55%
11D	Exchangers	6 940 230	2.70%	6 000 000	2.35%
11E	Drums/tanks	3 891 246	1.52%	4 000 000	1.56%
11F	Packages	24 418 596	9.53%	21 320 000	8.34%
12	Bulk equipment	85 990 764	33.55%	93 593 000	36.60%
12A	Piping	40 126 843	15.661%	42 500 000	16.62%
12B	Electrical	18 005 720	7.03%	20 000 000	7.82%
12C	Instrumentation	16 566 466	6.46%	20 000 000	7.82%
12D	Steel supplies	6 641 109	2.59%	4.493 000	1.76%
12E	Miscellaneous	4 650 627	1.81%	6 600 000	2.58%
	TOTAL	256 302 827	100%	255 713 000	100%

LIST ALL MAIN ORDERS / COST CODE

COST CODE	DESCRIPTION	TOTAL COMMITMENTS	FINAL COST FORECAST	COST CODE	DESCRIPTION	TOTAL COMMITMENTS	FINAL COST FORECAST
11A	<u>TURBO COMPRESSOR</u> Gas turbines Gas compressors Miscellaneous	86059024 59312691 26623916 122417	83000000	11F	MARINE DECK CRANE Pneumatic hoists Emergency shut down syst. Maintenance trolleys	3631507 396630 215495 160690	
11B	<u>EL. GENERATOR</u> 2 gas turbine Generator sets Emergency diesel gen.set. Miscellaneous	34518589 32650535 32650535 1831464 56590	33600000	TOTAL 11	MAIN EQUIPMENT	170312063	162120000
11C	<u>PUMPS</u> Fresh water/teg. cooling pump Sea water cooling pump Wash down pump Fresh water utility pump Diesel hydraulic driven fire pumps with package Miscellaneous	14484378 1094591 5251658 202215 284325 2479932 221922	14200000	12A	<u>PIPING</u> Axial flow piston check valve Carbon steel globe valves 2" & larger Carbon steel butterfly valves Butterfly valves with actuators Welded high pressure steel pipe High pressure fittings High pressure fittings High pressure fittings High pressure fittings High pressure fittings Ball valve with actuator Carbon steel bass valves Minimum flow by pam " Flat swing check valve Sea water piping Seamless steel pipe High pressure transition pieces Spring hangers and accessories Studbolts and nuts Carbon steel fittings Carbon steel pipe Flanges for high pressure piping Stainless steel fittings Seamless stainless steel pipes Seawater rejection shafts High pressure elbows Orifice flanges for HP 26" pipes	40126843 818300 202020 281447 174640 642452 245795 423670 501506 212480 192008 5029096 168678 350400 210600 9899751 141722 429408 113671 338095 758454 537073 1227582 139382 195015 4535480 135193 124726	42500000
11D	<u>EXCHANGERS</u> Plate heat exchanger Tabular heat exchanger Miscellaneous	6940230 5055063 1869000 16167	6000000				
11E	<u>DRUMS/TANKS</u> Vessel separators Cold vent K.O.drum Sea water strainers Miscellaneous	3891246 2177398 175800 401088 130960	4000000				
11F	<u>PACKAGES</u> Fresh water maker Platform hydraulic controll system Air compressors Fuelgas heaters/fuel gas packages Air condition system Ventilation system Halon 1301 system Deluge valves Cold vent extinguishing unit Maintenance hoists	24418596 1122209 2083422 1996744 9068812 563762 1311289 844130 162250 218900 2307991	213200000				

LIST ALL MAIN ORDERS / COST CODE

COST CODE	DESCRIPTION	TOTAL COMMITMENTS	FINAL COST FORECAST	COST CODE	DESCRIPTION	TOTAL COMMITMENTS	FINAL COST FORECAST
12A	Flanges HP pipes Studbolts and nuts Cable ladders in S.S. Stainless steel fitting Ball valves Carbon steel fittings MISCELLANEOUS	162 801 160 649 488 577 301 437 280 680 172 491 8 157 155		12C	Fire detection system Programmable units Fuel flow metering system Gas detection system Steel Laval MISCELLANEOUS	952 782 891 108 236 110 220 284 2 546 804	
12B	<u>ELECTRICAL</u> Transformer High voltage switchboard Low voltage switchboard Electric cables Static autonomous supply units Lightning junction boxes Socket outlets 24V Emergency lighting fittings Lightning fittings Floodlight fittings Hook up junction boxes MISCELLANEOUS	18 005 120 650 410 3 879 323 3 614 995 3 822 235 2 505 521 217 734 234 651 890 672 258 518 130 183 255 097 1 546 381	20 000 000	12D	<u>STEEL SUPPLIES</u> Steel plates Steel material Stainless steel cladding Supply of structural steel Steel profiles for panels MISCELLANEOUS	6 641 109 3 110 584 686 437 1 144 145 494 386 659 007 557 550	4 493 000
				12E	MISCELLANEOUS	4 650 627	6 600 000
				TOTAL 12	BULK EQUIPMENT	85 990 764	93 593 000
12C	<u>INSTRUMENTATION</u> Berger petrochemical type thermometer Pressure switches Annubar special flow element Level switchers Foxboro instruments Control valve Analog panel instruments Straight vane Flow and pressure trans- mitters Safety relief valves Tubes Instrumentation cables Local controller/recorder Gas detection system Blow down valves Pneumatic pilot valves Control panels and cabinets	16 566 466 42 855 150 394 298 932 344 700 531 521 349 196 231 145 189 852 349 602 222 219 890 981 2 651 058 111 721 1 010 424 531 108 133 510 3 679 560	20 000 000				

3.3. Vendor assistance.

The following list shows the vendor assistance rendered during onshore, offshore construction and commissioning/start-up phase. During the installation of certain equipment onshore some vendor assistance was rendered over a longer period (ref. Stal Laval, ACB) these hours are not shown here.

Some equipment was ordered with offshore assistance as an option to the order. However, in most cases separate orders were placed in order to cover this particular service.

The total amount of hours shown here and based on approved time sheets are 17500.

In addition to these recordings an additional 3000 hours offshore assistance has been included in the last budget revision. This means that the total vendor assistance can be put at 20 000 hours at a approximate value of NOK 7.5 mill.

SUMMARY OF VENDOR ASSISTANCE

Vendor name	Total hrs	Total amount
A.C.B.	2400	1.007.429
MARKEM	3500	450.110
JAMES SCOTT	4300	747.660
NORSK VIFTEFABRIKK	263	78.920
U.T.I.	3050	832.146
E.SUNDE	84	25.145
F.MOHN	138	41.280
STAL LAVAL	2800	926.200
DOWELL	44 (Days)	944.241
K.LUND	12	3.600
MARITIME SERVICE	61	9.150
NUOVO PIGNONE	276	120.336
EGA	6 (Days)	24.600
THUNE EUREKA	4 (Days)	7.935
OTHERS	648	

3.4. Equipment list by nationality.

The following list is a further detail of the list shown in chapter 3.2. Under the norwegian supplier, Nyland Verksted, Oslo are listed as the supplier of 2 gas turbine generator sets. However, during 1980 it was decided to close this company and all responsibility and further dealings on this matter was done with Stal Laval (Sweden).

Norwegian companies

Vendor	Value (NOK)	Description
A/S Telesystemer	952.782,-	Fire detection system
Aspelin Stormbull	1.839.829,-	Supply of structural steel
Cock	222.218,50	Safety relief valves
EGA	7.709.813,-	Emergency shut down system, high/low voltage switchboard.
Frank Mohn	2.479.932,-	Diesel hydraulic driven fire pumps.
HAEB	1.720.544,-	Emergency lighting fittings, socket outlets.
Holta & Haaland	599.797,-	Hook-up junction boxes
Kongsberg	16.321.442,-	Gas turbines
Lindflaten	5.251.657,75	Sea water cooling pump
Maritime service A/S	4.779.780,-	Sea water rejection shafts, cold vent. K.O. drum.
Nife	2.575.521,-	Static autonomous supply units incl. tests.
Norsk Hydro	5.762.982,-	Platform hydraulic control system, controll panels and cabinets.
Norsk Kabelfabrikk	6.473.292,25	Elect./Inst. cables
Norsk Viftefabrikk	1.875.051,55	Ventilation system
Nyland Verksted	36.282.041,91	2 gas turbine generator sets, marine deck crane.

Norwegian companies (cont.)

Vendor	Value (NOK)	Description
Rømmateriell	1.217.114,54	Carbon, steel, flanges, fittings.
S.Munck	2.307.991,-	Maintenance hoists
Solberg Andersen	349.196,-	Control valves
Stal Laval (ref. Nyland Verksted)	1.196.943,-	Offshore assistance on gas - turbine generator sets.
Stavanger rørhandel	1.135.245,-	Seamless steel pipes.
Sunde	1.063.030,-	Halon 1 301 svstem
Thune Eureka	5.233.060,-	Sea water coolings pump, fresh water utility pumps.
Others:	2.290.578.28	

Total norwegian comp. 109.639.841.78

French companies

Vendor	Value (NOK)	Description
Alsthon Atlantic (A.A)	19.471.728,15	Gas compressor, water hammer study.
ACB	9.068.812.86	Fuel gas heatexchangers/fuel gas packages.
Airoil Francaise	3.177.398,17	Vessel separators
Allen Bradley	891.108,-	Programmable units.
Auxitrol	410.794,80	Filter regulator.
Beck Crespel	498.744,69	Studbolts and nuts.
C.E.M.	650.410,80	Transformers
Creusot loire	1.869.000,-	Tubular heat exchanger.
Dresser	1.094.590,80	Fresh water/Teg. cooling pump.
GEC Elliott	531.107,93	Blow down valves.
Georgin	210.682,80	Pressure switches
ICARE	1.230.708,-	Gas detection system
Mapegaz	5.283.192,-	Carbon steel ball valves, ball valves with actuator.

French companies (cont.)

Vendor	Value (NOK)	Description
Metravib	853.012,80	Vibration study of the comp.
Poirier Pauze	396.630,34	Pneumatic hoists.
Profilor	1.133.145,25	Stainless steel cladding.
SACM	1.831.464,-	Emergency diesel generator set.
Societe Tolartois	488.576,90	Cable ladders in S.S.
SPM	745.551,12	Stainless steel fittings
Usinor	3.110.583,60	Steel plates
Worthington	1.996.743,60	Air compressors.
Others	3.871.209,55	
Total french comp.	58.815.196,16	

British companies

Vendor	Value (NOK)	Description
APV international LT.	5.055.062,88	Plate heat exchanger
Daniel industries LT.	236.109,60	Fuel flow metering system.
YIM	9.899.751,06	Sea water piping.
Oters	521.293,18	
Total british comp.	15.712.216,72	

German companies

Vendor	Value (NOK)	Description
G.O.C.	1.515.109,06	Flanges for high pressure piping.
Gullichsen	890.981,07	Tubes.
KSB	203.215,25	Wash down pump, sea water cooling pumps
Total german comp.	2.609.305,38	

American companies

Vendor	Value (NOK)	Description
AQUA CHEM	1.122.208,50	Fresh water maker
U.T.I.	50.247.915,34	Gas turbines and vendor ass.
Others		

Total american comp.

Japanese company

Vendor	Value (NOK)	Description
Sumitomo	3.386.842,-	Welded high press steel pipes.

Total japanese comp 3.386.842,-

Dutch companies

Vendor	Value (NOK)	Description
Carpenter & Patterson	113.671,08	Spring hangers and accessories
Giant BV	225.370,04	
Mock Veld	818.300,-	Axial flow piston check valve.
G.O.C.	72.022,41	

Total dutch comp. 1.229.363,53

Italian company

Vendor	Value (NOK)	Description
Italian company	73.965,28	Welded steel pipes

Total Italian comp. 73.965,28

4. Construction.

4.1. Contract summary.

4.2. Yard construction - works value.

4.3. Comparison initial to final value.

4.4. Ratios

4.1. CONTRACT SUMMARY

Construction was carried out at three different yards:

- Yard 1: Spie-Batignolles Vigor, Orkanger
 Yard 2: Øygrey Mekaniske Verksted, OIS, Kristiansand
 Yard 3: Nymo Mekaniske Verksteder, OIS, Grimstad

Contracts were placed Spring 1978 and work on all 3 yards was completed Spring 1980.

All contracts were based on lump sum, but also including unit prices, such that change orders could be included. Monthly payments were based on monthly physical progress. The progress measurement was based on a point system.

Change orders were issued along with the work and price settlements were negotiated and settled in each case. Claims that arose out of this method were settled by way of a final all inclusive lump sum payment. This is true for most of the cases, except for Yard 1 during the Autumn of 1979. Events had led to a rather large increase in the Scope of Work such that claims had reached almost 100% of the original contract price. At the end of October 1979 agreement was reached of total lump sum for all work done up to date of NOK 81 million pluss a bonus of NOK 5 million pending completion date. After this settlement all remaining work was done on reimbursements.

Final price summary:

Yard 1	Modules 30, 31, 32, and 33	NOK 176 045 000 ¹⁾
Yard 2	Pancakes 40, 41 and 44	NOK 21 720 000
Yard 3	Pancakes 42, 43, 45, 63-65	NOK 20 407 000

1) Including a 15% French francs payment

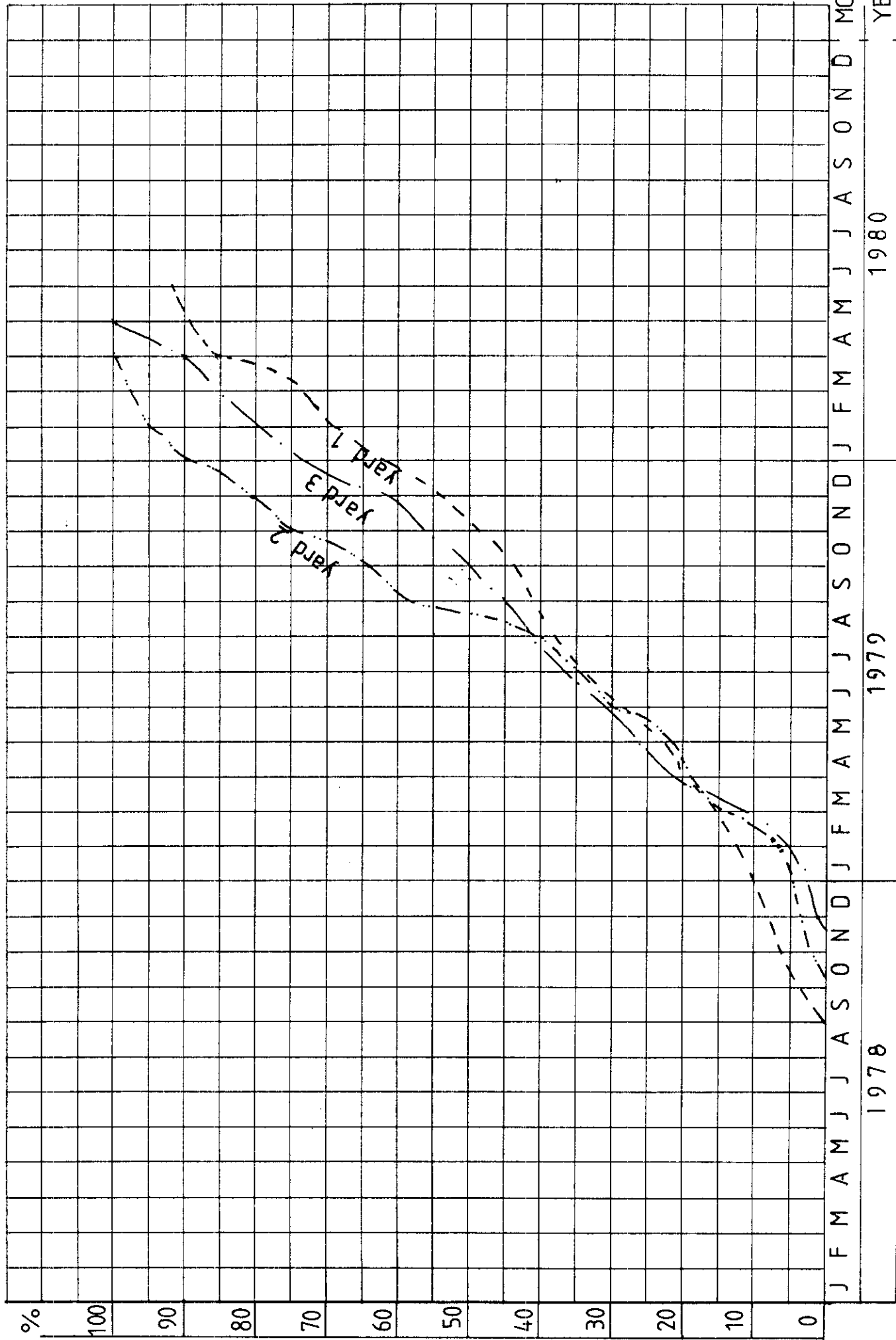
4.2. Yard construction - works value

The attached graph shows for each yard the per cent complete based on works value versus time.

Generally all payments (and hence invoices) were tied up to the latest agreed % progress. However, claims were kept outside this progress measurement system.

Yard 1 had a french francs payment condition which for the purpose of this curve has been converted according to project rates.

YARD CONSTRUCTION % COMPLETE



4.3. Comparison initial to final value.

The attached table makes a comparison discipline by discipline for each yard in terms of value.

Generally most of the increase must be seen as a result of change orders. But some of the increase is also a "carry over effect" in that certain activities were delayed in time. In this regards the very severe winter 1979/1980 was effecting the work at Orkanger.

DISIPLINES	YARD 1		YARD 2		YARD 3	
	ORIGINAL LUMP SUM	FINAL VALUE	ORIGINAL LUMP SUM	FINAL VALUE	ORIGINAL LUMP SUM	FINAL VALUE
Structure	15 097 896	37 169 744 781	3 567 800	5 806 862	1 826 000	4 329 914
Equipment	2 203 700 40	2 725 000	739 000	1 508 551	500 000	1 012 366
Piping	11 298 592 80	43 059 744	148 000	723 122	2 224 000	4 834 566 80
Electricity	3 528 795 60	9 898 937	1 065 000	4 184 374	528 000	1 434 225 60
Instrumentation	3 971 800 80	12 316 937	965 000	3 560 862	200 000	1 470 379 60
Insulation	483 951 60	605 744	289 000	344 014		
HVAC	1 326 837 60	1 183 744			55 000	478 090
Painting	3 065 752 80	10 202 744	765 800	1 545 317	694 000	2 796 103
Architecture	764 042 40	1 940 744				
Load out	1 818 630	1 133 744	200 000	242 405	94 000	213 827
Yard services		120 737 082		17 893 787		16 569 472
Staff		15 934 000		637 835		448 391
Material/serv.		29 320 744 781				
Currency costs		8 790 000		3 188 378		3 389 419
		1 763 167				
TOTAL	43 560 000	176 045 000	7 739 600	21 720 000	6 121 000	20 407 282

4.4. RATIOS

Table 1 shows the overall ratios between payment and hours in each discipline for each yard.

The total value is inclusive all settlements made in regards to claims etc. However, the recording done by each yard shows that some disciplines are put together, i.e. insulation and HVAC¹⁾ yet on other key items such as yard staff in the case of yard 2, 3 no recordings were carried out.

Table 2, page 1 and 2, contains several ratios between NOK value and some common criteria of measurement. However, in some cases ratios do not reveal the "true picture" for example, looking at structural, yard 2 spent on average 122 hours/ton whilst yard 1: 171 and yard 3: 142. But in these figures the degree of complexity in structure is not reflected.

Similar arguments could also be valid for other disciplines.

1) HVAC - heating ventilation and airconditioning

TABLE 1: OVERALL RATIOS, BY DISCIPLINE

	YARD 1			YARD 2			YARD 3		
	NOK	HOURS	NOK/HRS.	NOK	HOURS	NOK/HRS.	NOK	HOURS	NOK/HRS.
Structure	37 169 744	264 223	140	5 806 862	40 610	142	4 329 914	44 963	96
Equipment	2 125 000	13 228	206	1 508 551	12 832	118	1 012 366	6 747	150
Piping	43 059 744	205 046	210	723 122	11 520	63	4 834 566	36 000	133
Electricity	9 898 937	58 922	168	4 184 374	26 246	160	1 434 225	25 000	116
Instrumentation	12 316 937	73 315	168	3 560 862	31 787	112	1 470 379		116
Insulation	605 744	3 900	155	344 014	1 167	295	478 090		
HVAC	1 183 744	7 637	155						
Painting	10 102 744	71 650	141	1 545 317	11 665	133	2 796 103	18 000	155
Architecture	1 940 744	13 477	144						
Load out	1 133 744	7 873	144	242 405			213 827		
SUB TOTAL	120 237 088	719 271	167	17 915 507	135 827	132	16 569 472	130 710	127
Yard services	15 934 000	129 540	123	637 835	5 186	120	448 391	3 646	120
Staff	29 320 744	13 620	210						
Works total	165 491 832	862 431	-	18 553 342	140 013	-	17 017 863	134 356	-
Material/serv.	8 790 000			3 188 378			3 389 419		
Currency costs	1 763 167								
TOTAL	176 045 000	862 431	204	21 720 000	140 013	155	20 407 282	134 356	152

TABLE 2: RATIOS

SUBJECT	RATIO	YARD 1		YARD 2		YARD 3	
		INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
<u>STRUCTURAL</u>							
Main Structure	Weight(t) Manhours HRS./TON		1 456		317 33 380 105		
Secondary Structure	Weight(t) Manhours hrs/ton		92		15 1 230 472		
Overall Structure	Wight (t) Man hours HRS/TON	100 653	1 458 264 223 171		332 40 610 122		316 44 963 142
Contr. cost Cost Hourly cost	KNOK KNOK/TON KNOK/hrs	15 100	37 170 26 140	3 550	5 807 18 142	1 810	4 330 14 96
Weight% to total dead weight	%		43%		47%		34%
% value to total cost of prod. hrs	%	34.7%	38.4%				
<u>EQUIPMENT</u>							
Total weight	Tons		930		382		113
Man hours	Hours	14 691	13 228		10 500		
Hours/ton	Hours/ton		13		27.5		
Contr. cost Cost	KNOK KNOK/ton	2 204	2 125 2.3	140	1 509 3.9	210	1 012 8.9
% equip. to total weight	%		26%				19%
% value to total cost of prod. hours	%	5.1%	1.7%				
<u>PIPING</u>							
Piping weight	Tons	641	860	8.5	19	72	112
Total man hrs	Hours	75 320	209 240		11 520		36 000
Hours/ton	Hours/ton	117	240		413		320
Contr. cost Cost Hourly cost	KNOK KNOK/ton KNOK/hrs	11 300 17.7	43 059 51 206	150 17.6	723 38 165	2 220 30.8	4 834 43 134
% piping to total weight	%		24%		14%		
% value to total cost of productive hours	%	25.9%	30.4%				

TABLE 2: RATIOS (CONT.)

SUBJECT	RATIO	YARD 1		YARD 2		YARD 3	
		INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
INSTRUM. & ELECTRICITY Weight	Tons		2 606				
Man hours	Hours	50 004	132 230		58 033		25 000
Contr. cost	KNOK	1 500	22 214	2 020	7 880	130	2 870
Hourly cost	NOK/HRS.		168		136		115
Value of total cost of productive hours	%	8.1%	6.9%				
Cable pulling	Meters		68 840				
<u>PAINTING</u>							
Estimated	USE 20m ² /ton struc.	Steel 31260 Pip- ing 1980	36 300	Steel 8 180 Pip- ing 182 Tank 100	7 105	Steel 6 300 Pip- ing 840 Tank 600	8 000
CONTR. COST ₂	KNOK	3 070	10 102	770	1 545	690	2 796
Price per m ²	NOK/m ²	92.4	278	91	222	89	372
Contract price for add. paint.	NOK/m ²	143.5		154		154	
TOTAL MAN HOURS	Hours	20 438	71 650	6 200	11 665		18 000
Painting efficiency	%		60%		80%		60%
Est. prod. hours			42 990		9 332		10 800
Cost per hour	NOK/HRS.	150	234	124	166		155
Cost per ton total weight	NOK/TON		4		2		5
Cost per ton of structure	NOK/TON		9.5		4.8		9.4
Paint.perfor	m ² /hrs		0.85		0.9		0.75
	hrs/m ²	0.6	1.95	0.7	1.36		2.25
% value to total cost of prod. hrs	%	7%	10.3%				
EAN superv. TOTAL HOURS	Hours		65 500 862 431		29 971 161 125		20 112 163 500
% EAN SUPERVISION TO TOTAL HOURS	%		8%		18.6%		12.3%

5. TRANSPORTATION

5.1 Logistics

5.2 Flotel

5.1 Logistics

All transport of equipment to the platform during offshore was done by supply vessel.

The contract for this transport service was signed with Solstad Rederi. During the most hectic period of the hook up work the vessel was completing almost one round trip every second day. However, in terms of cost the daily rate was around NOK 15 000 (later revised to NOK 18 000).

For personnel all transport was by way of helicopters. Helicopters are operated by Helicopter Service and monthly costs for this service was allocated the project account, based on the passenger list. The total number of people transported in connection with the TCP2 Compression - is shown below, together with the total cost.

JUNE	80	745	SEATS	NOK	1 173 459,-
JULY	80	1 258	"	"	1 981 494,-
AUG.	80	1 122	"	"	1 767 214,-
SEPT.	80	1 015	"	"	1 598 625,-
OCT.	80	783	"	"	1 233 225,-
NOV.	80	620	"	"	976 500,-
DEC.	80	526	"	"	828 450,-
JAN.	81	474	"	"	793 950,-
FEB.	81	451	"	"	755 425,-
MARCH	81	267	"	"	447 225,-
APRIL	81	116	"	"	195 461,-
MAY	81	116	"	"	195 461,-
<u>TOTAL</u>		<u>7 493</u>	<u>SEATS</u>	<u>NOK</u>	<u>11 946 549,-</u>

Seat price	01.06. - 31.12.80	NOK 1 575,-
Seat price	01.01. - 31.05.81	NOK 1 685,-
Sikorsky S6IN hourly rate	01.01. - 31.05.80	NOK 9 451,-
Sikorsky S6IN hourly rate	01.01. - 31.05.81	NOK 10 034,-
Bell 212 hourly rate	01.06. - 31.12.80	NOK 6 064,-
(Shuttle)	01.01. - 31.05.81	NOK 6 440,-

AVERAGE FLIGHT TIME: Forus - Frigg - Forus: 2hrs. 30 min.

TOTAL AVERAGE LOAD FACTOR 01.06. - 31.12.80 - 93%

TOTAL AVERAGE LOAD FACTOR 01.01. - 31.05.81 - 88%

5.2. Flotel

Contract was awarded to Wilhemsen for usage of SSV Treasure Supporter.

Period was 10 months (June 1980 - February 1981)

The capacity was 500 people, however, due to safety aspects average overnight stay was 304 people.

Dayrate for flotel (without catering) was NOK 225.000 (revised to NOK 282.500 from 1/2-81)

Catering was based on the total number of people staying on board at any one time:

Fixed charge	NOK 20.000/day
Variable NOK (total - 100) 100	NOK X
Daily catering	<u>NOK 20.000 + X</u>

Radio/Telephone/Telex was at charge. Newspapers, books, films and other entertainment was provided outside the contract.

6.0. Hook-up
Commissioning
Start-up

6.1. Contract Summary.

6.2. Hook-up total work value.

6.3. Hook-up hours summary.

6.4. Task statistics by discipline

6.5. Task statistics by systems.

6.6. Reporting system.

6.1. CONTRACT SUMMARY.

Contract for offshore hook-up of TCP2 Compression modules, was awarded to UIE NORGE.

Scope of work was defined by tasks and all bid analysis and later contract price was done on the basis of tasks.

UIE accepted that the volume of work would be increased substantially beyond the scope of work defined in the contract..

UIE NORGE now located in Stavanger made use of several sub contractors: VCON, Sterkodder, Bjørge Offshore to mention a few.

Initial contract price: NOK 68.826.000 including mobilisation and demobilisation. In addition to the above price the contract contained a list of unit prices both for equipment and personnel (incl. stand by). Several units (air and electricity supply etc.) were rented all the way through the major work programme. Escalation (partly in 1980) was paid in addition.

SPECIAL EVENTS

- Contract signed approx. April 1980
- Extensive safety training (1 week) was required by EAN
- Mobilisation May 1980
- Air traffic controller strike 4 days in May 1980
(Personnel were taken offshore onboard "Berge Worker")
- Supervisor strike offshore 3 weeks, July 1980
- Task work (Phase 1) was completed by mid. December 1980 (on schedule)
- Post task work, phase 2 followed phase 1 and lasted 2 months.
Following phase 2 was phase 3, comprising of commissioning work and start-up assistance
- Contract completion May 31st 1981.

TOTAL FINAL CONTRACT PRICEPHASE 1

Lump sum period 26.05.80 - 15.12.80 NOK 171.848.102

PHASE 2

Post lump sum period 16.12.80 - 28.02.81 NOK 19.789.301

PHASE 3

Commissioning work 01.03.81 - 31.05.81 NOK 7.225.245

TOTAL NOK 198.892.648

Escalation approx. NOK 10.6 mill. in addition

6.2. HOOK-UP TOTAL WORK VALUE

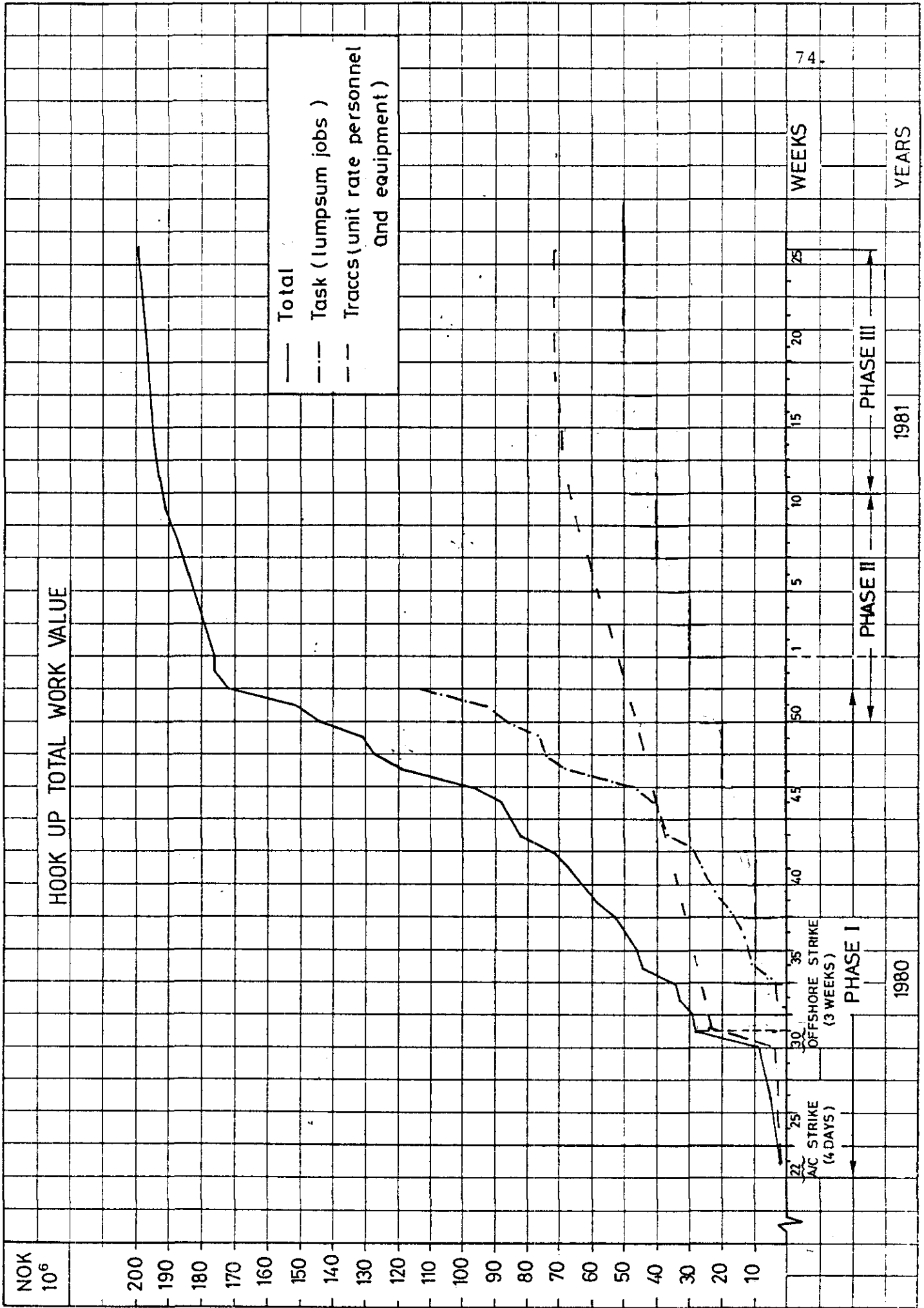
Attached graph shows the development over time.

All tasks¹⁾ (lump sum jobs) were based on final agreed price. With reference to physical progress this curve is lagging in time, due to the fact that final task prices were settled some time after completion.

The tracks¹⁾ (personnel and equipment) were weekly summarised. The values stated here do not account for inflation, which approximately had the following distribution over time:

3 quarter 1980	NOK 2.662 mill.
4 quarter 1980	NOK 4.758 mill.
1 quarter 1981	NOK 2.581 mill.
2 quarter 1981 ESTIM.	<u>NOK 599 mill.</u>
	NOK 10.600 mill.

1) For explanation, see chapter 6.6



6.3 HOOK-UP HOURS SUMMARY

The split in hours by each major phase (I, II and III) together with the similar price break down enables the average hourly pay to be found.

Phase I	(time period May 80 - December 80 Including commissioning/start up, 42 000 hrs. offshore standby 23 500 hrs. and strike 45 000 hrs.	578 000 hrs.
Phase II	(January 81 - February 81)	91 580 hrs.
Phase III	(March 81 - May 81)	<u>29 500 hrs.</u>
TOTAL		699 080 hrs.

RATIO NOK/HOURS

Phase I	$\frac{\text{NOK } 171\,848\,000}{578\,000 \text{ hours}}$ ⁽¹⁾	= NOK 297 per hrs.
Phase II	$\frac{\text{NOK } 19\,789\,000}{91\,580 \text{ hrs.}}$	= NOK 216 per hrs.
Phase III	$\frac{\text{NOK } 7\,255\,000}{29\,500 \text{ hrs.}}$	= NOK 245.93 per hrs.
Average:	$\text{NOK } \left(\frac{198\,892\,000 + 10\,600\,000}{699\,080 \text{ hours}} \right)$ ⁽²⁾	= NOK 299,67 per hrs.

(1) Included July 1980 strike NOK 20 mill. and safety training NOK 10 mill.

(2) Escalation

6.4. Task statistics by discipline

The attached table shows the summary of all tasks (lump sum jobs) completed during phase 1 (start 26/5/80 end 15/12/80)

The point summary here shown is based on method of allocation a certain number of points to each task. Pointvalue by definition was near 1 work hour, but has nothing to do with the NOK-value. The only purpose with the point system was for progress measurement.

30% advance payments was based on the contractual agreement. Each time a new task was negotiated, and accepted, contractor was entitled to receive 30% of the specific task price. This shows the amount of new task that had to be included. Similar to the above, but in reverse was the cancellation of any given task.

Completion payment and total payment are sums of previous to columns. Normally, final payment of any one task was only carried through upon 100% completion of each task.

HOOK UP: TASK STATISTICS PHASE

BY DISCIPLINE

NOK 1 000

DISCIPLINE	TOTAL TASK NO.	TOTAL POINTS	FINAL COST
Structural	502	44.284	12.232
Mechanical	101	77.484	4.829
Piping	423	134.349	37.108
Electrical	568	104.914	28.978
Instrument	652	96.412	26.630
Insulation	19	2.950	815
Painting	27	7.999	2.209
TOTAL	2.292	408.392	112.801

6.5. Task statistics by systems.

The attached set of tables are showing the total work program broken down by systems. The various columns carry the same explanations as the previous chapter 6.4.

Assistance given by the contractor during commissioning and start up is not included in this summary. These services are covered by Hook-up hours summary.

Outside the planned work was a lot of work such as:

1. Repair of damages which occurred during lifting of TCP 2 Compression modules NOK 4.333 mill.
2. Change of 32" valve, estimated at NOK 5 mill.

HOOK UP: TASK STATISTICS PHASE 1.

BY SYSTEM 1

NOK 1 000

SYSTEM CODE	DESCRIPTION	TOTAL POINTS	NO. OF TASKS	TOTAL
Z00	All systems	4 607	25	1 185
Z01	Structural	200	9	40
Z01A	Structure	40 647	159	13 306
Z01B	Architecture	1 595	6	676
Z02	Grounding - cable trays	3 770	1	1 000
Z02A	Grounding	6 836	90	925
Z02B	Cable tray	12 398	329	1 647
Z02C	Polytubes cable J.B.	71 042	380	15 686
Z03A	Insulation	1 890	14	823
Z03B	Painting	7 999	30	2 310
Z04	Gas compression line "A"	17 409	84	6 042
Z04A	Process line A	14 094	50	4 303
Z04B	Compressor & utilities A	231	8	225
Z04C	Turbine & utilities A	35	1	11
Z05	Gas compression line "B"	1 300	16	603
Z05A	Process line B	15 779	44	3 897
TOTAL	CONTINUATION			

HOOK UP: TASK STATISTICS

NOK 1 000

BY SYSTEM 2

SYSTEM CODE	DESCRIPTION	TOTAL POINTS	NO. OF TASKS	TOTAL
Z05B	Compressor & Utilities B	153	9	77
Z05C	Turbine & Utilities B	35	1	19
Z06	Gas compression line "C"	530	6	170
Z06A	Process line C	5 691	32	1 625
Z06B	Compressor & Utilities C	341	8	259
Z06C	Turbine & Utilities C	129	2	36
Z07	H.P. relief (flare)	3 845	16	2 317
Z08	L.P. vent	3 328	13	572
Z09	Desalinated water generation	795	4	373
Z10	Desalinated water distribution	960	20	268
Z11	Cooling medium	13 655	76	3 553
Z12	Main sea water cooling	24 757	74	5 821
Z13	Fuel gas and methanol insecton	16 674	80	5 000
TOTAL	CONTINUATION			

HOOK UP: TASK STATISTICS

NOK 1 000

BY SYSTEM 3

SYSTEM CODE	DESCRIPTION	TOTAL POINTS	NO. OF TASKS	TOTAL
Z14	Diesel oil	1 705	12	496
Z15	Process oily water recovery		1	
Z15A	Process oil high pressure	888	7	329
Z15B	Process oil low pressure	383	10	140
Z16	Closed/fresh water/T.E.G. drain system	599	14	188
Z17	Open drainage	7 571	46	3 364
Z18	Washdown system	4 213	38	1 267
Z19	Instrument & service air	460	2	192
Z19A	Compressor air generation	170	3	38
Z19B	Instrument air distribution	3 411	25	1 351
Z19C	Service air distribution	1 070	18	30
Z20	Power generation 5.5 KV	2 150	17	1 016
Z20A	Turbogenerator "A"	4 357	23	1 219
Z20B	Turbogenerator "B"	4 577	21	1 124
Z20C	Switchboard 5.5 KV	230	4	200
TOTAL	CONTINUATION			

HOOK UP: TASK STATISTICS

NOK 1 000

BY SYSTEM 4

SYSTEM CODE	DESCRIPTION	TOTAL POINTS	NO. OF TASKS	TOTAL
Z20D	5.5 KV to 380V transformer	340	3	109
Z21	Power distribution 380 V	2 583	13	438
Z22	Lighting normal & emergency	14 928	81	3 507
Z23	Emergency power	527	7	143
Z23A	Diesel generator	1 812	23	549
Z23D	Distribution 200 V	30	2	15
Z24	Field electrical inter-connection	11 481	90	2 439
Z25	Intercommunication - compression	1 210	20	205
Z25B	Public address	3 371	39	1 142
Z25C	Telephone	1 196	14	492
Z26	Safety fire & gas detection	2 295	42	571
Z27	Safety & fire fighting	424	62	79
Z27A	Fire water	11 613	65	3 378
Z27B	Deluge system	20 256	13	5 870
TOTAL	CONTINUATION			

HOOK UP: TASK STATISTICS

NOK 1 000

BY SYSTEM 5

SYSTEM CODE	DESCRIPTION	TOTAL POINTS	NO. OF TASKS	TOTAL
Z27C	Halon protected area	2 830	42	1 195
Z27D	Extinguishing system	600	1	620
Z27E	Lifeboat	467	7	178
Z28	Emergency shutdown - hydraulic & PN	4 538	28	1 418
Z29	Heating	9 121	80	2 962
Z30	Lifting equipment	720	4	160
Z30A	Crane	886	17	528
Z30B	Maintenance hoists	3 795	13	897
Z98	Temporary facilities	7 490	32	1 586
Z99	Contractor supply facilities	3 370	5	321
TOTAL	ALL SYSTEMS	408 392	2 292	112 801

6.6. REPORTING SYSTEM

During the main part of the hook-up work offshore cost and progress follow-up was done by the aid of a computer. Early in the contract negotiations it was clear that both EAN and UIE would develop their own software programmes in order to utilize a suitable tool, hardware solution was different, but report format and procedures were much the same.

Basically two systems were in use at the same time:

1. "TASK" = Task follow up
2. "TRACCS" = Personnel and equipment usage summary

The input/output facilities used by EAN were located onshore and offshore. Parent computer was communicated by telephone/satellite. Here is a list of typical input information:

TASK-SYSTEM

- . Task No./description
- . Taks points/price
- . Task progress points
- . Task rev. price

TRACCS-SYSTEM

- . Personnel lD No.
- . Nationality/profession
- . Helicopter flight No.
- . Team number
- . Unit prices

Typical output (reports)

TASK SYSTEM

- . Weekly progress
- . Weekly cost status
- . Weekly revised tasks without agreed price

TRACCS SYSTEM

- . Daily timesheets
- . Statistics
- . Weekly cost report

ANNEXES

- ANNEX A :PROJECT CURRENCY EXCHANGE RATES
- ANNEX B :INFLATION
- ANNEX C :COMPUTER SYSTEMS
- ANNEX D :PROJECT COST CONTROL FUNCTION
- ANNEX E :OVERALL PROJECT MANPOWER

ANNEX APROJECT CURRENCY EXCHANGE RATES

The various currencies have been converted to norwegian kroner (NOK) by using a fixed exchange rate regardless of time. Here follows a table showing the project exchange rates:

France	FRF 1	=	NOK 1.2
USA	USD 1	=	NOK 5.25
Great Britain	GBP 1	=	NOK 10.20
Germany	DEM 1	=	NOK 2.65
Netherland	NLG 1	=	NOK 2.45
Belgium	BEF 1	=	NOK 0.1675
Italian	ITL 1	=	NOK 0.00693

Sweedish kroner was converted at 1:1

During the period starting 1978 and right up to the end of the project actual exchange rates were "inserted" into the system. This enabled us to generate a report showing a different in having paid overseas invoices in either fixed project rates or variable rates.

Deviation between variable and fixed exchange rates:

French currency	:	NOK - 2.925.003
USA "	:	NOK 113.264
Great Britain "	:	NOK 359.531
Germany "	:	NOK 6.158
Netherland currency	:	NOK 94.434
Belgium "	:	NOK - 488
Total		<hr/> NOK - 2.349.104

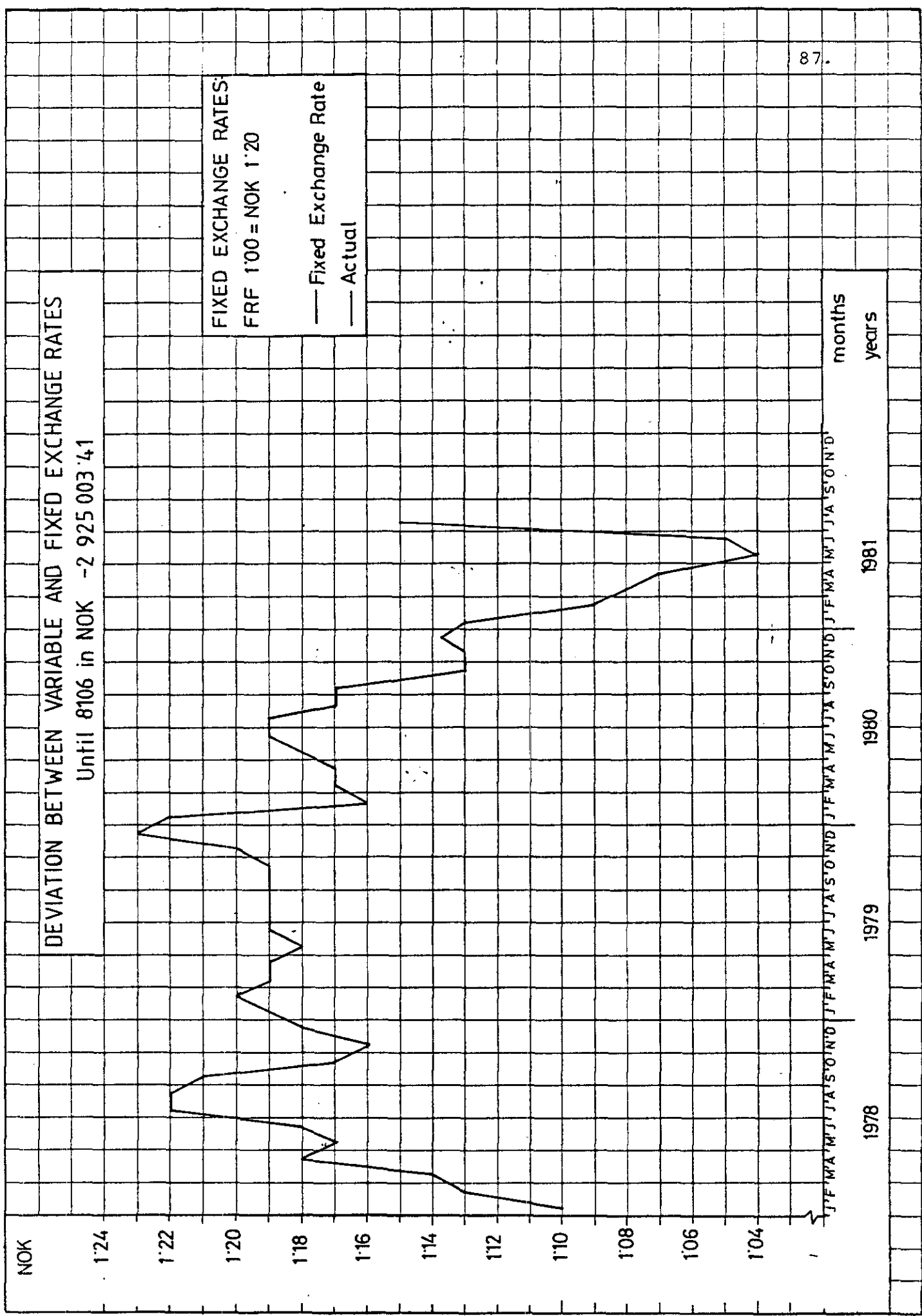
Following graphs (one for each currency) show the development over time. The variable exchange rates are picked out of the monthly summary report issued by finance dept. EAN.

DEVIATION BETWEEN VARIABLE AND FIXED EXCHANGE RATES

Until 8106 in NOK -2 925 003 '41

FIXED EXCHANGE RATES
 FRF 1'00 = NOK 1'20

— Fixed Exchange Rate
 — Actual



months

years

J J F M A M J J A S O N D J J F M A M J J A S O N D J J F M A M J J A S O N D

1981

1980

1979

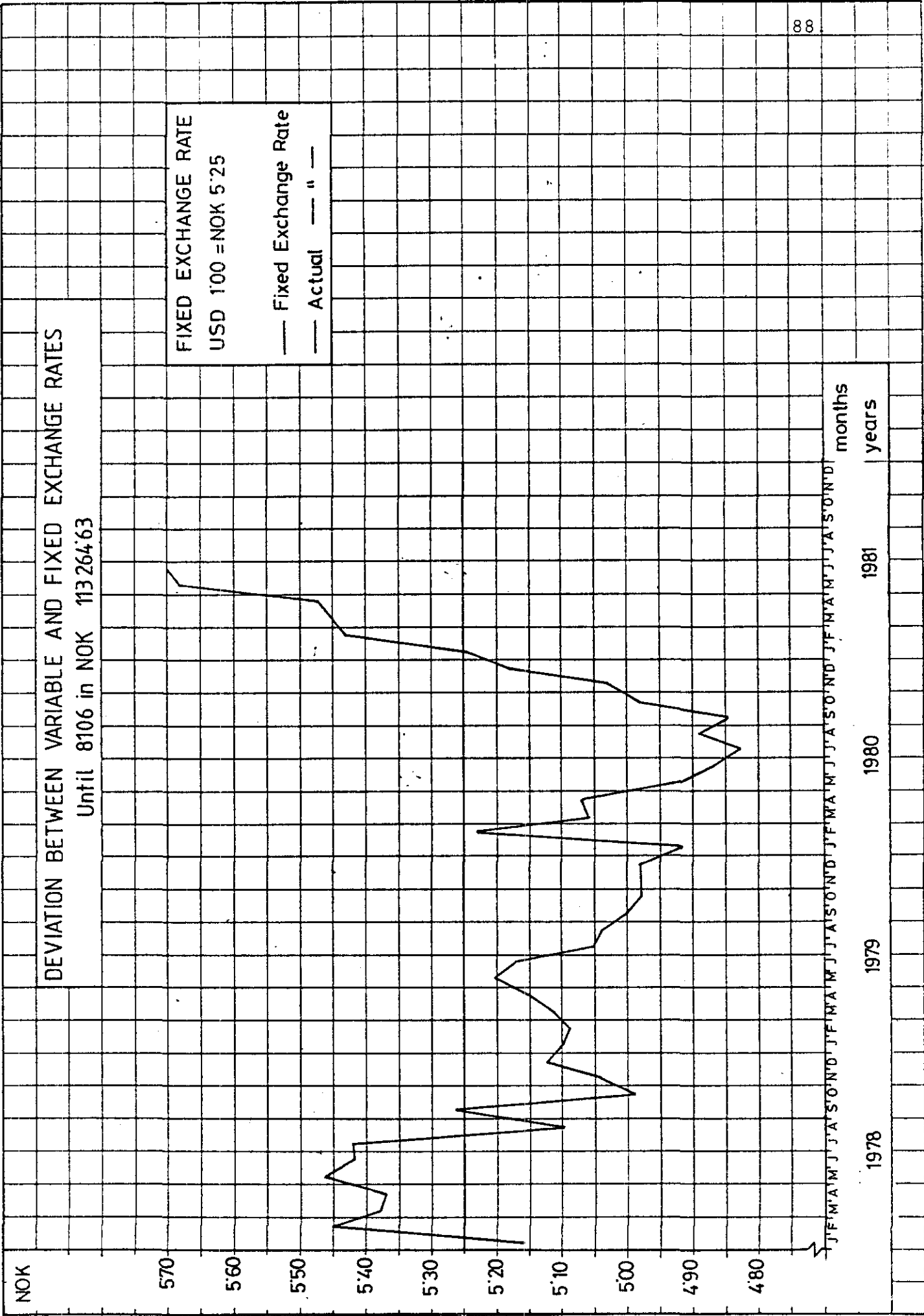
1978

DEVIATION BETWEEN VARIABLE AND FIXED EXCHANGE RATES

Until 8106 in NOK 113264.63

FIXED EXCHANGE RATE
USD 100 = NOK 5.25

— Fixed Exchange Rate
— Actual — " —



DEVIATION BETWEEN FIXED AND VARIABLE EXCHANGE RATES

Until 8106 in NOK 359531'40

FIXED EXCHANGE RATE :
GBP 100 = NOK 10'20

— Fixed Exchange rate
— Actual — — —

NOK

12'60
12'40
12'20
12
11'80
11'60
11'40
11'20
11
10'80
10'60
10'40
10'20
10
980

months
years

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

1978

1979

1980

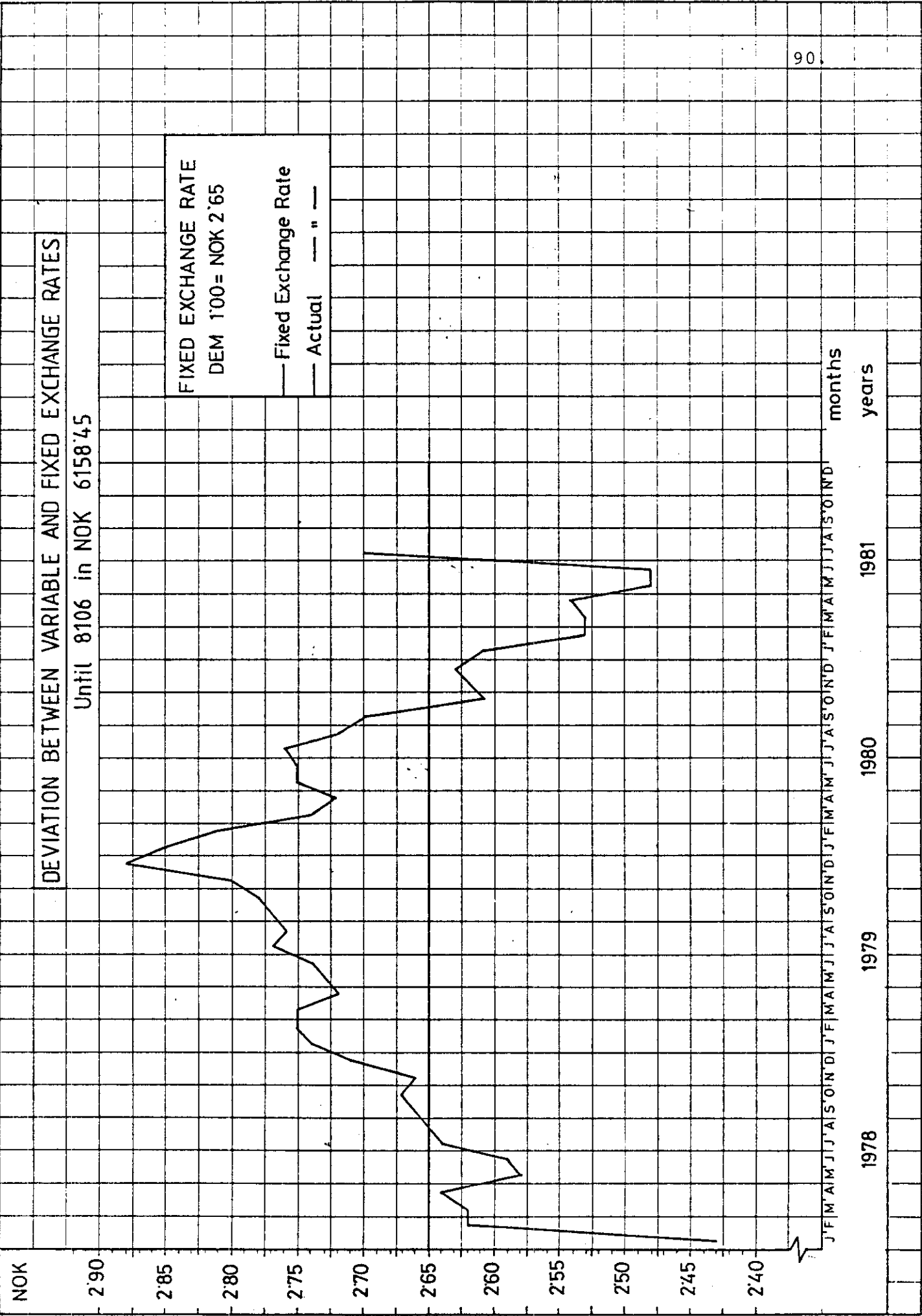
1981

DEVIATION BETWEEN VARIABLE AND FIXED EXCHANGE RATES

Until 8106 in NOK 6158'45

FIXED EXCHANGE RATE
DEM 100 = NOK 2'65

— Fixed Exchange Rate
— Actual



months
years

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

1978

1979

1980

1981

DEVIATION BETWEEN VARIABLE AND FIXED EXCHANGE RATES

Until 8106 in NOK 97433'99

FIXED EXCHANGE RATE
 NLG 100 = NOK 2'45

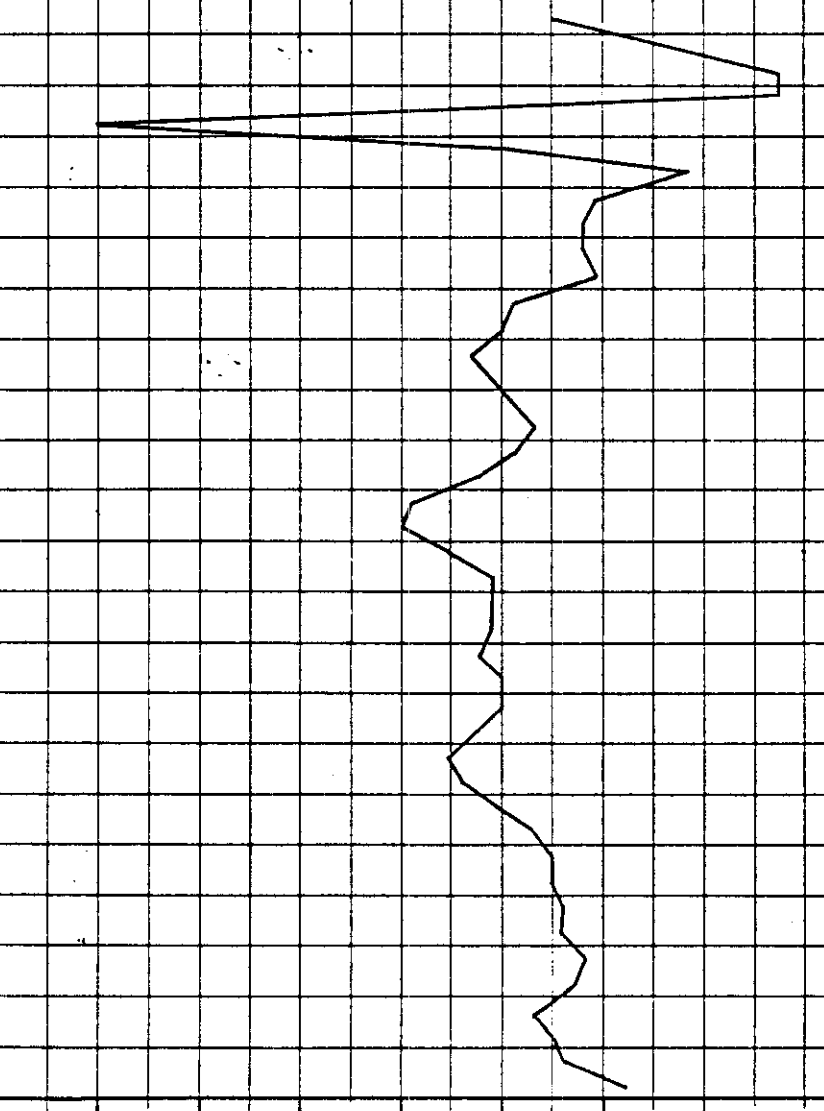
— Fixed Exchange rate
 — Actual — " —

NOK
290
280
270
260
250
240
230
220

Months
Years

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

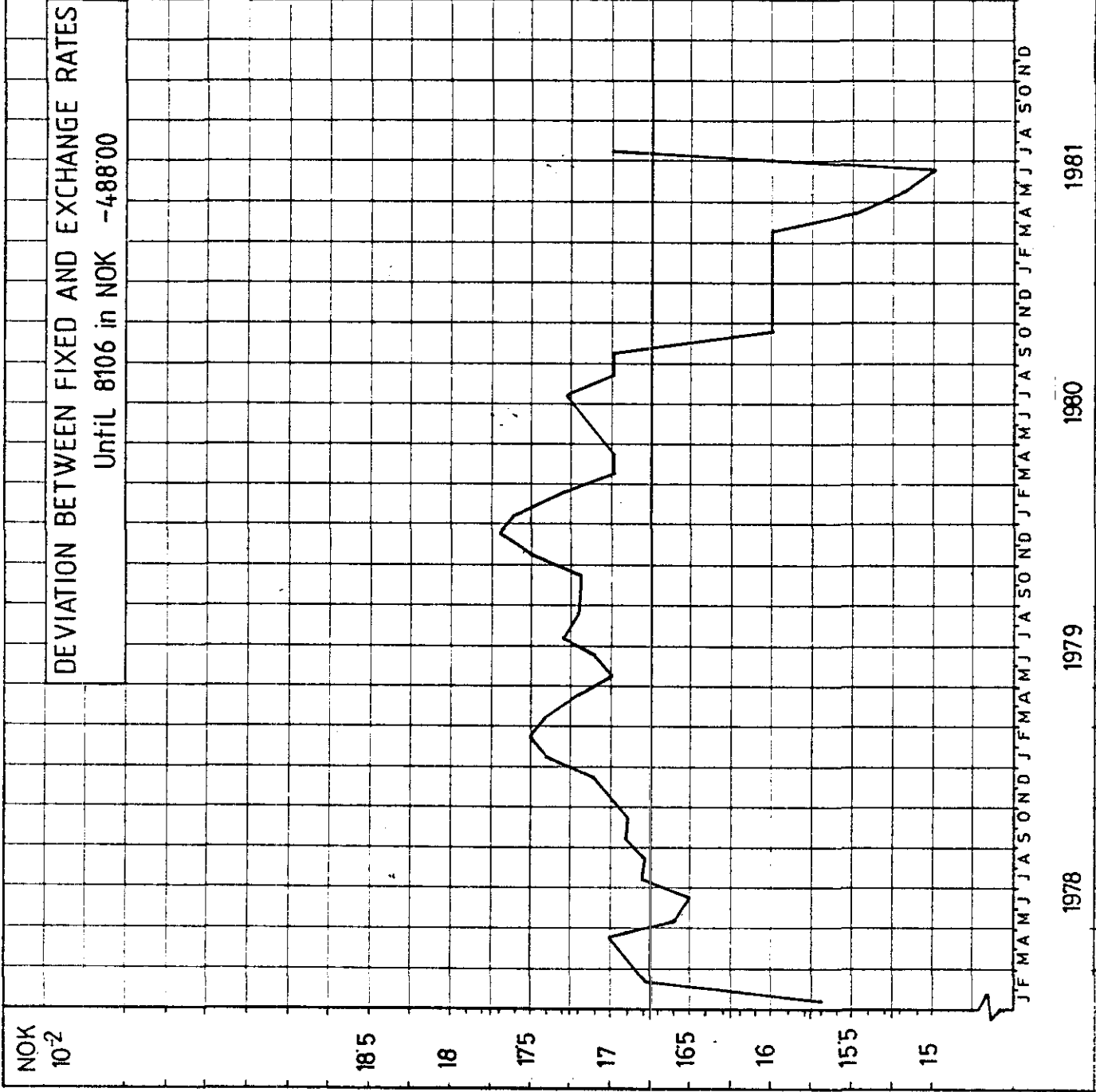
1978 1979 1980 1981



DEVIATION BETWEEN FIXED AND EXCHANGE RATES

Until 8106 in NOK -488'00

FIXED EXCHANGE RATE :
 BEF 100 = NOK 0'1675
 BEF 100 = NOK 16'75.10⁻²
 — Fixed Exchange Rate
 ---- Actual



J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

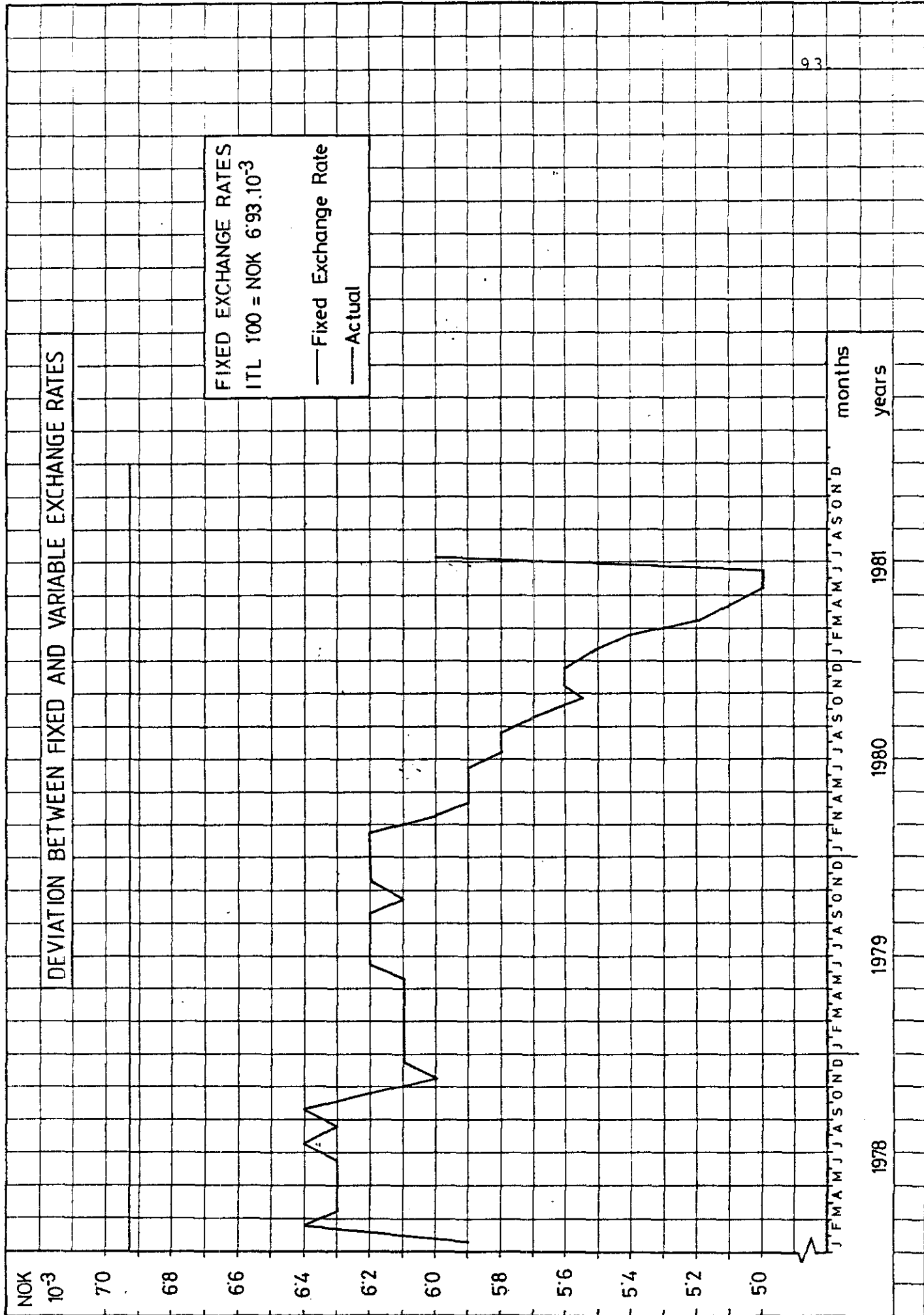
1978 1979 1980 1981

months
years

DEVIATION BETWEEN FIXED AND VARIABLE EXCHANGE RATES

FIXED EXCHANGE RATES
ITL 100 = NOK 6.93.10⁻³

— Fixed Exchange Rate
— Actual



ANNEX B

INFLATION

Throughout the project the budgets have attempted to adjust for the uncertainty as regards to inflation.

The following tables are attempting to show a possible impact on the project estimate based on a certain inflation as measured by the producer price index and average hourly earnings.

All currency conversion is done according to the project fixed exchange rates.

Only the inflation as measured in Norway is used here. This is a simplification as much of the equipment was purchased in other countries, and hence subject to other inflation rates.

All figures in NOK 1 000

<u>YEAR</u>	<u>WORKS VALUE</u>	<u>INDEX 1977 = 100</u>	<u>EFFECT OF INFLATION</u>
1977	44	100	0
1978	81	104.15	3.36
1979	259	111.45	19.66
1980	618	126.65	164.70
1981	<u>294</u>	136.6	<u>107.60</u>
	1 296		305.32

The above table shows the impact of inflation over time. Preparing the budget in 1977 would mean that the budget should be increased by 20% this is as said earlier a simplified method.

INDEX NUMBER OF HOURLY EARNINGS

1978 = 100
(NORWAY)

INDEX

112
110
108
106
104
102
100
98
96
94
92

1977 1978 1979 1980

years

Year	Quart	Index
1977		92.8
1978		100
1979	1.	102.4
	2.	103.6
	3.	102.4
	4.	103
1980	1.	112.4
	2.	108.4
	3.	119.2
	4.	116.8

COMPUTER SYSTEMS

Much of the routine work that arises in connection with project control was based on the usage of computer (EDP). (See diagramme further back)

Early in 1979, contract was made with several companies as regards to computer facilities, both for software development and equipment rental.

General Electric information services (GE) in Oslo were chosen. Except planning which was through engineering and construction phas was run at Sofresid (Paris) Pert (CPM). Technically their computer is located in the USA, communication is done over Telephone/Satelite. Their service is available seven days a week 24 hours, with a large capacity. Their services are rather expensive, all factors considered. Total costs for this project amount to NOK 2.696.599 or 0,3% of total project costs. All software development was done by GE - Technician with assistance by members from the project team.

All programmes were based on database technic using GE's own DMS language. The operation of the computers was done by the project team members. Training was "on the spot" combined with a 3 days outside course.

Here follows a list of all programmes:

1. COST FOLLOW UP:

By registrating: Budget data, contracts/purchase orders/invoices and currencies, several reports could be developed in order to follow cost development.

2. PERSONNEL PLANNING:

By recording: Each position on the organisation chart name, departments and rates, duration monthly personnel reports were developed.

3. PIPING PROGRESS

This programme was in use during the construction at the yards. This programme, together with others to come demonstrated one of the advantages of the GE - Service.

Recording all latest information on the building site and report output at head office, Stavanger with only minimum delay.

4. Instrument follow-up. This programme was designed expecting a very large involvement. This programme was intended to follow through from instrument design, order/delivery and installation at site. Probably this program was developed too late to be of any great usage.
5. Claim follow-up. This program was designed to meet the particular needs at yard 1 (Orkanger) programme wise this was very basic.
6. Bid analysis (Hook-up)
This programme was the first out of 3 to be of extensive usage in connection with Hook-up.
Having specified in the call for bids. The method of presentation, complete comparison between each bid was possible.
7. Task Follow up (Hook-up)
This program was developed such that a weekly progress and cost status could be generated with minimum of delay.
8. Traccs - Follow up (Hook-up)
This programme was designed as to record all personnel and equipment in operation offshore. Again the need for timely reports was given high priority.

TCP2 COMPRESSION: COMPUTER COSTS SUMMARY

TEXT	DEVELOPMENT ²⁾	RUNNING ³⁾	TOTAL
COST - FOLLOW-UP ¹⁾ (USED 36 MONTHS)	11.767 ⁴⁾	569.895	585.662
PERSONNEL PLANNING (24 MONTHS)	14.110	51.051	65.161
PIPING PROGRESS F.U. (12 MONTHS)	24.845	73.340	98.185
INSTRUMENT FOLLOW UP (6 MONTHS)	122.213 ⁵⁾	303.579	425.792
CLAIM FOLLOW UP (6 MONTHS)	14.829	12.729	27.557
<u>HOOK-UP</u>			
BID ANALYSIS (4 MONTHS)	25.020	87.188	112.208
TASK - FOLLOW UP (7 MONTHS)	31.125	418.145	449.270
TRACCS (PERSONNEL) F.U. (7 MONTHS)	72.000	725.348	797.348
<u>RENTAL & SERVICES</u>			
RENT - EQUIPMENT			120.300
CASSETTES - MAGNETIC TAPE/DISCETTES			949
COURSE IN STAVANGER			1.200
TRAVEL, SERVICE, INSURANCE			11.639
SPECIAL LISTING			3.650
OPERATING MANUALS			270
			<u>138.008</u>

1) INCL. ALL "HIGH SPEED" LISTINGS PERFORMED IN OSIO, ALSO INCLUDED

ARE HOURLY FOLLOW UP PROGRAM USED ORKANGER - SPRING 1980

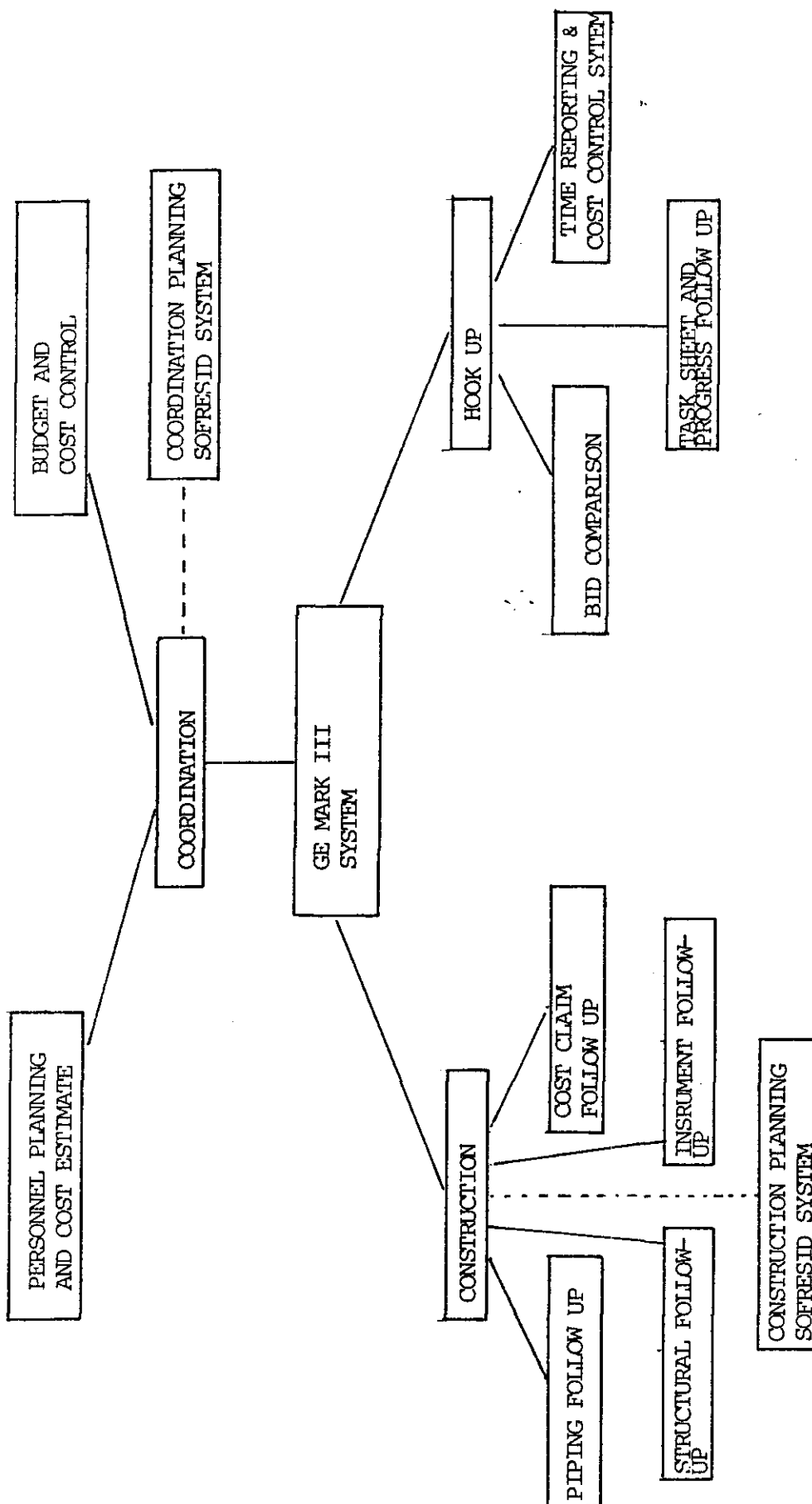
4) TOTAL PRICE APPROX 40.000, WAS PAID BY KE/TP

5) REQUIRED SUBSTANTIAL REWORK TO PI DIAGRAMS FOR DATA RECORDING.

2) SOFTWARE DESIGN

3) COMPUTER UNITS USED UNIT RATE
IN ADDITION SOFRESID (PARIS) WAS USED FOR PLANNING AT A COST OF FRF 250.000

Total: 2.799.191



COMPUTER SYSTEM

PROJECT COST CONTROL FUNCTION

Attached diagramme shows how the cost control discipline was organised.

The site cost controllers were assigned to the project with reporting responsibility to the yard managers.

During the construction period regular meetings were held between cost control yards and head office.

Cost control at head office was heavily involved in invoice follow-up and reccording.

Budget revision were done bi-annually at head office with full participation from yards. Each section leader was responsible for presenting the budget within his responsibility.

Forecasts were produced each month and was used as basis for call for funds.

Besides the reporting responsibility upwards to the project manger, a parallel reporting was done to Cost & Planning Manager: Production Division. The same department assisted with additional work force when work load become large.

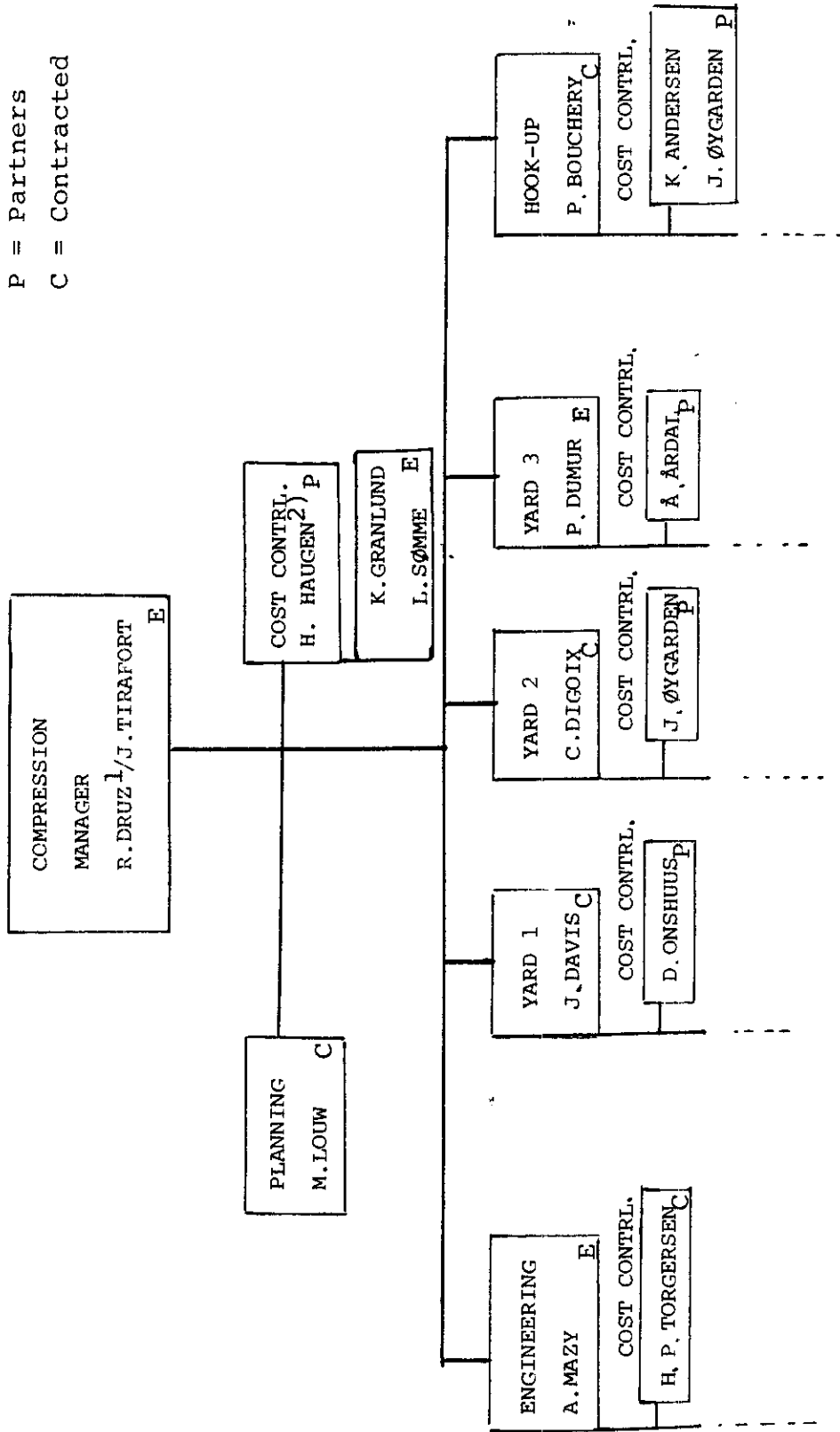
A total of approx. 20 000 manhours was laid down in cost control over the 3 last years.

At this late stage of the project much of total effort was put into invoice control, whilst very little time was spent on cost estimating and follow of change orders, or variance in scope of work.

Project control relied on a computer based follow up system. (Described in ANNEX C). This system was independent of ELF's accounting reports. The later being the official partners reports as time progressed became appearant that having the two reports separated ment that deviations had to be accounted for. Much effort was spent on this exercise.

TCP 2 COMPRESSION
 COST CONTROL ORGANIZATION

E = EAN
 P = Partners
 C = Contracted



- 1) R. DRUZ left the project August 1980 and CONSTR. SUB, DIVISION MGR, J. TIRAFORT took over.
- 2) H. Haugen replaced K.Ø. Johansen End 1979

ANNEX EOVERALL PROJECT AMNPOWER

All manpower spent by the project team was recorded and is presented here.

Over the 3 years shown approximately 527.000 manhours was spent. This includes the production team which is not covered by TCP2 Compression budget.

Personnel from KE/TP that were integrated in the central staff are included here.

The personnel not been provided by KE/TP were either EAN - or partner's or contracted.

MANPOWER STATISTICS (PROJECT ADMINISTRATION)

DEPARTMENT	YEAR MONTH	1979												1980												1981											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J						
Central staff		14	14	14	14	14	14	14	15	16	16	15	15	15	14	14	14	15	15	16	16	16	14	13	13	11	11	9	8	3	3						
Engineering		9	9	11	11	11	11	11	11	11	11	9	9	9	10	13	13	14	15	14	14	13	13	13	13	10	10	10	8	7	4						
OGD + Engn. Dept.		7	9	9	9	9	11	11	11	11	11	11	11	11	11	9	9	8	8	5	4	4	-	-	-	-	-	-	-	-	-						
Engineering		-	-	-	-	3	10	13	15	15	19	24	26	26	26	29	32	31	32	24	20	17	17	18	17	16	14	14	14	11	11	11					
Follow-up Stvngr.		4	4	13	12	11	10	9	9	8	8	8	8	8	8	8	8	8	7	6	6	7	7	5	5	5	4	3	3	2	-	-					
Material coord.		17	17	17	17	17	17	16	16	16	17	19	20	20	22	23	23	20	19	3	1	-	-	-	-	-	-	-	-	-	-	-					
Orkanger Yard		10	10	10	10	10	9	9	9	9	9	8	8	8	8	8	8	8	7	-	-	-	-	-	-	-	-	-	-	-	-						
Kristiansand Yard		8	8	8	8	8	8	8	8	8	8	6	7	6	7	7	6	4	3	-	-	-	-	-	-	-	-	-	-	-	-						
Grimstad Yard		1	1	9	9	9	9	9	9	9	9	8	7	7	5	5	6	6	5	5	5	5	5	5	5	2	2	1	-	-	-						
Hook-up onshore 1)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Hook-up offshore 2)		2	2	2	2	3	3	3	4	4	5	6	7	7	9	10	12	14	15	18	20	20	20	20	21	20	21	26	23	21	-						
Commissioning		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	10	12	18	20	20	30	32	33	40	56	56						
Start up production 3)		72	74	91	92	100	100	104	108	107	109	114	117	117	120	126	131	128	126	127	130	129	131	130	127	126	107	109	97	92	98	74					
TOTAL																																					

1) Included hook-up preparation
 2) 14 day rotation team 1 + team 2
 3) Not included in TCP2 Compression budget