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TECHNOLOGY TRANSFER IN THE CONSTRUCTION OF OIL AND GAS PIPELINES*

Papers from the ESCAP/UNIDO Symposium on Contracts for the Construction of Oil and Gas Pipelines

Jakarta, 30 August - 2 September 1983

Selected by
UNIDO and ESCAP secretariats

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PREFACE

The Operational Plan for the Implementation of the Vienna Programme of Action (1981) highlighted the importance of improving and upgrading negotiating capabilities of the developing countries and stressed the need for devising appropriate methods to ensure technology transfer on more equitable terms. Both ESCAP and UNIDO have been actively involved in promoting and assisting ESCAP member countries in the appraisal and implementation of projects relating to various stages of technology transfer. Emanating from this experience has been an array of indepth sectoral analyses on the technology transfer aspects of important industries, thus forming the basis upon which the Symposium on Contracts for the Construction of Oil and Gas Pipelines was convened.

Many ESCAP developing countries have developed the oil and gas production industries in the quest of enhancing their economic development. Investments of such kind not only serve to secure basic sources of energy but also encourage the establishment of downstream industries that provide useful by-products. One of the pecularities of oil/gas exploration is the pipeline sector, specifically, pipeline construction and laying, where specialized industries have emerged over the years mainly in the developed countries. The contracts on pipeline construction are of complex and sophisticated nature and require a closer look into its current structure and practices. Moreover, due to interlinkage between developing countries investors, suppliers of hardware, suppliers of technical services, design and engineering, there is a definite need to study such agreements closer with the purpose of providing investors in developing countries with clear-cut guidelines and recommendations as how to deal with this type of transactions, and to ensure that it takes place at the most favourable economic conditions.

The Symposium discussed the various contractual aspects of offshore as well as onshore pipeline construction contracts be-

tween individual national oil companies in the developing countries and international pipeline contractors and designers including discussions on the concept of fair and equitable terms. It also focussed on the transfer of technology and know-how in the pipeline construction industry. Last but not least, attention was given on how to absorb these new technologies by developing indigenous engineering capabilities, construction skills and increasing use of domestic resources.

The participants to the Symposium were primarily senior executives in charge of contracting of oil and gas pipelines in national oil companies of the following countries: Indonesia, Thailand, Philippines, India, People's Republic of China, Malaysia, Pakistan, Singapore, Republic of South Korea, Bangladesh, Burma and USSR. In addition to participants from the above mentioned countries, the International Pipeline Construction Association was invited to participate as well as the following UN and international organizations: UNCTAD, WIPO, World Bank, UNCTC, UNCITRAL, ICC, OECD and FIDIC.

It is hoped that this publication will stimulate activity in developing countries in the important area of oil and gas pipelines, especially with regard to contract practises, technology transfer and project management.

The generous assistance provided by the Government of Indonesia, particularly, the involvement of LEMIGAS, Centre for Oil and Gas Development, and the Department of Mines and Energy, was highly appreciated.

Report of the UNIDO/ESCAP Symposium on Contracts for the Construction of Oil and Gas Pipelines

30 August - 2 September 1983

I. ORGANIZATION OF THE SYMPOSIUM

1. The UNIDO/ESCAP Symposium on Contracts for the Construction of Oil and Gas Pipelines was held at Jakarta, from 30 August to 2 September 1983. It was jointly organized by UNIDO and ESCAP, in co-operation with LEMIGAS, Centre for Oil and Gas Development, Jakarta and with host facilities provided by the Department of Mines and Energy of the Government of Indonesia.

2. The objectives of the Symposium were (a) to initiate a dialogue between suppliers and recipients of technology in the pipeline construction industry, (b) to discuss specific provisions of international offshore and onshore pipeline contracts between individual national oil companies in developing countries and international pipelines contractors including the discussion of the concept of fair and equitable terms, (c) to review information and current practices in those contracts in selected countries of the ESCAP region and (d) to develop basic guidelines as to treatment of such contracts by national oil companies in developing countries.

Attendance

3. The Symposium was attended by 80 participants from 10 countries namely, Bangladesh, China, Federal Republic of Germany, India, Indonesia, Japan, Malaysia, the Netherlands, Republic of Korea and Thailand. Representatives of the following international professional non-governmental organizations also participated: International Bar Association (IBA), and International Federation of Consulting Engineers (FIDIC).

Opening Addresses

4. Prof. Dr. Wahjudi Wisaksono, Chairman of the National Organizing Committee of UNIDO/ESCAP Symposium, welcomed the participants. He thanked PERTAMINA (the National Oil Company), its foreign oil contractors operating in Indonesia, the various national consulting engineering firms and others who have ren-

dered assistance to the Oil and Gas Development Centre (LEMIGAS), for the successful organization of the Symposium: He pointed out that all participants were gathered together to learn from each other and to foster co-operation between clients, contractors and engineers in the construction of oil and gas pipelines.

5. In his message, the Chief of ESCAP/UNIDO Division of Industry, Human Settlements and Technology, thanked the Government and the People of Indonesia for the generous assistance which enable the convening of the Symposium at Jakarta. It was heartening to note that a number of national and international private sector enterprises were also participating in the Symposium.

6. The major problems confronting developing countries arose from structural changes in manufacturing with special reference to increase in productivity. Activities relating to science and technology had, therefore, become increasingly relevant. The most important task pertained to upgrading of negotiating capacities of member states There was a need to develop appropriate methods to ensure technology transfer on more equitable terms. Both UNIDO and ESCAP were actively involved in these activities. Contracts on pipeline construction were extremely complex. Technological, commercial and legal aspects constitute three elements which should be closely examined. The question of appropriate regulations of subcontracts and suppliers' involvement were also important. The Symposium should also take into consideration problems of improving capacities and capabilities of technologists and engineers in the developing countries. Additionally, the problem of increasing use of domestic resources should also receive considerable attention.

7. Mr. Johan Cramwinckel, on behalf of the Executive Director of UNIDO, stated that UNIDO was actively promoting accelerated industrial development guided by the target set by the Second General Conference of UNIDO at Lima, for the achievement of 25 per cent of the global industrial output by A.D. 2000 by devel-

oping countries. Technological interdependency was an important element in industrial development. UNIDO has concentrated on three major areas of concern in this area through such activities as (a) system of consultation by industrial sector in order to initiate an international discussion on the major constraints identified and bottle necks for the accelerated industrial development (b) development of appropriate infrastructure for the development and transfer of technology in developing countries and (c) direct technical assistance in the negociation of transfer of technology and foreign investment for industrial projects.

8. In his inaugural address, Mr. Sutaryo Sigit, Secretary General of the Department of Mines and Energy, observed that Indonesia has had a varied and wide experience on the subject of oil and gas pipelines construction, which had become more and more complex with the advancement of the industry. Production of oil in Indonesia dated back to 1885 when the first oil pipeline was constructed. During the last 12 years, with the introduction of modern technology, Indonesia has been able to achieve substantial progress. Offshore oil exploration commenced in 1967/1968 and the first offshore oil production commenced in 1971. The discovery of large onshore and offshore gas resources led to the construction of LNG plants. Constructions of new plants were still underway to support industries which were being set up in South Sumatra. The utilization of natural gas in Indonesia was still expanding.

9. Pipelines provided the cheapest and safest way of despatching oil and gas. Construction and laying of pipelines were therefore a decisive factor in determining the economic feasibility of new projects. With Indonesia's experience over the years it had been possible for Indonesian companies to have obtained extensive knowledge in this area of work. Today domestic firms provided designs and undertook engineering construction, radiographic inspection and construction management. The role of foreign companies was related to financing and supplying of equipment.

10. The Symposium provided an excellent opportunity to discuss the various aspects and problems of pipeline construction contracts. He hoped that the Symposium could provide guidelines on legal, financial and technical aspects of contracts and that special attention would be paid to promotion of national interests. The other important aspects related to training optimum utilization of domestic services and maximum employment of national labour und manpower. In that respect terms and conditions of contracts should also include a "national content".

11. The Secretary General extended a warm welcome to the participants and expressed the confidence that their deliberations would lead to practical recommendations for formulating basic guidelines for contracts for the construction of pipelines.

12. An exhibition next to the conference room was also held by national Indonesian contractors, engineering consultants and manufactures of their activities in the pipeline construction and manufacturing industry.

13. A visit to the Krakatao Steel Plant, 120 kms west of Jakarta, which uses natural gas for its energy and produces steel iron pipes was organized for the participants.

Election of Officers

14. The Symposium unanimously elected Mr. Wahjudi Wisaksono (Indonesia) as Chairman. Mr. T.N. Bhargava (India) and Mr. Bodin Asavanich (Thailand) were elected as Vice-Chairman and Rapporteur respectively.

Adoption of the agenda

15. The Symposium adopted the following agenda:

1. Opening

2. Election of the Officers
3. Overview of contracts for the construction of oil and gas pipelines in developing countries
4. Transfer of technical know-how
5. Development of local engineering capabilities, construction skills and use of local materials and equipment
6. Closing

II. CONSIDERATION OF ISSUES

Overview of Contracts for the Construction of Oil and Gas Pipelines in Developing Countries (Agenda Item No. 3)

16. The Symposium took note of two papers prepared by the secretariat (IHT/SYM83/T1 and IHT/SYM83/T1A), which stress, inter alia, the importance of defining clearly the parties to the agreement, and mentioned the unfavourable influence of undue risk allocation to the contractor on the overall price payable by the employer. The papers also made reference to new forms of international pipeline construction developed by various national oil companies of developing countries active in this field.

17. The following country papers were introduced briefly, highlighting in the important issues, by the respective country participants: Bangladesh (IHT/SYM83/T4), People's Republic of China (IHT/SYM83/T5), India (IHT/SYM83/T6), Indonesia (IHT/SYM83/T7), Malaysia (IHT/SYM83/T8), Republic of Korea (IHT/SYM83/T14) and Thailand (IHT/SYM83/T10).

18. Some countries expressed their concern on unfavourable influence of unusual weather conditions (e.g. early monsoon or other unpredictable weather conditions) on time of completion and costs for their pipeline construction contracts. Furthermore, it was mentioned that shortage of time was a severe handicap to

thorough survey and design. Other problems during the commissioning stages were also mentioned. In general, the occurrence of force majeure events seems to cause problems. In some cases the employer was not able to provide, in due time, right of way. In some cases material to be imported was late. It also happened, that the supply of local materials was interrupted.

19. It was mentioned that in one case, insufficient supply of energy made it impossible to complete the performance tests as foreseen in the contract.

20. On the commercial side, currency fluctuations have increased project costs for local employers. In the taxation areas contracting with consortia has caused problems to local fiscal authorities.

21. Finally the representatives of UNIDO, IBA and FIDIC introduced their papers. UNIDO mentioned that the implementation of technology transfer regulations, in some developing countries will have an impact on international pipeline construction contracts and their terms in the future. IBA stressed the importance of a need for appropriate allocation of risks between contractors, employers, and independent consulting engineers. FIDIC warned against the use of turn-key concepts as they would not be in the interest of the developing countries.

22. On the basis of the overall experience of the countries, the Symposium noted that lack of information and adequate knowledge were severe handicaps in the preparation of suitable contracts. It therefore urged that UNIDO/ESCAP in collaboration with others interested should formulate guidelines or standard forms to assist pipeline construction companies, engineers and employers in the preparation and negotiation of pipeline construction contracts.

23. Form the papers presented the following areas of concern

were identified and discussed in detail:

b) Concern Area No. 1: The parties and the contract between them

24. It was stressed that in case of contracting by several parties (on Contractor's or Employer's side), each party should sign the agreement. For reasons of clarity, formal agreements seem to be preferable to Letters of Order and separate Letters of Acceptance. The views varied to what extent approval of the Employer for subcontracting by the Contractor should be required. A view was expressed favouring prior approval to all subcontracting activities of the Contractor in order to keep control on the project. Another view was expressed to dispense with approval requirements altogether, as liability continued to lie on the side of the Contractor. One country thought that at least the technical and commercial capability of subcontractors should be examined and approved by the Employer without the need for approval of any and all terms of the intended subcontracts. It was mentioned that too much interference by the Employer in the choice of the subcontractors might reduce his contractual rights against the Contractor.

b) Concern Area No. 2: Scope of supplies and services

25. It was proposed that clear regulations should be made with regard to the amount of supplies and services to which the Contractor is obliged. Otherwise, additional unforeseen costs could arise to the Employer. Contractors expressed the view that they could only be expected to deliver what they had been asked for in the contract. In case of technological developments after contract dates, additional costs caused thereby should be recoverable by the Contractor. It was mentioned that the problem was diminished in cases in which the Employer contributed most of the materials (line pipes and other materials) for the pipeline system. It was finally felt that in those cases the most ef-

ficient way for the solution of the problem should be discussed and agreed between the Contractor and the Employer.

c) Concern Area No. 3: Transportation of line pipes, other materials and equipment

26. In order to allocate responsibility, it was proposed that thorough checking and inspection of materials prior and after transportation should take place. The point of handing over of materials before transportation and after transportation and the influence of possible transfer of risks should be clearly defined in the agreement. It was mentioned that early regulation of transportation questions would facilitate logistical considerations and appropriate allocation of transportation activities within the overall construction concept. The view was expressed that the Contractor was normally in a better position to provide transport than the Employer. The Symposium noted that in one country, in order to avoid risk of damage to the coating of the line pipes, small coating yards close to the job site were established. It was mentioned that in other countries local transportation companies existed who should be engaged in the transportation within the country.

d) Concern Area No. 4: Price and terms of payment

27. It was felt that in pipeline construction lump sum, unit price and daily rates should be normally the appropriate price system. Only in exceptional cases costs plus arrangements were felt feasible. Consequences of inflation could be covered by escalation clauses and use of national living cost indices. Delay through currency transfer restrictions could also be covered by escalation clauses. Anticipated local supplies and services should be paid in local currency. A view was expressed that 5 per cent down payment and 10 per cent retention (to be released with the expiration of the warranty period) was a usual payment term.

Concerns were expressed that contractors be sometimes misused as financing agencies. In addition, there were concerns that budgetary restraints and other internal regulations within Employer's organization has been often the cause for payment delays.

e) Concern Area No. 5: Time of delivery - delay - consequences of delay

28. It was generally felt that in many cases the period allowed for completion of the work was extremely short. There appear to be different dates for the start of the construction programme, sometimes the date of the receipt of the letter of intent, sometimes the conclusion of the contract, and sometimes the receipt of L/C or down payment. It was felt that circumstances of force majeure should excuse Contractor's delay in completion and relevant idle time would be compensated to the Contractor. In case of unexcusable delay, the Contractor should be obliged to make good the delay at his own cost. If he exceeded relevant dates, liquidated damages should be payable with a maximum amount being 10 per cent of the contract price. Some particularly referred to a grace period which could be provided for in the contract or granted to the Contractor in case the Employer does not suffer disadvantage from delay especially in cases in which he is not yet ready to use the pipeline system. The discussion focussed on the appropriate definition of force majeure by the parties (narrow and wide version). It was felt that shortage of own materials should not excuse contractors for delay, but that any reason beyond the reasonable control should do so. As consequence of the Employer's interest in early completion, the granting of a bonus for completion should also be considered.

f) Concern Area No. 6: Taking-over and use of pipeline system

29. The Symposium agreed that after mechanical completion and successful completion of performance test, the pipeline system

should be taken over by the Employer. A view was expressed urging that the Contractor should remain responsible for a specified period after the take-over. It was mentioned that the take-over procedures for oil and gas pipelines are different, but that in any case take-over activities should be planned well in advance. In order to reduce stand-by and other costs chargeable to the Employer in cases in which performance test and take-over could not take place due to reasons for which the Employer is responsible. A view was expressed stressing the need to come to diverging take-over arrangements in such cases. In appropriate cases the possibility of taking over of part of the pipeline system was mentioned. It was also proposed that in such cases part of the performance guarantee should be released and it was felt adequate that additional bank charges for the non-released part should be compensated to the Contractor by the Employer.

g) Concern Area No. 7: Warranty - guarantee - liability

30. A view of concern was expressed that engineering companies were held liable under their contracts for damages completely disproportionate to the fee received under the agreement and the view was expressed that engineers' total liability should be limited to their contract fees. With regard to the Contractor, it was felt that it could only be liable for defects in materials delivered by the Contractor and for its workmanship, but not for materials supplied by Employer. A view was expressed that clear stipulation should be made for speedy repair or replacement of parts by the Contractor during the warranty period; the Employer could not be expected to incur heavy losses if the Contractor delayed repairs or replacement. It was felt that the stipulation of a one-year warranty period would be appropriate. However, a view was expressed urging to consider appropriate extension of warranty for latent defects. It was the general view that the Contractor should not be liable for consequential losses of the Employer as a consequence of defects. Reference was made to available testing procedures to detect existing defects during

the original warranty period. It was mentioned that after longer periods allocation of responsibility would be extremely difficult. In cases in which the Employer delivers to the Contractor the complete design and engineering for the pipeline, no need for extension of liability would exist. With regard to arising damages and Contractor's possible responsibility therefore, the need for appropriate insurance coverage in favour of Employer or Contractor (as the case may be) was stressed.

31. With regard to the Contractor's total liability, it was felt that a maximum amount stipulated in the contract should be reasonable, to enable appropriate price calculation by Contractor. Considerable environmental risk as a consequence of pipeline construction projects should be covered by appropriate project insurance.

h) Concern Area No. 8: Security

32. It was the general view that bid bonds and performance bonds were justified security. A view was expressed that, just as a contractor is required to give security for his bid, so the Employer should reciprocate by giving the Contractor the security of an assurance that a contract would actually be awarded to one of the bidders (award guarantee). Furthermore, in the interests of creating good relationships between Employers and Contractors, a view was expressed that the Employer, before going out for international tendering, should ensure and declare that all necessary consents (so far as possible) needed by the Employer had been obtained and other pre-conditions been fulfilled; otherwise, it would be most unfair to a Contractor forced with paying the expenses of bid preparation, if the Employer after further clarifications would abstain from the project. A view was expressed however that relevant risks were considerably small as feasibility studies had proven feasibility of the project prior to bidding stage. Another view was expressed stressing that any Employer should have the liberty, not to award the contract, if

justified reasons were given. In certain countries bid bonds in the amount of up to 10 per cent of the contract value with three months life time seem to be used; performance bonds between 10 and 15 per cent of the contract value are normal practice. It was recognized that for smaller projects the relative amount of the bid bond could be higher than for larger projects.

33. Various concerns were expressed against the use of on-demand bonds by the Employer. It was mentioned that bonds should be payable upon objective events or should be conditioned upon delivery of acknowledging arbitration awards. The Symposium was advised of cases where a Contractor who had to supply an on-demand performance guarantee had successfully asked the Employer to agree to a counter-guarantee to be provided by the Employer, if he wanted to cash the guarantee.

i) Concern Area No. 9: Termination - cancellation

34. It was felt that any termination or cancellation of a pipeline construction contract will delay the project and cause enormous additional costs and should therefore be very carefully considered by the parties and especially the Employer. A view was expressed that in case of any breach of contract by the Contractor, the Employer should be entitled to cancel the agreement and the Contractor should bear all costs in this case. It was suggested that in addition to termination and cancellation the possibility of suspension of a project should be regulated in the agreement. It was felt that especially due to national economic reasons, interruptions of the project realization could take place. In order to safeguard in such instances, regulations on Contractor's rights were felt to be justified. The view was expressed that the Contractor should be compensated for additional costs in this case.

j) Concern Area No. 10: Applicable law - settlement of disputes

35. It was discussed that various national laws could apply to a contract: local laws, the laws of the country whose language was used in the contract, the laws stipulated in the contract and the laws applicable in the country of arbitration. It was felt that problems could arise from different applicable laws in the main contract and a particular subcontract. A view was expressed that a country's national laws should apply to all contracts executed in the country and also that it would be reasonable to have all contracts concluded in local language. It was stressed that in cases of use of a language different to the applicable law, the laws of the country whose language was used might govern the interpretation of the agreement.

Transfer of Technological Know-how (Agenda Item No. 4)

36. ESCAP introduced the general paper on the subject (IHT/SYM83/T3), which pointed out that parties to the contract should carefully investigate their status of technological capabilities and then arrange in the most appropriate way for the transfer of technology from the donor's to the recipient's side. Furthermore, examples were given for the most appropriate arrangement of technology transfer during the various phases of pipeline construction contracts. Two other papers (IHT/SYM83/T11 and IHT/SYM83/T17) gave examples of technology transfer arrangements in Indonesia and highlighted risks and possibilities in relevant regulations. It was especially stressed that turn-key acquisition of pipeline systems would not promote the desired transfer of technological knowledge and that a detailed concept for the achievement of technology transfer should be elaborated and fixed already at the feasibility stage. The second paper on experience in Indonesia mentioned the various technological capabilities developed through transfer of knowledge in the pipeline construction area in the past. However, in sophisticated areas as for example automatic welding and the entire area of offshore con-

struction, national capabilities did not exist yet. Training should therefore be intensified in these areas. The participants were informed that economic recession should in no case lead to a slowing-down of the technology transfer process.

37. The discussion on the technology transfer subject brought out that the promotion and acceleration of the technology transfer process was in the national interest of the developing countries. Each country should, therefore, develop a detailed strategy on the choice of technologies in the pipeline construction industry and the effect of the development of relevant national engineering, contracting and subcontracting capabilities on other sectors of the industry in the country. It was generally felt that a price had to be paid for the acquisition of technological knowledge and that relevant costs should finally be borne by the country and not necessarily by the Employer if he was a private company. It was warned against arrangements being made with a view to national technology transfer policies but with no real intent to transfer valuable skills. The importance of technological qualification of local personnel was mentioned, especially the necessity to be able to receive, retain and absorb relevant technological knowledge. Action should be taken to ensure that acquired skills would not be lost. One country mentioned in this respect risks if trained personnel were shortly after training transferred to other jobs.

Development of Local Engineering Capabilities, Construction Skills and Use of Local Materials and Equipment (Agenda Item No. 5)

38. The Symposium noted the various joint activities of ESCAP and UNIDO (IHT/SYM83/T4A) in promoting the development of engineering capabilities of the developing countries of the ESCAP region and the proposed establishment of a regional network of industrial consultancy. A paper brought out in detail the project organization in the Indonesian Badak-Bontang Gas Pipeline Con-

struction Project (IHT/SYM83/T12). It was shown that appropriate contractual arrangements between a variety of parties involved and especially the use of a separate engineering and project management contract had promoted necessary training on the job and transfer of valuable technological skills.

39. In case of use of local materials, quality problems should not be underestimated; furthermore, higher prices than prevailing in the international market could be expected. Document (IHT/SYM83/T13) dealt with the risks, which a local contractor had to face in Indonesia. From problems in the local material supplies market changes in specifications had arisen in some cases and caused delay and additional costs to a contractor. It was stressed that the technical qualification of the local work-force was still very low which was reflected in low discipline and productivity of work. To support the development of local engineering capabilities and relevant appropriate contractual arrangements, government assistance would be welcomed. In this connection, reference was made to the consensus among Ministers of Industry of the ESCAP region reached in 1979 and 1980 in Bangkok to the effect that there was a need for the creation of the basic capabilities for the generation and implementation of industrial projects. The document (IHT/SYM83/T17) also stressed that technology transfer could only be achieved through communication between people and appropriate communication arrangements should at the latest be elaborated and agreed upon at tender stage. Detailed work programmes, responsibility charts and job descriptions were needed to enable the choice of qualified candidates. Only if in developing countries clear concepts in this respect existed, development of local skills and use of local materials could be achieved as required.

40. The discussion on the subject reflected issues raised previously in the discussion on transfer of technological knowledge. In addition to necessary financial inputs for the acquisition of technical knowledge it was mentioned that funds had also to be

allocated by the Employer, if local materials were to be used for the construction of the pipeline system. However, a view was expressed against unlimited risks in this respect. Another view was expressed that the Government should only allow a 15 per cent price bonus for use of local industries. It was furthermore stressed, that mechanisms should be worked out by the countries, to make the investments in technology acquisition measurable and its effectiveness controllable.

III. CONCLUSIONS AND RECOMMENDATIONS

41. The Symposium commended the efforts of UNIDO and ESCAP for the initiation and preparation of the Symposium. It expressed its thanks to the organizing committee for the excellent facilities provided and efficient organization of the Symposium. It was felt that the discussion and dialogue initiated by UNIDO and ESCAP were extremely useful for the exchange of views and dissemination of knowledge between employers, contractors and engineers of the region in the pipeline construction area. The Symposium expressed its concern on unreasonable demands being often made during the negotiation of pipeline construction contracts and they felt that any efforts of UNIDO and ESCAP would find their approval which could promote the idea of fair and reasonable contract terms and facilitate the burdensome steps of their negotiations.

42. The Symposium therefore recommended that ESCAP and UNIDO should prepare, in co-operation with relevant international professional organizations and other experts a manual on the preparation and negotiation of pipeline construction contracts.

43. The manual should contain guidelines to employers, contractors, and engineers and specify reasonable and unreasonable demands. It should specify risk areas which fall within the responsibility of the relevant parties. Appropriate regulations to

ensure technology transfer and the use of local materials, equipment and services should also be proposed. The question of standard forms for pipeline construction contracts (off-shore and on-shore) for use in the region may also be examined.

44. The Symposium urged UNIDO and ESCAP to study appropriate means which could activate and promote the technology transfer process in connection with pipeline construction contracts, and relevant use of domestic consultancy services and materials supplies. In this respect UNIDO and ESCAP should also have regard to the positive influence which international financing agencies could have on relevant choices.

45. It recommended that UNIDO and ESCAP should examine and closely study environment risks arising from pipeline construction projects in order to enable the taking of adequate precautionary measures. UNIDO and ESCAP should also study the problems of proper installation and maintenance of pipeline systems or parts thereof by developing countries and recommend measures for its elimination.

46. The Symposium strongly urged member countries, professional organizations of engineers and contractors and national oil companies to increase information dissemination and establish close linkages with each other in order to promote the use of fair and equitable contract terms in contractual practices, the technology transfer process and the use of local supplies and services in the pipeline construction industry. Several countries proposed that the formation of a regional association of National Oil Companies would be extremely useful and welcomed and UNIDO and ESCAP should promote the idea and take all necessary and possible action to achieve such target. It was also proposed that meetings of this kind should be convened by UNIDO and ESCAP at regular intervals to inform each other on new developments, problems and possibilities.

47. The participants declared their willingness to assist UNIDO and ESCAP in their work and to give both organizations all relevant information on contractual practices in this field to facilitate the work.

48. The Symposium strongly urged UNIDO and ESCAP to publish the proceedings and papers used in the Symposium and make it available to the participants and all interested persons and organizations.

IV. ADOPTION OF THE REPORT

49. The Symposium unanimously adopted the report on 2 September 1983.

Contracts for the Construction of Oil and Gas Pipelines

by G.D. Campbell (FIDIC)

It has been traditional in the oil and gas industry, especially in developing countries, for the design and construction of facilities to be let on a "turn-key" basis. This method of contracting has been used successfully to a point but has become increasingly less successful for oil and gas pipelines. The major problems peculiar to pipelines derive from the evolutionary basis of the design and the integration of the project with the terrain and population it traverses. It is common when a pipeline system is being contemplated that the system considerations and the market requirements can change substantially during the course of the project. When any pipeline system is being considered the initial response from governments is generally to integrate the right-of-way with other service corridors. The attempts to maximise these benefits generally result in considerable delays to the oil and gas pipeline.

The concept of the engineer manager providing a professional technical and managerial service to the client and not fully committing the capital structure of the project can lead to considerable benefits for the owner. Flexibility of design when survey and right-of-way problems are encountered generally allow a quicker solution under the engineer manager concept. The interest of a turn-key contractor may not always coincide with that of the owner and this becomes more apparent in the oil and gas pipeline industry. The paper concentrates on the benefits of an engineer manager, especially in the context of third world countries. These benefits can best be illustrated by examining the right-of-way and property management aspects and their integration with the engineering and contractual requirements of the project.

INTRODUCTION

Oil and gas companies have tended to view pipelines as extensions of oil and gas production facilities to connect shipping terminals or sales points. Development managers generally come

from the refinery industry or production departments whose experience has centered on plant design and construction. The apparent simplicity of pipelines transportation systems tends to overshadow the specific characteristics that make this system of transport such an effective means if properly executed.

The style of contracts for pipeline design and construction should take account of the structure of the industry, the governmental structure and existing legislation, and the terrain, environmental and population constraints between the supply and delivery points.

STRUCTURE OF THE INDUSTRY

The oil and gas pipeline industry grew very rapidly in the late 1940's and 1950's in the United States with the development of the large oil fields in Oklahoma and Texas. The specialty technologies that are common today were developed in an environment where rapid growth demanded a very fast construction time to bring lucrative oil fields into the market place. Construction rates of 3 miles per day were not uncommon for pipelines in the range of 20 inch diameter. This development was possible because of the substantial industrial base in the region, very sparsely populated areas and a frontier attitude to effectively bring these projects to fruition. As the industry matured in the 1960's and more sophisticated materials for construction became available, professional designers and managers came to the fore. The complexity of pipeline systems had increased and the ability to carry multiple products in the same pipeline, discreetly, became a proven technology. The traditional construction companies concentrated on developing specialty equipment to more easily tackle difficult river crossings and previously inaccessible terrain, feasible for buried pipeline construction.

The professional designers and managers concentrated on solving the operations research problems and devising more soph-

isticated inspection and testing procedures to guarantee the integrity of the final pipeline system. As projects became larger and more complex, the financing arrangements became more important and financing became increasingly based on take or pay thru-put agreements to guarantee the success of the project.

By the 1970's the traditional problems of brittle fracture failure of steel and water permeable coatings had been solved and designers were concentrating on making the pumping/compressor facilities more energy efficient due to the spiralling cost of oil and gas as a fuel. With the increasing availability of communications and supervisory control technology, computer based batch-tracking of products through pipelines and remote control change stations and valve stations took the emphasis away from the basic problem of constructing the pipeline. A greater public awareness of safety in the community brought the introduction of more stringent and extensive government regulation of pipeline systems. These developments have brought an increased emphasis to the designers and managers of pipeline systems by informing both government and civic groups about the impact of the proposed pipeline.

The net result of this evolution has been the development of specialty professional engineering and management companies that provide an expert service to companies wishing to develop into oil and gas pipelines. Because of the substantial financing necessary for such projects, these companies work alongside the owners to solve the system design problems, provide advice on system sizing, material selection, construction planning and inspection and testing procedures. The final selection of contractors to carry out the construction of the pipeline has also been a service provided by these groups.

CONTRACTUAL STRUCTURES

In recent times several forms of contract have been used with varying success to allow for the development of oil and gas pipelines.

1. Transportation Tariff

This is the most extreme situation where an owner of an oil field or the marketer for the product lets a contract to a promoter largely on an agreed tariff basis for the transport of the oil or gas. After this contract has been negotiated, it is the responsibility of the promoter to arrange for the design, engineering, construction and operation of the pipeline for the life of the haulage contract. This structure would be satisfactory where a well-known source of supply and market are identified and neither buyer nor seller of the product is interested in owning a pipeline system. Difficulties generally arise during the life of the contract when substantial variations occur with production or market conditions.

2. Turn-key Contract

This type of contract is generally used when a stable production and market situation have been established but the potential owner of the pipeline wants a single source of responsibility for the construction and commissioning of the facility. Difficulties are generally encountered if the terms of the contract are altered substantially due to interpretation of government legislation, difficulties with community pressure groups for right-of-way access, adverse weather conditions or delays in construction of other associated facilities.

3. Engineer Manager

This style of contract has been more commonly used in the oil and gas pipeline industry where the professional engineer is retained to protect the interests of the owner in dealing with government, local interests groups, material suppliers, construction contractors and property owners. Because any major pipeline project requires suitable documentation for financing purposes, the professional manager is best able to protect the interests of the owner without substantial expenditure.

4. Client Management

In this situation the client company elects to develop a management team from its own group boosted by contract personnel for the period of the project. This system works well for companies who design and operate major existing systems but is less suited to companies who are only starting out in the business. Building up of an ad hoc team for a project such as an oil and gas pipeline can experience many difficulties when the integration of survey, right-of-way, design and construction activities are being carried out simultaneously.

Any one of the above four structures can be used effectively if the promoter of the project understands particular problems that will be encountered once the project gets underway. It has been our experience that from initial feasibility studies to final commissioning can take several years depending on the size and complexity of the project. Actual construction time may be as short as 25 % of the above time span. This can most effectively be carried out when proper attention is given to the planning and design aspects of the project. Gas pipeline projects tend to be much more difficult from a planning point of view as their profitability is far more marginal and the impetus for their development is generally based on a government or community perceived

needs rather than substantial profit derived from the development. In trying to ascertain the best method for a particular project, a full evaluation of the owner's interests consistent with minimisation of risk to the participant and the transfer of technology within the guidelines of developing countries are analysed.

CONSTRUCTION CONTRACTS

The determination of suitable construction documents for contracts can only be achieved with the development of a comprehensive construction plan for the project together with timely delivery of pipe, pipe coatings and other necessary permanent materials. As the success of a pipeline project relies largely on the evaluation of the logistical problems, the terms in the construction contract should focus on the following points:

1. Because the project will largely be underground, the contract should recognise that many unknowns will be encountered until clearing, grading and trench excavation have occurred. The terms of the contract should be fair and equitable to both the contractor and owner with respect to these contingencies. Generally, a good project manager on site will minimise these problems. However, the potential for extreme situations due to a possible archaeological site shutting down the work should not be ignored.

2. Because most pipelines traverse a variety of terrain and population, the evaluation of flooding, local village problems and the fact that the work force are constantly moving forward, should be properly recognised. Where pipelines need to be routed around villages and other development, interference with services will necessarily occur. Proper handling of these problems in advance by the owner's representatives, the construction manager's team, government inspectors and the contractor is essential. The very fact

that such a variety of group interests are involved will make the problem that much more difficult.

GOVERNMENT LEGISLATION

Each mainland State of Australia has legislated an Act of Parliament to govern the design, construction and operation of high pressure cross-country pipelines.

Each of the Acts make provision for the compulsory acquisition or resumption of easements to allow for the construction of pipelines. (Cross-country pipeline construction in Australia would be extremely difficult without such provisions).

While each of the Acts has varying procedures, fundamentally they provide for a Licence to be granted to allow for the construction, operation and maintenance and a provision for easements to be resumed in the event of the Licensee proving to the satisfaction of the relevant Minister that all reasonable attempts to obtain the easement by negotiation have been unsuccessful.

The relevant Acts generally require that the pipelines are constructed in accordance with the relevant Codes, have specific requirements with respect to satisfying environmental considerations and community interests and conditions with respect to the safe design and operation of the pipelines.

ROUTE LOCATION AND PROPERTY MANAGEMENT

The integration of high technology and local interests can best be examined by considering the route location and property management aspects of a pipeline project.

The right-of-way/property tasks in relation to a pipeline project need to be integrated with the proposed construction activities.

PRELIMINARY ROUTE ASSESSMENTS

In conjunction with engineering, distribution, political and other relevant requirements, the alternative 'possible' routes must be assessed taking into account the following right-of-way factors:

1. Length and topography.

2. General land use.

3. Current and proposed zoning.

4. Possible environmental constraints and requirements.

5. Current and potential population density.

6. Estimated easement purchase price and damage costs.

7. Use of existing right-of-ways/corridors. In the event of existing right-of-way/corridors being available, a study should be made to consider in detail all facets of advantages and disadvantages of mutual sharing of each existing right-of-way. Detailed tasks could be as follows:

   a) Define ownership of existing right-of-way; i.e.

      - owner of facilities
      - whether ownership in fee simple or easements

   b) Make on-site review of locations;

      - locate facility placement within right-of-way
      - review terrain
      - review development and potential development areas
      - review construction and technical constraints caused by existing facilities

   c) Determine restrictions relative to easements affecting joint use;

- obtain copies of easement/fee simple agreements
- contact owners

d) Evaluate feasibility of joint use of existing rights-of-way.

ADMINISTRATION - PRECONSTRUCTION

1. Review appropriate legislation and other project requirements.

2. Establish philosophy of approach with client, i.e. regarding public relations aspects, environmental concerns, constraints, etc.

3. Establish right-of-way procedures, right-of-way agents' manual, various forms to be used, together with filing and recording systems.

4. Establish procedures for Permit and Licence applications as may be applicable.

5. In consultation with client, establish necessary legal documents, procedures, etc.

6. Depending on project requirements and in consultation with client, establish right-of-way trust account and procedures.

7. Evaluate potential environmental problems and community resistance.

8. Assist as required in formulation of environmental impact statements, public relations releases and defence against or for use during public inquiries.

PROGRESSIVE TASKS

1. Obtain all relevant maps and plans regarding zoning, potential development and all other data necessary to evaluate the potential routes.

2. Consult Government and Local Government authorities re proposed route and liaise. Liaison to continue throughout the route determination phase.

3. Assist route location and liaise re right-of-way aspects and data search material.

4. Obtain titel searches and mining searches (Councils, Registrar-Generals Office, Land Titels Office, Mining Titles Office, etc.).

5. Collate property information files, prepare schedules and establish records system, landowner files, etc.

6. Contact landowners and obtain survey consents and maintain survey liaison. (Settle survey damages where necessary.)

7. Establish accurate population density data and submit to engineering (re class location under Pipeline Code).

8. Preparation of environmental impact statements.

9. Prepare applications and serve notices, etc. (where applicable).

10. Consult Government and Local Government authorities re specifications of road, rail and river crossings and obtain necessary permits and approvals.

11. Obtain, evaluate and schedule easement compensation payments.

12. Collate all property information for alignment sheets.

13. Establish location of all underground services and provide

information to engineering/survey for inclusion in alignments and construction drawings.

14. Prepare documentation for negotiations with landowners.

15. Negotiate with landowners, occupiers and encumbrancers, etc. and their advisors for acquisition of easements.

16. Acquire fee simple sites for compressor stations, meter stations, etc.

17. Collate all acquisition data, i.e. easement areas, compensation from legal surveys.

18. Prepare and submit Licence Applications and serve notices (where applicable).

19. Maintain liaison with appropriate administering authorities regarding grant of licence, environmental impact stations, approvals, etc.

20. Prepare Memorandum of Transfer of Easements or Release documents in relation to easement acquisition following grant of Licence and pay compensation for easements.

21. Prepare construction line lists for incorporation in tender documents and for advice to contractors.

22. Carry out right-of-way inventory.

23. Liaise with parties travelling route, i.e. soil tests, surveyors, tenderers, contractors, cathodic protection engineers, etc.

24. Liaise with environmental consultants.

25. Effect easement registration, issue of Certificates of Title for fee simple lands and where necessary, the extinguishment of unwanted registered easements.

CONSTRUCTION

1. Notification of construction entry to establish landowner essential requirements and advice to contractors, inspectors, etc.

2. Liaison during construction with landowners and others, attend to complaints, obtain permits and approvals as required.

3. Research and compile crop compensation schedule rates.

4. Record damages as they happen for later settlements.

5. Settle damages and obtain releases from private landowners, government departments, etc. following completion of restoration.

COMMISSIONING AND HANDOVER TO CLIENT

1. Prepare property schedules.

2. Prepare payment schedules, easement and damages.

3. Prepare access and emergency procedures manuals as may be required.

4. Assemble all landowner office and field files, government department files, documents, licences, releases, etc. and hand over to client.

SPECIAL PROBLEMS FOR DEVELOPING COUNTRIES

As described in this paper, the special problems to confront a pipeline development revolve around the fact that the project affects a large number of communities which are traversed by the right-of-way. Refineries and terminals tend to be controllable from this aspect and the impact on the local community is much

more localised. It has been our experience that the development of professional engineering and management teams can best be done when substantial indigenous participation occurs. The understanding of conditions with respect to water and flooding history play a substantial role in the pipeline routing and design. The location of pump stations, communications towers, valve stations and cathodic protection points is important from an overall logistical view. The decision to route a pipeline along a road or rail right-of-way or an existing power line right-of-way needs close attention. Considerable difficulty exists in construction parallel to roads because of the need to keep access open for the road and to minimise interference to ribbon development of housing along the road. Future safety needs to be considered. The alignment of a pipeline along a rail system creates problems of access and future safety in the event that a derailment may cause a rupture of the pipeline. Power lines are generally routed from ridge to ridge whereas pipelines are best located along a ridge line. Also, cathodic protection problems can be severe because of stray currents being developed by the power system into the pipeline.

Survey and soil investigation teams can generally best be sourced from local groups. However, a good knowledge of the particular problems of locating pipelines is necessary to make these activities more effective within the management team.

The development of a mature pipeline industry requires stable and well-known government legislation both at state and regional levels together with experienced engineering, management and contracting organisations and is the prime hurdle for developing countries.

Overview of Current International Practices in Contracts for the Construction of Oil and Gas Pipelines

by J. R. Salter*

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OVERVIEW OF DIFFERENT TYPES OF AGREEMENTS

(i) Introduction

The drafting of Agreements should be by means of a partnership between Engineer and Lawyer which in my opinion, is essential to achieve the best result for the Client, whether he be employer or contractor.

(ii) Consortium Employer

Where the Employer is an operator acting on behalf of a consortium in entering agreements with Contractors for, say, the laying of an offshore pipeline, should the appointed operator be seen to be acting as an agent or as principal? Subject to the operator being properly indemnified by his co-venturers, perhaps he should contract as principal and hopefully avoid any possibility of having his position or decisions undermined or questioned by a Contractor. On the other hand the Contractor may prefer to be in contract with all members of the consortium. Rather than leave the question open for argument under the local law relating to agency, perhaps it is right for the contract to deal specifically with this aspect.

(iii) Tender Bidding for Offshore Pipeline Construction

(a) Procedures

Offshore bidding procedures are not normally laid down in one set of formal rules. The details and formal framework will vary not only between each oil company but also between each jurisdiction. The details and formal framework will vary not only between each oil company but also between each jurisdiction. The details differ because of different types of procurement involved such as procurement of construction work, of supplies and of services. Details also vary due to the size of the contract and how well the scope of works is in fact defined in the contract

documentation. A third element which causes details to vary is the actual competitve situation at the time. Some bid packages are designed to enable the employer to go into direct bargaining with respective contractors to obtain the best offer for the contract.

(b) Documentation

The bid contractual documentation usually consists of:

(1) an "inquiry" being a covering letter sent by or on behalf of the Employer to a number of Contractors selected by him or his consultant to tender for pipeline construction. It may explain the names and nature of the concess or licence holders for the exploitation of offshore gas or oil. It may set out or make reference to the terms of the Joint Venture or oint Operating Agreement governing that exploitation and where in the normal case there is an operator acting for the Joint Venturers it may explain that the operator is under a duty to obtain the best offer. On the other hand the employer may choose to assume that all this is within the general knowledge of the contractor and, if as operator he is a major oil company, then he will seek to impose on the contractor the terms of his internal standard contract and established p ocedures on tender bidding.

Next the "Inquiry" letter will deal with any particular requirements of the host government which probably also requires competitive tenders. The host government will probably wish to afford host Contractors an opportunity of participation in the host countries exploitation of oil and gas reserves. Apart from this principle the host government is clearly concerned to see that the construction costs which may be offset against taxable profits of the oil exploitation are not too high as otherwise the government profit by tax or by participation in the development would be reduced.

(2) Enclosed as annexes to the "Inquiry" will be general conditions, special conditions, scope of work, technical information and instructions including a tender bid form.

The tender documentation being drafted by the Employer tends to impose maximum obligations on the bidder and minimum obligations on the Employer.

The bids are generally sealed and opened at the same time and the tender evaluation takes place leading to the creation of a short list. In offshore pipelaying work there is often the need for consultations with the short listed bidders regarding further technical solutions.

Depending upon the state of the market the invitation to bidders will either state that there will be no opportunity for adjusting prices during the period of tender evaluation or that there might be some negotiations on the subject or remain completely silent about the possibility of negotiations. The third stance is undesirable. With the first two the Contractor knows where he is and he can elect whether to spend time and money in bidding or not. If there are to be subsequent negotiations most Contractors would be unprepared to go too low in their initial quote. From the Employer's point of view however it is not just a question of obtaining the lowest price; it is also a question of getting the pipelines laid properly, because (certainly offshore) it is a very expensive business to have to come back and either repair or relay. There is much to be said therefore for employing a Contractor with a known track record for offshore pipeline laying. The policy approach to be adopted when using the tender system should therefore be such as to hold the Contractors' general confidence in being willing to participate in the tendering system.

An operator when acting for a consortium is in a slightly difficult position here. He has to know that his partners in the exploitation of the oil and gas reserves will be happy with the conduct of the tender evaluation and subsequent negotiations. It

is understood that certain restrictions imposed by the legislature of Norway in 1898 against negotiations and re-bids after tenders for government contracts have been opened were the result of several firms having gone bankrupt after having reduced their tender price too much during subsequent bargaining. Denmark has legislated obligatory rules on tender bidding for private industry. The tenders are to be opened in the presence of the tenderers. The price is to be read out and price reductions after the bid is opened are prohibited so far as selecting the lowest bidder is concerned. In England the Joint Operating Agreement for offshore exploitation has to be approved by the Department of Energy and under the usual form of J.O.A. the operator is obliged to obtain competitive sealed bid tenders.

Furthermore, there is a Memorandum of Agreement between all the operators of the British sector and the Department of Energy of 3rd November 1975 (it was revised 2nd February 1981) which assumes a bidding arrangement under which British Industry is given a full and fair opportunity to compete in bidding for tenders. It envisages tender evaluation procedures where inequalities in the submissions are resolved relative to the short listed bidders - but the wording is somewhat flexible!

(iv) Standard Forms

There are several types of standard forms of conditions of contract published by various professional bodies which are used in the engineering and construction fields as a basis for contract and conditions of contract for example:

(a) the ICE Conditions of Contract (conditions of contract for works of civil engineering construction - Fifth Edition 1977) - it is understood that these conditions form the basis of many of British Petroleum's contract and conditions;

(b) the FICID - FIEC Civil Conditions of Contract (Conditions of Contract (International) for works of Civil

Engineering and Construction - Third Edition 1977) - these are based on and are similar to the ICE Conditions but are specially adapted for use where companies of international standing are invited to tender for works involving civil engineering construction anywhere in the world;

(c) the Red Book Conditions of Contract (Model form of conditions of contract for process plants suitable for lump sum contracts first published October 1968, revised April 1981 by the Institution of Chemical Engineers) - these have been used for some lump sum contracts for the laying of pipelines in the United Kingdom;

(d) the Green Book Conditions of Contract (Model form of conditions of contract for process plants suitable for reimbursable contracts in the United Kingdom, July 1976 published by the Institution of Chemical Engineers) - these conditions are quite often used in the United Kingdom for the construction of LPG pipelines and associated plant.

The advantage of using a standard form is that it is immediately available for use and will be known to be generally acceptable to the Contractor to be employed on a project. The disadvantages are that the drafting is often rather loose and the conditions tend to be Contractor oriented. There do not appear to be any Standard Conditions for offshore pipe-laying works.

(v) Letters of Intent

A Contractor often asks for a letter of intent whilst negotiations are continuing between him as selected Contractor and the Employer. One kind of letter of intent is a mere statement of commercial intention, pending further negotiations and finalization of the contract documentation. This kind of document contains no intention to be bound legally until the contract

documentation is concluded. A second kind of letter of intent is one where the parties intend to be bound but that some of the detailed terms require to be incorporated in a formal contractual document. Legal relations are intended to be created on the basis of the broad principle terms agreed. If a letter of intent is legally binding it is generally couched in phraseology which permits it to comprise of an interim arrangement terminable at any time upon audited costs being paid to the Contractor as may have accrued at date of termination.

(vi) Part Performance

It is possible under English law for a contract by conduct to arise where in reliance upon certain assurances given by the employer the contractor has commenced construction arrangements.

THE INDIVIDUAL CONTRACT CLAUSES

Preliminary Note

The general conditions to which reference is made with reference to on-shore pipeline contracts are those of the:

INSTITUTION TO CHEMICAL ENGINEERS
MODEL FORM OF CONDITIONS OF CONTRACT PROCESS PLANTS
(REIMBURSABLE)

1. DEFINITIONS

(a) Employer would normally be deemed to include his authorised representatives.

(b) Contractor would normally be deemed to include his employees and agents contracting to perform work.

(c) Engineer would normally be deemed to include the person from time to time appointed by the Employer to be Engineer and his authorised representatives.

(d) Right of Way would cover not only the pipeline trench and the safety area but also the working strip and access to the working strip.

(e) Work would generally be defined as wide as possible, for example, it would include all the obligations and requirements imposed upon the Contractor.

On-shore Contracts

"Definition of Terms" is contained in clause 1 and "Interpretation" in clause 2.

It is clearly important to establish which legal system will govern the parties' obligations and by which the Contract is to be interpreted. In this case it is the law of England (2.1). The Purchaser will frequently insist on his own law and legal system governing the Contract. In the event of conflict between the general conditions and the specification it is usually desirable not to have the provisions of the general conditions prevail and since the parties will tend to be more specific in writing the specification than in amending the standard form to suit their particular requirements (2.2).

2. SCOPE OF DELIVERIES AND SERVICES

(a) Definition of Scope

Lawyers and Engineers must combine their efforts to define the scope of the contract to prevent the contractor using variation machinery to increase the contract price. Very often it is the definition of the scope of the contract which governs whether or not a claim to variation is genuine or not. Wherever it can be reasonably inferred from the contract description of the scope of works that other undescribed work would be necessary to achieve

completion or a satisfactory and effective result, then, in the absence of any contrary indication, such undescribed work should normally be regarded as included in the definition of the contract work in the contract. It is better to rely on express obligations rather than implied. This makes the drafting of the scope of the contract clause a most important consideration.

(b) Responsibility for ground conditions

It is usual for the Contractor to accept the full burden of site investigations. If the Employer provides any data, then nonetheless Contractor should be bound to make all necessary enquiries to verify such data, and the contract should make clear that the Employer accept the responsibility for data so provided.

On-shore Contracts

These are set out in clauses 3 and 4 of the general conditions.

The scope of the Contractor's work is defined as being "in accordance with the provisions of Schedule 1 (Description of the Works), the Specification and the other provisions of the Contract. Lack of definition of the precise scope of the Contractor's supply may be the raison d'être for the use of a Reimbursable Form of Contract. Where a lump sum is to be used for any part of the supply appropriate detail will be required (see Guide Notes B & S). "Works" may be expected to include provision and removal of temporary works, and site restoration.

The Contractor is required to carry out "the Works" (as defined) in accordance with good engineering practice and to the reasonable satisfaction of the Engineer. The qualification "reasonable" is desirable from the Contractors' point of view, enabling him to challenge the Engineer's decision in arbitration if he considers it unreasonable.

A brief summary of the distinction between Lump Sum and Reimbursable Contracts is contained in section 3 of the Introductory Notes on pages 2 and 3.

3. CONTRACT DOCUMENTS

(a) Representatives during negotiations

The Employer should exclude any representations or understandings from the ambit of the contract unless such understandings or representations are set forth in the contract documents.

(b) The position of the Engineer

In some contracts the Engineer is closely allied with the Employer and the Contractor is bound to deal with the Engineer directly on all matters relating to the work and in the event of any disagreement the requirements of the contract document shall be decided by the Engineer acting reasonably. The Committee reviewing the FIDIC - FIEC Civil Conditions (1977) has recently suggested that the conditions should contain the following provisions:

a) "requiring maximum co-operation from both parties and the Engineer in the performance of the contract and the practical solution of problems".

   Under civil legal systems it is understood that an appeal founded on such basic principles would lie if any party should depart from them. Under English common law legal systems specific objections could be incorporated in the contract with appropriate arbitration machinery.

b) "defining the circumstances in which the Engineer can be requested or is required to give decisions or instructions and defining the circumstances in which decisions may be reviewed by the Engineer. Where possible a fixed time scale for decisions should be defined, otherwise decisions should be required in a reasonable time".

A review of each and every existing reference in the standard form of contract to the Engineer's "opinion" or "satisfaction" is surely desirable with a view to deletion since such references are to a subjective opinion of the Engineer and not to any objective test. Although the contract provides that some opinions can be overruled on arbitration, the wording of the arbitration clause can easily be misconstrued under some legal systems or if the arbitration clause is altered.

c) "more attention should be given to the powers of the Engineer, which being fairly wide and loose, may actually disadvantage even employers and engineers.

   (i) if the powers are exercised, by rendering an Employer exposed to financial claims by the Contractor in a number of situations which are really the responsibility of the Contractor;

   (ii) whether or not the powers are exercised, by rendering both the Engineer and the Employer liable to third persons for damage or accidents occuring during construction which are in reality in the Contractor's area of control."

d) "defining the reasonable and objective criteria upon which the Engineer will have to exercise his discretion, wherever he is given a discretion by the terms of the contract."

(c) Time allowed for Tendering

The time allowed from the date invitations first go out for Contractors' tenders to the date that the works under the contract are to commence may well be insufficient for negotiations and all the formal documentation to be completed. The consequences are:

a) that the contract is signed after the works of the contract have started.

b) the parties will be working under pressure and this could lead to mistakes in documentation. Piecemeal changes could effect construction of other clauses.

A further reason for providing for a reasonable time for negotiations is to allow negotiations to be opened with another Contractor should the original negotiations break down for any reason assuming that the letter of intent, if it is proposed to issue one, is not a letter which creates a binding contract. It could be however that commercial considerations, such as a tight programme for the laying of a pipeline, operate against the holding of successful negotiations. Very often the date for oil or gas having to be on stream is so tight that the construction programme, which is only part of the whole project, has to be kept to a tight timetable. This would not permit time to go through the tendering procedure again to find a new Contractor.

For this reason amongst others, most Employers have their own standard contract conditions. It is easier for their lawyers to make changes to those conditions rather than for an Employer's lawyer to try and negotiate and change the Contractors' standard contract and conditions.

(d) Construction of Contract Documents

It is perhaps unwise to provide that priority should be given say to general conditions over and above a schedule of prices or technical documentation forming part of the contract. Some contracts state that priority should be given in the event of ambiguity or contradiction to the agreement and to the schedule of prices. They have priority over general conditions and over technical documents. If a lawyer does not understand technical documentation the result could be to upset the balance of the normal rules of construction.

On-shore Contracts

These are referred to in clause 1 of the Form of

Agreement in Appendix 1 on page 34. They comprise the Form of Agreement, General Conditions of Contract, Special Conditions (if any), the Specification and Drawings (if any) and schedules relating to the description of the works etc. The order of precedence is provided for in clause 5 of the Form of Agreement and under clause 2 of the Agreement, the Contract as defined in clause 1 comprises a "full statement of the contractual rights and liabilities of the Purchaser in relation to the Works" and nothing signed prior to the Contract has any contractual effect. Without such provisions, confusion can often arise as to whether particular documents have been incorporated into the Contract, particularly where different terms have been discussed during the negotiating stage.

4. WORK SCHEDULE

The Contractor being an independent contractor should be fully responsible for scheduling work. Some Employers however think it prudent to lay down hours of work and working days per week.

Oil Company Employers have a tendency to specify within the scope of work not only the extent of the work required but also the procedures to be adopted by the Contractor in executing the work and achieving the principle object. By imposing his own procedures and quality tests and controls over the Contractor the Employer may possibly relieve the Contractor, if the contract is governed by English Law from some express or implied obligations as to the performance of work. So perhaps if any schedule of work procedures are to be annexed to a contract, they should be those of the Contractor and identified as such. One can reasonably expect them to have been fully debated prior to annexation!

5. ARRANGEMENTS CONCERNING TRANSPORT FROM FACTORY TO SITE OF MATERIALS AND EQUIPMENT

On-shore Contracts

This is only briefly dealt with by clause 23 which relates only to provision by the Contractor for adequate unloading and storage facilities on Site and the requirement for consent of the Engineer if the Contractor wishes to deliver before the date specified in the approved programme of work. The responsibility for transport would appropriately be set out in Schedule 1 (description of the works). The cost of transport would be included in Schedule 2 (Schedule of Costs Elements - Materials and Subcontract Materials) (see pages 40 and 41). Risk in the materials remain with the Contractor until take-over by the Purchaser (30.1). The time for delivery will be governed by the approved programme of work (13.1) and Schedule 4 (times of completion).

For more detailed provisions relating to damage to highways, transport of plant and transport of materials, see ICE Conditions of Contract Clause 30, which govern strengthening of and damage to highways and bridges, and transport of Constructional Plant and Materials.

6. REGULATION WITH REGARD TO SPARE PARTS

On-shore Contracts

This is not specifically dealt with in the general conditions of contract, but may be included in Schedule 2 (Schedule of Costs Elements - Field Commissioning) (see page 41).

7. REGULATION WITH REGARD TO MAINTENANCE EQUIPMENT

On-shore Contracts

This is not specifically dealt with in the general

conditions of contract but may be included in Schedule 2 (Schedule of Costs Elements - Construction Equipment and Tools) (see page 40).

8. DELIVERY OF WORKS - PASSING OF RISK - TRANSFER OF TITLE

On-shore Contracts

This is specifically dealt with by clause 24 - Ownership of Plant and Materials. Property in the plant and materials rests with the Purchaser following delivery to the Site.

Where plant is being assembled and installed on the Purchaser's property and commissioned by the Contractor, it could in theory be argued that the Contractor should retain ownership of and liability for the goods until take-over when property and risk would pass. This solution is however often inpracticable since the Contractor will require a substantial payment for the value of the goods when delivered and the Purchaser will require security for the money paid.

Risk however remains with the Contractor under 30.1 until take-over by the Purchaser. This must of course be (unless otherwise agreed) expressly stated, in the absence of which the Purchaser as legal owner of the plant, will find himself treated as the person upon whom liability for any loss or damage falls. Agreement may be reached that the Purchaser will assume responsibility for taking delivery and storage of parts until needed and that while the Purchaser is actually handling or storing the Plant, risk remains with the Purchaser.

9. INSPECTIONS AND TESTS

On-shore Contracts

Inspection and off-site testing is dealt with in clause 21 which incorporates provision for notice to be given by the

Contractor to the Engineer before delivery to site. Clause 21 contains no provisions for reasons to be given for rejection or for the Engineer to be entitled to request only such tests as are reasonable. If the Purchaser wishes to impose special testing procedures over and above the Contractor's normal internal procedures it is desirable that these be clearly defined in the specification to enable the Contractor to allow for these in his programming. Clause 34 relates to Performance Tests. This clause is however only relevant if the Contractor has given specific guarantees in respect of the performance of the plant. (see also Guide Note K).

10. PACKING AND MARKING

On-shore Contracts

This is not specifically dealt with in the general conditions of contract.

11. TIME FOR COMPLETION - DELAY

On-shore Contracts

The time related provisions are contained in clauses 14, 15 and 16.

The times for completion are to be inserted in Schedule 4. Clause 14.1 contains a mechanism whereby the dates may be completed after execution of the Contract (subject to reference of any dispute to the Expert if the Contractor and Engineer cannot agree on completion dates) to enable design work and planning to proceed to a point where the Engineer and Contractor can agree on target dates. Under 14.3 the Engineer is given power to suspend performance of the works but no power to order acceleration.

Clause 15 contains provisions relating to delays and extensions of time. The Contractor will be entitled to an extension of time where he is delayed "by any matter not under his reasonable control (including an instruction by the Engineer) which affects the programme of work". An extension of time is also apparently permitted in cases of Force Majeure under clause 43. In that clause Force Majeure is, to some extent, defined.

The liquidated damages provisions are contained in clause 16. This is the standard form of liquidated damages clause whereby the Employer is entitled to claim damages for delay in completion which are automatically calculated in accordance with the length of the delay. Under English law the real extent of the Plaintiff's loss is irrelevant where a valid liquidated damages clause applies, and the Plaintiff will recover the precise amount calculated in accordance with the liquidated damages clause whatever his actual damage may be, unless the clause is held to amount to a penalty i.e. no a genuine pre-estimate of damage. To be declared a penalty, the amount of liquidated damages would have to be wholly unreasonable and the onus would be on the person attempting to attack the clause.

There are no bonus provisions.

12. PRICE

(a) Intrusion by Government Agencies

Many countries have set up agencies the object of which is to ensure that the Employers of pipeline laying operations give every opportunity to the local industry to get involved with the provision of goods, services and expertise relating to the exploitation of that country's oil and gas resources; in some cases this may involve specified pricing provisions.

(b) Export Credits

It is usual to bind the Contractor to give such information, to supply such documentation and to complete such forms as the export credit agency involved (if any) may require. The qualification limiting this to "reasonable requirements" should not be accepted since some government export agencies make unusual demands.

(c) Open ended price

Decisions of the English Courts have been given to the effect that, where all other elements are contracted and agreed, a stipulation to agree a price at a later date does not necessarily invalidate the contract. It seems that the Court will grant an Order for the parties to go away and reappraise the situation and report back on the price agreed. It is suggested that this is not very satisfactory and that the parties should use every endeavour to agree comprehensive schedules of rates and prices not only for the principal work but also for additional work that might be ordered.

(d) Rates

The construction of off-shore pipelines is generally on the basis that Contractors are paid on a day rate and cost-plus basis, at any rate so far as the North Sea is concerned. Day rates are payable for the Contractor's own equipment. So far as sub-contractors services and materials are concerned, Contractors are reimbursed on a cost-plus basis, the "plus" being a mark-up to cover handling and administration.

The construction of on-shore pipelines are more frequently contracted on a lump-sum basis, but sometimes on a reimbursable basis or on a mixture of the two systems.

(e) Bonus Payments

These are arrangements whereby employers pay bonuses linked to speed of construction and completion of part of the works by

certain dates. The Contractor will undoubtedly argue that he should be entitled to his bonus if he would have achieved a date but for matters outside his control, for example, an event of Force Majeure, bad weather, interference by Third Parties or causing instructions delay from the Employer. It is really a question of risk apportionment between Employer and Contractor. Whether that should be the same apportionment as under the main contractual clauses is a matter for debate.

(f) Currency

A very substantial proportion of pipelaying contracts in the North Sea were awarded to non-UK companies. There was a time when the English Courts would not make awards of damages in currencies other than sterling. Since the case of Miliangos v. George Frank (Textiles) Limited (1976) AC 443, claims made in foreign currencies will, where appropriate, be accepted by the English courts considered by the English Courts in relation to those currencies and judgments given and enforced by the English Courts in those currencies.

Employers should therefore expect to pay in the currency of the contract whatever the rate of exchange prevailing as between his own currency and the contract currency is as at the date of payment. The Employers may well be advised to buy forward to cover the risk of foreign exchange fluctuations.

So far as the Contractor is concerned, he would not normally expect to bear the risk of foreign exchange fluctuations. If there is a contractual term requiring him to do so in any respect then the contract should fix the actual exchange rates. Contractors often tender on the basis of fixing their own tender price having regard to certain foreign currencies payable to sub-contractors. There may well be a range of sub-contractors each with his own quoted day-rates or lump sum price in his own particular currency. Some contractors approach the problem by stipulating that a fixed percentage of either lump sums or day rates (as the case may be) should be varied in accordance with variations in

the rates of exchange between the currency of the contract and the currencies in which the Contractor has to pay his sub-contractors.

(g) Exchange Control

During the construction period local legislation may change in the countries of the Employer, the Contractor or sub-contractors. Exchange control consents may be rescinded. Contracts should normally contain a provision in such circumstances that the contract should not be voidable at the instance of any party and then provide for some solution. The Contractor may have to accept payment being made into blocked accounts of amounts equal to the payment in question converted into the appropriate currency at say the mid-market rate of exchange on the day when the payment is made.

On-shore Contracts

Under the provisions of clause 38 the Contract Price is to be calculated in accordance with the provisions of Schedule 2 (Schedule of Costs Elements), Schedule 3 (Schedule of Rates and Charges) and clause 35 (liability for defects).

Schedule 2 sets out a typical list of main cost elements under the headings, Home Office, Construction Equipment and Tools, Materials and Sub-Contract Materials, Field Office, Field Labour, Field Costs, and Field Commissioning.

Those cost elements identified in Schedule 2 which are chargeable to the Purchaser at other than net cost will require a corresponding entry in Schedule 3 which lists the rates and charges to enable the relevant parts of the Contract Price to be calculated. Reference is made under Schedule 3 to Rates for Home Office Personnel, Rates for Field Office and Field Supervisory Personnel (including commissioning), Travelling and Subsistence Allowances, Reprographic Rates, Computer Rates, Construction Tools and Plant, Field Labour, Procurement Rates and Fees.

13. PRICE ESCALATION

Prior to the first major oil crises in 1973 escalation formulae in construction and supply contracts, whilst not being uncommon, were not regarded as being usual. Now it is the norm. Some Contractors have been using price variation formulae to escalate the contract price rather than to vary the contract price to reflect inflation. Some countries like the UK, are pursuing anti-inflation policies. Where price reductions are encountered, if an Employer is expected to reimburse a Contractor for increased costs, so a Contractor should afford the Employer the benefit of any decrease in prices.

On-shore Contracts

Where the Contract is wholly reimbursable, escalation will only apply to the rates and charges given in Schedule 3. Reference is made to escalation in Guide Note R.

Where the price contains lump sum elements see Guide Note S. Where there are substantial lump sum elements, it may be necessary to incorporate provisions from the Model Form of Conditions of Contract for Process Plants Suitable for Lump Sum Contracts published by the Institution of Chemical Engineers (the Red Book).

14. TERMS OF PAYMENT

(a) Timing

A reasonably short period should normally be stated within which payment certificates must be issued. A payment certificate should not be held up simply because some minor matter remains unresolved. Contractual conditions should provide a mechanism whereby deductions can be made in respect of such minor matters. Contractual conditions should normally deal with what happens if there is non-compliance.

(b) Interest on late payment

Under English Law it is necessary to have express contractual provisions prescribing the payment of interest for late payment. The case of London Chatham, and Dover Railway v. South Eastern Railway (1893) AC 429 decided that there is no custom of trade or mercantile usage in relation to building contracts which entitles any person to interest for the late payment of any sum unless and only to the extent that the contract provides otherwise. If proceedings are actually taken then interest can be awarded at the discretion of the English Court or English Arbitrator for whatever period is deemed appropriate. It appears however that if a person pays up just before proceedings are commenced that this effectively prevents the injured party from recovering interest in the absence of contractual provision.

On-shore Contracts

This is governed by clause 39 which provides for payment by monthly instalments unless otherwise specifically provided in the Contract. In brief, the procedure to be followed is that the Contractor submits a request for payment each month to the Engineer, the Engineer certifies within 7 days subject to any further information which the Engineer may require from the Contractor, and the Purchaser shall pay within 14 days of receiving the certificate.

Such interim certificates are not binding or conclusive as to the quality of the work performed by the Contractor. In view of the provisions of the arbitration clause (46) it would also seem that a certificate is not a condition precedent to payment since the Arbitrator under 46.2 has power to revise or overrule any decision or certificate of the Engineer.

15. SECURITIES

(A) In favour of Employer.

aa. Bond - Guarantee - Surety

The object of a Bond is to guarantee the Contractors' performance. Problems arise with regard to off-shore pipeline contracts where work is to be performed on a day rate work basis. No bond or insurance company or insurance group is going to be willing to provide a bond for even its most respected Contractor where work of this kind is involved. It will be recalled that in many offshore pipeline laying contracts there is no obligation to maintain and or to repair defects. Because conditions under sea are not easily the subject of inspection and testing, there tends to be frequent changes in the scope of work.

The present system of attaching a standard form or bond to Standard Conditions is thought to be inadvisable. The form of bond should be tailor-made to the contract in question to avoid contractors charging heavily for the risk in making their tender or in some cases to avoid the best Contractor not being prepared to tender at all. Contractors are nervous about the collectibility of sums secured by bonds, guarantees, letters of credit or surety contracts because in recent times there have been some unjustified call-ins. The contract should make it clear that sums secured by such documents should only be collectible on default. Contract conditions should clearly specify the circumstances in which such sums may be called and should specify the specific form of proof required from the Employer in such event. Thus, for example, if bonds are to be issued on demand then they should be collectible only against the issue by the Employer of a counter-guarantee issued or confirmed by a prime Bank in the Contractor's country and payable upon judgment or award. An alternative suggestion is to provide that the bond moneys should be paid by the guaranteeing bank directly into an escrow account, in a neutral country, from which they will be collectable by the Employer if and when and to the extent that a judgment or award

is made in his favour. Failure to take these steps means that a Contractor will price against the risk in his tender.

bb. Bid-Advance-Performance-Warranty-Security

See comment below.

cc. Letter of Credit.

The provision of a Letter of Credit is no guarantee of performance. It is simply a system of enabling the Employer to draw on it for certain specified reasons, such as:

(i) in respect of liabilities incurred by the Employer against Third Parties where the real responsibility lies with the Contractor;

(ii) in the UK in respect of the Employers' potential liability for tax under certain provisions of the Finance Act on profits or assessed profits of a non-UK Contractor performing exploitation activities for the Employer in UK designated waters.

It is a well-established principle of international law that one country will not enforce the tax law of another country so that there is little point in dealing with the matter under the contract by way of warranties or indemnities. The amount of the Letter of Credit under English Law jurisdictions must be reasonable so as not to be deemed a penalty.

dd. Retention Monies.

The object of the Employer retaining money upon the payment of the Contractor's monthly certificate is to procure compliance by the Contractor with any obligations that he might have to (a) maintain the works and (b) to repair any defects in the completed works. Where an offshore pipelaying contract is concerned and there is no obligation for running maintenance or to come back to site and repair defects, it is possible that the use of a retention clause might be regarded as a penalty.

On-shore Contracts

Provisions are made in clause 36.4 for the Contractor, if required by the Purchaser, to tender a bond or guarantee by a bank or insurance company of good commercial repute in the event of failure to pass performance tests or revocation of the Acceptance Certificate under clause 36.6.

Three types of bond or bank guarantee which the Contractor may in the normal course of events be required to provide are:

(i) Advance payment bond

(ii) Contract performance bond

(iii) Maintenance or retention bond.

16. MODIFICATIONS

(a) It would appear to be fair to have a clause that variations which exceed a certain percentage of the original contract price, say 15 %, may not be ordered by the Employer if the Contractor is able to demonstrate to the Employer that the acceptance of such a variation would create for him problems of a non-financial nature or financial problems which are not covered by the contractual mechanism or which he cannot overcome. A variation of over 15 % would probably be regarded as changing the character, the quality or the kind of works. The Contractor may not have the capacity to undertake such a variation; his staff may be employed on other projects. The 15 % may be regarded as cumulative, that is to say, that variations already ordered say two variations of 5 % each, would in such circumstances only allow a further variation of 5 % within the contract rules.

(b) Where a Contractor has undertaken to carry out and complete the work at a certain price, he is usually bound to do so, however expensive it may turn out to be. Quite often a Contractor will claim a variation to try and cover the additional cost

involved. A variation clause may also often be used by a contractor who has underbid his tender.

(c) It is difficult to specify exactly in the contract documents the complete content of the contract works because there is always the element of the unknown or the unexpected occurring. A variation in quantity is perhaps easy to argue by a Contractor when the clauses appearing in the FIDIC and ICE General Conditions of contract state that the quantities set out in the bills of quantities are the estimated quantities.

On-shore Contracts

Variations are dealt with by clause 17 of the Contract. The Contractor has no power to object to any variation order and must comply with it save to the extent that he may notify the Engineer under 17.3 if in his opinion the variation order would defer completion of the Works or under 17.4 if in his opinion compliance with the variation order would prevent or prejudice him from or in fulfilling any of his obligations under the Contract. After a notification under 17.4 the Engineer must reconfirm the variation order for it to become binding. The Contractor may also object to a variation order if the cumulative effect of that variation order and previous variation orders would increase or decrease the first agreed estimate of the value of the Contractor's services by more than 25 %.

17. WARRANTY

On-shore Contracts

There is no provision for warranties in the standard form.

18. GUARANTEES

Under English Law liquidated damages, which are not a

genuine pre-estimate of loss likely to be incurred by the Employer constitute a penalty, the effect of which is to make the liquidated damages clause unforceable. English Law on the subject is clearly stated in the leading case of Dunlop Pneumatic Tyre Company v. New Garage and Motor Company (1915) AC 79. It must be recognized that the tests laid down in that case are not always easily applied in practice. Lord Dunedin stated the basic principle as being "the question whether a sum stipulated is a penalty or liquidated damages is a question of construction to be decided upon terms and the inherent circumstances of each particular contract judged as at the time of making of the contract, not at the time of the breach". He went on to say that "it will held to be a penalty if the sum stipulated is extravagant and unconscionable in amount in comparison with the greatest loss that could conceivably be proved to have followed from the breach".

The Dunedin test is applied in different ways and different circumstances:

(a) where there is a single obligation, upon the breach of which a sum becomes payable, if the loss caused by the breach in question can at the date of contract be accurately or reasonably calculated in money, the fixing of a larger sum by way of liquidated damages will almost certainly be treated as a penalty.

(b) where there are several obligations upon the breach of any one of which a sum becomes payable, the problem is more complex. The test is still the same. The problem occurs where there is a wide discrepancy between the consequences of the various breaches contemplated by the clause in terms of seriousness. How can one say that <u>one</u> lump sum could possibly be a genuine pre-estimate of damage relating to such a variety of breaches? Perhaps a safer way of proceeding is to insert an estimate under each appropriate heading.

On-shore Contracts

A form of guarantee to be given by a third party guarantor to the Purchaser is contained in Appendix 2.

19. LIABILITY

(a) Consequential Losses

Relief is usually given to the Contractor from liability for consequential losses incurred by the Employer as a result of defective work.

(b) Contractors Default

Contractors grudingly accede to a duty to re-perform a service or part of it in the event of their default. Whilst the Contractor might be prepared to take on liability for incidents arising from the works, the Contractor is not normally prepared to take on liability for the employers personnel and property and third party liability irrespective of to whom fault in relation to such liability was attributed. Some Contractors insist on inserting an express term to the effect that should the Employer be negligent or in default then the responsibility for whatever happens as a result will be his.

(c) Increase of cover

Contractors are also keen to limit their financial liability under contracts. Some contracting companies carry extremely low insurance to cover their liabilities and will gladly increase the limits that their insurance cover necessarily imposes provided the Employer pays a premium.

On-shore Contracts

Under the provisions of clause 44 the Contractor's liability for breach of contract and for making good defects after

take over by the Purchaser (excluding liability arising under the insurance provisions) is limited to an amount to be stated in the Form of Agreement. Under this clause the Contractor's liability for breach of contract is also limited to exclude certain consequential loss.

Prior to take over and for the period of 12 months following take over the Contractor's liability for defective work is governed by clause 35 (Liability for Defects).

20. INSURANCE

The Employer may need either to self-insure or to obtain all risks insurance in respect of goods and construction work from the time that risk passes.

On-shore Contracts

Clauses 30 and 31 are relevant in this connection.

Under clause 30 the Contractor is responsible for all plant and materials until take-over by the Purchaser but only to the extent that (subject to certain exceptions) he is entitled to be indemnified under the terms of his insurance policy. Any costs of making good damage in excess of those sums recoverable under the policy can be recovered by the Contractor from the Purchaser as part of the Contract Price (30.4).

The insurance provisions are contained in clause 31. Clause 31.1 (a) relates to plant and materials. Clause 31.1 (b) relates to loss or damage to other property and liability in respect of death or personal injury to third parties arising out of the performance of the Contract.

21. CANCELLATION

On-shore Contracts

The rights of the Contractor in the event of failure by the Employer to make payment in due time are contained in clause 39.5 whereby the Contractor is entitled, if such failure continues for 28 days after giving notice, to suspend performance of the Contract until payment is made. Under 39.6, if the suspension continues for 4 months the Contractor may terminate and the provisions of clause 42 are to apply.

Clause 41 relates to Contractor's default (i.e. bankruptcy/ liquidation - otherwise not defined). In addition to his other remedies, the Purchaser is entitled to take possession of Contractor's equipment, etc. on the Site and to have a lien on them pending completion of the Works and payment by the Contractor of all damages due.

22. TERMINATION

(1) Termination by Employer

Most Employers take a power to terminate a pipelaying contract at their discretion during the currency of the contract. This could occur because of a change in the overall pipelaying scheme involving the abandonment of the line under contract in favour of an alternative network. Or this could occur because the economics of the field development had changed so dramatically (say due to a change in the taxation regime or a substantial fall in the price of oil and gas) as to make the continuance of the project uneconomic for the Employer. A third possible reason would be that the Contractor's performance and the difficulties encountered say on the sea bed were so appalling as to make the Employer want to cut his losses in circumstances where he could not show that the problems were entirely or even mainly attributable directly to default by the Contractor. In such an event a

Contractor would expect to be compensated for his reasonable and proper loss and the contract would spell out how this must be calculated. Under English Law the level of compensation set by the Contractor must not be so high as to amount to a penalty. Provision must be made for mitigating steps able to be taken by the contractor to be taken into account, such as the use of pipe-laying equipment elsewhere or the use of labour elsewhere. To the extent that a local law system does not provide a duty on the Contractor to mitigate the rules should be spelt out in the contract.

(2) Termination due to default of Contractor

There is always the problem of the Contractor who undercuts his price to provide continuing employment for his workforce and equipment and then finds himself in financial difficulties which, coupled with other events, may well lead to the appointment of a Receiver or Liquidator. One then is faced with the problem as to whether the Liquidator can or cannot renounce the contract but it is usual to provide that the appointment of a Receiver or Liquidator is an event that enables the Employer to terminate the contract.

Another event that gives rise to termination is where the Contractor is substantially in breach of contract. It is desirable in order to avoid argument to define the expression "substantial". There is then the problem of taking on employees and plant. Even in such circumstances there is no guarantee that labour working on the site would be prepared to make itself available to serve a new Contractor. There can also be problems with loaned or hired plant and equipment where the standard terms of hire preclude the Employer's remedy of taking over such plant allocating it to a new Contractor for the purpose of completing the works. It is doubted whether a legal framework can provide sufficient safeguards for what is essentially a practical matter. The track record and capability of respective Contractors is

something that Employers examine very carefully before letting the contract.

(3) Termination for other reasons

The question arises as to the apportionment of risk between Employer and Contractor to cover such contingencies as, offshore, say freak weather leading to a complete breakdown of safe construction of a gas pipeline, and, onshore, say of a band of insurgents intent upon pipeline destruction or the wrecking of pipelaying equipment in support of some sort of industrial dispute. From the Contractor's point of view anything which occurs beyond the reasonable control of either party which causes an interruption or slows down or even prevents work should be regarded as an event of "Force Majeure". From the Employer's point of view the Contractor should bear some of the risk in having his tender accepted for the works and consequently the Employer prepares a list of matters which constitute his opinion in the events of Force Majeure.

To what extent does a Contractor have control over his own workforce? Should he bear the risk of delays due to industrial disputes? Should the Employer be exposed to any financial risk due to industrial disputes other than the consequences arising from delay in completion? Why should for example day rate payments continue to be paid to a Contractor during the continuance of an industrial dispute?

Should not the Contractor take the risk of mechanical or equipment breakdown? The weather conditions for the site in question must be known and the pipelaying barges surely must be designed to accommodate those weather conditions. Personnel operating pipelaying barges presumably are skilled enough to know when bad weather is likely to occur. Why therefore should day-rate payments continue to be made to Contractors during periods of pipelaying barge breakdown due to adverse weather? In some contracts clauses have been introduced allowing a wait and see period. If a problem is overcome during this period then the

Contractor continues to get paid full rates. If the defect is not remedied then various scales are introduced allowing for the payment of reduced rates with an appropriate cut-off.

On-shore Contracts

Where this is due to force majeure clause 43 applies, with either party having the option to terminate if performance of the Works is substantially prevented by force majeure for a continuous period of 4 months.

The Purchaser may order termination of the Contract under clause 42. Under clause 42.5, the Contractor is entitled to be paid under the terms of a termination certificate to be issued by the Engineer within 3 months of the Contractor's withdrawal from site or within 3 months of receipt of the termination order. On termination, the Contractor is obliged to assign rights and deliver drawings and other documents to the Purchaser.

23. INDUSTRIAL PROPERTY RIGHTS

Most pipeline arrangements between Employer and Contractor relate only to the performance of work utilising coated pipelines furnished by and belonging to the Employer. In such cases the question of ownership of goods does not arise. However, with increasing technological advances there is often the question which now tends to arise of a mixed supply of goods and services. Some long pipelines require intermediate structures with plant and equipment on them relating to the operation of the pipeline. The time of passing of ownership and risk in the physical property can be of considerable importance. The Employer would like to have property rights as quickly as possible and to leave the risk with the contractor or the supplier for as long as possible. The supplier would like to pass the risk immediately the equipment has passed out of the factory gates.

The pipeline system may well involve original design work. Provisions should therefore be made in construction contracts for the ownership of the design and of all drawings showing the works to pass to the Employer. It should also be provided for copyright in the designs and drawings to pass to the Employer because after all he has paid the contractor for them. To what extent an Employer may also be entitled to the benefit of technical innovations which may have been created as a result of the Contractor being paid by the Employer for design work is a matter for negotiation. Technical innovations which would no doubt be protected by patent arise from the Contractor's own expertise notwithstanding that he has been paid for them and that they arose due to the nature of the works in the course of a specific conflict.

On-shore Contracts

This is dealt with by clause 7, providing an indemnity against protected right infringement, for the Landlord of litigation and a warranty by the Purchaser in respect of furnished designs.

24. STOPPAGE OF THE WORKS AND SUPPLIES

Clearly there should be power to suspend work and order investigations on any sign of failure or defects in the work. The cost should be to the account of the Contractor if the failure or the defects are due or found to be due to defective work carried out by the Contractor. If not, the costs fall on the Employer, unless the Contractor takes full risk of defective ground site conditions, defective materials or adverse climatic conditions. The power should also be taken to open up further similar areas of work if the Contractor's work has been shown to be defective in any one place and that this is a reasonable step to take. Such investigations should be at the expense of the Contractor. Contracts should also contain provisions whereby the permanent work can be varied without extra cost to the Employer if it is more

practical to have variations implemented as opposed to reconstruction.

On-shore Contracts

This is dealt with by clause 14.3 under which the Engineer is entitled to order the Contractor to suspend performance of the Contract. Under clause 14.5, if this suspension lasts for a continuous period of 4 months and the Engineer fails to respond to the Contractor's notice, the Contract shall be terminated.

25. ASSIGNMENT

On-shore Contracts

This is dealt with in clause 8.1. and permitted with consent.

26. SUB-CONTRACTING AND SUB-SUPPLYING

Where the Employer permits sub-contracting but reserves himself the right to nominate who the sub-contractors shall be, then the case law of English Law jurisdictions indicates that in certain circumstances a Contractor may be relieved from his obligations to the Employer with respect of performance of the work where that work should have been performed by a sub-contractor nominated by the Employer. It is probably better for the Employer to approve sub-contractors chosen by the main Contractor rather than to nominate. (Some of the English Law cases are Gloucestershire CC v. Richardson (1969) 1 AC 480 and Vickerton v. North West Metropolitan Regional Hospital Board (1970) 1 WLR 607).

If the Employer involves himself in approving the terms of the sub-contracts to too great an extent, then the Employer may inadvertently relieve the Contractor of some of his obligations. Surely it is sufficient for the Employer merely to satisfy him-

self in general terms as to the competence of any sub-contractor and to approve the business terms of the arrangement i.e. the amount and method of payment, the warranties as to quality and performance of the work and insurance matters, and leave the other matters to the main Contractor.

On-shore Contracts

This is dealt with in clauses 8.2 - 8.9 and 9. The prior written consent of the Engineer is required before the Contractor may enter into any sub-contract (8.3). Sub-contractors must be bound to observe terms corresponding to the general conditions of the main Contract (8.4.). In sub-contracts for supply of materials, the Contractor must use his best endeavours to obtain appropriate guarantees in respect of materials, workmanship and fitness for purpose (8.5).

27. GOVERNING LAW

Some construction contracts relating to the oil and gas industry provide that the rules of commercial law generally acceptable in the countries of Western Europe shall apply as governing law. It is surely better to plump for some specific law with a well-known track record for fairness and equity.

It is normal for the contractor to undertake to comply with local law and with the duties imposed by that law, i.e. the lex situs. The Employer should not give itself so many areas of inspection and approval as to reduce the Contractor's liability in this area.

Sometimes the Employer from the public relations point of view is very concerned to see that Contractors comply with safety requirements, arrangements and devices. In this connection the Employer reserves to himself the right to inspect and approve.

On-shore Contract

See clause 2.1 of standard conditions.

28. SETTLEMENT OF DISPUTES

On occasions a need arises for urgent decisions to be made. Contracts should therefore provide a mechanism whereby an arbitrator can give an interim decision in a short space of time. If this is not feasible for any reason then one could build in a mechanism by referring the point in question to referee, along the lines presently being studied by the International Chamber of Commerce in Paris and by other bodies concerned with arbitration matters. Some contract conditions permit quasi-judicial review by the Engineer of his own decision. Such a clause is only favoured by Employers who wish to make things more difficult for the Contractor. It certainly makes things difficult for the Engineer.

Where the contracting parties' first language is English, English Law is often chosen as the governing law with a reference to arbitration in England. Such arbitrations are not final and binding but either party if dissatisfied with the arbitration can state a case to the English High Court with Appeals to the Court of Appeal and House of Lords. The advantage is that there are clear rules and the arbitration is relatively cheap compared say with an arbitration under the rules of International Chamber of Commerce in Paris. The new Arbitration Act of Hong Kong has additional benefits.

On-shore Contracts

See clauses 45 and 46. Certain disputes are expressly made referable to an Expert to be agreed between the parties or in the absence of such agreement to be appointed by the President for the time being of the Institution of Chemical Engineers on application by either party. Such disputes are to be decided by the Expert as an Expert and not as an Arbitrator. Any dispute referred to an Expert under clause 45.1 thereupon ceases to be referable to arbitration under clause 46.

See also Guide Note Q.

29. NOTICES AND ADDRESSES

On-shore Contracts

See clause 5 of the standard conditions.

30. PARTIAL INVALIDITY

On-shore Contracts

This is not dealt with under the standard conditions.

31. REGULATION OF NON-REGULATED MATTERS

On-shore Contracts

Statutory and other obligations are dealt with under clause 6 of the standard conditions.

32. COMPLETENESS CLAUSE

On-shore Contracts

This is contained in clause 2 of the form of agreement in Appendix 1.

33. WRITING CLAUSE

Oral amendments should be prohibited.

34. LANGUAGE

On-shore Contracts

There is no specific clause relating to this in the standard conditions, but the language of the law of the Contract should perhaps prevail.

35. CONTRACT COSTS

On-shore Contracts

These may be included as reimbursable costs under Schedule 2 as a main cost element under Home Office - "Legal" or "General Administration and Overheads".

36. RIGHT TO WITHHOLD PAYMENT OR TO OFFSET

On-shore Contracts

There are no specific set-off provisions in the standard conditions.

37. ANNEXES

On-shore Contracts

See clause 1 of the Form of Agreement and Guide Notes for the Preparation of the Schedules.

38. REGULATION WITH REGARD TO EXPORT LICENCE AND IMPORT LICENCE COSTS; DELAY ETC:

On-shore Contracts

These are likely to be included as reimbursable items in Schedule 2 under "materials and sub-contract materials - licences, duty and tax".

39. SECRECY

A clause should be inserted placing an express obligation on the parties to keep confidential information imparted by one party to another of a confidential nature and which is clearly identified as having the quality of confidence. The party re-

ceiving confidential information would be put under an obligation not to make unauthorised use of it. Under English Law an injunction can normally be obtained restraining not only the person making unauthorised use of the information being the person to whom the information was originally imparted but also against a person receiving that information in a situation whereby that person knew or reasonably ought to have known that such information was protected as confidential. The leading case is Coco v. A.N. Clarke (Engineers) (1969) RPC 41.

On-shore Contracts

This is dealt with in clause 18.

40. COMPLETION CERTIFICATE

In general, the issue of a completion certificate signifies only two things: firstly that the works have been completed; secondly that the works are free from apparent defects. After the issue of a completion certificate the Contractor will remain liable in respect of latent defects for maintenance in accordance with contractual conditions relating to maintenance, and for partial or total collapse. These matters and similar matters are governed by the law made applicable by the contract. That law defines the extent and duration of such liabilities.

The question of the Contractor giving as warranty that the works constructed will stand up to use by the proposed operation becomes particularly important in relation to the acceptance of the work by the Employer and to questions of maintenance and repair. The provision of off-shore construction expertise in the laying of off-shore pipelines has perhaps initially been very much a seller's market and Contractors have been able to refuse to accept any obligations with regard to a maintenance period for the construction works they had performed or with regard to returning to repair defects not immediately apparent at or before the time of the hand-over and acceptance. This has been reflected

in the fact that many contracts have been on a day-rate work basis rather than on a lump-sum basis. So far as off-shore laying of pipelines is concerned, equipment is often fully committed and difficult to acquire for repair work and in any event Contractors ask to be paid full day-rates throughout the repair period.

Transfer of Technical Know-how in Pipeline Construction Projects

by

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INTRODUCTION

Building a pipeline of international dimensions is tough business, not only for the pipeline contractor but also for the Employer.[1/] Whereas the Contractor's primary concern is, to have the engineering, procurement, construction, start-up, testing and commissioning done in time and proper workmanship, the Employer is faced with problems of providing suitable right-of-way, co-ordinating the work progress with other activities such as processing plant construction or construction of connecting pipeline systems. In addition, financing must be assured and moneys permanently be available to cover Contractor's monthly invoices in considerable amount. During all pipeline construction projects of international calibre, technical disputes, as well as claims for cost and additional time come up. In some of those projects extraordinary situations such as uproar of rebels in areas where the pipeline is laid or destruction of the ditch due to extremely bad weather conditions can put the entire project on a different basis and create sheer invincible problems for Contractor and sometimes more for Employer. Political risks leading to embargoes or even complete stop of the works at site have to be added.

Apart from all these hindrances and incumbrances, from a national viewpoint the question of the advantage of the project for the national economy comes up. Of interest in our discussion is not so much the direct financial advantage of high transmittance fees flowing everyday of operation of the pipeline system into the pockets of the national treasury, but something more substantial and enduring: the transfer of technology.

If one compares the various pipeline construction agreements, technology transfer aspects are sometimes not dealt with at all, and in some cases only fragmentary, unsystematically and

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1/ Employer shall mean such body of a developing country which has entrusted the Contractor to build the pipeline system. Employer is often the relevant National Oil and Gas Company or an affiliate or subsidiary of it. Employer may be operating and maintaining the pipeline or not.

without understanding. Text books on pipeline construction contracts do not exist and even those on general construction law are normally silent on this question. Enlightening jurisprudence is not available.

Let us, therefore, in the light of our experience throw some light on the various stages of pipeline construction and see where technology transfer aspects are involved and what should be the appropriate contractual regulation. Prior to that, however, we have to explain what we understand by technical Know-how and Know-how transfer and what is the impact of Know-how transfer in pipeline construction agreements compared with other contracts in which technologies are transferred. A few words should also be said about existing knowledge and experience in the various developing countries concerning design, engineering and construction of pipelines, before we enter on our main theme.

A. DEFINITION OF TECHNICAL KNOW-HOW AND ITS TRANSFER

Without embarking on the fruitless discussions on definition of Know-how, technical Know-how and technology, it seems to us that Know-how is the broadest concept comprising technical, financial, management and marketing aspects. General management skills, financial and marketing capabilities necessary for the successful operation of the pipeline-system as well as contract and project management expertise is therefore not to be considered to be technical Know-how. On the other side technical Know-how seems to be the wider concept if compared with technology. Whereas technology only comprises systematic technical knowledge, experience and skills, technical Know-how could also consist of pure practical knowledge, experience and skills.

For technology as well as technical Know-how only those knowledge, experience and skills are relevant which - patented or unpatented - in written, oral or non-communicated form serve for the manufacture of a product or the application of a process in industry.

For industrial processes and products of high sophistication, like the construction and delivery of overall pipeline systems (including pumping stations), technical Know-how and technology are more or less synonymous. Mere practical knowledge will not enable any Contractor to build a pipeline system. On the other side systematic knowledge alone without application of practical experience will lead similarly to meagre results.

B. IMPACT OF KNOW-HOW TRANSFER IN PIPELINE CONSTRUCTION AGREEMENT

As important as the question of and need for transfer of technical Know-how is, one thing should be borne in mind: Pipeline construction agreements are by nature exchange contracts and not collaborations. Exchange contracts are made to exchange goods or services against a consideration, in most cases: money.[2/] They are normally due for short or medium term execution and different to collaborations not intended to bind partners for a longer period. In financial collaborations (contractual and equity joint ventures) the partners join together in order to reach a common target. The effectiveness of the transfer of technology is the condition for profitable business outcome. Consequently, the foreign partner has an inherent interest in the successful transfer. In technical collaborations (licensing of patented or non-patented Know-how) the main subject of the arrangement is the transfer of technology. Although contrary to financial collaborations, in technical collaborations it is only the local licensee who bears the commercial risk. The foreign licensor has, however, a vital interest in the success of the venture as his royalties - and reputation in case of use of his industrial rights and trade marks - are at risk in case of failure.[3/]

2/ As a consequence of shortage of foreign exchange and non-availability of well functioning marketing systems, some developing and socialist countries have been forced in the past to ask for counter-purchase or buy-back arrangements. This form of barter naturally has increased the price, they had to pay for technologies.

3/ Provided the contract provides for royalties payable upon sales and not upon production or units of production and not for lump sum payments regardless of sales.

In pipeline construction agreements, the situation is quite different. The Contractor makes a variety of supplies and renders a variety of services, all of sophisticated kind, against a price, payable basically according to progress. Such price in most cases will be fully paid up at date of completion and taking over of the works.[4/] When the Contractor has made all supplies and rendered all services and the Employer has taken over the works, the Contractor "walks away", leaving the Employer alone with all his problems of operation, maintenance, purchase of reserve and spare parts and sometimes even defects in the plant.

The more it is of importance to Employers from developing countries, to prepare a clear status of their existing manpower and management capabilities in the area of pipeline delivery and construction and to arrange for clear and effective contractual regulations for the transfer of all such additional knowledge which is necessary for the operation and maintenance of the pipeline system in particular and for the increasing of engineering, manufacture and construction capabilities in the area of pipeline construction in general.[5/].

C. NATIONAL CAPABILITIES AND CONTRACTUAL ARRANGEMENTS

Technological sophistication of a pipeline system can have various aspects: material and length of line pipes and entire pipeline system, medium to be transmitted, pressure and flow diagram, pumping stations, telecommunication systems, instrumentation, monitoring systems and of course conditions of operation. The higher the grade of sophistication the more developing countries have to order supplies, services and expertise from abroad.

4/ Leaving aside small retentions of some 5 % payable upon expiration of warranty period, if not to be released against presentation of bank guarantee in the same amount.

5/ It needs not be mentioned that apart from technical Know-how a variety of knowledge in the area of contract and project management as well as control can be transferred - and this normally without cost.

In areas of generators, turbines, telecommunication, instrumentation, cathodic protection, hydrostatic and non-destructive testing, acoustic pipeline monitoring system and heavy construction equipment, practically only a few European or US companies are competing. Less sophisticated items such as valves, pumps, transformers, motors, wires and cables might be available from the more advanced developing countries. Most developing countries are able to handle civil works to be erected such as housing areas and storage buildings. The same is true for unskilled and to a certain extent for skilled labour such as welders, painters, benders, drivers, electricians and mechanics. Services like catering can in many cases also be provided locally.

It is interesting to see that out of a total of seven gas pipelines built in Bangladesh since 1960 with a total mileage of 1,433 (2,300 kms) at least 2 have been constructed by one or more local Contractors.[6/] However, it is assumed that in those 2 cases as in the 5 others the Bangladeshi Employer was advised by an independent consultant and an engineering consulting firm from the developed world with regard to design and supervision of erection.

Within the ESCAP region there seems not to be any country in which no sources for local supply and local services of any kind are available. The Employer in his national interest will, therefore, have to study the local scene and propose to and request Contractors to make use of available local inputs.[7/] As far as pipeline construction contracts are financed, most international

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6/ Contracts for the Construction of Gas Pipeline in Bangladesh, Country Paper, ESCAP/JNIDO Symposium on Contracts for the Construction of Oil and Gas Pipelines, 30 August to 2 September 1983, Annex I.

7/ Sceptical with regard to economical considerations, Marsh, P.D.V., Contracting for Engineering and Construction Projects, Second Edition, Aldershot/England, 1981, p. 24: "Because of this there will be pressure on clients both in the public and private sectors to maximise on the degree of local involvement in any project even on occasions to the detriment of the economics of construction."

lending institutes demand use of available local consulting and other services as well as supplies.[8/]

To be precise, there are three stages, which the local Employer has to evaluate:

(1) own in-house capabilities,

(2) capabilities available in the country, but not in-house, and

(3) capabilities not available in the country.

The various national oil and gas companies or corporations which have been set up in the countries of the region after the second world war have developed considerable design and engineering Know-how in pipeline construction. In some cases, only reasons of amount of work involved in the engineering of a pipeline system, require contracting with an independent consulting firm. Unfortunately, relevant specialized independent consulting services are often not yet available in the national market.[9/] For these cases, contracting with an experienced foreign pipeline consulting engineering company is the only remaining choice.

For the general design of the pipeline system the Employer might in some cases employ a senior professional highly acknowledged in the international pipeline world to use his vast experience for advice and assistance. Although due to the high

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8/ Clause 3.04 Guidelines for Procurement under Asian Development Bank Loans, May 1981 provides that local purchasing shall be made where local production or construction facilities are available at reasonable cost, efficient and adequate in terms of prompt delivery. In a similar way say Clauses 1.11 and 1.12 Guidelines for the use of consultants by World Bank Borrowers and by World Bank as Executing Agency, August 1981, that local consulting services shall be employed, provided relevant firms are qualified to perform the work either alone or in combination with foreign firms.

9/ International engineering consulting firms in such cases increase their chances of obtaining contracts from Employer by setting up a subsidiary in Employer's country and obliging themselves to train Employer's personnel in their offices; a form of technology transfer with high success ratio!

calibre of the adviser, the fee payable will be substantial, the arrangement in general seems quite reasonable, as it ensures at critical initial stages of the project the avoidance of major mistakes.

Comparing the various arrangements made for the construction of large pipeline systems in the region, a not unusual approach is that the Employer will be advised on major matters by a senior consultant and have the general design prepared by an internationally experienced consulting engineering firm, which will also supervise erection by Contractor. Procurement of linepipes and other materials is in some cases handled by the Employer himself or by his Consulting Engineer on his behalf. In other cases this is part of the overall purchase and construction arrangement with the Contractor. With regard to pumping stations and communication systems, due to the technical complexity of such items and otherwise accruing co-ordination tasks, inclusion in the deal with the Contractor seems to be a preferred choice for Employer. However, in certain cases direct purchase from internationally reputable large electrical companies is also to be found.

On the basis of these more or less usual patterns, we shall now look into the various contract stages and discuss to what extent use is made of possibilities for technology transfer and how relevant flows could be increased.

D. THE VARIOUS STAGES INVOLVED

I. General Design

As said before, the general design of the pipeline system (including pumping stations, telecommunications systems and instrumentation) has in many cases to be provided by independent consulting engineering firms. If not yet existing, Employer has to build up during such stage, in-house technical departments to handle firstly, counterpart administration and, at a later stage

and as a consequence of familiarization with the subject, substantial supervision and control activities. The new technical department will at its initial stage make full use of the experience and advisory capacity of the senior consultant hired by the Employer.

If technical departments within the Employer's organization with qualified personnel do already exist, close co-operation between the personnel and the consulting engineer in the design stage is advisable. A workable solution would be to have most of the design work of the engineering firm done in the building where Employer's technical department is located and to provide some offices in the engineering firm's foreign headquarters for use by counterpart personnel of Employer. Thus a variety of special design knowledge, experience and skills can be transferred to the Employer's personnel.

II. Preparation of Tender Documents

Basically Tender Documents can be divided into a technical and a commercial part. The preparation of the technical part consisting of specifications, drawings, and other technical data requires high technical knowledge and experience in the pipeline construction field. It is normally the duty of the engineering firm employed by the Employer to prepare these essentialia for tendering.

The commercial part is closely interlinked with the technical part of the tender documents and normally prepared by the same body which prepares the technical part. The preparation of comprehensive, non-contradictory and systematic commercial tender documents requires contractual and legal as well as commercial skill. If one reads commercial parts of tender documents prepared by consulting engineers, one sometimes finds that a lot of room for improvement of relevant draftsmanship and understanding of basic legal structures exists. However, we should not go into more details of this important part of the tender documents as we

would then have to discuss dissemination of commercial and management Know-how, which is not our concern here.

In the preparation of the technical part of the tender documents, as already proposed for the design stage, close co-operation between Employer's technical department and the consulting engineering firm is required. This will enable Employer to prepare at least certain parts of the tender documents for similar future projects by himself. We shall later discuss to what extent Employer should be entitled to make use of tender documents prepared by the engineering firm, if he intends to build a second identical pipeline system.

III. Site Visits

Employer's personnel should attend all site visits of interested possible tenderers. Discussion on the spot and various questions concerning climate, meteorological, geological and other physical conditions of ground and sub-surface can clarify or bring to light errors in design and in general promote further understanding of engineering and construction of pipeline systems. Valuable knowledge concerning character of equipment and facilities needed preliminary to and during the execution of the works and handling and storage of materials can be transferred. In addition, during site visits valuable contacts with knowledgeable people and reputable companies working in the pipeline business are made, which will be of great value for future work.

IV. Contract Negotiation

During contract negotiations all kinds of commercial, legal and technical items are discussed. The technical discussions may be very useful as Contractors - sometimes assisted by their Sub-Contractors - might raise interesting technical questions, which if implemented might save a lot of cost or increase Employer's earning by increased efficiency of the system. Technical discussions might also clarify differences in views and therefore serve a useful purpose. However, we do believe that the contract

execution phase on the basis of appropriate contractual regulations gives by far more possibilities for the transfer of valuable technical knowledge than negotiations - might they be short or extend over several months - could do.

V. Contract Execution

1. Inspection, checking and approval of engineering

During the stages of preparation of general and detailed engineering of the pipeline system many possibilities for transferring engineering knowledge exist, both in the preparation itself as well as with regard to inspection, checking and approval.

As the overall responsibility for the engineering lies with the Contractor contributory activities in its narrow sense and shifting of responsibility cannot be recommended. However, actual information dissemination to the technical personnel of Employer through provision of office space and daily or weekly discussion and explanation sessions seem advisable and are often contractually provided for.[10/] Hardly any Know-how transfer will take place if Employer for inspection, checking and approval uses the services of engineering consulting firms, unless - which does not seem to be too difficult - in the consulting engineering contract special provision is made for teaching, explanation and training of Employer's technical personnel through the employed consulting engineering company. In the latter case the engineering contract consists of a separate very practical "on the job" training part. The price of training will be on time basis and consequently within reasonable financial limits. By day-to-day contact of the engineering firm with Contractor and the technical personnel of Employer, the engineers are in a very good position to judge the

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10/ We have seen contractual arrangements where 5-10 offices plus secretarial services for the entire duration of engineering and procurement stage were provided to Employer's personnel in Contractor's head offices to enable Employer to make step by step inspection and checking of engineering work and checking and approval of detailed specifications for the materials and equipment.

technological gap and thus take in their training activities appropriate measures for the narrowing of it.

2. Checking and approval of specifications for purchase of materials and equipment

The specifications provided by Employer to Contractor for the construction of the pipeline do not comprise detailed specifications for materials and equipment. Such specifications have to be prepared by Contractor at a later stage. As far as we can see, the existing internationally practised standard contract provisions do not provide for checking and approval thereof by the Employer or his Engineer.[11/] It is therefore advisable to stipulate relevant contributory activities of Employer in the individual agreement. Employer's technical personnel will thus be enabled to see how specifications for e.g. welding, coating, valves and pumps, are prepared. This might enable Employer in future contracts to do the bulk of procurement by himself and thus to reduce the overall contract price.[12/]

3. Inspection and approval of materials and equipment

Most international standard conditions used in connection with pipeline construction provide for inspection, examination, testing and approval requirements for materials and equipment to be manufactured and/or delivered by Contractor to Employer.[13/] In this context, to ensure the utmost transfer of knowledge, the working out of detailed procedures with involvement of Employer's

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11/ Clause 5.1 of the Conditions of Contract (International) for Electrical and Mechanical Works, FIDIC, 1980 (Fidic E&M) only requires approval of the Engineer with regard to drawings, samples, patterns and models prepared by the Contractor.

12/ The reduction of the contract price is, of course, counterbalanced against the shifting of risk elements to the Employer and the coming up of management obligations for co-ordination of work. Everything has its price!

13/ Clause 25.1 FIDIC E&M, clauses 36 and 37 Conditions of Contract (International) for Works of Civil Engineering Construction, FIDIC, March 1977 (FIDIC - Civil).

personnel seems advisable. To eliminate risks of defects or improper workmanship after taking place of inspections, relevant checks and procedures have to take place during the period of manufacture in the works, transportation, construction and erection. Follow-up inspections give ample opportunity for Employer's personnel to build up comprehensive knowledge and experience.

For inspections and tests of sophisticated material such as line pipes, cathodic protection, coating and welding, in most cases Employers - or Contractors, as may be regulated in the contract - make use of national inspection institutes from developed countries to assure high standards of testing with highly sensitive apparatus. In this case admittedly there is often only limited room for transfer of technological knowledge. However, depending on the technological level of Employer's personnel, it should be carefully checked, to what extent participation of Employer's engineers in the inspection by such inspection institutes can be reasonably arranged.[14/]

4. Local supplies, engineering services and manpower

The use of local supplies and services for the construction of a pipeline system has the direct positive effect for the developing country, in that valuable foreign exchange is saved, industrial production is stimulated and unemployment decreased. The purchase of local raw materials, intermediate goods, parts and equipment[15/] brings about favourable quality checks and improvements.

More important for the transfer of technology is co-operation of local engineers and technicians with the foreign Con-

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14/ In a larger pipeline construction agreement it was agreed that the Employer should appoint "Six of his engineers to work with the inspectors of the inspection institute both at the site and at Manufacturer's works. The inspection institute shall submit to Employer for approval a programme for the training of these engineers and shall endeavour to train the said engineers in all phases of the inspection work."

15/ Such as sand, cement, fencing material, furniture (including office equipment) and in more developed developing countries valves, fittings and small motors.

tractor. How can this be achieved? At first there must be a contractual obligation on the side of the Contractor to make use of available local technical knowledge. If one looks into the various pipeline construction agreements, relevant stipulations are still the minority.16/ In the interest of the project such demands should, however, only be made, if the local supplies and services are of sufficient high quality, if they can be provided in time and if they are available at competitive prices. It is the duty of Employer to properly monitor the fulfilment of Contractor's obligations in this respect, in order to ensure utmost use of local inputs.

With regard to the qualification of local manpower, in some contracts one finds for certain professions, especially for welders, training programmes and final examinations for the local workmen. This seems a very useful arrangement to transfer skills. The Contractor as an experienced pipeline construction company is in the best position to lay down technical requirements needed for proper manual (arc process) or automatic (gas metal arc process) welding.17/ At the end of the training, examinations will be held, which give evidence for the transfer of the required technology.18/ In a more general form one sometimes finds formulations such as:

> "Contractor shall provide staff and equipment to train local workers where necessary to assure an adequate supply of local skilled craftsmen."

If Employer wants to ensure the training results and acquisition of technology he might instruct independent inspection

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16/ The wording of a relevant clause could be: "Contractor for the performance of the Works will make all use of local supplies, engineering and other services as well as manpower, provided that they are competitive in quality, time of delivery and price. Employer will hand over to Contractor within 4 weeks after coming into force of contract a detailed List of Available Local Supplies, Services and Manpower."

17/ International Examination Standards would be: API-1104.

18/ Many developing countries do not possess comprehensive knowledge of the national status of technological know-how. It would be advisable if national professional or technology institutes take relevant development of indigenous technologies through technology transfer on record.

companies (e.g. national inspection bureaus of developed countries such as Technischer Überwachungsverein e.V. (TÜV), Federal Republic of Germany) to attest and give certificates.[19/]

In appropriate cases use of local sub-contractors can be made. Some developing countries possess local coat yards in which line pipes provided by Contractor can be coated. Civil works are usually executed by local civil engineering construction companies, sometimes on the basis as sub-sub-contractor by contract for Contractor's sub-contractor.

5. Operation and maintenance

With successful start-up and test-run, Employer takes over the entire works and starts operation of the pipeline system. Essential requirement for smooth operation of the plant is proper maintenance.

Knowledge of operation and maintenance in most cases must have been transferred from Contractor to Employer at the latest at the date of take-over. Until then, even if commissioning takes place at an earlier date - be it under Contractor's or Employer's direction - the risk for the entire system remains with the Contractor. Consequences of improper handling until take-over will, therefore, be on Contractor's account.

What are the ways and means of transfer of operating and maintenance knowledge in the most appropriate form? Contractual regulations in most cases state in a lapidary form that Contractor shall train Employer's personnel in the safe operation and maintenance of the pipeline system.[20/] Sometimes reference is

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19/ Contract clause: "Contractor shall be responsible to train and qualify all local welders in accordance with the agreed Procedure for Training of Local Welders to the satisfaction of Employer's inspectors, before they are permitted to work at the site."

20/ A relevant clause: "Fournir tous les renseignements et toute aide nécessaires pour permettre à ce personnel d'acquérir une connaissance parfaite de l'installation." Another clause reads: Contractor shall provide all information and assistance to enable Employer's personnel to become fully familiar with the Works, its operation and maintenance."

made to Operating and Maintenance Manuals, which have to be prepared by Contractor and delivered to Employer "in due time". These general regulations are not sufficient. From the outset Contractor should fix the approximate amount and qualification of Employer's operating and maintenance personnel. With the assistance of Employer, required capabilities of Employer's personnel prior to training must be determined to ensure that successful transfer of technical knowledge can take place in the envisaged time. It is advisable to start training as early as possible. Detailed descriptions, plans and drawings especially with regard to equipment to be provided at the job-site, can be explained to Employer's personnel prior to issuance of the final Operating, Safety Instructions and Maintenance Manuals. In countries, for example, Thailand or China, where English is not commonly spoken by the people, training and instructions manuals must beside in the English language be also in Thai or Chinese language. Correctness of translation must be assured. Sufficient copies in local and English language have to be delivered.[21/]

It is advisable to familiarize operators e.g. for the central stations of the entire telecommunications system, early and during construction with descriptions, layout and diagrams etc. of the entire system. Employer's operators shall be explained how to use the measuring, recording and controlling instruments. To this effect i.a. wall diagrams, films and transparencies should be used.[22/] A reasonable regulation would be to provide for training of a certain amount of senior operators and supervisors of Employer on similar plants built by Contractor for a period of, let us say, some three months. Practical training on plants in operation will best enable them to cope with problems in operation of the new plant and to train and guide Employer's own

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21/ For large pipeline systems some 30 copies of each Manual in local and English language each would be an appropriate regulation.

22/ See also UNIDO, Guidelines for Contracting for Industrial Projects in Developing Countries, New York, 1975, Annex XXII (Check List for Spare Parts, Maintenance and Training Programmes).

workers at the operating stage. In addition training has to take place at the job-site.

The training of Employer's workers, operators and supervisors should be completed at the latest during the latter part of the construction phase. Often training is handled by erection personnel and other staff of Contractor available at the job site. This might in some cases not be the best solution as such Contractor's personnel will especially with the approaching of test dates, be fully occupied with their own work leaving no room for additional training.[23/] In such cases it will be more appropriate that additional personnel of Contractor responsible only for the training is brought to the job-site,[24/] even if this causes additional cost, which of course will have to be paid for by Employer. Costs for travel and living allowance of Employer's personnel are normally included in Contractor's price, as such expenses are costs of the overall project.

It seems advisable to describe in the contract experience and give professional data of any trainer, who shall be engaged in training activities of Contractor at site or in the works.[25/]

6. Start-up - Test-Run - Commissioning

During these crucial phases of construction of the pipeline system proof must be given that the system is able to work under various operating conditions and that the training provided to

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23/ A relevant clause in particular Tender Documents reads: "All costs of operators/instructors at the job-site will be borne by the Contractor who may use staff available at Site for this purpose and the Contractor shall ensure that the progress of the Works is not affected as a result."

24/ It seems worthwhile for Contractors to consider the establishment of a separate technology transfer unit within their project organization which has to ensure by appropriate action utmost transfer of technology in the most efficient good time. Of course, such units should be involved already during contract negotiation and drafting of relevant clauses.

25/ In one contract comprehensive training and experience résumés for each supervisor, engineer and specialist of Contractor assigned to the project were laid down in a special Annex.

Employer's operators, supervisors and workmen was successful, thus enabling Employer to properly operate the pipeline system. Only if relevant evidence is shown, take-over shall take place.

It seems therefore in the interest of appropriate transfer of technical knowledge and its assurance by the Contractor not advisable to have commissioning done by the Contractor, but by the Employer under the supervision of Contractor.

Commissioning activities have to be prepared and laid down in detail well in advance. Contractor should prepare and deliver to Employer (and for approval of Employer's engineering consulting firm) a detailed Commissioning Programme at the latest some 4 months prior to intended start of commissioning, and Test-Run Procedure at the latest 2 months prior to intended test-run. Such programme should contain names, duties and responsibilities of Employer's commissioning team and of Contractor's supervision personnel. The Test-Run Procedure should specify on the basis of the design specification, temperatures, pressure, speed and other criteria as well as amount of samples to be taken during the test run.

On the basis of the approved Commissioning Programme and Test Run Procedure, Employer's operators, supervisors and workmen should be able to operate the plant smoothly.[26/] If this is not possible, there is either a shortcoming in plant construction or operating knowledge has not been transferred properly.[27/] In both these cases the contract has not been fulfilled properly in major respects, and hence take-over of the pipeline system should not

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26/ The date of the (latest) successful Test Run Certificate will normally be the date of taking over of the pipeline system and the start of the warranty period.

27/ Provided always Employer's inputs for commissioning such as electric power, crude oil and gas, water and fuel as well as lubricating oils have been delivered as agreed.

take place immediately.[28/]

If commissioning (including test-run) is handled by Contractor and Employer's operators, supervisors and workmen do not take a responsible part therein, no evidence for effective transfer of technology can be given. Relevant shortcomings will in this case come to light only after take-over during the warranty period, when Contractor with his trainers has demobilized and left Employer's country.

7. Maintenance

For the period following the taking over of the pipeline system, basically two forms of regulations are possible. The Contractor can, upon successful performance of test run and handing over of the pipeline system completely demobilize. From thereon, Employer's operators, supervisors and workmen will be entirely on their own to handle operational problems, replacement of parts, shut downs of the system etc. Only if actual defects come to light, be it from defective material or bad workmanship, Contractor in order to fulfil his warranty obligation has to come to the site for repair or replacement.

The other possible solution would be to engage Contractor in addition to his warranty obligation in the maintenance of the pipeline system. In this case, the Contractor shall in addition to his repair/replacement obligation which exists in cases of defects be obliged to effect elimination of any damage which occurs to the pipeline system or to execute minor modifications as requested by Employer during a fixed period of 1 or 2 years.[29/]

28/ If Employer cannot provide his inputs for commissioning (e.g. electric power from the public network because of various interruptions in supply), operation of the system should start and if after a period of some 6 months no commissioning for this reason could take place, take-over shall be pronounced if there are no major shortcomings in the operation of the pipeline system.

29/ The maintenance period is often identical with the warranty period. Often the words "maintenance" and "warranty" are used synonymously, which is dangerous. See also the regulation in Clause 49 FIDIC Civil where the Contractor during the period of maintenance is obliged to effect repairs/ replacements whether he is responsible therefore or not with the exception of "fair wear and tear".

Which regulation is advisable for Employer to adopt depends on the individual case. If Contractor has at central points installed main repair centres consisting of a complete spare parts warehouse and mechanic and electrical shops for major repairs, overhaul and service works and smaller shops along the pipeline routes for normal repairs and general service, and if these stores and shops are run by well-trained shopkeepers and workmen of Employer and if other maintenance facilities such as camps, vehicles and - if necessary - helicopter services are available, there is no need for costly maintenance services of Contractor. In other cases it might be advisable to have a small maintenance team of Contractor at the site which can take speedy decisions and contact the central foreign offices of Contractor, when problems come up.

8. Improvements

As far as we can see, contracts for the construction of pipeline systems normally do not contain provisions concerning improvements.[30/] During the operation of the system with regard to the pipeline system and its various components new technologies for cathodic protection, periodical inspections and detection of leakages might be developed. For the pumping stations, telecommunications systems, instrumentation and tank farm storage, energy saving devices or more rational construction methods might be used. In these cases Employer has a justified interest to be informed thereof by Contractor in due time. Relevant contractual regulation could be that Contractor obliges himself to inform Employer of such developments on a gratuitious basis and that Employer as consideration accepts to buy at market prices relevant items from Contractor, if he will implement the improvements in his plant.

9. Ownership and use of technical documents prepared by Contractor

A discussion on technology transfer aspects in pipeline con-

30/ Different to license agreements, in which improvement clauses are usual.

struction projects cannot be completed without due regard to the question of ownership and right of use of technical documents prepared by Contractor for the execution of the works and handed over to Employer.

Astonishingly, in pipeline construction agreements both questions are not always properly separated or even dealt with at all.[31]

At first, two questions have to be distinguished, to which the answers might be given in different ways. The first task is to decide who shall be the owner of specifications, drawings, plans and other technical documents prepared by Contractor for the execution of the works. Thereafter, and irrespective of the answer given, the question who shall have the right of use, including the form of use and copyright has to be decided.

Unless contrary stipulations are made in the contract, it will normally be held that upon delivery or at the latest with taking over of the works, ownership (property) of the documents will pass from Contractor to Employer. With the price accepted by Employer for the delivery of the entire pipeline system, he has acquired the right of ownership of everything which will be produced and delivered during or in connection with the execution of the contract. At the same time, however, the right of use of those documents, of which ownership has been transferred to Employer, is limited to the particular pipeline system only. Every and all ways of usage of such documents (including its copying or transferring) in connection with the operation, repair, and maintenance of the pipeline system will be allowed. The same must be valid for modifications of the pipeline system according to autonomous decisions of the Employer or reasons of necessity. Most repairs and many modifications can only be ef-

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31/ The reason seems to be that people in the pipeline construction industry who are responsible for the drafting of relevant clauses are not familiar with the law of copyright. It is consequently thought that a proper secrecy-clause will suffice.

fected through use of As-built drawings, construction plans, etc. prepared by Contractor. As such documents normally have been prepared by Contractor only for use in connection with the operation of the pipeline system, use for any other purpose is not allowed and will require prior consent of Contractor.[32/] However, if the Employer in case of damage to the pipeline system after taking over uses the documents for reconstruction of the damaged part of the system, this does not seem to be an infringement of Contractor's copyright.[33/] Furthermore, does copyright only exist in the pure arrangement of lines, figures, etc. and infringement does not come up, and Employer develops new methods or ideas from plans or other documents prepared by Contractor.[34/]

For this reason Employer might be well advised, to ask Contractor in the agreement for unrestricted permission of general usage; in other words for transfer of copyright in the documents upon Employer. In addition, however, for reasons of national copyright regulations Employer must in the agreement also ask for the right to modify the documents according to his wishes.[35/] If no express provision is made to this effect in the agreement, Employer is not entitled to use or modify the documents for reasons other than the operation of the plant.

32/ If the features of a structure are copied without a copy being made of the plans, where for example the Employer does keep the plans at the end of the work and uses only the originals for an extension of the works, copyright may be infringed (Abrahamson, Max W.: Engineering Law and the I.C.E. Contracts, Third Edition, London, 1975, p. 361).

33/ See also Abrahamson, ibid., p. 361 et seq. for documents prepared by the Engineer.

34/ See Abrahamson, ibid, p. 360 et seq.

35/ See S. 39 I German Law of Copyright (Urheberrechtsgesetz) whereby the owner of a right of use is not allowed to modify the protected Work, unless special agreement to the contrary is made.

CONCLUSION

We have seen that in connection with the construction of large pipeline systems on international level ample room exists for transfer of technological knowledge. To ensure easy and smooth transfer of such knowledge requires skills, experience and intelligent draftsmanship, contract execution and management on both sides. If all technical, commercial and legal persons involved in such process understand and implement relevant requests, no need arises for the development of separate technology transfer managers. If we are able to elaborate and agree on clear-cut regulations for the assurance of successful transfer of technology, we have contributed to a considerable amount to technological development in developing countries in the area of pipeline construction. It is the character of a sophisticated pipeline system to transfer media from one station to another in the most rational way. It should therefore be a challenge to all people involved in such process to aim at parallel transfer of technologies in the most appropriate way and at fair and reasonable contract conditions.

Use of Local Resources
in
the Badak-Bontang Gas Pipeline Project
a Case Study

by
Tri Patra Engineering
Jakarta - Indonesia

ABSTRACT

Indonesia, over the last decade, has been very active in undertaking major capital projects to develop its energy resources. This includes construction of pipelines throughout the country as a means of transport for oil and natural gas. Indonesian domestic companies supported by their foreign counterparts have been working successfully to complete these projects.

Set against the background of domestic resource utilization, this paper presents relevant facts and figures on current pipeline projects in Indonesia. Whenever applicable, the technology transfer is mentioned in passing.

1.0 Introduction

Indonesia has been producing LNG since July 5, 1977 when the Badak Plant in Bontang, East Kalimantan, the seventh in history and the second largest natural gas liquefaction plant in the world produced its first drop.

The same plant is now undergoing an expansion program to install an additional two trains which will increase its natural gas consumption to approximately 1200 MMSCFD.

To meet the additional demand, PERTAMINA, the Indonesian State Oil Company, required a 57 km long 42 inch diameter gas pipeline parallel to the existing 36 inch line which runs from Badak field, a large gas field operated by Roy M. Huffington Co, a production sharing contractor of PERTAMINA, to the existing LNG Plant located at Bontang. This will increase the gas flow capacity of the pipeline system to approximately 3000 MMSCFD.

Encouraged by the Government's Indonesianization policy and, supported with experiences accumulated in more than 10 years working in pipeline industry, Indonesian domestic resources took a greater-than-ever-before role in the execution of the project.

This participation encompassed a range of activities including engineering and project management, manufacturing, construction and material supply. Foreign resources were utilized only in support functions and in technology transfer situations.

This paper serves to present facts and figures on the execution of the project with regard to the use of local resources. However, its intent is not to discuss justification in detail for either the technical or financial aspects of these policies. The process of transfer of technology which is expected to take place is also mentioned.

2.0 Project Description

A brief technical description of the Badak-Bontang Pipeline Project is presented below. The gas pipeline connects the Badak gas field in East Kalimantan to the Bontang LNG Plant 57 km to the North as shown in Exhibits A and B. The first 30 km of the right-of-way is mostly flat with few river crossings, while the last 27 km is laid thru hilly terrain requiring a large number of field bends. At river crossings and swampy areas, the pipeline is weight-coated with concrete. To protect the pipe from corrosion the line is coated with coaltar coating and equipped with an impressed current cathodic protection system.

Technical data are summarized as follows:

Length	: 57 km
Diameter	: 42 inch
Wall thickness	: 0.625 inch and 0.750 inch
Operating pressure	: 930 PSIG upstream 650 PSIG downstream
Temperature	: 90° F
Linepipe specification	: API 5 LS X 56
Design flowrate	: 2310 MMSCFD

The estimated total cost of the project was approximately US $ 60 million. The project mobilized a total of about 800 workers (for engineering, project management, construction and inspection), consisting of engineers, field and administrative personnel.

This manpower requirement was drawn from several Indonesian and foreign companies. The total cost of required material and equipment was about US $ 30 million of which more than US $ 20 million was manufactured or purchased within Indonesia.

The scope of project includes, survey, clearing the right-of-way, engineering, project management, procurement, construction, testing and commissioning.

3.0 Contractual Arrangement

The project is organized in the manner shown in Exhibit C. The Owner set up a small Project Management Team consisting of a number of executives and administrators supported by a number of expatriate advisors. This team was involved throughout the entire project execution.

The project is divided into several packages consisting of linepipe supply, material and equipment supply, construction, inspection, engineering and project management contracts.

These contractors have direct contract with the Owner but are managed by the engineering and project management consultant.

The main function of this Owner Team is to make decisions from time to time regarding contract interpretation, purchase orders, extra work, change of schedule, and miscellaneous items which directly affect the financial performance and over-all completion of the project. For further reference, Exhibit D lists contracts drawn for the project.

In line with Indonesian Government policy, wherever possible, contracts were made on lump sum basis.

Therefore, as shown in Exhibit D, most of the contracts were drawn on this basis including those for construction, linepipe manufacturing, supply of fittings, valves, and other appurtenances.

For Engineering, Project Management Assistance and Radiography Inspection, where the duration and volume of work depend on activities beyond the contractor's control and responsibilities, the contracts were drawn on unit-rate-plus-reimbursable-basis.

4.0 Engineering and Management Assistance

PERTAMINA appointed an Indonesian Engineering Company to perform Engineering and Project Management Services. This Engineering Consultant is a wholly owned Indonesian Company having more than 10 years experience in similar projects.

The Scope of Work of the Engineering Consultant is shown in Exhibit E.1.

To perform these works, the Consultant established a fully dedicated project team who remain with the project during its entire duration. The team consist of fully qualified Indonesian engineers and technical personnel and a minimum number of expatriates in advisory capacity. The organisation diagram is shown in Exhibit E.2.

The engineering effort for the project covers a wide range of disciplines including mechanical, process, electrical, instrumentation, soil and civil engineering. All engineering work was performed in Indonesia utilizing, where necessary, computer facilities available in the country.

The codes and standards used are of U.S. such as ANSI, API and ASME. The pipeline system itself is basically designed in accordance with ANSI 31.8 code with types B and C construction, taking into account the expected population growth over the next 20 years.

A good part of the length of the pipeline is located either in swampy or in flood areas. To avoid positive buoyancy, the line is coated with concrete weight to 1.10 specific gravity. In addition, concrete set-on weights are also installed in necessary locations as determined in the field during construction.

Another factor which had to be taken into consideration during the engineering stage was the use of materials and equipment produced in Indonesia as a result of a policy set by the Indonesian Government. An example was the use of spiral weld pipe for most parts of the pipeline.

Specifications, contract forms and other commercial documents were adopted from those commonly used in international industry with major modifications to suit local conditions. This is a good example of a successful technology transfer.

Even before detail design was completed, the team had started issuing inquiries for purchase of materials and equipment. This is to avoid excessive delays as the majority of the materials such as linepipes, MOV's, elbows and flanges were all long lead items. Evaluation of the quotations was conducted along with effort to finalize the detail design.

Once the detail design was approved, purchase orders were issued to vendors. The team maintained an up-to-date Material Status Report at all times incorporating the latest data on estimated deliveries from vendors. Where necessary, visits were made to manufacturers to inspect materials and equipment being fabricated.

The Project Management Team together with the Owner Team sat down from time to time to review the schedule of various activities of the project and took any necessary actions to keep all phases of the work progressing simultaneously and in harmony.

Financial control was excluded from Consultant Project Management Team activities and performed by the Owner Team.

5.0 Construction

Owner awarded the construction contract to a consortium of Indonesian and foreign companies on a joint operation basis.

Scope of Work of construction contractor is shown in Exhibit F.1.

Radiography inspection was contracted as a separate package and awarded to an Indonesian company. Purchase of steel materials and equipment was also excluded from the construction contract as the Owner handled the purchasing themselves assisted by the Engineering Consultant.

The type of cooperation applied between the construction joint operation companies is "share-basis" where each of the parties contributes a share of the necessary working capital. At the end of the project, profits and losses are shared on the same percentages as the contribution to working capital.

Each of the parties contributes resources to the project task-force and receives compensation from the "joint funds" at cost plus agreed overhead charges. Required resources that are not available within the organizations, were mobilized from outside sources and directly paid for from "joint funds".

The co-operation between the Indonesian Contractor and its foreign counterpart was found to be necessary, because available domestic resources were not capable of executing a project of such size and complexity.

Foreign participation is especially required on the following:

a. Heavy equipment

b. Pipeline construction expertise and personnel of high level of skill and management

c. Financing

Most of the pipeline specialized equipment such as side booms, bending machines and wrapping machines were furnished by the foreign organization. The remaining equipment is either furnished by the local contractor or hired from outside sources. Large size pipeline equipment for handling lines greater than 24 inches, is unlikely to be available locally, since there are not enough projects requiring larger size pipe to justify purchase of this equipment.

It was unfortunate that the lump sum contracts drawn for construction and linepipe manufacturing provided little flexibiliity for the contractors to accomodate unexpected events such as late delivery of materials by the owner or others, increase in cost of doing business due to weather down time, etc.

Exhibit F.2 presents the organization diagram for construction personnel. The concept used was that of an integrated construction team consisting of locals and expatriates who worked closely together throughout the project. Decisions are made jointly with everything taken into account.

During the project period, transfer of technology took place as a result of interactions between the Indonesian personnel and their foreign counterparts. This was especially true in the areas of project planning and scheduling, accounting, project reporting, and other management activities.

6.0 Materials and Equipment

Owner placed the purchase orders for steel materials and equipment directly to vendors or, in the case of foreign supply, to their representative agents in Indonesia.

Exhibit G presents list of materials and equipment purchased for the project.

The exhibit shows, that materials manufactured locally constitutes a major portion of the total value. It results mainly from purchase of linepipe and pipe coatings, while valves, instruments and fitting were all imported.

Since most of these materials are long lead items and not available in stock, material arrivals had to be carefully co-ordinated and taken into account in establishing the project schedule. Contingency plans must be defined to solve problems arising due to late material deliveries.

One of typical problems encountered was the lack of technical support available from vendor agents who represented imported products. The Team had to communicate with the principals to consult on technical matters. This resulted in additional unexpected delays to the project.

7.0 Closing Words

In the past ten years Indonesia's resources progressed considerably in the pipeline industry. In the Badak Bontang pipeline project alone, local resources contribute more than 50 % of total project in terms of the dollar value.

One of the reasons for that increased level of local participation is the fact that the scope of work of the project was divided into smaller packages. This enables local companies to participate, either individually or in co-operation with their foreign counterparts.

The fact that the local Government, as project Owner, is involved in the decision making process at every stage of project execution also helps local participation. This would not be possible if a project were handled on a turnkey basis making it too large for a local company to handle. Another factor enhancing local participation is financing. When the financing terms are controlled by the host country, the chances are that local participation will be high.

However, in any project of this size and complexity, foreign participation will still be required in the foreseeable future. This is especially true in highly specialized operations where the technology is held by only a handful of companies in the world.

With limited knowledge of local conditions, foreign Companies may find it difficult to bid competitively in lump sum contracts often preferred by the Owner. By working together with local companies and eliminating some of the risk foreign companies have a better chance to come up with a better bid price and obtain fair and equitable contract terms. That foreign companies can learn local conditions from their local counterpart who in turn acquire technical know-how from the foreign organizations, provides a good contracting trade off and a more efficient solution to the owner's need.

Teamwork between foreign and local companies is the key to a successful venture in large projects including pipelines. In order to create a good teamwork environment, foreign companies must be sensitive to local needs and requirements.

8.0 Exhibits

A. AREA MAP OF EAST KALIMANTAN

B. PIPELINE ROUTE MAP

C. DIAGRAM OF PROJECT ORGANIZATION

D. REPRESENTATIVE LIST OF CONTRACTS

E. ENGINEERING AND PROJECT MANAGEMENT CONSULTANT

E.1 SCOPE OF WORK

E.2 ORGANIZATION DIAGRAM

F. CONSTRUCTION CONTRACTOR

F.1 SCOPE OF WORK

F.2 ORGANIZATION DIAGRAM

G. REPRESENTATIVE LIST OF PURCHASED MATERIALS AND EQUIPMENT

H. PIE-CHART OF LOCAL PARTICIPATION

EXHIBIT A

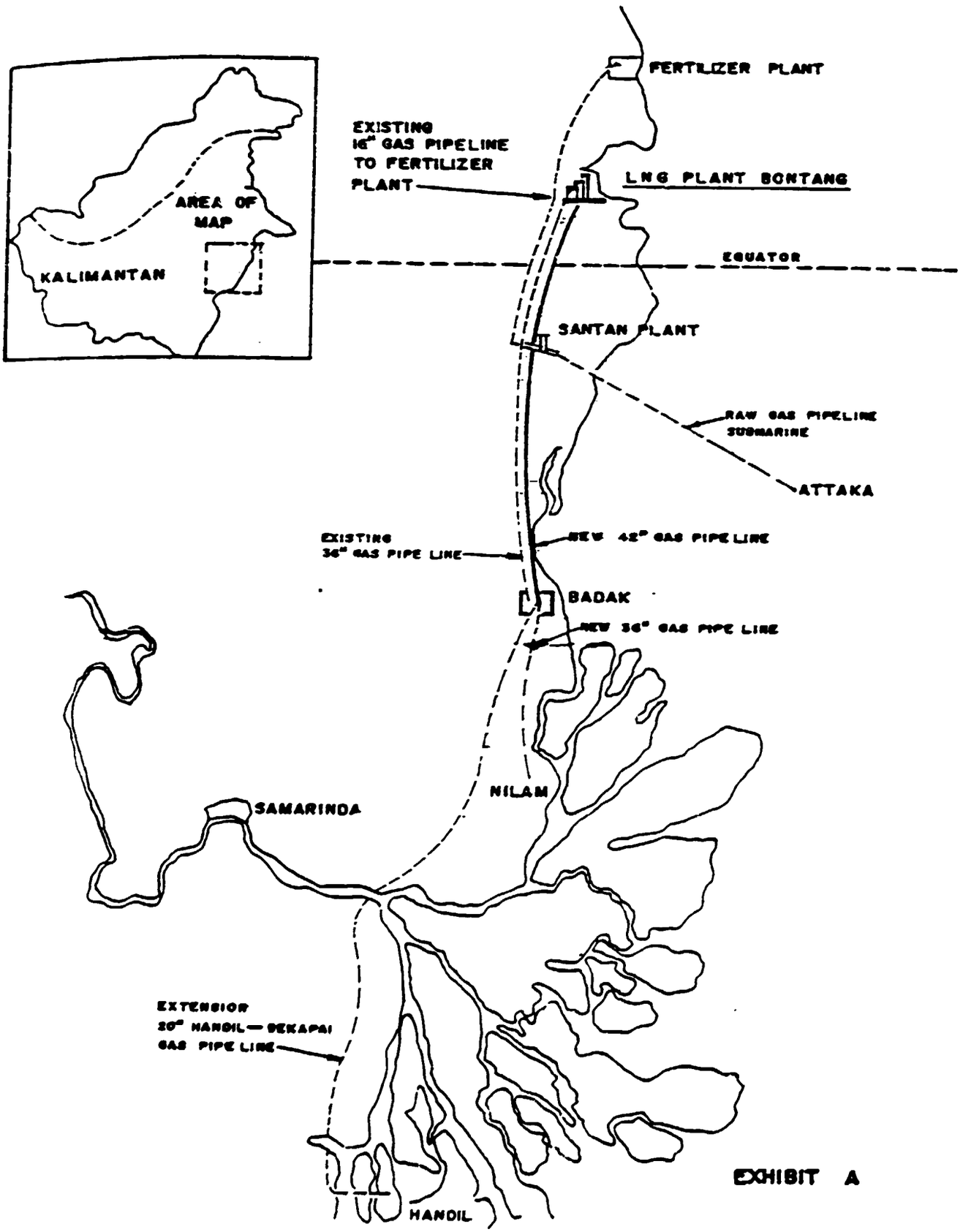


EXHIBIT A

EXHIBIT B

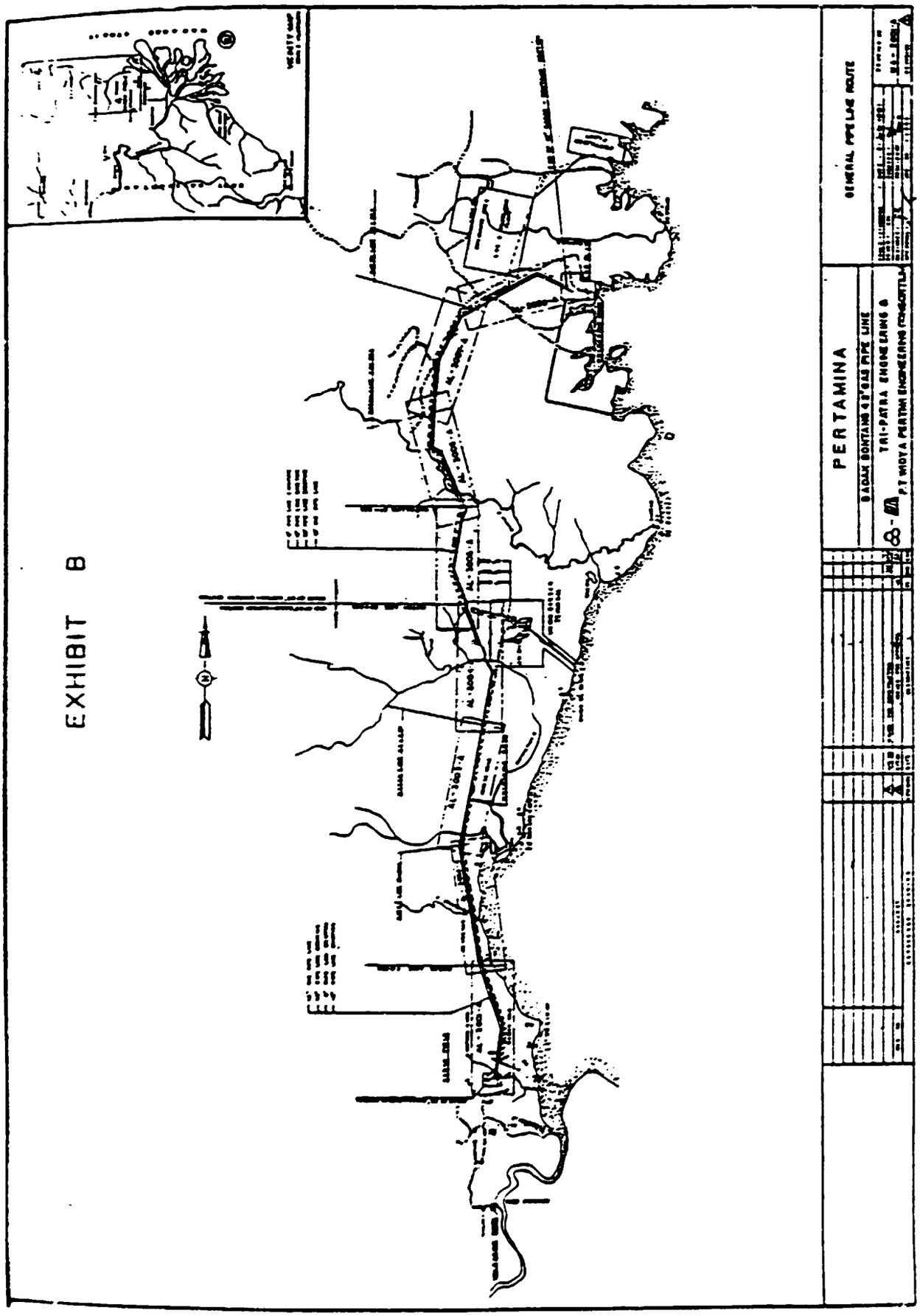


EXHIBIT B
PERTAMINA
GENERAL PIPELINE ROUTE
TRI-PATRA ENGINEERING

DIAGRAM OF PROJECT ORGANIZATION

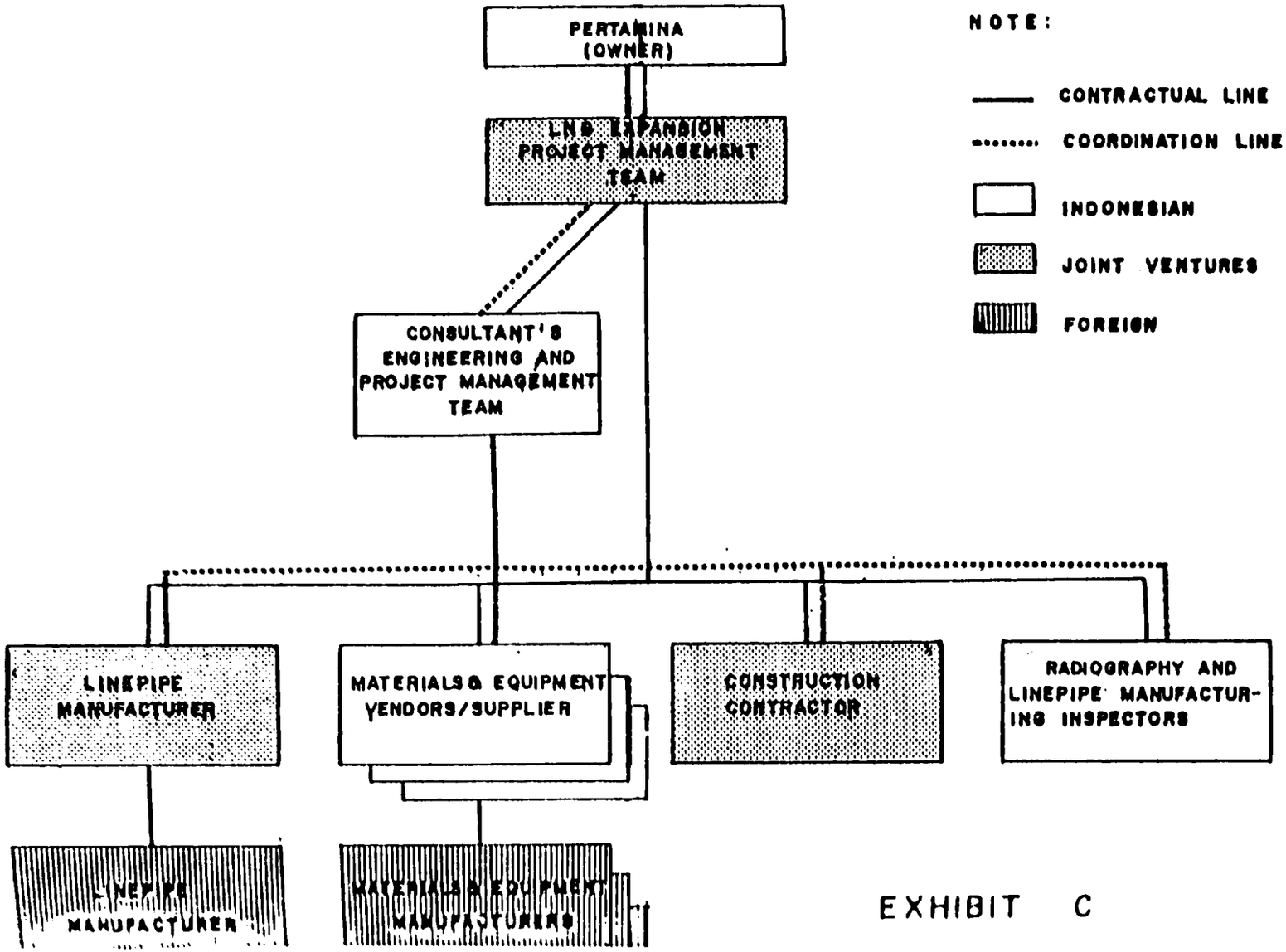


EXHIBIT C

EXHIBIT D

REPRESENTATIVE LIST OF CONTRACTS

NO.	SCOPE OF WORK	TYPE OF CONTRACT
1.	Engineering and Project Management	Unit Rate and reimbursable with a target lump sum
2.	Line pipe Materials	Lump sum with Progress-Payment
3.	Line pipe Constructor	Lump sum with Progress-Payment
4.	Line pipe Manufacturing Inspection	Unit Rate and reimbursable with a target lump sum
5.	Non Destructive Test Inspection	Unit Rate and reimbursable with a target lump sum
6.	Other Materials	Lump sum

EXHIBIT E.I

ENGINEERING PROJECT MANAGEMENT CONSULTANT
SCOPE OF WORK

1. SURVEY

2. BASIC ENGINEERING

3. DETAIL ENGINEERING

4. PREPARATION OF BID PACKAGES

5. MATERIALS PROCUREMENT

6. BIDS EVALUATION

7. CONSTRUCTION MANAGEMENT

8. START-UP AND COMMISSIONING

EXHIBIT E-2

ENGINEERING AND PROJECT MANAGEMENT CONSULTANT

ORGANIGRAM

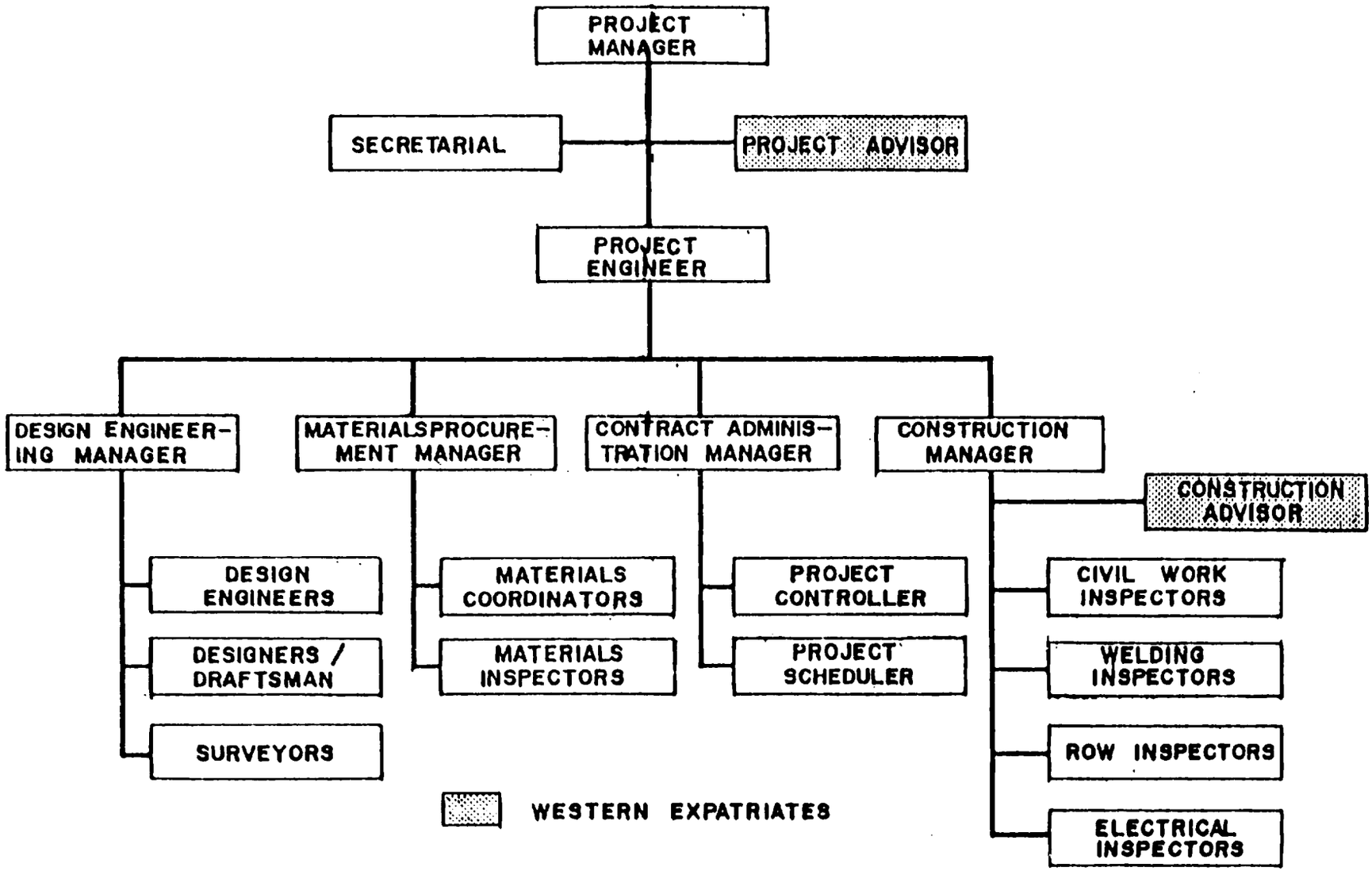


EXHIBIT F.1

CONSTRUCTION CONTRACTOR
SCOPE OF WORK

1. MOBILIZATION

2. RIGHT OF WAY PREPARATION

3. TRENCHING AND DIGGING

4. STRINGING, BENDING, WELDING AND LOWERING IN

5. BACK FILLING

6. ELECTRICAL AND CATHODIC PROTECTION SYSTEM

7. HYDROSTATIC TESTING

8. CLEAN UP

9. DEMOBILIZATION

ORGANIGRAM

EXHIBIT F-2

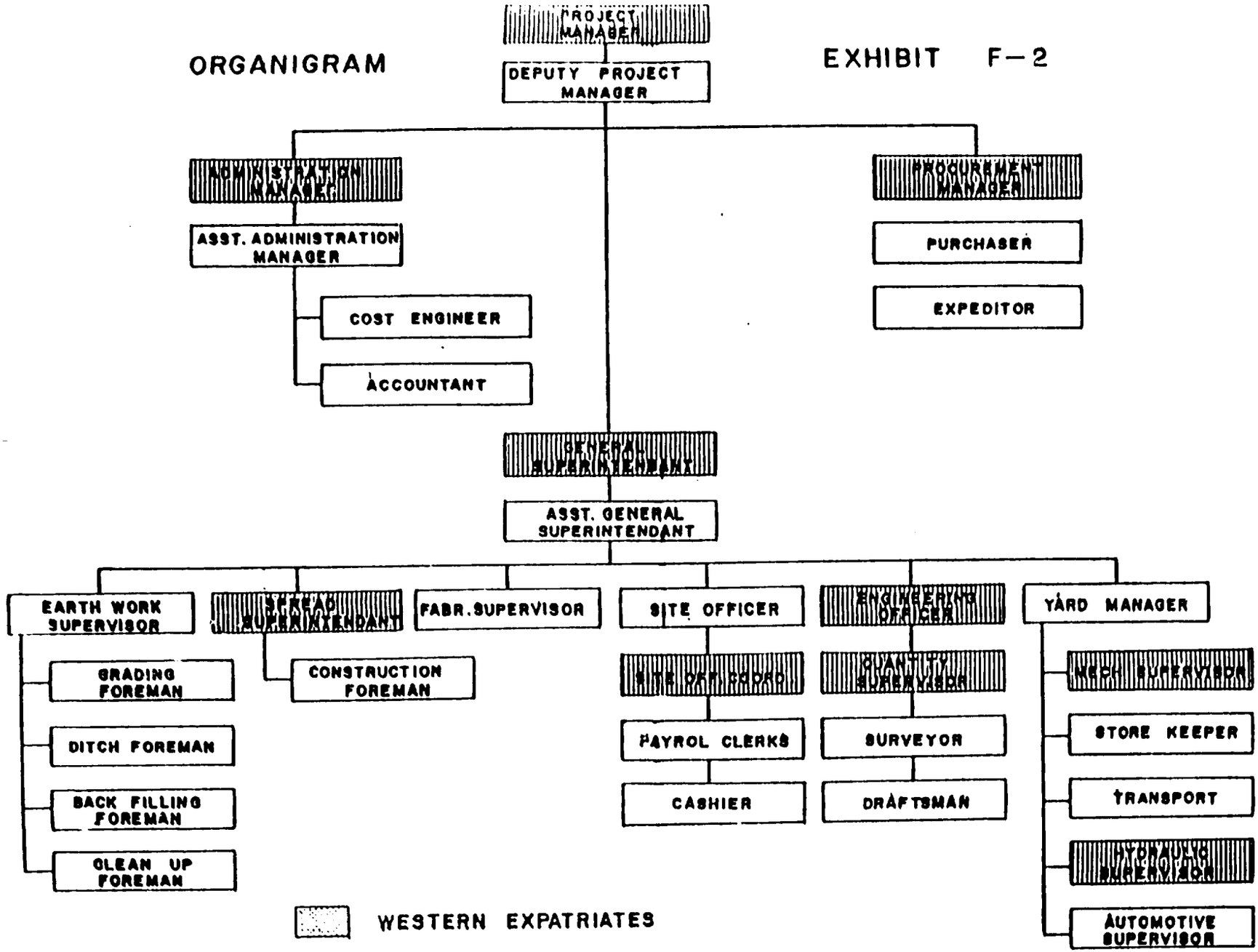


EXHIBIT F-2

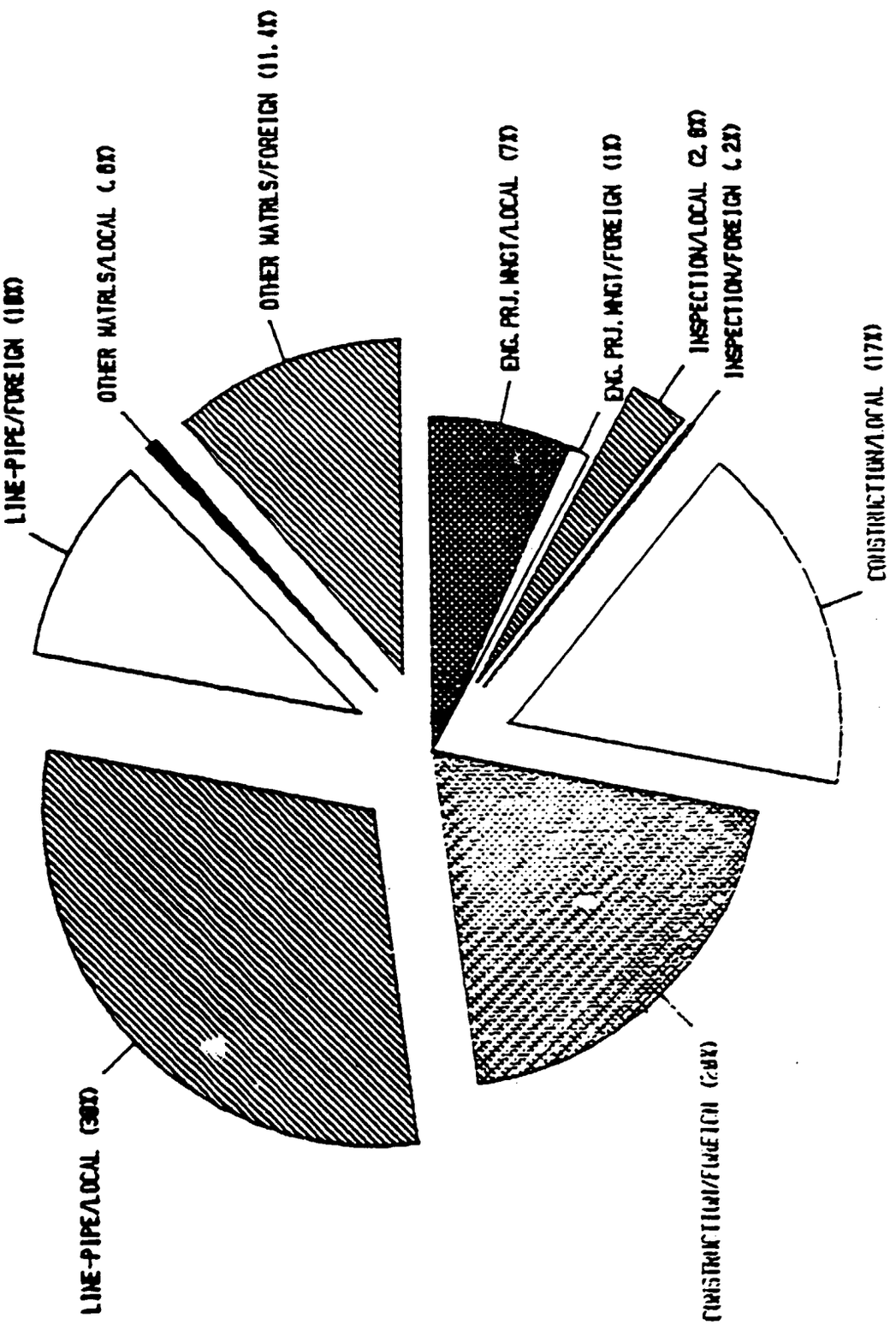
EXHIBIT G

REPRESENTATIVE LIST OF
PURCHASED MATERIALS AND EQUIPMENT

NO.	DESCRIPTION	LOCAL PORTION (%)	FOREIGN PORTION (%)	PERCENTAGE FORM TOTAL MAT'L COST (%)
1.	LINE PIPE	76	24	77
2.	PIPE COATING	100	-	17
3.	VALVES	5	95	2.8
4.	FITTINGS	5	95	1.8
5.	ELECTRICAL AND CATHODIC PROTECTION	5	95	0.6
6.	INSTRUMENTATION	5	95	0.08
7.	OTHERS	5	95	0.72
	TOTAL MATERIALS COST	75.8	24.2	100

EXHIBIT-H

EXHIBIT-H
PIE-CHART OF LOCAL CONTENT



The Terms of Pipeline Construction Contracts

A Comparative Study
based on
papers contributed
by
selected participating countries

by

Dr. Paul Strunk
ESCAP Regional Adviser on Technology Transfer

	India	Malaysia	Bangladesh	China	Thailand
I. GENERAL					
Contract Structure	Contracts seldom given on a turn-key basis to one contractor, normally procurement done by Owner			Turn-key, procurement and labour contract, (the latter most commonly used in China)	Independent international Cons. Eng. does design and prepares Bidding Documents including draft Contract (used as a sample for other contracts)
Agreement or LoO/LoA	LoO/LoA and subsequent formal Agreement		International: agreement Local: LoO/LoA	Pre-agreement concerning principles of contract usual	1) Signature Document 2) Part I: Scope of Work 3) Part II: Commercial term 4) Part III: General terms and Conditions 5) Part IV: Special Terms
Standard Conditions	Owner usually adds his own existing standard conditions		Not applicable		Yes

	India	Malaysia	Bangladesh	China	Thailand
II. INDIVIDUAL CONTRACT CLAUSES					
1. Definition		Necessary for clarification			
2. Scope of deliveries and services	will also include supplies from Owner	engineering/design/procurement/construction/testing/training/commissioning	Materials to be delivered by Employer		Pipes to be delivered by Employer; Expert as expressly provided elsewhere Con. to deliver everything necessary for the System
3. Contract Documents	Liq. Damages or bonus clause	covered under agmt. including invitation to bid and Contractor's technical and commercial proposal	Vol. I: Invitation to Tenderers; Form of Acknowledgement; Instruction to Tenderers Form of Agmt; Schedule of Rates; Itemised break-down of lump sum; Gen Cond. Spec. Cond.; Vol. II: The Work Vol. III: Gen. Spec.		1. Signature Document 2. Part I: Scope of Work 3. Part II: Commercial terms 4. Part III: General terms and conditions 5. Part IV: Special terms
4. Work Schedule	Seldom projects are according to original schedule, therefore daily rates schedule advisable	Specified	Schedule of completion (bar chart) Construction programme (approval of Empl.) to be provided by Con.		Scheduling of works and Co-ordination with others between Con. and Empl.
5. Transport		Contractor's obligation (including insurance)	Emp. materials handed over to Con. in Chittagong port.		For equipment and materials delivered by Con., transport to be effected by Con.; materials furnished by Emp. to be delivered to Con.

	India	Malaysia	Bangladesh	China	Thailand
6. Spart Parts		2 categories: i) necessary to complete works (incl. in lump sum) ii) required for 2 years operation, Con. submits price list and has to deliver to Emp. on request	Not applicable		
7. Maintenance Equipment		Classified as spare parts (categ. 2)	Not applicable		
8. Delivery/Risk Title		Mech. Compl. Certf. Initial Acceptance Certf.; Final Acceptance Certf.	Work in progress, consequently not applicable		Title passes with incorporation into the plant; risk to be transferred with final acceptance
9. Inspection/Tests		inspection and qualify assurance programme. Con. issues weekly inspection lists for following 4 weeks, Emp. may join inspection. Insp. does not relieve Con.	Con. provides complete right to attend, proceed in Empl. absence Delay of Con: seven days' notice entitles Empl. to perform tests.	Notification to Empl.,	Con. to deliver his quality control program for approval Right of Emp. to inspect at all reasonable time Emp.'s right to witness tests of Con.
10. Packing/Marking		Empl.'s general packing requirements All equipment shall be marked. Assembly drawings shall accompany shipment	not applicable		

	India	Malaysia	Bangladesh	China	Thailand
11. Time for completion	Liq. dam. normally max. 5-10 % contract value	Initial Acc.; liq. damage/day of delay Only force majeure or change in scope of work excuse delay. Definition of force majeure.	Con. must start within 14 days from Engineer's written order. Completion at date stated in contract; 0.05 % of Con. value liq. dam. per day, max 5 %, reasons, which Con. claims are beyond his control.		liq.dam.: 0.1 % of Contract Price for each calendar day of default, max: 10 % Notice of completion (incl. performance tests) by Con. Force majeure (cases mentioned)
12. Price		Fixed lump sum in US$ Price untouched by currency fluctuations	Currency of bidder's country or US$		Provisional lump sum price (?); US$ unit prices (10 % plus/minus)
13. Price Escalation	$P_o = \frac{In}{I_o}$ (Cost of Living Index)	No escalation	Not mentioned		
14. Terms of Payment	Financed Contracts: General conditions of Bank are binding for parties.	5 % signature 80 % progress 5 % Mech. Acc. 5 % Initial Acc. 5 % Final Acc.	Advance Payment may be considered against Bond Retention 10 %, payable against Bank Guarantee at taking over.		
15. Securities	Performance guarantee to be given back by Owner after end of warranty period	Bid Bond, Malaysian Bank valid six months from closing Performance Bond 10 %; Malaysian Bank, not later: 1 month after conclusion of contract (reduced to 5 % upon initial Acc.)	1 % Bid Bond or Bank Guarantee		10 % Performance Guarantee as per model form (bond type, on demand with objective reference) from effective date until fulfilment of all obligations (incl. warranty) additionally 100 % performance guarantee of parent co. upon request of Emp.

	India	Malaysia	Bangladesh	China	Thailand
16. Modifications	Up to 10 % of total work without consent of Con.	Emp. may alter, omit, change or modify any part of the work. Con. has to perform; Variation request of Con.	Not applicable		Addition, deletion or revision by Emp. Con. to inform Emp. within 10 days on influence on time and price; written approval of Emp.; no suspension allowed.
17. Warranty	18 months form take-over Right of Owner to repair/replace by himself and ask for repayment of price (generally)	Con. shall obtain in name of Emp. best warranties and guarantees from Suppliers	12 months from taking over. Equal period for replaced parts No remedy of Con without reasonable time, right of Emp. to do by himself		Period: 18 months from final written acceptance or 12 months since start of operation or use by Emp. (whichever occurs first); for repaired work new 12 months period starts. If Con. fails to correct, right of Emp. to do at Con's cost
18. Guarantees		12 months conformity with specifications and without defects. Correction of defects by Con.	Performance Guarantee in lieu of 10 % retention		
19. Liability		Liable for loss/ damage to: pipeline system any material, third party property; resulting from performance of work Conseq. damage limited to contract price	Con. must have made claim at the latest 31 days after completion of maintenance period		Liability of Con. to Emp. for failure to obey applicable laws; violate copyright, patented or unpatented know-how, personal or property injury; contamination, pollution, etc.

	India	Malaysia	Bangladesh	China	Thailand
20. Insurance	Con. shall insure materials of Owner, while in his custody. CAR, 3rd party, workmen compensation; marine insurance	Erection AR Insurance of Emp. General Third Party Liability Insurance of Emp. Contractor: AR Transit motor vehicle, Airborne Craft Liab. Physical Damage Ins. (equipment and other Con. property)	Third party insurance by Empl. Motor vehicle by Con.		Con. effects: 1. Workmen's Compensation 2. Third Party Liability 3. Automobile 4. All risk builder's and storage insurance Insurance with Thai companies or at least office in Thailand
21. Cancellation		If Con. fails to comply with Contract and does not remedy despite 14 days written notice Con. to receive contract price or cost, whichever is lower up to date of cancellation and damages of Emp.	Empl. may at its absolute discretion stop work or cancel contract at any time		
22. Termination	Emp.'s right at his discretion with 15 days' notice	At Emp.'s discretion, 14 days' notice. Actual cost of Con. up to termination Hold harmless owner from claims of sub-contractors or 3rd parties. no right of Con. for loss of profit or damages	In case of Con.'s default. 14 days' notice in writing then (1) Suspend (2) Take out of hand (3) Cancel		a) at discretion of Emp., Con. entitled to cost plus overhead and profit (lump sum) or price plus cost (unit price); no prospective profit or damages b) termination due to Con.'s default

	India	Malaysia	Bangladesh	China	Thailand
23. Industrial Property Right					Con. to compensate and save harmless Emp. for any claim
24. Stoppage of Works	If Con. cannot proceed for reasons attributable to Owner he shall be paid idle time on basis of daily rates. Owner may order move of Con. to another place. No idle time in cases of force majeure	14 days' notice; If Con. violates specific cond. of contract expenditure of Emp. to be paid by Con.	Emp.'s right at any time with cost compensation unless exceptional situations exist		no right of Con. to stop works pending claims situation;
25. Assignment		Emp. may after prior notification Con. may only with prior consent Con. shall upon request in case of cancel. or term. transfer	not mentioned		with written consent of Emp. Emp. may assign to other Thai Government agencies
26. Sub-contracting Sub-supply	Minor, ancillary work with permission of Owner	For sub-contracting prior written approval of Emp. required Preference to Malaysian Sub-contractors	No assignment or subletting of the contract without written consent of Emp.		with prior written approval of Emp. (delivery of draft sub-contract without prices)
27. Governing Laws	Petroleum Pipeline Act, 1962 Con. shall conform to local laws, etc.	Laws of Malaysia	Obey with all acts by-laws, etc. of public, municipal and other authorities		Government agencies and state enterprises normally only accept Thai laws

	India	Malaysia	Bangladesh	China	Thailand
28. Settlement of Disputes	Gentleman's agreement or two arbitrators. Obligation to continue works during arbitration	Ad Hoc Arbitration with 3 arbitrators according to Arbitration Act., 1952 of Malaysia	Single arbitrator agreeable to both parties.		mostly ICC, although foreign arbitral awards are not enforceable in Thailand; Emp.'s Governor with right to request Ad Hoc arbitration within 30 days
29. Notices and Addresses		Emp... Attention Contractor	Registered post or leaving at Con's registered office; same for Emp.		
30. Partial Invalidity	-	-			
31. Regulation of non-regulated matters	Obey by all applicable laws etc., taxes, labour safety	-			
32. Completeness Clause	-	-	not mentioned clearly		
33. Writing Clause		-	not mentioned clearly		Change of contract only by writing
34. Language	In developing countries English is the prime language Advantage to translate extracts into local language and distribute down the line	English language is governing language All correspondence, literature, data in English	All tenders are to be submitted in the English language		English language, although normally Thai language is used in contracts For all contract documents (incl. drawings)
35. Contract Cost		Lump sum non-escalating price	To be borne by Contractor		

	India	Malaysia	Bangladesh	China	Thailand
36. Right to withhold payment/ offset	Emp. may take over the work and withhold remaining payment Con. in default shall not seek any further payment until work is completed by Emp.	Until settlement of the dispute by mutual agreement	For minor defects with regard to costs necessary for repair		Emp. has right to offset
37. Annexes		-	not clearly mentioned		
38. Export/Import License		Contractor responsible	-		
39. Secrecy		Con. shall use information only for performance of works	-		All plans, drawings, specifications and other information; only for use by Con. in performing the works upon completion upon request of Emp., destroy or return

	India	Malaysia	Bangladesh	China	Thailand
III. PROBLEMATIC AREAS	Clear right of way necessary on certain dates Materials to be delivered by Owner must be available at fixed dates Ad Hoc claims of land owners with possibility of interruption of work	Common to any other construction contract (eg. liability, insurance, taxes, take-over)	Cannot be said yet, B. is young country	Time of completion (hindrances during construction), modifications (design, specifications), unpredictable factors during construction (ROW), delivery and inspection of materials and equipment (certificates, order of shipment, transport damages, responsibilities), equipment maintenance and repairing, rejections	
IV. OTHERS					
1. Authorizations, approvals, licences					Contractor to apply for all permits at his costs; Building permits to be provided by Emp.
2. Taxes					In former times paid by Emp. for Con.; now less and less used Customs duties for equipment and material to be paid by Emp.
3. Use of local supplies and services					Foreign Con. favoured if in joint venture with local or use of local sub-contractors
4. Trade Customs and Usage					Superseded by the contract and not be applicable
5. Number of Contract Documents					duplicate

	India	Malaysia	Bangladesh	China	Thailand
6. Specifications, Drawings					Emp. has to approve; incompleteness, errors or omissions, Con. deviating from drawings (written prior approval Emp.)
7. Clean-up					Obligation of Con.; if Con. fails right of Emp. to do work at Con.'s cost
8. Suspension					Discretion of Emp. max: 180 consecutive calendar days or 270 calendar days in the aggregate; additional costs as per claims clause; no damages or profit
9. Claims					Inform Emp. within 7 days with detailed estimate on influence on price and time; Obligation of Con. to continue work No claim after receipt of final payment.