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CONSTRUCTION CONTRACTS

How to *Manage Contracts and
Control Disputes in a Volatile Industry*



Edward Whitticks

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and Control Disputes
in a Volatile Industry*

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Houston, Texas

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Preface

This book is written for major civil and engineering contractors, consulting engineers, and their clients in the energy industry. It is intended as a desktop companion and reference for project managers, project engineers, contract administrators, cost scheduling engineers, and others engaged in the field of oil, gas, and petrochemical plant construction. It is also valuable as a textbook to be used in the training and education of the above.

The book covers, *inter alia*, efficient preparation of bid packages, pitfalls encountered in the invitation to bid, advice on suitable contract formats, evaluation of bids, processing of variation orders, work procedures, avoidance of construction claims, quantification of delay and disruption costs, negotiation strategies in disputes, work breakdown structures and invoicing, and contract closeout procedures.

Edward Whitticks has had many years of experience as a field contracts manager on projects in North and South America, the Middle East, and the North Sea. He has written and/or administered more than 1,000 contracts for oil and gas construction worldwide.

Mr. Whitticks presently conducts courses and seminars throughout Europe, the Middle East, and India on contracts management and construction claims avoidance. He lives in Surrey, England.

Client Policy and Practice

1.1 Introduction

The oil, gas, petrochemical, and the energy industry in general instructs and imposes a duty upon its employees to observe certain policies regarding the contracting process and to maintain a high standard of ethics and fairness. All contracts are issued in writing and are intended to be executed prior to committing work to a contractor or a contractor starting work. Adequate safeguards and controls in terms of procedures, documentation, files, reviews, and approvals are expected to be established and maintained for all contracting activities.

Certain contracts, which are governed by institutional terms and conditions, may introduce a third party into the executed agreement, namely, the engineer. This title usually refers to a consulting company who acts, among other functions, as an intermediary between the client and the contractor. In these contracts, the client may be described as the owner or employer or company but in this work we will usually refer to one party as the client and the other party as the contractor. When the latter is obliged to engage another to carry out work, the contract will be made between the contractor and a subcontractor.

1.2 The Fundamental Contract Document

The construction contract is an agreement between the parties for the performance of work through the supply of labor and materials.

First, a valid contract must be sufficiently certain to have a practical meaning and before execution the parties must have agreed on all terms and conditions. Second, there must also be an agreement on the consideration and on the payment terms. Third, the contract must be in writing. A contract is not easily enforceable if it remains entirely as an oral agreement and without written evidence.

It is worth bearing in mind that the contract of magnitude in size and value—succinct, crystal clear with guaranteed protection against future construction disputes, and capable of being understood by all parties to the agreement—has probably yet to be written!

1.2.1 Letters of Intent

Letters of intent should only be used in special circumstances and should only be issued after all contractual matters are settled or specifically delineated in the letter of intent as being unresolved.

The letter of intent will be valid only if it contains, at the very least:

- (a) Confirmation of the client's intent to award a contract to a named contractor.
- (b) Reference to the scope of work in the invitation to bid.
- (c) The consideration (i.e., pricing for the work) or an invitation to submit monthly invoices based on percentages of work completed against the price quoted in the contractor's bid proposal.
- (d) The effective date of the contract (being the date when the client receives the contractor's confirmation by letter).
- (e) Reference to the receipt of the contractor's agreement to the preceding (see d).

A letter of intent is defined as a contract designed for interim use only that sets forth certain agreed terms and conditions remaining to be negotiated (see the following example).

CRUDE OIL COMPANY INCORPORATED

Subject: Letter of Intent

Contract No. _____

Contract Title _____

Effective Date: On receipt of your confirmation and agreement

(Contractor's Name)

(Contractor's Address)

Gentlemen,

This is to express our intent to enter into a contract with you for (description of Work) in accordance with your proposal dated (date), your subsequent letters dated (dates), and your meetings with our representatives held on (dates).

[Note to Contract Engineer/Administrator: Add here a clause specifying what was agreed and what was not.]

It is understood and agreed that this expression of intent is subject to the execution of a final contract in writing between us and that of this date and until a final agreement is reached, neither of us is bound to the other or to any third party by any legal or equitable commitment whatsoever except as set forth in the following text.

You may submit monthly invoices for payment based upon percentages of work completed against the price(s) set forth in your bid proposal dated (date). However, in the event we decide not to enter into a final contract with you for this work, we will reimburse you only for all costs and expenses incurred by you up to the date of our notification to you that we will not enter into a contract with you, plus ____ percent of such costs and expenses to cover profit. In such event, all your said costs and expenses shall be subject to audit.

Very truly yours,

W. H. Smith

Vice President, Procurement

CRUDE OIL COMPANY INCORPORATED

1.3 Invitations to Bid

Open bidding, that is, an open invitation to contractors to tender for work, is not a usual feature of oil company practice. Advertising in technical magazines

and other media is more properly confined to the building construction industry and to work for government departments. However, in certain areas, there are regulations in force that oblige organizations proposing to embark on construction ventures to publicly announce their intentions. Work in refineries, gas plants, and on pipelines is, for the most part, highly specialized and only a limited number of contractors have the resources and the workforces to undertake such ventures. In an open tender situation, however, this consideration would not discourage a large number of contractors from having a shot at it. Invitations, therefore, are normally restricted to those organizations regarded by the client as capable of handling the work.

1.4 Lump Sum Contracting Preferred

Lump sum contracting is normally the preferred contract format when it can be properly used. Competitive bidding is used to select a technically and financially qualified contractor whose bid represents the least overall cost to the client. Negotiated contracting is only used in exceptional circumstances involving exceptional skills or equipment that would otherwise be unobtainable.

Lump sum, unit prices, day rates, and reimbursable cost fixed fees that are quoted under competitive conditions for defined work are not normally negotiated. There may be exceptions to this policy where:

- (a) The contractor selected is the only one capable of performing the work within the project schedule.
- (b) The selection of any other contractor would result in substantial additional costs to the client.
- (c) The contractor selected possesses special expertise or other experience that would cause its work performance to be superior to that of other potential bidders.

The essence of a lump sum contract is that, in return for a lump sum payment, the contractor supplies such goods and services as it finds necessary to ensure that the end product is in accordance with its specification and meets the delivery and performance guarantees. Once the contract is in force, the lump sum price is fixed regardless of costs incurred by the contractor who must therefore include in its price contingencies for estimating design errors and for other unknown costs that may be incurred although their magnitude is uncertain.

The lump sum or hard money contract policy may be applied when:

- (a) Detailed design engineering, drawings, specifications, and a defined project scope of work are complete or nearly complete. It is folly to begin a lump sum arrangement when only a limited amount of engineering is available at start-up although some clients need persuading in this respect. Situations vary as to the right time to consider lump sum, but circa 75 percent engineering could be a safe margin. Less than 10 percent may be considered unsafe. Some authorities hold that there can be no such thing as a fixed price lump sum contract without an adequate specification.
- (b) It is possible to find contractors willing to compete for work involving a proprietary process (i.e., in a petrochemical plant) or special equipment (e.g., definable marine work).

1.4.1 Lump Sum Advantages

- (a) The client is able to define the work and prepare drawings and specifications before going out to bid.
- (b) In view of (a), the client may also prepare an “in-house” fair price estimate for bid comparison and know in advance its budget commitment.
- (c) Close competition between bidders may be realized.
- (d) The contractor has an incentive to adhere to schedule and budget.
- (e) Responsibility for the project is with the contractor.
- (f) Bid evaluation is easier.

1.4.2 Lump Sum Disadvantages

- (a) There may be a long period between the decision to issue the requests for quotation from bidders and the contract award.
- (b) A low-bid contractor may try to recover losses through excessive variation proposal orders and claims.
- (c) Maximum design engineering may be necessary.
- (d) Lack of flexibility—changes expensive.
- (e) Open to claims attempts.
- (f) Contingencies for risk and escalation.
- (g) Importance of low bid price may result in unsatisfactory work.

1.5 Lump Sum Plus Unit Rates

For lump sum plus unit rates, the advantages and disadvantages are the same as lump sum, but it behooves the client to put as many unit rate offers in the request for quotation (RFQ) as possible. Whereas, if these are *not* requested, it suits the contractor to negotiate separately and possibly more advantageously during the course of the contract.

1.6 Unit Rate Only

A unit rate contract is one in which payment for the work is made upon the basis of completed quantities of specifically stated items of work and materials furnished and used by the contractor, each quantity being multiplied by the contractor's bid price for that unit.

One advantage of entering into a unit rate-type contract is that work may commence earlier because the bidding cycle is shorter and engineering does not have to be firm at the time of placing the contract, thereby permitting construction to start sooner. The downside is that placing contracts on unit rate may involve both the client and contractor, and considerable time updating, pricing, and often remeasuring the work and agreeing on quantities.

1.7 Reimbursable Cost Contracts Where Necessary

Reimbursable cost contracts with fixed or percentage fees for "hands-on" work are usually the last choice for clients and will be used only where there is little or no engineering accomplished in the time available or in any other situation that makes a "cost plus" agreement unavoidable. Client contract managers will explore every possibility before entering into such an arrangement. In the late 1970s, when the oil industry was still enjoying a major boom, this policy was partially relaxed because many contractors were reluctant to accept any other type of contract unless the risk was minimal. In times of recession, the contractor may have to accept lump sum as the order of the day.

Guiding principles regarding reimbursable costs arrangements are as follows:

- (a) The term *reimbursable costs* means those costs for performing the work under the contract for which the contractor receives *direct* reimbursement from the client as opposed to *indirect* reimbursement using fixed rates.
- (b) Reimbursable costs include only those allowed under the contract.

- (c) Reimbursable costs must have been incurred after contract award and be net costs actually incurred and paid.
- (d) Reimbursable costs exclude the cost of materials, services, and other items that are provided for in fixed rates.
- (e) Reimbursable costs exclude the contractor's general costs of doing business and profit that are provided for in the fee.
- (f) Costs not clearly identified in the contract as reimbursable costs require the client's approval prior to committing the expenditures to qualify as reimbursable costs.

Guiding principles regarding fixed rates are as follows:

- (a) Fixed rates are practical arrangements to pay the contractor for certain costs that it will incur in connection with work under the contract. Fixed rates are normally used for certain items of the contractor's office costs, such as payroll burden for reimbursable personnel, departmental overhead, computer, and printing, and may be used for certain other costs such as construction equipment and expatriation of employees.
- (b) Fixed rates should represent the contractor's best estimates of fixed unit prices that will permit the recovery of costs incurred and paid in connection with work under the contract. They should be based on the contractor's recent, but reasonable, actual net cost experience projected over the term of the contract. Reasonable estimating contingencies and escalation allowances may be used. However, fixed rates should not be designed as profit generators. The contractor's total planned profit should be included in the fee. An exception to this is that fixed rates for construction equipment may include a reasonable return to the contractor on its investment in the equipment, if the cost of capital is not recovered in the fee or otherwise.
- (c) The contract normally gives the client the option, where practical, of selectively supplying any or all services covered by fixed rates, such as construction equipment, or of requiring the contractor to purchase such services from others.
- (d) Fixed rates, as agreed at award and documented in the contract, are fixed unit prices. After award, fixed rates are not subject to revision, either up or down, based on the contractor's actual cost experience. However, if there is a change after award in the scope of materials or

services required by the client or provided by the contractor under the fixed rates, then it may be necessary for the client and the contractor to agree on revised fixed rates to cover the new situation.

- (e) Payroll burden for reimbursable home or branch office personnel may be reimbursed directly on an actual incurred and paid basis or indirectly through the use of fixed rates. If fixed rates are used, such rates are normally expressed as a percentage of reimbursable salaries. Separate rates are established for basic workweek hours and for overtime hours. The rate for overtime hours should cover only the contractor's incremental costs related to overtime and the rate should be applied only to straight time salaries excluding any overtime premiums.
- (f) Departmental overhead rates are normally expressed as an amount per reimbursable man-hours. Separate rates are established for basic workweek hours and for overtime hours of both contractor's personnel and any agency or freelance personnel. The rates for overtime hours and for agency and freelance personnel should cover only the contractor's incremental costs related to those situations. Rates for overtime hours should be applied only to hours actually worked.
- (g) Fixed rates for departmental overhead should exclude the contractor's bidding and research and development (R&D) costs that should be included in its quoted fee.
- (h) Most clients will not permit the contractor to allow for the following expenses:
 - The costs of salaries and traveling expenses of executive officers who are not directly assigned to perform work for the contract.
 - Interest on capital employed or on borrowed money.
 - General, administrative, and overhead costs relating to general company and all office operations.
 - Consultancy services, unless specifically requested and related to the contract.
 - Income tax.
 - Costs for employee bonuses and profit-sharing plans.
 - Employee severance costs.
 - Employee relocation and recruiting expenses.

Guiding principles regarding the fee are as follows:

- (a) The fee provides for the contractor's recovery of its general costs of doing business, including:

- General and corporate overhead costs.
- Income, profit, franchise, occupational license, and personal property taxes.
- Income on capital.
- R&D and bidding costs.
- Profit-sharing and business risks.

The fee also provides for the contractor's total planned profit related to performing the work under the contract.

- (b) A fixed lump sum fee is normally used when the contractor's work may be adequately described at the time of bidding. Otherwise, fixed rate fees applied to reimbursable engineering man-hours and construction management and staff man-hours are used. Fixed rate fees should be applied only to hours actually worked.
- (c) The contract includes provisions for increasing or decreasing the fixed lump sum fee if client-authorized changes demonstrably affect the amount of the contractor's services required to accomplish the work. The fee is adjusted according to the effects of changes on the costs of the contractor's home and branch office and construction management services. The fee rate for changes should bear the same relationship to the cost of services as does the fixed lump sum fee.

Reimbursable cost contracts mean considerable audit surveillance on the part of the client, far more than would be necessary with a hard money contract. Every invoice for goods and services, for example, would have to be checked by the client. Whereas on a lump sum contract, the client is not particularly interested in how much the contractor pays for material provided it is within specification. The same applies to subcontracting.

1.7.1 Advantages of Reimbursable Cost Contracts

- Requires minimum inquiry definition.
- Shortest possible bid time.
- Complete flexibility.
- Client/contractor conflict of interest minimized.
- The client has control over costs incurred.
- The client can assess the contractor's rates.
- The client may use the contractor to evaluate alternative schemes.
- The client may terminate at will without incurring substantial costs.

1.7.2 Disadvantages of Reimbursable Cost Contracts

- The contractor has no monetary incentive to minimize cost to the client.
- The client has no assurance of final costs.
- The client has to check and verify the contractor's man-hours and expense records.
- Bid evaluation may be difficult.
- The contractor competition is only a very small part of the total cost.
- The contractor has no monetary incentive to achieve early completion unless covered by special conditions (see section on "Incentives" in the following text).
- Poor workmanship is still paid for.

1.8 Cost Plus a Percentage Fee

Using cost plus a percentage fee has advantages and disadvantages that are much the same as those mentioned in the preceding text with the fee based on the cost of construction.

1.9 Start Cost Reimbursable with Later Conversion to Lump Sum

One of the main reasons for using a cost reimbursable format is the absence of design engineering at the time of bid. However, if this is obtainable during the progress of the project, the contract may be converted to lump sum if agreed by both parties (or guaranteed maximum or target price and the like). Conditions will have been drawn up previously with the possibility of conversion in mind.

Conversion of a contract requires that the contractor shall quote alternative terms for undertaking the work so that the client has the option of accepting these terms or continuing on the reimbursable basis. Conversion of a contract may, of course, be negotiated at any time provided the project is sufficiently defined by then. If the possibility of conversion is foreseen at the original inquiry stage, it is desirable to provide for it in some special conditions spelling out, *inter alia*, the nature of the alternative tender(s) required and the performance delivery and cost responsibilities that would apply.

1.10 Provisional Contract Price Agreement

Given circumstances where a lump sum contract would be unsuitable and a cost-reimbursable arrangement would be unacceptable, there is a device that would suit most requirements and would result in a fair deal to client and contractor. This is the provisional contract price agreement and it works as follows:

- (a) Bidders will indicate their fixed costs at a cost as described in the following text. Because of the possibility of front-end loading with finance charges (in situations where the successful contractor would be obliged to lay out a considerable sum of money before its first progress invoice is submitted), a proportion of the fixed costs is paid at the beginning of the contract and in monthly increments thereafter.
- (b) Quantities relating to each unit price line item are estimated (by the client) and bidders will quote on these including profit. The total, when added to the fixed costs, is known as the provisional contract price.
- (c) Substantial additions or deletions to the work over the life of the contract would actuate a sliding scale that allows for a reduction in the total unit price and an increase in the fixed costs or vice versa.
- (d) The logic behind this arrangement is simple and fair to both the client and contractor. It is based on the premise that the award to the contractor of extra work of the same nature and using only limited extra labor and equipment should result in lower unit price cost, but possibly increased fixed costs. For example, in a contract involving the installation of one mile of pipe in a trench, the client instructs the contractor to lay an extra 500 yards of pipe and excavate accordingly. The contractor will use approximately the same amount of men and equipment and it would be reasonable to expect that the contract unit rate should be reduced. It would also be reasonable to allow the contractor more money for its fixed costs in view of the extra time involved in keeping its organization mobilized, and so forth.
- (e) In the provisional contract price arrangement, the bidders are asked to quote on a sliding scale the relevant increases or decreases in prices for more or less work awarded during the progress of the contract. At the end of the contract the final amount to be paid or deducted is calculated by application of the sliding scale (see the following example).

<i>Fixed Costs</i>	<i>U.S.\$</i>
Mobilization	1,200,000
Camp construction	1,500,000
Camp operation	2,000,000
Transportation	300,000
Safety program	50,000
General administration expenses	500,000
Demobilization	750,000
TOTAL FIXED COSTS	6,300,000

Tabulation (from Bill of Quantity)

Site preparation	1,500,000
Civils	6,300,000
Mechanical	25,500,000
Electrical	10,000,000
Instrumentation	5,500,000
Insulation	1,200,000
Painting	750,000
TOTAL	50,750,000
Fixed Costs	6,300,000
Provisional Contract Price	57,050,000

Sliding Scale

Increase Work by: Decrease Unit Cost Increase Fixed Cost

10 percent
20 percent
30 percent

Decrease Work by: Increase Unit Cost Decrease Fixed Cost

10 percent
20 percent
30 percent

1.11 Target Cost (Shared Overrun or Underrun)

The target cost is defined as the estimated total cost of the work under the contract agreement and may be adjusted from time to time in accordance with the provisions of the contract. The estimated target cost may be calculated and agreed by a team of experts appointed by both parties before the execution of the contract.

The method of payment for the works is on the basis of actual cost plus the fee but subject to the target cost, as provided in the conditions of the contract.

- (a) The target cost is \$_____, subject to adjustment in accordance with the conditions of the contract.
- (b) The fee for the works is \$_____, subject to adjustment in accordance with the conditions of the contract.
- (c) The contractor's share of the difference between the actual cost and the target cost when the actual cost is less than the target cost as provided in the conditions of the contract is ___ percent.
- (d) The contractor's liability for the difference between the actual cost and the target cost when the actual cost exceeds the target cost as provided in the conditions of the contract is ___ percent.
- (e) The fee for the works may be adjusted under the conditions of the contract.
- (f) Actual cost means those costs incurred in the execution of the work and ascertained and admitted to the actual cost less any credits received by the contractor.

Actual cost will include, but not be limited to, salaries and wages, bonuses, allowances paid to staff, and all similar payments relating to service in connection with the work.

Actual cost will also include purchases and hire of plant (equipment) directly connected with the work, vehicle taxes, fuel, oils, lubricants, greases, and consumable items also used in the conduct of the work. Construction; operation and maintenance of offices, laboratories, workshops, stores, operatives' camps, canteens, first aid, welfare, recreational, and sanitary facilities; accommodation for the company's and contractor's staff required in connection with the work; and operation of power and water supplies for the work.

Actual cost will also include all permanent and temporary materials, loading and unloading of plant and materials, and the cost of work carried out by subcontractors.

In many ways, the terms and conditions of a target cost contract are similar to that of a straight cost reimbursable agreement excepting that the contractor has an added incentive to adhere to or improve upon the target and is faced with a penalty for overrun.

During the preliminary negotiations and before the initial target amount is mutually agreed, the company may consider lump sum or unit prices for definable portions of the work.

Target cost arrangements may be employed, for example, where physical conditions on land, sea, or under the seabed could not be reasonably foreseen by an experienced designer or contractor even after extensive exploratory probing.

1.12 Partnering

Partnering is a contractual arrangement between a client and its chosen contractor that has a term of a given number of years rather than the duration of a specific project. During this term, the contractor may be responsible for a number of projects, both large and small, and also continuing maintenance work and shut down.

1.12.1 Advantages for the Contractor

- A long-term base of work that gives stability to the overall operations.
- Improvement in operations systems that spill over into all activities.
- Better use, allocation, retention, and development of resources, particularly human resources.
- Better career development for staff.
- No expenditure on nonproductive bidding activities.
- Identification with a substantial and influential client.
- Ability to enhance technical skills and to be involved in innovation, research, and development.

1.12.2 Disadvantages for the Contractor

- Possible loss of opportunities with other clients because of perceived special relationship with partner.

- Fewer risks, but profit margins may be less.
- If the workload does not materialize or is exceedingly variable, the commitment to provide resources may become onerous.

1.12.3 Advantages for the Client

- Less confrontation—problems get solved, not escalated, and information is shared and not preserved for commercial advantage.
- Reduction in fixed overheads as a result of employing a contractor to carry out work previously done by in-house engineering departments. Flexibility is achieved and fixed overheads are transferable to variable ones.
- Obviates the need for senior management involvement with the handling of adversarial claims.
- Eliminates recycling of learning curves.
- Benefits from productivity gains.
- Quality improvement.
- Eliminates the need to allocate highly skilled resources to bid evaluation process.
- Brings the contractor's skills into selection of alternative and possibly cost-saving methods.

1.12.4 Disadvantages for the Client

- Absence of competitive bidding may reduce benefit to be gained from market downturns.
- Committed to provide work for core team.
- More *difficult* to provide incentive for the contractor.
- May have adverse impact on the client's staff—perceived career limitations resulting in skill depreciation with a consequent effect on motivation.
- In the event of a major disagreement and dissolution of partnership, previously confidential information may not be secure.

1.12.5 General Observations

- The long-term relationship implicit in partnering can only be sustained if the client is able to provide a significant ongoing core program.

- The period of partnership should be a minimum of five years.
- Partnering is not right for every organization or situation.
- Both parties should be prepared to invest in ongoing training.
- It must be accepted that the benefits of partnering may not be immediate and it involves entering a long-term relationship from which it may be difficult and costly to withdraw.

1.13 Prime Contracts

Prime contract is a term generally used to describe a contract between a client (owner) and a managing contractor. This arrangement will usually consist of any one or all of the following elements: engineering, procurement, fabrication, and construction. An oil company or similar owner intending to embark upon a major project is unlikely to have on its permanent staff sufficient management and field superintending personnel to properly conduct such a venture and may well consider the employment of a large engineering and construction company to manage the project.

The client may elect to give the managing contractor full management responsibility for all phases of process, design, procurement, and construction. In this situation, the managing contractor contracts work in its own name and on its own paper. Such contracts are essentially two-party (managing contractor/subcontractor) agreements, although certain guarantees and indemnities may accrue to the client without any reciprocal responsibilities being placed on the client. The managing contractor will be liable, in such a situation, for any money due to the subcontractor for performance of the work. In other circumstances, the prime contract may specify that the managing contractor will act as an agent for the client in the procurement of goods and services. In this situation, the managing contractor will contract the work in the client's name and on the client's paper. Such "agency" contracts are three-party (or more) (e.g., client/managing contractor/contractor) agreements. In these contracts, the managing contractor retains its management responsibilities and control while the client assumes full responsibility for payment.

1.14 Professional Services Contracts

The professional service contract is designed for use where professional, expert, or specialized services are required and no actual construction

work is to be performed. Professional services may be for consulting work, engineering agreements, soil investigations, aerial surveys, and the like.

1.15 Short Form Contracts

The short form contract is written only for low-value, low-risk work and may be developed in the field or on site when the estimated final value of the work does not exceed a predetermined amount (perhaps, \$50,000). No change orders or amendments are written against such contracts. Extra work and the like are made subject of a further short form contract.

The short form contract consists of a signature document, scope of work, commercial terms, general terms (abbreviated form), and, when applicable, drawings, specifications, and exhibits.

1.16 Incentive Plans

Incentive plans are financial schemes or packages designed to encourage improved performance by the contractor. They may be selectively used in lump sum contracts to motivate a contractor to meet or improve the work schedule and in cost plus contracts to improve the cost and/or schedule while maintaining work quality.

Incentive plans normally involve (a) establishing targets for cost and/or schedule and then measuring the contractor's performance against these targets and (b) improving the contractor's motivation and performance by offering attractive bonuses for meeting or beating targets and by providing for payment of liquidated damages for overrunning them. Some incentive plans may be without bonus features and may only have liquidated damages for overrunning scheduled targets.

Incentive plans are entirely dependent upon accurately definable cost or scheduling targets. Therefore, if these targets must be adjusted during work performance to take into account direct or indirect delays to the work that are beyond the reasonable control and foresight of the contractor, the entire incentive plan may be threatened by an absence of target definition. For this reason, incentive plans are usually applicable only to "turnkey" types of contracts and the like. As a general rule, these plans should not be used for contracts in which the client is obligated to provide a substantial amount of services or materials.

Several types of incentive arrangements are available. The principal types are as follows.

1.16.1 Plans for Lump Sum and Unit Price Contracts

- (a) Bonus/liquidated damages plan (a schedule incentive plan) established in the bid invitation or as a result of negotiations before or after contract award. The contractor receives a bonus for meeting or beating the target completion date(s) or the contractor pays liquidated damages for late completion.
- (b) The bonus plan generates payment only for early completion of the established critical contract schedule milestones.
- (c) Should the contractor fail to complete the work within the time stated in the contract (either the completion of the entire contract or the achievement of milestones), then the client would be entitled to deduct from the contract price a sum equivalent to ___ percent of the contract price per day or part thereof as liquidated damages up to a maximum of ___ percent of the contract price.

It may not be immediately apparent but there is a benefit to the contractor in having a definition of the amount of liquidated damages in the contract and this is the quantification of its liability. If there is no definition of the amount of liquidated damages (and not all contracts include this clause) and the work is not completed in the time stated in the contract, the risk for the contractor is that subsequent damages may be unlimited. If, however, the parties agree beforehand on the level of damages to be paid by the contractor in the event of lateness (i.e., liquidated damages), then those liquidated damages become due in the event of lateness, irrespective of the actual loss suffered.

1.16.2 Plans for Cost Plus and Day Rates Contracts

- (a) A negotiated target is when the client and contractor agree on the contractor's definitive cost estimate. The contractor receives a bonus (a share of the client's savings) if it underruns the target cost or it receives no bonus and reduced compensation if it overruns the target. In addition, the plan may contain a target completion date allowing the contractor to receive a bonus for early completion. A definitive description of the contractor's work is required to define the target cost.
- (b) Negotiated maximum cost is similar in all respects to the negotiated target described in the preceding text except that the contractor assumes all cost in excess of a negotiated maximum cost.

- (c) The negotiated lump sum was established as a result of negotiations after contract award and the contractor's completion of a definitive cost estimate for the work. This involves conversion from a cost plus or day rate to a lump sum or unit price contract. In addition, a bonus/liquidated damages plan as described in the preceding text may be negotiated at this time. A definitive description of the contractor's work is required to define the lump sum price.
- (d) The unilateral incentive plan(s) was established as the result of unilateral offering(s) by the client at contract award or shortly thereafter. Targets for cost and/or completion dates are set by the client.
- (e) The contractor receives a bonus for meeting or beating a target cost or dates; any bonus earned for meeting or beating one target is reduced if the contractor overruns another target. No liquidated damages are paid by the contractor because the terms of the plan are not the result of bilateral negotiations.

The unilateral incentive plan offers several advantages:

- The plan is effective at contract award or shortly after and the incentives apply during the entire performance of the work, including the early work when critical decisions are made in contract planning and procurement.
- The plan can be established at any time because it does not depend on bilateral negotiations.
- The cost estimate, schedule, and targets established by the client are designed to be realistic and do not contain "padding." The client's cost estimate is given to the contractor to serve as the basis for contract cost control thus providing a guide for quantities and cost against which the contractor can measure its performance in design, purchasing, and other contract activities. (The plan may also be applied when the contractor prepares the cost estimate. Although some of its advantages are then lost, it may still be a better choice than the negotiated incentive arrangements.)
- The bonus rates in the plan are proportioned to the client's needs, assuring proper contractor motivation to save time in exchange for money, right from the start of the work.

1.17 Policy on Claims

In times of recession when oil companies are in a strong position regarding conditions of contract, they are still a comparatively soft touch when it comes to acceptance of contractors' claims. Performance claims, when they arise, are usually investigated promptly and resolved in a reasonable manner and most clients' project procedures will reflect this policy of fair play.

1.18 Quality and "Intent" of Contracts

In spite of the client's employees' desire to adhere to these principles in the field, they are often governed by the quality of the contracts they administer. As explained in Chapter 6, the field contracts engineer is not always the one who put the contract together in the first instance and therefore he is obliged, when disputes arise, to seek for the intent of the contract when it was compiled. Some lawyers will hold that "intent" is not worth much in law and courts will only consider what is *written* in the contract, assuming that both parties chose and signed the written words thereby accurately setting out their intentions. However, this book is concerned with judgment by nonlegal personnel in the field in situations unlikely to appear in court. In general, oil company policy is such that, if it can be reasonably argued that the contractor did not intend to follow a certain course of action when it bid for the work, the argument will usually receive sympathetic consideration where the contract is silent on the subject or is capable of being interpreted either way. The degree of sympathy may appear to expand in circumstances where the contractor is indigenous to the country in which the client operates.

1.19 Field Administration of Contracts

A client site team, operating in remote areas, does not have a company lawyer in residence. In all probability, it has never seen the company lawyer and therefore relies on the contracts engineer for immediate and local guidance. To give this service to his colleagues in construction, he must know the contract from cover to cover and must also be aware of company policy and philosophy for the whole project. When a contractor considers that it is in a claim situation, a good contracts engineer will anticipate the claim long before it hits the table and will be able to judge its success, or otherwise, on its way through the claims process. It is likely that the construction team will voice an opinion on the dispute, generally in opposition

to the contractor's stance. The contracts engineer may see vagaries in the contract language supporting the contractor's case and may believe that if the matter reaches the higher echelons it may be decided in the contractor's favor. Because even a modest claim costs the company money to process to conclusion, the contracts engineer may try to arrive at a settlement by negotiation and recommend to his management a speedy resolution of the matter.

1.20 Planning Policies

This book is not specifically concerned with the investment analysis techniques of the owners and unless it is required to provide funding for a project, the contractor may not have more than a passing interest in the client's source of capital. However, client management groups are constantly faced with the problem of choosing between various investment alternatives for the simple reason that the funds at their disposal are limited and shareholders and others demand the maximum possible return on their money.

There are, of course, some immediate expenditures that are justified on noneconomic grounds, such as, the rescue and reestablishment of the Kuwait oil fields, and elsewhere, perhaps, the imposition of governmental regulations affecting the output of a plant.

The decision to embark on a new project in the oil, gas, or petrochemical industry is almost certainly made with a view to increasing revenue throughout the anticipated life of the project. Once having made the decision, it is of paramount importance to the owner that the project is completed and off and running on schedule and inside the budget. There have been surprising exceptions to this rule, and one owner engaged in the construction of a liquefied petroleum gas plant was alternating between goading the contractors into greater efforts and allowing the schedule to slide backward depending on various influences on market conditions.

The various evaluation techniques are basically methods of comparing alternative investment proposals. It is sufficient to say that there are always at least two alternatives to weigh against each other, that is, the proposed project and doing nothing. If the latter course is adopted, then there will be no change in the cash flows of the company and management would then be comparing the effect of accepting the proposed project with the present rate of return on the company's invested capital.

Capital expenditure may be classified into three major types:

- Expenditures made to reduce costs:
This type of expenditure does not affect the present level of production or sales of a company but is aimed at reducing the present operating costs of the company. For example, the replacement of a machine that requires two operators with a machine that requires one operator.
- Expenditures made to increase revenue:
This type of expenditure is aimed at increasing the production capacity or sales of the company and can affect the operating costs as well as the revenues. It is made with the express purpose of increasing the net revenue of the company.
- Expenditures justified on noneconomic grounds:
This expenditure has been explained in the preceding text using the Kuwait example and governments' legislation.

Having decided to go ahead, the choice for the client lies in the decision to:

- (a) Finish the project with the company's own personnel.
- (b) Finish the project with the company's own personnel with support from a major contractor, using the latter as a sort of "hot body shop."
- (c) Finish the project with its own personnel plus selected freelance consultants from various areas.
- (d) Engage a major managing contractor such as Bechtel, Fluor, Kellogg, Foster Wheeler, Parsons, and so forth.

Early contract planning is essential for successful contract development. Accordingly, this planning should be initiated as soon as sufficient information is available to define the proposed work to be contracted so desirable contracting alternatives are not precluded by lack of time or attention.

To examine the initial moves of a company about to embark on a large and expensive project, we will agree to define a "super project" as a venture expected to cost anything over one billion dollars. This will be split up into separate contracts for site preparation, civils, mechanical and pipe work, insulation, refractory, electrical, instrumentation, and painting

worth from one million to five hundred million dollars each. We will consider the mechanical contract at the top end of the scale for value.

The probable order of construction in, say, a refinery extension would be:

- Site preparation (grading, roads, paving, etc.)
- Civils (foundations, substations, control buildings, etc.)
- Mechanicals (steel structure, pipe work, tanks, spheres, vessels, rotating equipment, etc.)
- Insulation and refractory
- Electrical and instrumentation
- Painting

The client will engineer the work, probably by engaging a design engineering contractor to produce the specifications and drawings. The head office contract engineers will begin the task of gathering information to make up a bid package for each contract in the disciplines mentioned in the preceding text.

First the model Articles of Agreement will be modified to suit a particular contract and the modifications will be offered to the company lawyers for approval. Scope of work check sheets will be collected from the project engineers and several discussions and meetings will be held before the final scope of work emerges. A bar chart schedule will outline the work sequences within the overall timeframe for accomplishing the work.

Schedule milestone dates will be determined. The contract engineer will advise on the options regarding the pricing of the contract and will eventually insert details of lump sum, unit rate, or other methods of payment as appropriate. This exercise may include the collection and layout of bills of quantity and details of payment by measurement. He will also include information on free-issue materials should the company propose to adopt this route and will put all this into a bid package or an RFQ, usually in a frenzied race against time. Meanwhile, the estimating engineers will be putting together their estimate of how much the project should cost.

In the front-end planning of a super project, most client organizations will establish a small core team well in advance of anticipated start dates. This team, made up of experienced client personnel, will prepare a project execution plan. The first issue of the plan will be brief in outlining the philosophies of how the project will be conducted. This document will be

the forerunner for subsequent detailed planning. The format may be as follows:

- Overall schedule—bar chart
- Resourcing plan
- Organization chart with durations
- Contracting plan
 - Basic strategy
 - Master list of contracts
 - Dates of award
 - Approximate value
- Quality assurance (QA) plan
- Engineering schedule and plan
 - Preliminary engineering
 - Key dates
 - Definition of output required
 - Constraints given designer
 - Detailed engineering
 - Key dates
 - for procurement
 - for receipt of vendor data
 - for output (definition of output required)
- Procurement plan
 - Major items
 - Schedule
- Construction plan
 - Schedule
 - Key dates
 - for installation
 - for operation

The basic project philosophy will be defined before writing a project execution plan.

A super project could well employ several hundred specialist personnel extra to the client's normal staff level. Assuming that such a project will have a duration of three or four years, and members of the project team

will have varying dates of mobilization and demobilization, the client will not normally employ home office and field staff on a permanent basis, but will seek outside help. This can be achieved by using consultants or freelance specialists, but is more usually accomplished by engaging a service contractor who has a sufficiently large force of trained personnel to manage the project. Such international giants as Bechtel, Fluor, Foster Wheeler, Kellogg, Parsons, and others provide staff for these ventures and, if required, will also engineer the work. This is usually done through a cost reimbursable plus fee contract.

The managing contractor will undertake to issue contracts for the work, either in the client's name or on its own account, depending on the terms of the prime contract with the client. Apart from the advantage to the client of having the managing contractor supply staff with special skills and relieving the client of the extra involvement in payrolls and wage rate determinations, fringe benefits, personnel transportation, and other labor or social aspects of hire, the managing contractor also offers engineering and design skills, established procedures and systems, and specialist knowledge that may not be available within the client's organization. Regarding administration procedures, the managing contractor has volumes of well-tried procedures (in stock, as it were), all available to the client, that saves it the bother of inventing any procedures. The same may be said for all the checklists and forms for compiling bid packages in RFQs.

In project planning, the client may consider the appointment of one or more detailed design engineering contractors (DECs) in addition to the managing contractor. This has been known to diminish the ability of the managing contractor to support the client. One reason is that the DEC often has no contractual interest in the overall project schedule and therefore no incentive to expedite the procurement-related part of its scope of work. It is worth investigating a concept where the managing contractor is made responsible not only for the supervision of construction, but also for engineering and procurement.

1.21 Integration

In every project there has to be a certain amount of integration between the client's project staff and others in the construction effort. There could not be a watertight division between, for example, the managing contractor's staff and that of the client. On the other hand, the client's staff at the

lower levels could not be in a position to supervise or issue instructions to the contractor's management. Most clients work this out amicably enough with their managing contractors.

The evolution of the managing contractor is comparatively recent. Before 1958, for instance, one of the world's largest oil producers had its own construction division, mostly for civil work within its own community and purchased very little from local merchants. Onshore construction companies in the area had no work with this client although international firms were occasionally involved with refinery revamps and the like. There was a certain amount of offshore work, mostly shared between Brown & Root and McDermott lay barges. At that time, daily crude oil production was around one million barrels. With the increase in oil production (2.6 million barrels per day [mbd] by 1967) and the build up of pressure from the government for participation in ownership, local purchase, and construction, the company slowly gave way and encouraged local traders and contractors to seek agencies and joint ventures with Western manufacturers and contractors. By the mid-1970s, production had risen to more than 10 mbd and the company sought to collect and process the flash gases associated with the crude oil produced. Plans were made to complete a gas-gathering project by 1982 costing an initial five billion dollars. For this project and similar ventures in the country, a leading U.S. engineering-construction company was chosen to act as managing contractor. In 1980, such companies as Fluor, Parsons, Foster Wheeler, C. E. Lummus, Brown & Root et al., had a backlog of orders for plant worth billions of dollars and construction contracts not only in the Middle East but in Europe, South Africa, Canada, and throughout the United States. Fewer than a dozen design engineering-construction companies were in a position to accept a contract for a super project. As a result, the expertise of the few was in great demand. Those management contractors designed the plant, ordered the material through their vast procurement channels, engaged the subcontractors for each discipline, and supervised every stage of the venture. To be sure, the oil company clients appointed their own project managers and staff who signed documents and, in theory at least, held the purse strings, but there is no doubt that the managing contractors ran the show, usually on their own terms. Had this situation been allowed to continue, it is probable that the industry would have run into massive equipment delivery problems and certainly a shortage of skilled labor. However, the recession came as quickly

as the boom and managing contractors were faced with hard money quotations for what was left of the industry construction program. In some cases they were told to find the money to finance the project if they wanted to be dealt in. Some clients decided to use the once-powerful managing contractors as suppliers of labor and office services, using their now half-empty offices as headquarters for the project in hand.

Some of the managing contractors found themselves in real difficulties. During the boom years they had acquired an enormous amount of cash because they had little or no equipment of their own and relatively few assets other than their buildings and personnel, and they financed their day-to-day business with the clients' cash. Many of them started to buy up other companies with their spare money, but when the boom ended the other firms in the group fared no better than the purchaser. Companies who would not look at a quotation request of less than \$100 million in 1980 were now seriously investigating the possibilities of a hard money paving job. Of course, the large construction companies may ease the situation by laying off the workforce and even top management, but the snag here is that if business improves in the near future, those laid off have either retired or found employment in alternative industries and would be difficult to recover. In the middle of these hard times came the idea of "total integration" meaning that the client will use a one-time managing contractor to supply some of the personnel, but will also recruit others through agencies, cost engineering companies, and consultancies leaving the managing contractor no longer managing, but in a new role as a "hot body shop," a kind of glorified employment agency. In theory, this should work well and project management positions would be filled by those best qualified to hold them, regardless of whether the incumbents originated from the client's permanent staff, from the managing contractor's staff, or from a small consultancy out of obscurity. To integrate, as applied to project policy, means to combine into a whole the best of hired help regardless of its origin. So what is wrong with total integration? From the managing contractor's viewpoint it is nothing but bad news, however much it may try to look as though it is enjoying it. The managing contractor is no longer in a position to ride along on a cost plus agreement while dealing out hard money contracts to others. The managing contractor may also find that it has lost its exclusive position and may have to work alongside smaller companies in one big management organization. In a fully integrated system, the client may engage a number of contractors, consultants, and smaller freelance companies or individuals and integrate them all into the project management team.

In this arrangement, it is possible for someone on the management contractor's staff or even the client's permanent staff to find himself reporting to another contractor's supervisor. From the client's position it loses the benefit of the managing contractor's vast contractual and procedural knowledge and generally dedicated personnel. When a managing contractor completely manages a project, it always tries to move its people to another job as they are phased out of the current one. The client, on the other hand, will probably not be able to employ integrated and therefore temporary staff on another project in the organization so they will be released. This means that as the end of the project draws near, individuals may lose interest in the work knowing that there will be no further employment for them. They may, however, use every device to prolong the closeout.

During the construction stage, a super project involving around one hundred contracts could have over four hundred people on the project staff. A typical personnel distribution would be:

Project management	10
Secretaries and clerical staff	25
Finance and administration	55
Project QA	10
Project controls (cost and scheduling)	10
Procurement (purchasing, expediting, and inspection)	20
Safety officers	5
Contract administration	15
Engineering	40
Construction supervision	200
Commissioning	10
<hr/> TOTAL	<hr/> 400

It has been acknowledged that most clients are unable to produce that number of personnel from their permanent staff ranks and unwilling to recruit directly for a comparatively short duration. In a totally integrated situation, about three-quarters of the disciplines mentioned in the preceding text would be drawn from outside sources with varying mobilization and demobilization dates.

1.22 Governmental Policies and Influences—The “Third Party”

In most oil-producing countries there exists an important authority not normally a signatory to construction contracts but who, nevertheless, may have

a massive influence on the project. This authority may be a government department charged with the responsibility to inspect and license certain proposed activities, a commission appointed to watch over the project for potential infringements regarding safety or the environment, or, in very large projects, a specially convened body dedicated to one project alone. The last mentioned authority may have a voice on matters of safety, security, the environment, and/or nonconformity with government regulations and laws. Where authorities have to give approval before the next stage of design or construction may begin, both client and contractor will find that time is not always as important to members of the commission as it is to the project. Third parties do not have the same schedule urgency as the proponents. Other authorities may not actually grant approval to contractors' proposals but have the right to express disapproval that sometimes amounts to the same thing. It will be seen through a claims exercise later in the book that failure to keep the government authority informed may lead to a great deal of expense for both the client and contractor. When the project involves refinery work, for example, with the daily necessity to obtain permits from the client for road closures, hot work, and the like, it is all too easy to forget to advise that "third party" of what is going on.

A graphic illustration of the retarding influence of officialdom appeared during the construction of the British/French Channel tunnel in the 1990s. An Intergovernmental Commission (IGC), which also incorporated a safety authority, was established to supervise—in the name of both governments—all matters concerning the construction and operation of the tunnel. The IGC was empowered to review and approve the constructors' designs, among other things. To a builder, approval of design changes must be given without unnecessary delay, as delay costs money. To the IGC, approval means when they were ready to give it and more often than not the IGC raised objections on the grounds of safety, defense, security, or the environment. Necessary and even laudable though these objections may have been, the time taken by the IGC to raise them was crippling to the constructors' progress. Eurotunnel, the eventual owners, had this to say about the IGC: "From the start we have striven to find solutions to issues of safety raised by the IGC upon our submitted designs. Eurotunnel has set high standards but any requirement of perfect safety in all conceivable circumstances, is unattainable in transportation." Support or otherwise for this sentiment is beyond the scope of this book but this cry from the heart must be familiar to engineers and constructors all over the world.

CHAPTER TWO

The Bid Package

2.1 Preparation by the Client's Team

Stretch the imagination and it might be possible to picture a situation in which a newly inducted contract engineer is required to prepare several bid packages for a project without the benefit of previous experience or guides such as model contract documents. Let us say, the engineer must prepare one for site preparation, civils, foundations, and the like, and another for mechanical work, steelwork, insulation, refractory, electrical, instrumentation, and painting. It would not take long to discover that even widely diverse packages such as instrumentation and painting, for example, use common phrases and clauses. The smart way to deal with this would be to collect all these repetitive terms and conditions, have them preprinted and bound in a separate section, and slip one into each new package as required. This collection may be called either the “Articles of Agreement” or “General Terms and Conditions.”

There are a considerable number of permutations relating to contract documents but the following contain the essential parts:

- Part 1 Articles of Agreement
- Part 2 Scope of Work

- Part 3 Master Schedule and Milestone Dates
- Part 4 Compensation
- Part 5 Materials
- Part 6 Specifications
- Part 7 Drawing Numbers
- Part 8 (Only to be used if certain of the articles in Part 1 are irrelevant and require amending.)

Alternatively, some contract documents are arranged as:

- General Terms and Conditions (Articles of Agreement)
- Exhibit A
- Exhibit B
- Exhibit C and so on ...

Generally, the only part of the contract documents having precedence over the other parts is the Articles of Agreement but in the event of conflict, the order would normally be the articles, special conditions, drawings, and specifications. Regarding the latter, contracts will carry an attachment reading as follows:

Anything shown in the drawings and not shown in the specifications or shown in the specifications and not shown in the drawings shall be of like effect as if shown in both and shall not be considered to be a conflict.

Anything shown in the drawings but contradicted in the specifications, or vice versa, should be discussed and resolved between the client and contractor, but usually the most stringent terms will apply. Inconsistencies in the contract document, of course, spring from mistakes and omissions in the preparation of the bid package because, preaward changes and instructions to bidders excluded, the former document should be a replica of the latter. Therefore, the bid package scope of work should be written with the administration of the future contract in mind. Efforts should be made to remove all vagaries, gray areas, and indeterminate expressions. No contract, for example, should contain the conjunction “etc.” (e.g., “Contractor shall supply fuel, water, gas, etc.”). In contractual terms this is quite without meaning. It is preferable to say “fuel, water, gas, and each and every item to complete the work” if such items cannot be listed. Clear directions are

important. For example, use “Contractor shall supply...” *not* “provision will be made” or “electricity will be supplied.”

All too often, in the client’s home office, the contract engineer is obliged to put together a bid package with input from other disciplines but does not have the time or assistance from others to check the finished product for clarity of intent. We all know that, after hours of proofreading the same document, the words tend to swim around and although the smallest grammatical or typographical error may be caught and corrected, a large anomaly may go undetected. It is worth the extra time to pass the draft to a colleague for a “What would happen in this event?” investigation. This may seem an elementary precaution but it is not always a procedural obligation with some clients or managing contractors. By asking another member of the staff (not necessarily one who is involved in that particular project) to check out the package, the result may be surprising and the proponent may face the question, “Do you really mean to include this clause?”, because if you do, it is possible that this may happen.”

2.2 Errors and Omissions

Had it been possible to keep a record of every contractor claim on every super project over the past few years, one of the most significant factors common to each would be inadequate or omitted contract language. The energy industry construction contract that is completely watertight and describes succinctly the obligations and intentions of both parties is uncommon. Another rarity is the invitation to bid (ITB) that is totally engineered prior to release. Yet clients and their managing contractors continue to produce these gems in the belief that construction contractors will forgive their errors and omissions and work in a spirit of happy cooperation with a minimum of change proposals. It is true of course, that there is a honeymoon period just after contract award when this belief seems justified, but this quickly gives way to acrimony and possible divorce and payment of alimony.

Because the Articles of Agreement are preprinted and only need fine-tuning for the production of a new contract, where do the mistakes and loopholes occur? Quite a few of them appear in the nontechnical parts of the scope of work. Clients and managing contractors have engineers on the permanent staff specializing in every discipline of the industry. Initial work on the preparation of a new construction contract may involve engineers from all departments including civil, vessels, pipelines, insulation,

electrical, instrumentation, painting, coating, fireproofing, and other disciplines, all of whom have carefully prepared check sheets to ensure that they do not miss anything in compiling the scope of work. The check sheets are used to fully describe the work and then the information in them is transferred to a rough draft of the scope of work. It is during this transfer of technical data to the contract engineer that the message to the contractor may become distorted or unclear. One possible solution is to have someone in the engineering department write the whole scope of work with the aid of a preprinted worksheet and subsequent contractual editing by the contract engineer.

2.3 What Type of Contract?

An additional home for potential claims is in the compensation section, especially where unit rates for extra work are to be provided. Having gathered the articles, scope of work, details of the planned schedule, drawings, and specification lists to suit the proposed bid package, the contract engineer will work on the pricing section. The first consideration is to determine the basis on which payment will be made: lump sum, unit rates, or other options. As a general rule, lump sum conditions should not be imposed unless the bulk of engineering design is complete or likely to be complete at an early stage of the proceedings. Because this is hardly ever achievable on a large undertaking, the contract manager should attempt to get as many unit rates as possible into the package for extra work to be introduced during the administration of the contract.

2.4 Job Explanation Meeting

For the larger or more complicated invitations to tender (ITT), clients are well advised to hold a job explanation meeting for their selected bidders and, either at a later date or at the same time, conduct a site visit. This is a very important meeting for both the client's team and the bidders who will undoubtedly send along the personnel designated to manage the contract should they be successful. It is important enough for the client's contract manager to be present and to enlist his available staff to assist even if they had no hand in the preparation of the bid package. Engineers from the relevant disciplines should also be there to answer technical questions raised from the floor. During the job explanation meeting, it will be helpful to have a tape recorder running. Aside from obvious reasons, there are always one or two bidders who arrive late and, rather than go through the

whole performance again, the organizers will save time and breath by allowing them to listen to the playback. Bidders might bring their own tape recorders for later listening and discussion.

The job explanation meeting should be held within a reasonable period of time after the distribution of the bid package to allow bidders time to review the documents and come to the meeting with questions on the work to be done. If possible, a site visit should be made on the same day. A typical job explanation meeting agenda would contain the following items:

- (a) Register attendance.
- (b) Introduction and brief explanation of the nature of the work.
- (c) Examination of the scope of work with references to those areas in the scope of work or specifications that are unusual or may need special attention.
- (d) Highlighting passages or references in the other parts of the package or exhibits that may require clarification.
- (e) Description of the location of the work.
- (f) Estimated start and completion dates with special references to items on the critical path.
- (g) Reminders regarding closing dates for bids and where to direct them.
- (h) Meeting open for bidders' questions.

Note: It is essential that all bidders respond in the same manner to requirements in the bid package that are not clear or on which the package is silent. For example, someone asks the question, "Will electricity be supplied by the client or shall we provide our own generators?" If the client's team does not know the answer at that time, the question may be noted and letters sent out at a later date. However, if, owing to time considerations and so forth, an answer should be given, it is preferable to give a positive direction one way or the other so that all bidders include, for example, for the supply of electricity. Even if this condition is altered later, at least all bidders are thinking along the same lines when their bids are presented.

2.5 Site Visit

It may not be possible for the site visit to be conducted on the same day as the job explanation meeting depending on the location of the site or the time required to examine it. Nevertheless, it is important that all bidders

make the effort to visit the proposed site. Some clients will make attendance at the job walk a condition of the bid particularly where the proposed site is in close proximity to an existing plant as in the case of a refinery extension.

The model Articles of Agreement, in Part 1 of the proposed contract handed to the bidders as part of the bid package, should contain clauses confirming that the successful bidder (contractor) has thoroughly investigated and satisfied itself regarding all the conditions of the site including access, roads, water, electricity, climatic conditions, and obstacles to be encountered (e.g., buried pipelines, drainage systems, and the like). Operators of an ancient plant in operation for 40 years or more are not always certain of the exact location of abandoned pipelines or cables. One of the first actions of an experienced contractor following contract award at such a job site is to dig a trench all the way around the perimeter to satisfy itself that there will be no expensive surprises during the life of the contract. Of course, it will not be possible to see these hazards during the site visit but very often a quiet word with one of the old timers at the adjacent operating site may reveal quite a few unknown factors.

In recent years, a contractor had been awarded the job of constructing a 1,500,000 barrel (bbl.) floating roof tank intended for the storage of natural gasoline on partly reclaimed land in the Middle East. Before work began on the massive foundation, all the necessary tests were carried out on the site, which had been thoroughly investigated to the satisfaction of client and contractor. But not, apparently, to the satisfaction of an old company retainer who had been semiretired and relegated to the position of gatekeeper at the site from terminal operator many years before. The old man insisted that there was a large diameter out-fall pipe that ran directly under the foundation to the sea. It had been abandoned for many years and had long since disappeared from any plot plan but it was, nevertheless, not the sort of thing on which to balance a large tank foundation. The contractor was skeptical until he was taken out to sea a little way to where the out-fall pipe could be seen in the gin clear water heading toward land and straight under the foundation.

At the site visit to a proposed petrochemical plant extension in Holland, the bidders turned up at the previously arranged time of 10 A.M. and spent a couple of useful hours at the site before adjourning for lunch and returning to their respective offices. One bidder, however, had noticed railway lines passing in front of the main gate to the site over which all vehicles had to

pass to get into the work area. The bidder decided to forego lunch and make a few inquiries. It appeared that, at frequent intervals throughout the day and night, locomotives with long trains of goods wagons would travel to and from the docks sometimes blocking access to the main gate up to half an hour at a time. The client had not mentioned this activity at the job explanation meeting or the fact that the railway authorities had no intention of changing their routes to suit plant construction. It also appeared that there was no strict timetable; the goods trains were dispatched along the line in accordance with the loading and unloading of ships at the docks. It became apparent that whoever bid for this job would have to take into account the possibility of late arrival of staff, workforce, equipment, and materials, not to mention the irritation of the workers having to wait to get home half an hour after clocking-off! There would obviously have to be some contingency built into the bid response.

2.6 Bid Package Worksheets

The contract administrator's task is made easier by the introduction of various checklists prepared for each discipline. The following forms illustrate the method of gathering information prior to completion of the bid package.

2.6.1 Request for Quotation

The request for quotation, when completed, is sent to all prospective bidders as part of the package. It is sometimes known as the invitation to tender (ITT) or invitation to bid (ITB).

Note that the client is asking only for bids that conform in all respects to the RFQ. Of course, should a bidder suggest a different approach or *modus operandi* that would save time and money then this suggestion would probably be considered, but the bidder would be required to list this separately.

The client may also consider extending the closing date if one or more bidders simply cannot meet it. If, because of this, more time is given, then all bidders must be informed of the new closing date.

2.6.2 Instructions to Bidders—RFQ Checklist, Electrical

It will be seen that the facing page of the RFQ ends with paragraph 6.0. Subsequent pages will refer to the type of work on offer; for example, the ITB RFQ Checklist, Electrical. This document follows the first page of the RFQ and will begin with paragraph 7.0, Pricing Conditions, and continues through Technical Conditions (8.0), Scheduling (9.0), Exceptions

(10.0), Job Site Inspection (11.0), Quotation Instructions (12.0), Schedule (12.2), Subcontracting (12.3), General Notes (12.4), and Enclosures (13.0).

Therefore, paragraphs 1 through 6 will be issued, as printed, to all bidders, but subsequent pages will apply only to the scope of work under consideration.

2.6.3 Part 2—Scope of Work

Words in parentheses or that are italicized are meant as instructions, not to the bidder, but to the contract administrator who is compiling the form and will therefore be deleted when the form is ready to be dispatched. Note that this information is repeated in *all* the forms.

Exhibits could be client documents that the bidder may be required to use as the contractor (e.g., change orders and work orders). In this case, samples would be attached in addition to merely listing them.

Part 3 may run into several pages depending on the size of the scope of work.

2.6.4 Technical Checklists

It is possible that an experienced contract engineer may be able to complete the site preparation checklist unaided especially if his or her background includes site preparation work. Normally, however, the contract person would complete the form with the assistance of an expert in site preparation; hopefully with someone who will be supervising the actual work after contract award. Note that if the first item is required and is checked, then the number allotted will be 3.1. If the second item is not required then this will be deleted and the third item becomes 3.2 and so on.

Similar instructions apply to the electrical checklist and when all of the checklist items are completed, the information gathered will be transferred to the scope of work.

2.6.5 Part 4—Commercial Terms, Lump Sum Worksheet

Having decided which contract format is to be employed, the compensation worksheet may be compiled. In this instance, it would be the worksheet for a lump sum bid.

Note that under subsection 1.2 the client is asking for the lump sum price to be broken down for accounting purposes only. Under conditions governing lump sum quotations, it should not be the client's business to inquire into the amount of profit the bidder is expecting. Indeed, subsec-

tion 1.1 indicates that the sum to be quoted will represent full compensation to the successful bidder for full and complete performance of the work under the contract. In subsection 1.2 the lump sum breakdown into areas, sections, or portions of the work is made solely to facilitate administration in the field and the prompt payment of invoices. However, the client's contract management on receipt of the quotation will usually be able to discover from the breakdown that part of the response is above or below the client's fair price estimate.

The company's legal department will be consulted on changes that may be necessary to the model Articles of Agreement. Either these changes will be made directly to the articles or a separate chapter will be inserted containing all the terms and conditions particular to the new contract, including all changes, additions, or deletions to the model Articles of Agreement. With the exception of changes and addenda during the bid stage, the bid package should be a replica of the proposed contract plus a section dealing with instructions to bidders. This portion, not to be part of the proposed contract, will advise bidders where to send their quotations; the closing date of the bid; the date and venue of the job explanation meeting and the site visit; and special instructions regarding alternative methods of construction should the bidders come up with any bright ideas to the benefit of the project.

In addition, the instruction to bidders will contain as much information about the work as possible that would not be otherwise obtained by examination of the package, specifications, and drawings. This information and questions for the recipients of the bid package may be taken from a stereotyped checklist prepared in advance by the contract engineer. This data could be worked into the RFQ as follows:

Pricing conditions

- (a) The quotation shall be valid for a period of _____.
(The bidder will fill in the number of days or months over which it is prepared to keep the quotation open.)
- (b) Firm pricing for the duration of this Contract is requested. If the bidder cannot guarantee firm prices, Company will consider a proposal with maximum percentage of escalation clearly stated for labor, construction equipment, and materials.
- (c) The quoted price(s) shall include all costs to the Bidder for materials, labor, equipment, testing, and each and every item of expense,

fees, taxes, overhead, and profit for the Bidder's complete performance of the work as set forth herein.

- (d) Company may elect to issue to the Successful Bidder a Contract for all field erection labor and a separate purchase order for all materials, shop fabrication, and freight. The Bidder's quotation shall include a breakdown of these components of pricing.
- (e) The bidders are advised that quotations for this work will be invited from other contractors.

To be considered for award of Contract any deviations from or exceptions to specifications, drawings, terms, and conditions and/or any other documents listed herein must be clearly defined and set forth in your quotation in accordance with one of the following statements.

Certification to *either* "A" or "B" in the following text.

- A. "Our quotation is in exact accordance with the specifications, drawings, terms and conditions, and other requirements of this Invitation to Bid with NO EXCEPTIONS."
 - B. "Our quotation is in exact accordance with the specifications, drawings, terms and conditions, and other requirements of this Invitation to Bid with no exceptions other than those listed in the following text."
- (a) Bidder's quotation shall include the manufacturer, brand, catalog number, or other trade designation when prices are quoted on goods other than those specified herein.

(The contract engineer will refer to his checklist and use one or more of the following arrangements.)

- (a) Total lump sum price for all work.
- (b) Unit prices for the items set forth in section (insert section number).
- (c) As a separate item, the bidder's electrical power requirements and the price for providing its own electrical power.
- (d) As a separate item, quote fees for compliance with any applicable regulations, local or otherwise, and for obtaining all licenses and registrations.
- (e) As a separate item, quote all local, municipal, state, and federal sales and use taxes, excise taxes, gross receipt taxes, and all other similar taxes applicable to performance of work.

2.6.6 Schedule

Based on award by _____ (date), your quotation must indicate, by item, the number of weeks from award date required to:

- (a) Procure materials.
- (b) Submit legible, reproducible copies of checked fabrication and shop drawings for company approval.
- (c) Complete shop fabrication of subassemblies (if any) after drawing approval.
- (d) Complete shipment of all items (free on board [f.o.b.] jobsite).
- (e) Complete field fabrication.
- (f) Complete field erection.
- (g) Complete testing for final acceptance by company.

Based on (site preparation), (foundations) being completed by others to suit successful bidder's schedule, submit your tentative mobilization arrangements and schedule.

Based on award by _____, quote your best completion date, by item.

2.6.7 Subcontractors

- (a) State which portion of the Work, if any, you propose to subcontract and list the names and addresses of potential subcontractors.

2.6.8 Notes

When the bid package is prepared in draft form, it will be distributed for review and comment to other client departments including:

- Project Management
- Procurement
- Construction
- Engineering
- Law
- Audit
- Accounts Payable
- Tax
- Insurance

- Cost and Scheduling
- Industrial Relations
- Construction Quality Control

(The contract engineer is very careful to put a time limit on this review so that he has a chance to meet the bid invitation schedule. He is also at pains to ensure that nil responses are recorded, knowing very well that, in the event of disputes arising during the course of the contract, some departmental heads will swear that they never approved the issue of the bid package in that form.)

Request for Quotation

Date issued _____ Inquiry No. _____ Closing Date _____

YOU ARE INVITED TO SUBMIT YOUR QUOTATION FOR THE FURNISHING OF THE FOLLOWING CONTRACT WORK:

For _____
(Hereinafter referred to as "Client")

in connection with _____
at or in the vicinity of _____

1. Please direct your Quotation and all communications in ___ copies to

When telephoning about this Request, please ask for _____

2. GOVERNING TERMS AND CONDITIONS

Bidder's Quotation shall be submitted subject to the attached Specimens:
"Contract" Form No. _____

Part 1	Articles of Agreement	Part 5	Materials and Equipment
Part 2	Scope of Work	Part 6	List of Specifications
Part 3	Master Schedule	Part 7	List of Drawing
Part 4	Commercial Terms	Part 8	Special Terms

and any and all other attachments made a part of this Request for Quotation by reference herein.

3. The following DEFINITIONS shall apply:

Wherever the word "Client" is used, it shall mean _____.

Wherever the word "Contractor" is used, it shall mean "Successful Bidder."

Your Quotation shall conform in all respects with applicable drawings, specifications, and conditions referred to in this Request for Quotation. You may offer an alternative Quotation, providing all deviations or exceptions are listed separately and are clearly defined. Your standard Terms and Conditions of Sale will not be considered. Terms, conditions, and exceptions in your Quotation that depart from the terms referred to in this Request are to be deemed rejected except to the extent that they may be expressly set forth in a formal written Contract executed with Contractor.

4. Please complete and return promptly the attached acknowledgment of receipt.
5. All Quotations must be received on or before the closing date. Please advise us immediately if you wish to submit a Quotation but are unable to meet this requirement.
6. Client reserves the right to accept other than the lowest Quotation and to accept or reject any Quotation in whole or in part, or to reject all Quotations with or without notice or reasons and if no Quotation is accepted, to abandon the Work or to have the Work performed in such other manner as Client may elect.

Part 2
Scope of Work

RFQ Inquiry No. _____

Contract No. _____

1.0 General Description of the Work

(This Article shall generally define the type and extent of the Work to be performed. Indicate the appropriate words by numbering them in the proper order in the blanks provided. Place "and" before the last word listed.)

Except as otherwise expressly provided in this Contract, Contractor shall supply all

- labor
- consultation
- engineering and services
- inspection and testing
- installed and consumable materials
- construction camp accommodation
- supervision
- storage
- quality control
- equipment
- tools
- transportation
- _____

and each and every item of expense necessary for the

- supply
- construction
- fabrication
- handling, hauling, unloading, and receiving
- erection
- design engineering
- installation
- testing
- application
- assembly
- evaluation
- production
- _____
- _____

of _____.

(Hereinafter called the "Work.")

2.0 Specifications, Drawings, and Exhibits

(List any documents containing exceptions, revisions, or clarifications to the specifications and drawings immediately under the title of any specifications or drawings affected. When an exhibit is used to list specifications or drawings, the above data shall be shown on the exhibit and the exhibit referenced under the appropriate title—specifications or drawings. Recheck to ensure that the listed revisions to specifications and drawings are in accordance with the agreed upon basis of award.)

All Work shall be performed in strict accordance with the following described specifications, drawings, and other documents, which, by this reference, are made a part hereof.

2.1 Specifications

(All specifications shall be listed here. This list shall consist of specification number, revision number, and specification title.)

Specification No.	Revision No.	Specification Title
_____	_____	_____
_____	_____	_____
_____	_____	_____

2.2 Drawings

(All applicable drawings shall be listed here. This list shall consist of drawing number, revision number, and description of drawing.)

Drawing No.	Revision No.	Description or Title
_____	_____	_____
_____	_____	_____
_____	_____	_____

2.3 Exhibits

(All applicable documents other than those for specifications, drawings, or price structure shall be listed here. Exhibits shall show the identifying letter of exhibit, revision number, and title of exhibit.)

Exhibit No.	Revision No.	Title
_____	_____	_____
_____	_____	_____
_____	_____	_____

3.0 Description of Work—Specific

(List all additions, clarifications, engineering notes, and important items of work or instructions, especially those that might have been specifically negotiated or that might without clarification, create uncertainty. This section must include an accurate and detailed limitation of the parameters of the Work, including start and stop points. If materials or equipment are involved, the specific item or tag numbers must be listed here.)

The Work described in this Part 2 shall include, but not be limited to, the following:

4.0 Data or Information Requirements

4.1 Contractor shall submit the following data as part of the Scope of Work:
(List all data requirements; if none, write “none” and delete section 4.2.)

4.2 Contractor shall show the Contract Number and identifying item numbers, if applicable, on all data submitted pursuant to the above.

4.3 (All specific instructions regarding the required data shall be listed here and in subsequent sections; if none, delete section.)

Technical Checklist for Site Preparation Contract

RFQ Inquiry No. _____ Contract No. _____

(Use this checklist to fully describe the Work. When completed, transfer the information to the Scope of Work worksheet. A copy of the completed checklist should accompany the worksheet for entry into the Contract file.)

1.0 Description of Work—General

Use Scope of Work worksheet.

2.0 Specifications, Drawings, and Exhibits

Use Scope of Work worksheet.

3.0 Description of Work—Specific

See Scope of Work worksheet instructions. Check and insert numbers in proper order below, as applicable.

- 3.__ Obtain entry and the following special permits.
- 3.__ Clear and dispose of grub and strip site of vegetation and trees.
- 3.__ Relocate existing:
 - structures cemetery graves
 - above and below ground utilities and communication systems
- 3.__ Demolish, remove, and dispose of existing above and below ground obstructions.
- 3.__ Divert existing streams.
- 3.__ Drain existing reservoir(s) and/or pond(s).
- 3.__ Backfill existing well(s).
- 3.__ Drill new water well(s).
- 3.__ Perform general earthwork including excavation, fill, blasting, compaction, and grading.
- 3.__ Perform necessary surveying (layout, grade setting).
- 3.__ Dispose of debris and unsuitable excavated material.
- 3.__ Install surface drainage system including ditch lining(s).
- 3.__ Install all culverts.
- 3.__ Install riprap.
- 3.__ Prepare subgrade.
- 3.__ Install subbase course for roads, driveway, parking areas, and sidewalks.
- 3.__ Install base course for roads, driveway, and parking areas.
- 3.__ Install:
 - asphalt
 - concrete surfacing for roads, driveway, parking areas, and sidewalks
- 3.__ Construct tank foundations (pads).
- 3.__ Perform soil stabilization (lime, cement, etc.).
- 3.__ Perform necessary dewatering of site.
- 3.__ Stockpile usable soils.

If the Work is to be divided into Unit Prices, the following wording shall precede the Unit Price Portion:

3.____ Unit Price Portion.

The Unit Price Portion of the work shall consist of the work requested and authorized in writing by Client from time to time for performance on a Unit Price basis and may include the following:

3.____ (Other—Specify)

3.____ (Other—Specify)

3.____ (Other—Specify)

3.____ (Other—Specify)

3.____ (Other—Specify)

4.0 Data Requirements

Use Scope of Work worksheet.

Technical Checklist for Electrical Contract

RFQ Inquiry _____

Contract No. _____

(Use this checklist to fully describe the Work. When completed, transfer the information herein to the Scope of Work worksheet. A copy of the completed checklist should accompany the worksheet for entry into the Contract file.)

1.0 Description of Work—General

Use Scope of Work worksheet.

2.0 Specifications, Drawings, and Exhibits

Use Scope of Work worksheet.

3.0 Description of Work—Specific

See Scope of Work worksheet instructions.

Check information blocks and insert numbers in proper order below, as applicable.

3.1 Major Electrical Equipment

- 3.1.__ Supply all major electrical equipment in accordance with the attached specifications and other instructions referenced herein.

Note: Client's Representative's approval is required before purchase of any major electrical equipment by Contractor.

- 3.1.__ Receive all major electrical equipment.
- 3.1.__ Inspect all major electrical equipment before off-loading.
- 3.1.__ Off-load equipment and transfer to storage.
- 3.1.__ Store equipment in accordance with the attached storage instructions.
- 3.1.__ Transport equipment from storage to the final equipment site.
- 3.1.__ Inspect in detail all equipment in accordance with the Construction Division checklist.
- 3.1.__ Completely erect equipment as required, including but not necessarily limited to, the following:

- 3.1.__ Provide necessary hangers and supports with foundations for bus duct installations. Bus duct supports shall include painting.
- 3.1.__ (Other—Specify)

3.2 Bulk Electrical Material

- 3.2.__ Supply all bulk material in accordance with the following list (Specify):

- 3.2.__ Receive all bulk material.
- 3.2.__ Provide storage for bulk material.
- 3.2.__ Install all bulk material.
- 3.2.__ (Other—Specify)

Note: Contractor shall properly utilize the Material Handling System to ensure a proper study of equipment and materials to maintain its construction schedule. Any claims of delay due to lack of equipment will not be acceptable if the material control system has not been utilized.

- 3.2.__ When Contractor's Scope of Work includes storage responsibility, this shall include a complete inventory at the completion of the Contract and maintenance of the surplus materials until direction of disposal is made.
- 3.2.__ Contractor shall make all tests necessary to satisfy itself that it is receiving a good product at the time the material is delivered to Contractor and prior to the time said material becomes its responsibility and under its control. Any defective materials shall be replaced at Contractor's expense from the time of acceptance.
- 3.2.__ Contractor shall provide all manpower required to assist with the assembly, installation, testing, and energizing of major electrical equipment as may be required under the direction of the manufacturer (vendor).
- 3.2.__ Storage, assembly, and testing of equipment by Contractor shall be in accordance with the specifications and/or other instructions attached as part of this Contract.
- 3.2.__ (Other—Specify)

3.3 Installation

- 3.3.__ Provide electrical underground ducts including:
 - Excavation Forming Concrete
 - Conduit installation (ducts) Back fill
 - Standby labor during concrete pour on ducts
 - Install underground cable and wire
 - (Other—Specify)

- 3.3.__ Install all above ground electrical work including:
 - Conduit Conduit supports Cable trays
 - Cable tray supports Conduit fittings
 - Cable and wire
 - (Other—Specify)

- 3.3.__ Termination and splicing of all cable and wire.
- 3.3.__ Install the complete grounding system.
- 3.3.__ Install the communications system, including:
 - Telephone utility—conduit and pull wire only
 - Intraplant communication system
 - (Other—Specify)

- 3.3.__ Install the cathodic protection system.
- 3.3.__ Install the electrical heat-tracing system.
- 3.3.__ (Other—Specify)

3.4 Test and Check Out

3.4.__ Perform tests and check out all equipment and conductors in accordance with Client's procedures and lists attached.

3.4.__ Supply the following required test equipment (Specify):

3.4.__ Provide standby electrician during motor run-in.

3.4.__ (Other—Specify)

4.0 Data Requirements

Use Scope of Work worksheet.

List all equipment required on Contractor purchases such as ratings, operating and maintenance manuals, spare parts lists, and the like.

4.__ Contractor's performance of its obligations hereunder shall not be complete until Client's Representative is in receipt, in proper form, of all technical data, drawings, parts lists, instruction manuals, and other documents to be submitted to Client's Representative as part of Contractor's Scope of Work. Failure of Contractor to comply with the above data requirements shall entitle Client's Representative to withhold any progress payment and/or final payment pending Client Representative's receipt of all the above data without prejudice to any other remedies.

4.__ (Other—Specify)

Contract

CRUDE OIL COMPANY CONTRACT NO. _____

THIS CONTRACT IS entered into, effective as of _____ by and between THE CRUDE OIL COMPANY (hereinafter referred to as "Client"), whose address is: Shale Beach, San Francisco, California, U.S.A., and ACCLAIM CONTRACTING INCORPORATED (hereinafter referred to as "Contractor").

In consideration of the agreements herein contained, the parties hereto Contract and agree as follows.

Article 1.0 Contract Documents

This Contract shall consist of this Signature Document and the following documents and the exhibits, drawings, specifications, and documents referred to therein, all of which, by this reference, are incorporated herein and made a part of this Contract.

- Part 1 Articles of Agreement
- Part 2 Scope of Work
- Part 3 Master Schedule
- Part 4 Commercial Terms
- Part 5 Materials and Equipment
- Part 6 List of Specifications
- Part 7 List of Drawing Numbers
- Part 8 Special Terms

Said Contract sets forth the entire Contract and agreement between the parties pertaining to the Work and supersedes all inquiries, proposals, agreements, negotiations, and commitments, whether written or oral, prior to the date of execution of this Contract, pertaining to the Work or this Contract.

The provisions of this Contract may be changed only by a writing executed by the parties to this Contract. Trade custom and trade usage are superseded by this Contract and shall not be applicable in the interpretation or performance of this Contract.

Article 2.0 Scope of Work

Except as otherwise expressly provided elsewhere in this Contract, Contractor shall supply all services and items of expense necessary to perform and shall perform, the following Work:

Said Work being more particularly described in PART 2—SCOPE OF WORK for or in connection with the facility of Client, said Work to be performed on a site designated by Client at or in the vicinity of:

Article 3.0 Contract Price

Contractor's full compensation for full and complete performance by Contractor of all the Work and compliance with all the terms and conditions of this Contract shall be as set forth in PART 4—COMMERCIAL TERMS.

Article 4.0—Captions

Titles and captions used in this Contract are for convenience only and shall not be used in the interpretation of any provision of this Contract.

IN WITNESS WHEREOF, the parties hereto have executed this Contract on the day and year written below, but effective as of the day and year first set forth above.

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

Notes

1. The “effective” date of the Contract is the date of commitment to Contractor or the date Contractor first performed Work, whichever is earlier.
2. If there is no Part 8 to the Contract proposed, delete the title.
3. In cases of express conflict between Parts of the Contract, specifications, drawings, or exhibits, the order of precedence shall be as follows:
 - (a) Signature Document
 - (b) Articles of Agreement
 - (c) Scope of Work
 - (d) Exhibits
 - (e) Drawings
 - (f) Specifications
 - (g) Special Terms (if used)
 - (h) Commercial Terms
 - (i) Materials and Equipment

Contract Part 4—Commercial Terms Lump Sum Worksheet

1.0 Contract Price

RFQ Inquiry No. _____

Contract No. _____

- 1.1 Full compensation to Contractor for full and complete performance by Contractor of all the Work, compliance with all terms and conditions of this Contract and for Contractor's payment of all obligations incurred in, or applicable to, performance of the Work shall be the total Lump Sum Price of:

(Write out in full words followed by figures.)

- 1.2 (For accounting purposes only, the Lump Sum Price is broken down as follows: This section should record the cost code numbers, area numbers, and amounts. This section may also be used to record other breakdowns relating to the overall price, which may be required by the Project or convenient for administration in the field.)

(This section shall detail any Special Pricing Provisions if applicable. These may include mobilization and demobilization costs, allowances, options, emergency shutdown costs, etc.)

2.0 Pricing Basis

The Contract Price set forth herein is firm for the duration of the Work and includes all of Contractor's costs, expenses overhead, and profit for complete performance of the Work.

If the statement above is not applicable, insert a statement outlining clearly any provisions for adjustment escalation or de-escalation applicable to labor, equipment, or materials. This should include elements affected, effective dates, maximum percentages and basis for evaluation, actual cost adjustments, dates of draft agreements, and the like.

3.0 Pricing for Changes in Scope of Work

Adjustments to the Contract Price for any changes in the Scope of Work shall be in accordance with the provisions of Part 1—Articles of Agreement.

RFQ INQUIRY NO. _____

CONTRACT NO. _____

Contract Part 4—Commercial Terms Cost-Plus Pricing Formula Worksheet

1.0 Contract Price

Full compensation to Contractor for full and complete performance of the Work, compliance with all terms and conditions of this Contract and payment by Contractor of all obligations incurred in, or applicable to, Contractor's performance of the Work shall be the sum of the following costs and markups:

1.1 Labor, Related Costs, and Profits

1.1.1 (All-in Rate Compensation to Contractor for labor, related costs, and profit in accordance with the rates set forth in Exhibit ____ Entitled Labor Rate Agreement attached and incorporated herein.) (Or, if there are only a few rates to be listed, use "with the rates set forth below.")

(The Exhibit for the All-in Rate should be titled "Labor Rate Agreement" and should include all straight time rates, overtime rates, expiration dates, and escalation provisions referenced to Article 2.0.)

1.1.2 Except as may be expressly provided otherwise elsewhere in Article 1.0 of Part 4, the rates set forth in 1.1.1 above are inclusive of all direct wages, fringe benefits, labor allowances, payroll taxes, insurance, small tools that cost Contractor less than ____ per tool, temporary construction facilities, consumables, expendables, overhead and profit, and all other costs and expenses incurred by Contractor in performing the Work and this Contract.

ALTERNATIVELY:

1.1.1 *Labor:* At actual direct wages paid plus fringe benefits and labor allowances as established by applicable labor agreements plus a markup for payroll burdens of ____ percent.

Said payroll burdens shall include all taxes, contributions, and insurance levied or assessed by any governmental authority and measured by the compensation payable to employees.

1.1.2 *Overhead:* Except as may be expressly set forth elsewhere in Article 1.0 of this PART 4, all overhead and other costs to Contractor of performing this Contract, shall be at a markup on the labor costs and burdens set forth in 1.1.1.

Said overhead and other costs shall include but not be limited to, all home office and administrative costs, all temporary construction facilities, all consumables, expendables, and small tools that cost Contractor less than ____ per tool.

1.1.3 *Profit:* Except for markups expressly set forth elsewhere in Article 1.0 of this PART 4, all profit of Contractor shall be at a markup on the sum of the labor costs and burdens, set forth in 1.1.1 above and the overhead and other costs, set forth in 1.1.2 above of ____ percent.

(If neither of the preceding alternatives is applicable, place appropriate wording in the lines below. Any alternative section must provide for reimbursement of labor costs as well as provision for any overhead and profit computed as a factor of labor costs. The subsection should also include any specific provisions covering reimbursement to Contractor for compensation to all supervisory or noncraft personnel not covered by applicable area agreements.)

1.2 Material Costs and Markup

1.2.1 All actual costs to Contractor for materials supplied by the Contractor for incorporation into the permanent facility (excluding consumables, expendables, and small tools that cost Contractor less than ____ per tool) shall be at actual invoiced cost to Contractor (exclusive of tax) delivered to the job site, plus a markup, for all profit and overhead expense of Contractor thereon, of ____.

1.2.2 All materials listed in the Exhibit, attached and incorporated herein, shall be at the rates set forth therein. Said rates shall be inclusive of all costs of delivery to job site, all profit, and all overhead expense of Contractor thereon.

1.2.3 All other materials supplied by Contractor for incorporation into the permanent facility (excluding consumables, expendables, and small tools that cost Contractor less than ____ per tool) shall be at actual invoiced cost to Contractor (exclusive of tax) delivered to job site, plus a markup, for all profit and overhead expense of the Contractor thereon, of ____.

1.2.4 (This section shall set forth any other provision for material costs and profits thereon.)

1.3 Equipment Costs

1.3.1 All costs of Contractor for Contractor-owned equipment and all profit and overhead expense of Contractor thereon, shall be at the rates set forth in Exhibit __, entitled Contractor-Owned Equipment Rates, attached and incorporated herein.

1.3.2 All costs of Contractor for equipment rented from third parties shall be approved by the Client’s Field Representative prior to rental and shall be actual invoiced cost to Contractor plus a markup, for all profit and overhead expense of Contractor thereon.

1.4 Subcontracts

All Subcontracts for performance of the Work that have been approved as to price and terms by Client in advance shall be at the actual cost to Contractor of such subcontracts (not to exceed such Subcontract price) plus a markup, for all profit and overhead expenses of Contractor.

1.5 Taxes

Subject to the provisions of Article 4.0 set forth in this Part 4, all duties, sales and use taxes, excise taxes, and similar taxes applicable to and directly out of performance of the Work, which are imposed by any governmental authority, excluding personal property taxes on construction equipment and other property owned by Contractor and taxes on net income of Contractor, shall be at Contractor’s actual cost without markup.

1.6

This section and following sections should document any special provisions for reimbursable costs under the Contract; if none, delete this section.

1.7

All costs and expenses of all items expressly stated in PART 1—ARTICLES OF AGREEMENT to this Contract, or elsewhere in this Contract, to be at the cost or expense of or for the account of Contractor or to be performed by Contractor at no additional cost to Client and all costs and expenses of Contractor to perform the Work and this Contract that are not expressly stated in this Article 1.0 to be reimbursable to Contractor, shall not be reimbursable costs under the provision of Article 1.0 and shall be deemed included within the markups for overhead and profit set forth in this Article 1.0.

2.0 Pricing Basis

- 2.____ The Contract price set forth herein is firm for the duration of the Work and includes all of Contractor’s costs, expenses, overhead, and profit for complete performance of the Work. *(Check box if applicable.)*
- 2.____ *(If the statement above is not applicable, check this box instead and insert a statement outlining clearly any provisions for an adjustment escalation or de-escalation applicable to labor, materials, or equipment. This should include elements at affected, effective dates, maximum percentages, and basis for evaluation [actual cost adjustments dates of draft agreements indices].)*

3.0 Pricing for Changes in Scope of Work

Compensation to Contractor for any changes in the Scope of Work shall conform with the provisions of Article 1.0 of this Part 4 and shall otherwise be in accordance with the provisions of the Article entitled “Variations to the Work” set forth in PART 1—ARTICLES OF AGREEMENT.

4.0 Taxes

The Contract Price as set forth herein includes the taxes, duties, and fees set forth in the Article entitled Taxes, Duties, and Fees in PART 1—ARTICLES OF AGREEMENT. The following tax requirements and provisions shall also be applicable. *(Delete this last sentence if not applicable.)*

4.1

This section should contain any tax provisions that add to or deviate from that found in PART 1—ARTICLES OF AGREEMENT and that apply to this Contract (i.e., tax exemption certification or certificate). *(If none is applicable, delete this section.)*

5.0 Special Invoicing Instructions

(This Article should contain any special invoicing instructions as may be required by Project Cost and Billing, Accounts Payable, or Cost and Scheduling; if none delete this Article.)

Instructions to Bidders RFQ Checklist—Electrical

RFQ Inquiry No. _____

Contract No. _____

7.0 Pricing Conditions

7.1 Quotations shall be valid for a period of () days after the closing date of this Request for Quotation.

7.2 Firm pricing for the duration of this project is preferable. If the Bidder cannot guarantee firm prices, Client will consider a proposal with maximum percentage of escalation clearly stated for labor, construction equipment, and materials.

7.3 The quoted price(s) shall include all costs to the Bidder for materials, labor, equipment, testing, and any and all items of expense, fees, taxes, overhead, and profit for the Bidder’s full and complete performance of the Work as set forth herein. This quote shall include a complete price breakdown for all the above costs. The breakdown supplied shall be used as a price adjustment formula to compensate for additions as well as reductions in work.

7.4 Insurance

7.4.1 The Successful Bidder shall, as a minimum requirement, provide the insurance coverage listed under the Insurance Article of PART 1—ARTICLES OF AGREEMENT hereof.

7.4.2 Client will carry “All Risk” Builder’s Risk installation insurance covering loss or damage to the Work. Contractor is an additional assured under such insurance but only to the extent to which Contractor is not liable to assume the loss by reason of indemnity or other provisions of this Contract. Bidder will exclude from its quotation costs associated with premiums for such insurance that the Bidder may carry in its name.

(Include only when necessary.)

8.0 Technical Conditions

(Specify.)

9.0 Scheduling

9.1 General scheduling requirements shall be as described in the Article titled “Schedule, Coordination, and Reporting” of PART 1—ARTICLES OF AGREEMENT.

9.2 Detailed scheduling requirements shall be as described in the article titled “Schedule, Coordination, and Reporting” of PART 2—SCOPE OF WORK.

10.0 Exceptions

10.1 Any deviations from or exceptions to specifications, drawings, terms, and conditions and/or any other documents listed must be clearly defined and set forth in your quotation in accordance with one of the following statements, to be considered for an award of a Contract.

Certification to either “A” or “B” in the following text:

A. “Our quotation is in exact accordance with the specifications, drawings, terms and conditions, and other requirements of this Request for Quotation with NO EXCEPTIONS.”

B. “Our quotation is in exact accordance with the specifications, drawings, terms and conditions, and other requirements of this Request for Quotation with no exceptions other than those listed below.”

10.2 Bidder’s quotation shall include the manufacturer, brand, catalog number, or other trade designation when prices are quoted on goods other than those specified herein.

11.0 Job Site Inspection

Bidder (may/shall) inspect the proposed site of the Work at its own expense to become acquainted with the Scope of Work and site conditions. This is notwithstanding a general visit arranged by Client following the Job Explanation meeting with all bidders. Arrangements for such extra inspection may be made by contacting Client’s Contracts Manager or Contracts Engineer at _____.

12.0 Quotation Instructions

Bidder shall submit itemized quotation as follows:

- 12.1.____ Total Lump Sum Price for all Work as set forth in PART 4—COMMERCIAL TERMS.
- 12.1.____ Unit prices for the items set forth in PART 4—COMMERCIAL TERMS.
- 12.1.____ As a separate item, quote fees for compliance with any applicable regulations, local or otherwise, and for obtaining all licenses and registrations.
- 12.1.____ All local municipal, state, national, and federal or governmental sales and use taxes, excise taxes, gross receipts taxes, and all other similar taxes applicable to performance of the Work shall be quoted as separate items.
- 12.1.____ Price list or pricing basis for materials and equipment furnished. Pricing shall include the Bidder's markup.
- 12.1.____ (Other—Specify)

12.2 Schedule

- 12.2.____ Based on award by _____ (date), your quotation must indicate, by item, the number of weeks from award date required to:
- Procure materials.
 - Submit legible, reproducible copies of checked fabrication and shop drawings for Client's approval.
 - Complete shipment of all items (f.o.b. job site).
 - Complete testing for final acceptance by Client.
- 12.2.____ Based on foundations being completed by Client or others to suit the Successful Bidder's schedule, submit your tentative field move-in data.
- 12.2.____ Based on award by ____ (date), quote your best completion date, by item.
- 12.2.____ (Other—Specify)

12.3 Subcontracting

State which portion of the Work, if any, you propose to subcontract and list the names and addresses of prospective subcontractor(s).

12.4 General Notes

- 12.4__ The quotation must include the following information:
- 12.4__ The RFQ Inquiry Number on the Bidder's quotation and other written communications.
- 12.4__ Location of the Bidder's engineering office(s) proposed for utilization on this Work.
- 12.4__ The Labor Craft Affiliations intended to be used in the performance of the Work. Identify local unions involved and labor Contract expiration dates by craft.
- 12.4__ (Other—Specify)

13.0 Enclosures

13.1 Enclosures as listed under Paragraph No. 2 of this Request for Quotation.

13.2 (Other—Specify)

(This document is intended as a rough draft and is not to be transmitted to the Bidder in this form. Instructions written hereon shall be added to the RFQ as a continuation to the first section of the RFQ.)

Bid Preparation

3.1 Bidders' Responses to the Invitation to Tender

Whatever time is allowed for bidders to prepare quotations to meet the closing date, it never seems quite enough. In the frenzied activity of estimating, the bidder sometimes overlooks the inconsistencies and pitfalls introduced by the client, not by design, but as a result of haste or carelessness in the composition of the bid package. The ITT (bid package) will start with a brief description of the work and how it fits in with the overall pattern of the project. It will give general instructions on how to prepare and submit the tender and what information is required concerning the bidder's organization, financial ability, joint venture intentions, and the general proposed management of the contract if awarded. The remainder of the package is the basic contract that only requires the insertion of the bidder's quotation in the compensation section.

Most bidders are confident that they have read the bid package from cover to cover before submitting their tenders but in reviewing the contract *proper*; it is important not only to understand what is written therein but also to be aware of what is left unwritten.

When bid packages are written in the English language and this is not the first or native language of the bidder, extra care should be taken to understand the contents and to identify the potential hazards.

3.2 Articles of Agreement or General Terms and Conditions

The Articles of Agreement are preprinted as a permanent part of each contract and some clients consider that the articles are set in concrete and not to be challenged. Unfortunately, some contractors are willing to accept this view and skip over the articles in review as something to be accepted without question. Indeed, most of the articles are reasonable, practical, and inserted for purposes that few bidders would contest. On occasions, however, clients' lawyers will slip in some clause that could be unfair to the contractor or, at best, biased in favor of the owner. Here are a few examples:

1. *Contractor shall comply with all applicable laws and regulations of all governmental and other authorities having jurisdiction, including but not limited to, laws and regulations regarding labor, taxes, and safety.* The bidder might inquire who pays extra taxes, and so forth, if these laws are revised during the life of the contract. Probably the "other" authorities having jurisdiction should be listed.
2. *Without prejudice to Company's other rights under Contract, Company shall have the right to terminate Contract for any reason and at any time by giving notice in writing to Contractor.* (The clause goes on to explain to what compensation the contractor will be entitled if the termination is not for default.) Most articles are silent on any suggestion regarding the contractor's right to terminate, but if the bidder accepts this it may be worthwhile looking closely at the compensation to determine if, when the contract is halted through no fault of the contractor, the amounts offered are sufficient. The same applies to the suspension clause that may be actuated solely at the convenience of the client or perhaps by some failure to deliver free-issue material on time.
3. *In the event Contractor is a subsidiary or affiliate or is owned in part or in whole by another company, Contractor, if requested by Company, agrees to provide a letter of guarantee satisfactory in form to Company, from that company or companies, guaranteeing Contractor's full and complete performance of the Work and all the obligations of Contractor hereunder.*

This clause has been dropped from most U.S. contract articles as there seems to be a question as to its enforceability. If it is addressed at all, it should be done in the ITB and should not appear in the contract.

There are other clauses in various articles that may be questioned but it is not the intention of this work to step outside the area of its competency and possibly on legal toes. The general message to the bidder is: *Don't be afraid to challenge the Articles of Agreement if you think they may be weighted against you.*

Finally, it should be mentioned that, because the articles are frequently taken from a "model" contract, one or two clauses might creep in to the bid package and be completely irrelevant to the work. On discovery, the client will usually be quite willing to alter or delete them.

3.3 Scope of Work

Where they can, clients will insist on contracts that place the onus of providing everything firmly on the contractor with the possible exception of materials that the client, through a larger procurement system, may buy more cheaply. These are commonly known as lump sum contracts and the opening paragraph of the scope of work may start off something like this:

Except as otherwise expressly provided in this Contract, Contractor shall supply all labor, supervision, installed and consumable materials, equipment, tools, consultation, services, testing devices, storage, and each and every item of expense necessary for the supply, fabrication, erection, installation, application, handling, hauling, unloading and receiving, construction, evaluation, design engineering, testing, assembly, and production of _____, hereinafter called the Work.

This, it is thought, obligates the contractor to do just about everything. However, as indicated previously, no construction contract is completely safe from attack by a determined contractor. There are always gray areas where an instruction or a condition could be read in more than one context.

In the initial examination of the scope of work, there are a number of checks that the bidder should make to bring up with the client at the job explanation or clarification meetings or in some cases, just to keep as ammunition for the future. The following paragraphs may be helpful in this respect.

3.4 Has It Been Done Before?

Work on a super project is usually too technically advanced to allow a completely open bid situation. The client will not normally publicly advertise the proposed contract where international contractors or joint ventures are to be considered. In Europe, there is an official journal available for information on European Union (EU) tenders that is only published electronically and found at <http://www.eur-op.eu.int/general/en/b7.htm>—a page full of information—and <http://www.ted.eur-op.eu.int> (use Netscape). UK readers could try the European Information Centre at <http://www.thamesvalleychamber.co.uk/eic/about.htm>. Generally such work will be bid by selected contractors who will initially receive a confidential approach soliciting their interest in submitting a competitive bid on a lump sum or cost reimbursable plus fee basis or permutations of the same. The work may be planned for extremes of climate, difficult terrain, or may involve technical innovations. The Flexicoker plants in South America and Europe are examples of new ventures and so are pipelines in Alaska or across the Norwegian trench in the North Sea. Undoubtedly, technical “firsts” breed design changes.

The client has an obligation to disclose essential technical information about the proposed work in the bid package and to emphasize potential difficult areas at the job explanation, if it knows about them at the time. Very often, however, problems come to light only after work has commenced. In addition, the client may *know* about awkward requirements in the scope of work or in the specifications but is not aware at the time of bid that they will cause problems and should be specifically mentioned before the award of contract.

If the contractor is bidding for work in a foreign country for the first time, the following questions may come up:

1. How much control/influence/authority do the government agencies have?
2. Is it mandatory to accept indigenous labor?
3. How much emphasis is placed on the production of quality assurance/quality control (QA/QC) manuals and work procedures? Does the client want the contractor to produce, at its own expense, bound volumes with full illustrations on how to do the complete job or just a few pages as a guide? What will it cost in man-hours and equipment? In the event of the bidder being unsuccessful, will there be compensation for the production of the bound volumes or guide?

4. Is there a list of government-imposed official holidays? Is there any likelihood of holidays being unofficial and unscheduled? The same applies for government-imposed wage increases.
5. Is the scope of work reasonably clear? Can some sections be interpreted in more than one way?
6. How is it intended to conduct client and contractor inspections at all levels?
7. Are all contractual requirements plainly in the scope of work or in the specifications and not tucked away in a bill of quantity or, worse still, as notes on a drawing?
8. Is there a definition of mechanical completion? (Often a contentious subject!)
9. What is the rough order of magnitude of the cost of reporting to the client?
10. Is it required to set up a training scheme for local workers (e.g., welders)? If so, is there payment provision for this item or is the contractor supposed to do it and include it in its bid?
11. Will there be work interface with other contractors? Do they have any preferences? What sort of contracts do they have? Hard-money contractors have a different outlook from cost-reimbursable ones.
12. Will the client supply electric power? Will it provide standby equipment in case of mains failure?
13. If an assembly or fabrication yard is allotted to the contractor, how far away is it from the job site? A long distance away not only means cost for transportation but causes a need for additional supervision, manpower, and equipment plus lost effort in trying to coordinate the work in two separate work areas.
14. In site preparation how far must excess dirt be hauled for disposal, and if additional fill is required, where is the nearest source?
15. What classifications of labor are available locally and what are the basic wage rates and overtime rates?
16. Is there a copy of the client's project procedures available? Even if it has to be a *bootlegged* copy, it will be very handy as a guide to how the client operates behind the scenes. The client's claims procedures will be especially useful.

3.5 Changes to the Scope of Work

A sample of the client's change order format should be included in the bid package as an exhibit or be otherwise available. Contractors, being familiar with scope of work variation procedures, may be inclined to skip over the perusal of this form but certain clients include words that could be questioned by the bidders.

A standard change order will include the following paragraph:

The payment described above shall include Contractor's profit and shall be in full and final settlement of all costs, expenses, and overheads, whether direct or indirect, incurred by Contractor and arising from or related to, but not limited to:

1. The extra work described in this Change Order.
2. Any delay caused to the schedule or any change in the completion date of the Project resulting from said extra work.
3. The cumulative effect, if any, of said extra work in conjunction with extra work described in any other Change Orders.

Conditions 1 and 2 are acceptable, but condition 3 may cause problems depending on the nature of the project. Contractors may find it hazardous to sign such a change order and still preserve their rights to impacts, acceleration, and other effects they cannot foresee.

3.6 Schedule

1. How much *float time* is there on the schedule? Is it possible to claim ownership of it? Most contracts are silent on the question of who owns the float time but because possession is nine-tenths of the law, whichever party claims it and uses it first would seem to be entitled to it. Many a contractor has successfully claimed for delay when the delay, in fact, did little or no harm and did not even bruise the critical path on the schedule. If a contractor does not claim ownership of float time, loss of it may result in a loss of flexibility and may eventually cost money in terms of delay, acceleration costs, or liquidated damages. If the client is able to insert a clause into the contract claiming ownership of float time that does not effect the achievement of milestones or completion dates, it has gone a long

way toward the prevention of contractor claims. The ownership of float time is therefore valuable to either party.

For example, the master schedule indicates that the client will deliver free-issue materials in week 8 for incorporation into the permanent works by week 12 (not critical) with overall completion by week 20. The client does not deliver the material until week 10, which delays the contractor slightly but does not stop work from continuing in other areas or create a standby situation and still enables completion by week 20 as planned. All the contractor has lost is the float time between week 8 and, say, week 14. On the face of it, no harm has been done but if the contractor had claimed ownership of that float time, there may have been a supportable claim situation. Some clients are alive to this possibility and insert the following safeguard clause into the contract: *It is acknowledged and agreed that actual delays in activities that, according to the baseline schedule, do not effect any milestone or completion dates shown by the critical path in the schedule, do not have any effect on the contract completion date or dates, and, therefore, will not be a basis for a change therein.*

2. The client will require a detailed work schedule showing the time to complete the work. How detailed the work schedule is may vary from client to client but may involve the employment of a logic network diagramming technique and a computer program to identify the critical/subcritical paths that establish its scheduled completion date. The network will be expected to highlight all major activities and restraints along the critical and subcritical paths.

3.7 Compensation

Assuming a bid for a hard-money contract is in preparation and there are no special arrangements for advance mobilization payments, the contractor will be well advised to get as much of its fixed costs paid at the front end as possible. Even with lump sum contracts, the bid package will normally require a breakdown of the lump sum price. Depending on the methods adopted by the client, the breakdown can range from a simple division of costs for mobilization, construction, and demobilization to a complete description of the job broken down into detailed work packages. The contractor may protest that in a lump sum arrangement, the client is not entitled to inquire into the contractor's profit margin and by insisting

on a breakdown of the lump sum, some loading may be exposed possibly indicating the markup. The client's answer to this objection is that division of the lump sum by work packages makes it easier to approve invoices resulting in prompt payment to the contractor.

Whatever the contractor believes demobilization will cost, it is always preferable to load the mobilization portion with as much as it can stand to get the cash flow situation off to a good start.

Unit rates for changes, where called for, should be quoted as high as possible but still within a competitive range. If they are not called for, none should be volunteered.

Bidders will be asked to state the period over which their quotations will be valid. This is expected to be approximately 30 days after the closing date of the bid. In a proposed lump sum bid, a firm price may be requested for the duration of the contract but if the bidder cannot guarantee firm prices, the client may consider a proposal involving a maximum percentage of escalation for labor, equipment, and materials.

3.8 Materials

1. If client free-issue material is involved, will the material certification certificates be readily available? Will the client commit in writing on this point?
2. Does the client import material duty free? Would this also extend to contractor-supplied items?
3. If the contract says something to the effect that *all materials and equipment furnished by the Company shall be unloaded and received by Contractor*, where will unloading take place? It could be at the docks and the docks may be a long distance from the site.
4. Where free-issue steel products are provided, particularly line pipe, it is essential to know how many manufacturers are involved. Pipe from more than one mill may mean that considerably more welding procedures must be produced before work starts. If this situation is not revealed at the bid stage, one side or the other will be faced with much extra expense after contract award.
5. If the contractor has to supply some or all of the materials, will the client issue instructions on which product to buy or merely give the specification and allow the contractor a choice? Bidders should beware of clauses that specify the name of the manufacturer of

contractor-supplied products but also hold the contractor responsible for the performance. Paint is a good example. The bid package may expect the contractor to buy paint from Manufacturer X but on application it may not give the required results. Who pays for the remedial work? It is virtually impossible for the contractor to prove that the paint was applied strictly according to the manufacturer's system instructions regarding temperature, relative humidity, and so forth. Some owners have a commercial interest in manufactured products and may try to insist on their use. It is infinitely preferable for the bid package to provide required specifications of the product and allow the contractor to purchase accordingly.

3.9 Specifications and Drawings

1. Who engineered the work? How many design-engineering companies were involved?
2. Do the contract specifications have preference over international standard ones?
3. How will revisions be signaled to the contractor for *Approved for Construction* drawings?
4. What technical data and drawings are required from the bidder to allow evaluation of its technical ability to accomplish the work?

3.10 As Built Documentation

The certified *Approved for Construction* drawings issued to the contractor may be revised from time to time by the client through engineering design changes but the finished product may not be exactly as the drawings dictate, although still be within the scope of work and acceptable to the client. The contractor, on reaching job completion, will be required to mark up each drawing to reflect the completed state. Together with these marked up drawings, the contractor will be instructed to assemble other documentation that, when catalogued, will represent the work as it is when completed. The physical size of the *as built* documentation will depend upon the client's requirements and has been known to fill one or two large shipping containers.

Unfortunately, bid packages seldom give much guidance in this direction and at the end of the job the contractor is faced with the considerable expense of collecting data and printing copies of practically every document

that has passed through its hands. It is as well, therefore, to prepare a list of probable requirements that may include but not be limited to the following:

- Description of change orders issued.
- Exemption reports.
- Agreed outstanding work list.
- Signed statement by contractor certifying correct usage of materials.
- Certificates showing suitability of all contractor-furnished materials.
- Copies of certificates for all client-furnished materials.
- List of *as built* drawings.
- Marked up plans and drawings showing location of all identified materials and location of tests (e.g., welding radiography).
- Welding procedure qualification reports and welding procedures.
- Welder qualification certificates.
- Weld examination reports.
- Nondestructive testing (NDT) procedures, qualification, and calibration reports.
- NDT reports.
- Index of radiographs.
- Mill test certificates for all installed materials.
- Heat treatment records and charts.
- Dimensional control reports.
- Tests and commissioning reports (hydrostatic, instrumentation, electrical, and architectural).
- Certificate of Acceptance.
- All required certificates from authorizing authorities.
- Any other documents relevant to certification and acceptance of the work.
- Vendor drawings, manuals, and operating instructions.
- Operation and maintenance manuals for contractor-furnished equipment.
- Test instruments and calibration and test reports.

3.11 Bid Preparation in General: Alternative Proposals

Most clients insist that quotations are prepared in strict accordance with the specifications, terms, and conditions set forth in the bid package. Failure to conform with this requirement usually provides cause for disqualification of the bid. However, bidders are not discouraged from the submission of an alternative proposal or a proposal with qualifications provided such proposals are made *in addition* to the bid prepared in accordance with the specifications, and so forth. In certain situations, bidders are positively encouraged to develop and propose alternatives and exceptions to the scope of work that will reduce the contract price, and improve the schedule or operating economy with no sacrifice in safety or operability. Bidders must be careful when submitting such alternative proposals to ensure that the only deviations proposed are listed in separate attachments to the bid response. The client will not accept responsibility for the discovery or identification of alternative methods that are mentioned in the main proposal. Should the bidder become the successful contractor, the only deviations recognized will be those written into the contract.

3.12 Subcontractors

If the bidder proposes to associate with another company for performing any portion of the work, it is normal for that company to be relegated to a subcontractor role and, therefore, not be a party to the contract. Of course, in most cases, clients prefer that the work be accomplished without the use of subcontractors but if this is patently a necessity, the following data must be submitted to the client for approval:

- (a) Specific areas of the work to be subcontracted.
- (b) Names and addresses of subcontractors proposed.
- (c) Subcontractors' financial references.
- (d) Subcontractors' experience in similar work.
- (e) Total effect on the bid proposal should all or any of the subcontractors not be approved.

CHAPTER FOUR

Evaluation

4.1 Reception and Examination of the Bids

Assuming that the contract engineer has met the deadline, all prospective bidders will receive their bid packages and start work on producing a quotation. The client will assemble its bid evaluation team and will open the bids on or after the closing date. Then the technical and commercial examination of the bids begins.

The period of bid evaluation is a potentially dangerous time in terms of bid security and confidentiality. The team leader will probably be the client's contract manager. He will arrange for the commercial and technical teams to occupy separate rooms complete with lockable file cabinets. The commercial team room, particularly, should be kept locked at the end of each day's evaluation session and at other times when the room is unoccupied. The commercial team room will be out of bounds to everyone not on the team, including the technical squad. Members of the commercial team, however, will require access to the technical room for clarification discussions with the engineers.

The bidders may have been asked to submit their commercial and technical offers in two separate packages thus simplifying distribution to the teams.

4.1.1 Communication with Bidders

Because the commercial team will be made up of contract and cost engineers, communications to and from bidders by telephone, facsimile, and e-mail will be directed to the contract personnel who will relay queries and messages to the technical team, if necessary. It is important to discourage bidders from approaching the technical team members directly.

4.1.2 Checking the Bids

Most clients have a formula for technical evaluation in which each bidder is assessed on its proposed:

- QA/QC.
- Scheduling and reporting.
- Material control.
- Construction facilities including equipment.
- Safety and security.
- Management personnel.
- Execution plan.
- Experience.

Of these, the execution plan, construction facilities, and management personnel may be considered the most important and will be weighted accordingly.

The commercial team's first job will be to check the arithmetic. It is surprising how often this is found to be in error. Included in the commercial evaluation will be the following considerations:

- Bottom-line figures of *actual* price based on the tender document and subsequent adjustments made by the bidder.
- Evaluated prices for outstanding items.
- Effect of difference in cost of export financing between bidders.
- Comparative cost of manning the site team, including subcontractors.

- Comparative effect of an increase in the scope of work (for 10, 20, and 30 percent using the bidders' rates).

4.2 The Bid Clarification Meeting

Throughout the evaluation period, separate clarification meetings will be held with each bidder (possibly only brief meetings with those who are not seriously in contention). During these sessions, bidders will be questioned on the parts of their offer that need further explanation. Important technical and commercial revelations will be confirmed in writing. The atmosphere at clarification meetings is, by necessity, informal. No official minutes will be taken at these sessions as there is a need for relaxed discussions on each bidder's *modus operandi* and for both sides to get a better view of the bid invitation and the response, which may not be completely apparent in the written words. It would be unreasonable to pin down the bidder to any firm statement made at the clarification meeting, hence the absence of minutes. However, when an important matter arises that would affect the conditions of the contractor's offer the client should request a separate response in writing to clarify the point raised. The written answer from the bidder will be accepted as part of the bid if the offer results in a contract award. For example, if the bidder's offer includes for fabrication of pipe work but does not specifically state that the prices include painting, the client may ask for written clarification on this score. If, later on, after contract award, the contractor produces a change proposal for painting that somehow missed the scope of work, the client would be correct in referring back to the preaward confirmation to show that this work was in the bid. Nevertheless, should a dispute arise during the course of the work, the clarification meeting notes are of limited legal value because the governing document is the contract. However, a contractor's claim has often been withdrawn on production of notes and correspondence from the clarification meetings indicating that the bidder agreed to take this or that particular course of action or that the intent of the meeting was contrary to the contractor's current claim. Clarification meetings also offer the engineers an opportunity to discuss the technical aspects of the proposed work. They can find out how the bidder intends to tackle certain parts of the program, how many man-hours will be expended on various tasks, and generally question the bidder on its operational methods and resources.

There may be more than one clarification meeting held with short-listed bidders and, in the period between the first meetings and contract award, it is likely that several addenda will be added to the package. This usually means a flurry of messages with price adjustments throughout the bid evaluation period.

It is not unusual for changes and amendments to creep into the bid package during the evaluation period, sometimes due to alternative suggestions or offers from the bidders but mostly because of second thoughts from the engineers. Finally, the bottom line will be reached and the evaluation team will be ready to make their recommendation to client management. To reach the bottom line, the commercial section of the evaluation team will produce a spreadsheet that will incorporate:

- (a) All effects on the quotations brought about by bidders' qualifications to the bid package.
- (b) Escalation, if any.
- (c) The effect of changes not known at the time of bid but now included.
- (d) The effect on the contract price by the relative time to be spent on day rates.
- (e) The effect of various financial arrangements.
- (f) The effect of anticipated extra work given during the program using bidders' quoted unit rates.

In Table 4.1, bidder A, who may have started off in row A1 with the lowest figure, could end up the highest in row E by the time the team has evaluated qualifications to the bid and quantified other considerations. Having reached an evaluated contract price in the total of A, B, and C, the team will then apply the percentages of extra work using the bidders' unit rates for variations. This result may make a significant difference to the final recommendation. The team's estimate of the amount of variation, to a large extent, will be based on the status of engineering work completed at the time of evaluation. Much of the figures realized during evaluation will be the product of a certain amount of intelligent guesswork. For example, in D2 and D3, the technical team will have to estimate the reliability of each bidder in technical expertise and the expected adherence to the proposed schedule. Column C deals with differences in payment schedules and financial arrangements. This refers mainly to work where the contractor needs to be reimbursed in foreign currency.

Table 4.1 *Bid Evaluation Spreadsheet for Two-Year Contract Duration Lump Sum with Unit Rates for Extra Work (amounts in U.S. \$ millions)*

		<i>Bidders</i>		
		<i>A</i>	<i>B</i>	<i>C</i>
A1	Lump sum	10.000	11.000	12.000
A2	Escalation in 2nd year on 50% of contract price	6%	5%	4%
A3	Lump sum escalated	10.300	11.275	12.240
A4	Day rate estimated at 60 days/yr.— A3300, B2900, C2700	.396	.348	.324
A5	Escalation in 2nd year	.012	.009	.006
A6	Day rate work escalated	.408	.357	.330
A7	Known changes estimated at 10,000 hrs. Per hr. A-41, B-37, C-34	.410	.370	.340
A8	Escalation in 2nd year	.012	.009	.007
A9	Known changes escalated	.422	.379	.347
A10	Subtotal A	11.130	12.011	12.920
B1	Correction to time on day rate A-70 days, B-65 days, C-60 days	.068	.030	Nil
B2	Correction for qualification to scope of work—out of 100% efficiency A-97% B-98% C-99%	.334	.240	.130
B3	Escalation on above	.010	.006	.003
B4	Sum: time/scope escalated	.412	.276	.133
<i>C Column will not be used in this example as it deals only with payment in foreign currency</i>				
SUM	TOTAL A & B	11.542	12.287	13.053
D1	Commercial qualifications (risk) A-.5% B-.3% C-.2%	.058	.037	.026
D2	Technical qualifications (risk) A-1% B-.5% C-.3%	.115	.061	.039
D3	Schedule risk quantified A-5% B-3% C-2%	.577	.369	.260
D4	Legal risks quantified—all at 1%	.115	.123	.130
SUM	TOTAL A, B, & D	12.407	12.877	13.508

continues

Table 4.1 *continued*

		<i>Bidders</i>		
		A	B	C
E1	5% extra work on unit rates @ 40 hr./ week × 52 weeks × 2 yr. = 4,160 hr. × (e.g.) 100 men = 416,000 × 5% = 20,800 hr. @ average rate of A-41, B-37, C-34	.853	.770	.707
E2	10% extra work = 41,600 hr.	1.706	1.539	1.414
E3	20% extra work = 83,200 hr.	3.411	3.078	2.829
E4	30% extra work = 124,000 hr.	5.084	4.588	4.216
SUM	with 5% extra work	13.260	13.647	14.215
	with 10% extra work	14.113	14.416	14.922
	with 20% extra work	15.818	15.955	16.337
	with 30% extra work	17.491	17.465	17.724
SUM	difference with 5% extra work	—	2.92%	7.20%
	difference with 10% extra work	—	2.15%	5.72%
	difference with 20% extra work	—	.87%	3.28%
	difference with 30% extra work	—	—	1.33%
A1	difference was	—	10%	20%

4.3 Low Bidding

Occasionally, the lowest bidder will be so far below the client's fair price estimate that it could be awarded the contract only in certain knowledge that it will lose money in the process. Some clients have strict rules to apply to this kind of situation and they will not accept such a bid for the following reasons:

1. When the "successful" contractor discovers that it is losing money on the job (if it had not anticipated it at the time of the bid), it will attempt to make up the difference by change proposals and claims.
2. If another job on another project should come along during the contract, most of its attention and probably its best personnel will be transferred in that direction.

Clients who are uneasy with this situation will call in the bidder and, without disclosing the amount of the client's estimate, will advise withdrawal. Often the bidder will reply that it is aware of its low offer but has men and plant lying idle and is prepared to take on the job to keep them in work in spite of the prospect of little or no profit. This approach should also be rejected for the same reasons as given in the preceding text. *If all*

the bidders on the shortlist are below the company estimate, the wise client will rebid the whole job, which in most cases means calling in the bidders and advising them of the situation and perhaps pointing out common factors in the bid where they could have gone wrong. However, before this step is taken, it is essential to call back the company estimators and tell them to take another look at their estimate. If this is done and they have shaved off as much as they possibly can and the bidders are still below the company estimate, then most clients will consider that there is no alternative but to rebid. Not all clients take this view or even have time for it, believing that contractors, particularly the international ones, are “big boys” and should be allowed to lose their own money in their own way. In a recent inquiry for the mechanical construction portion of a petrochemical plant, all the bidders were below the company estimate, three of them at nearly half the company figure, but the award was made against the commercial evaluation team’s advice. The team was made up of three experienced engineers who were, as it happened, not on the client’s permanent staff but were seconded into an integrated project. When they discovered that all the bidders were low, the engineers recalled the company’s estimators to confirm the validity of the original estimate. A few errors were discovered and corrected but the revised estimate was still twice the amount of most of the bids. The evaluation team was, by this time, in a position to pinpoint all the low areas in each bid and to indicate exactly where each bidder had underestimated. The team leader duly reported to the client’s senior management and suggested that all five bidders should be called in, told that they were well under the company estimate without revealing what that estimate was, given the areas in which they were below the company estimate, and told to rebid within two weeks. Management appeared to be horrified at this suggestion and insisted that the bids should stand as presented. The award was made in accordance with these instructions and the “successful” contractor mobilized. It is possible that some of the bidders intended to bid low and recoup on claims and change orders but certainly the one who was awarded the job soon woke up to the fact that it was in a loss-making situation right from the start. Within weeks, the contractor brought in extra help whose sole purpose was to manufacture change proposals and claims. Every flaw in the scope of work, overlooked during the bid stage, was examined for exploitation and extra work rates not already in the contract were inflated as far as possible in negotiation. Two hundred change orders

and ten claims later, the company's original fair price estimate was passed and a contract price paid in excess of budget for a job not particularly well done.

The contractor who finds itself in a similar position, that is, either knowingly or in error bidding dangerously below a fair price estimate, will have to take steps to recoup its losses once it wakes up to the situation. The contractor may attempt to do this in a number of ways:

1. Try to negotiate the price with the client.
2. Obtain extra work through change orders.
3. Call in the claims experts.

If renegotiation fails and it has rejected the idea of giving up altogether, the contractor will turn to change orders and claims.

4.4 Bids Above the Company Estimate

The occurrence of one, some, or even all of the bids exceeding the company estimate may be caused by the following factors:

1. Failure of the company estimate to properly reflect the scope of work.
2. Mistakes in the estimate.
3. Estimator not taking into account current adverse market conditions.
4. Unanticipated concern of bidders over availability of labor and/or materials, difficulty of terrain or site conditions, or the imposition of a stringent schedule in the bid package.

If the cause can be corrected by clarifying the scope of work, extending the schedule, approving alternate sources of labor, or other action, then the bidders may be allowed to resubmit that portion of their proposals. However, they must *all* be given the same opportunity to do so. If the situation cannot be corrected and the bidders have bid on the defined work, then proceeding or not proceeding will be a commercial decision and subject to a recommendation from the evaluation team.

4.5 Unit Rates for Work Variations

Once the bidders have, in competition, submitted their prices for a lump sum contract that includes unit rates for possible extra work, it is not customary for the client to attempt to negotiate a lower price or lower unit

rates during the bid evaluation and clarification meetings. The same principle applies for day rates and fixed fees in cost reimbursable contracts. However, all other portions of the bid are subject to clarification and review, particularly reimbursable cost items such as salaries and equipment rates.

Clients will attach considerable importance to unit rates offered in a lump sum quotation to be used for variations to the work without the necessity to negotiate prices. Labor and equipment rates quoted in this manner will constitute all-inclusive payments, usually per hour, for extra work and will include all costs such as:

- Mobilization/demobilization, site overheads, camp, and catering/maintenance costs.
- All direct labor costs, vacation pay, insurance, sick pay, completion, and retirement bonuses.
- Transportation, travel time to and from work sites, subsistence, and living allowances.
- Safety costs, small tools, consumables, and all burdens and indirect costs as well as profit.
- Repairs, refueling and lubrication, spare parts, operating supplies, depreciation, and taxes.
- In certain cases, equipment will be inclusive of drivers or operators.

In addition to labor and equipment rates, clients may call for a quotation for “all-in” rates that are unit prices for the provision of crews and equipment to carry out complete jobs such as electrical installation, trenching, or pipe laying per lineal foot or meter. Considering that it is normal for a large mechanical contract to attract 10 or 15 percent extra work through variation orders, great care is taken by the client in the evaluation of this part of the lump sum bid. The contract engineer is well advised to put as many variation unit price requests in the bid package as he can think of. This will help to avoid costly price negotiations later on during the course of the contract work. *The bidder, on the other hand, should not volunteer any separate unit prices for extra work if the bid package does not ask for them.*

4.6 General Observations

Client requirements in bid evaluation sessions vary from company to company. Some organizations insist on strict adherence to security, bid

confidentiality, and thorough examination and evaluation of bid responses by experienced teams. Others are more relaxed in this area. One company called for bids in the accepted manner, opened and examined each response, and summoned all the bidders to a meeting. “We have opened the bids,” said a senior official, “the lowest one is \$2,500,000. We want you all to go back to your offices, see if you can improve on that offer, and come back here next Wednesday with your best quote.”

Finally, in evaluation, the client may benefit from the advice of John Ruskin (1819–1900), the nineteenth-century essayist, critic, and reformer:

It is unwise to pay too much but it is unwise to pay too little. When you pay too much, you lose a little money, that is all. When you pay too little, you sometimes lose everything because the thing you bought was incapable of doing the thing you bought it to do.

The common law of business balance prohibits paying a little and getting a lot. It can't be done!

If you deal with the lowest bidder, it is well to add something for the risk you run and if you do that, you will have enough to pay for something better.

Procedures

5.1 Client's Procedures

Project management, quality assurance, engineering, safety, contracts, procurement, construction, cost control, schedule control, personnel, administration, legal, insurance, accounting, and each and every discipline of the client's organization will be governed by the project procedures that should be written and produced at the very beginning of the project. This very seldom happens on schedule because not all the key people are on board at the beginning, particularly in construction, and those who are present are usually too busy to devote any time to this tedious but essential task. It is interesting to reflect that on most large projects there seems to be insufficient staffing in the early stages when huge numbers of contracts, manuals, and procedures are in simultaneous preparation. However, at the tail end of the projects there is a tendency to retain people who have very little to occupy themselves.

It may be thought that once a client has produced procedures for one project, the same words will suffice for subsequent ventures. In some disciplines, particularly administration and finance, this may be true, but for engineering and construction it is usually a completely new exercise. It must also

be recognized that even the largest companies do not create super projects at frequent intervals, and when one comes along, any existing procedures from past projects are of limited use except as a guide for format.

It has been said, not without a certain amount of truth, that project procedures are a guide to the wise man and instruction to the fool. They certainly create employment, not only for the number of people who write, check, and approve them but also for the army of QA/QC and contract compliance personnel who audit and enforce them. And yet, probably better than half of the total workforce employed throughout the life of the project never sees them!

Procedures are descriptions of practices to be adhered to and definitions of associated responsibilities. They are necessary and valuable in the conduct of the work, but publication should not be allowed to get out of hand to the extent that there is a procedure for every natural function. One well-known state-controlled oil company produced five massive volumes of procedures on business ethics, conflict of interest, and security of information running to several pages complete with charts. A single-page letter circulated to the staff would have done just as well.

A procedure should be produced to give direction on a subject or series of actions and to provide a model for the conduct of the work for each discipline. A procedure does not necessarily guarantee that the method laid down is positively the best method, but it ensures that everyone is marching to the same drumbeat. There are, for example, many excellent and efficient ways of documenting variations in a contract scope of work. However, in a project where 20 or more contract engineers may be employed, it would be ridiculous to allow them to choose their own method of processing change orders, regardless of how experienced the individual may be. It is eminently preferable to have a standard Procedure A that everyone will follow but that many consider to be inferior to Procedure B, than to allow the proponents to follow individual and alternative courses. A procedure, therefore, should define the practices to be adhered to, demarcate responsibilities, describe the method to be employed, and provide references and exhibits if relevant. Procedures should not be set in concrete but should be revised from time to time if necessary to keep pace with the changing demands and conditions of the project. Unfortunately, some project managers hand down their procedures like tablets from the mountain and refuse to consider revisions even when it is plain that the original message is outdated.

5.2 Project Coordination Procedures (A Typical Client Issue)

5.2.1 Introduction

These procedures are intended to assist company personnel in the administration and execution of all projects. The company may unilaterally amend these procedures as it considers necessary to achieve adequate control over each and every project during the performance of the work. Each procedure will carry the following introductory headlines:

- Procedure No.
- File No.
- Date
- Title
- Company Name
- Approved by
 1. Title
 2. Purpose
- Responsibilities
- (Plus other headings as required)

Accounting

- General requirements
- Reimbursable material purchases
- Invoices and monthly statements
- Monthly cash flow forecast

Company Organization

- Definitions
- Staff responsibilities
- Publicity and press releases

Communication and Correspondence

- Correspondence from the company

- Correspondence to the company
- Correspondence filing system
- Minutes of meetings
- Internal correspondence
- Site diaries
- Weekly plant and labor returns
- Requests for information
- (Plus other headings as required)

Construction Project Execution Plan

- Purpose
- Definitions
- Responsibilities
- Description of facilities

Contract Administration

- Bid package preparation and contract formulation
- Job explanation meetings
- Site visits
- Bid evaluation
- Bid clarification meetings
- Company “fair price” estimates
- Treatment of low/high bids
- Contract execution and distribution
- Mobilization, list of documents required
- Kick-off meeting and agenda
- Indemnity and insurance required
- Contract file index
- Progress reporting
- Schedule requirements
- Business ethics, conflict of interest, security

- Variation orders and short form contracts
- Disputes and claims settlements
- Completion and acceptance
- Contract closeout
- Models
 - Contract document
 - Amendments
 - Work orders
 - Change orders
 - Short form contract

Drawings and Specifications

- *As built* documentation
- Drawings register
- Vendor manuals

Forms (Excluding Contract Administration Forms)

- Daily diary sheets
- Weekly program
- Confirmation of instructions
- Information required
- Measurement information sheet
- Day-work daily record sheet
- Day-work returns
- Weekly labor and plant returns
- (Plus other headings as required)

Health and Safety

- Safety policy
- Responsibilities
- Execution of safety program
- Construction compliance safety surveys

- Site safety and toolbox talks
- Debris and waste removal
- Welfare

Material Control

- Contractor-furnished materials
- Company free-issue materials
- Warehouse and facilities
- Site receipt of materials
- Stock control
- Marking
- Imported material
- Scrap and surplus material
- Material transfers
- Back charges, back-charge notice, and register
- Material closeout procedure
- Material reconciliation
- Material substitution
- Weight control
- Vendor representatives

Quality Assurance/Quality Control

- QA manual requirements
- Company's quality program
- General procedure for quality audits

Quality assurance program shall mean the contractor's written description of systems, plans, organization, job instruction, and control measures that will be used to ensure that the required quality will be achieved in performing the work. The description shall relate to all aspects of work execution, including, but not limited to, work planning, work management, work instruction, material work, quality control, inspection, testing, safety, and documentation.

5.2.2 Quality Assurance Program/Manual Requirement

Within 30 days after receipt of the notice of the award of the contract and prior to the commencement of any work under the contract, the contractor shall submit for review and approval a QA manual describing a fully developed QA program as defined in the contract and these procedures. The QA program shall reflect the QA system of BS5750, Part 1, or other company-approved equivalent.

- (a) The words *quality assurance program* shall be taken to mean the comprehensive system of plans, procedures, instructions, and documentation describing the measures necessary to ensure that quality is planned and obtained. The QA program shall consist of description and procedures for all aspects of execution of the work including, but not limited to, work management, work planning, engineering, procurement, inspection of vendor-supplied material, fabrication instructions, material control, QC (inspection and testing), safety, and documentation.
- (b) The manual describing the QA program shall include a statement signed by the contractor's management to the effect that the QA program shall be applied to all work performed under the contract.
- (c) After company approval, the contractor shall supply the company with numbered, controlled copies of the QA manual and shall not revise the QA manual as it relates to work performed under the contract without company approval.
- (d) No work under the contract, by the contractor or by the contractor's subcontractor(s) or vendors on whom the same quality assurance must be imposed, shall commence before the contractor's QA program has been reviewed and accepted by the company. The contractor should schedule the submission of the QA manual and the beginning of the work to allow 10 days for the company review after receipt of the manual and should recognize that revision and resubmittal may be required before the company approval is received.

Quality Assurance Manual Content

The QA manual shall include, but not be limited to, the following areas of the contractor's responsibilities:

- (a) QA policy statement signed by the contractor's management.

- (b) Organization, scope, and duties of the contractor's organization including QA/QC function and personnel together with job description of key personnel.
- (c) Procedures for control of work management, engineering, fabrication, procurement, inspection of vendors, construction, installation, and safety.
- (d) Procedure for control of identification of materials.
- (e) Procedure for control of production, inspection, and testing.
- (f) Procedures for detection, remedy, and control of nonconformances.
- (g) Procedures for dimensional control.
- (h) Procedures for document control in all aspects of the work including engineering, procurement, fabrication, construction, and QA inspection.
- (i) Procedures for welding inspection and nondestructive examination (NDE) including handling and storage of radiographs and other records.
- (j) Procedures for welding techniques qualification and approval.
- (k) Procedures for welder certification.
- (l) Procedures for quality/safety auditing of the contractor's and subcontractors' activities.
- (m) Testing procedures (hydro test, electrical testing, fire and gas detection instruments, and the like).

Quality-Related Records

Contractor shall develop and maintain complete records in good order of all tests and inspections performed. Inspection records shall include all test results, certificates, explicit identification of the materials and the fabrication process used, the nature and number of observations made, the number and type of deficiencies formed, and the nature of corrective action taken. All inspection records (including radiographs and radiograph interpretation sheets) shall be stored and made available throughout the duration of the work and for five years after the completion of the contract. The company's representative shall have access to all the contractor's quality-related records at any time. The contractor shall further submit copies of all test and inspection records to the company's site representative.

Contract Administration Procedures

As previously mentioned, only a few project procedures are candidates for standardization; most of them are too closely aligned to the scope of work to conform to a standard. Contract administration procedures, however, lend themselves to this treatment and the following procedures could be standardized and presented for general use in the industry:

1. Contract administration.
2. Work orders, change orders, and contract amendments.
3. Claims.

The following are sample procedures for such activities. They would be part of the project procedure manual along with the engineering, construction, finance, and other procedures.

Procedure No. 123

File No. 1.2.A.3.1 Sheet No. 1 of ___

Date: June 5, 2004

Title: Contract Administration (Field)

CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Responsibilities
3. Administration
4. Back charges
5. Meetings with the Contractor
6. Contract closeout

1. Purpose

The purpose of this procedure is to establish the manner in which the Project Team will administer all contracts following award.

2. Responsibilities

The Contract Engineer assigned to construction contract(s) is responsible for monitoring the overall performance of the Contractor(s) in accordance

with the terms and conditions of each contract. These responsibilities will include but will not be limited to:

- 2.1 Monitoring and expediting the Contractor's performance and progress against the Master Schedule.
- 2.2 Ensuring that the Contractor conforms with timely submittal of all procedures and documentation as required by the Contract.
- 2.3 Reviewing the Contractor's reports.
- 2.4 Reviewing the Contractor's *pro forma* invoices and submitting them for payment.
- 2.5 Preparing and processing authorized Work Orders, Change Orders, and Amendments as required.
- 2.6 Conducting all site meetings with the Contractor.

3. Administration

The Contract Engineer will carry out the following administrative duties throughout the duration of each Contract:

- 3.1 Maintain Contracts Department filing system in accordance with Procedure No. _____.
- 3.2 Review all contract correspondence and prepare correspondence to the Contractor for the Company Representative's approval and signature.
- 3.3 Prepare minutes of all job-site meetings held with the Contractor and distribute as required.
- 3.4 Transmit specifications and drawings and revisions to the Contractor as and when they become available.
- 3.5 Initiate and maintain a daily log of each Contractor claim at the earliest manifestation and commence a separate file on the claim complete with full backup information including, but not necessarily limited to, records of the following data: progress; manpower; weather and equipment reports; schedules, including all revisions, drawings, and specifications, including all revisions and minutes of meetings, including job explanation and bid clarification meetings; telephone conversations; relevant correspondence; memos to file; and photographs.
- 3.6 Prepare and process all Work Orders, Change Orders, and Amendments.
- 3.7 Prepare and distribute monthly cash flow forecasts and Contract status reports.

4. Back Charges

Back charges may be raised on the Contractor or Vendor when expenditure incurred by the Company is to be recovered. Back charges to the Vendor of material or equipment may arise through incomplete or damaged material or equipment and although these back charges are processed by the Procurement section, there will be a close liaison with the Contract Engineer through the effect on the Contractor's performance caused by the Vendor default. Back charges to the Contractor may be raised following equipment loan or provision of services by the Company or by another contractor appointed by the Company to remedy Contractor neglect such as failure to clean up the site or any other departure from the Scope of Work. The Contract Engineer will be responsible for the following actions:

- 4.1** Initiate and maintain a back-charge register.
- 4.2** Advise the Contractor of impending back charge and raise the relevant debit.
- 4.3** Distribute copies of the back-charge debit to the Finance Department.

5. Meetings with the Contractor

- 5.1** The Contract Engineer will preside over progress and negotiating meetings with the Contractor and will prepare and distribute minutes of such meetings.
- 5.2** Meetings with the Contractor will take place on Company premises or neutral premises.
- 5.3** In addition to progress meetings, the Contract Engineer will order regular meetings with the Contractor to discuss and settle variation orders and to determine the existence of potential claims.

6. Contract Closeout

On completion of all contractual obligations by the Contractor, the Contract Engineer will carry out the following actions toward Contract Closeout:

- 6.1** Ensure that all necessary completion certificates have been processed.
- 6.2** Review and pass the Contractor's final invoice to Finance.
- 6.3** Ensure that all back-charge debits have been settled.
- 6.4** Complete Contract Closeout checklist.
- 6.5** Prepare Contractor Performance Report.

Procedure No. 124

File No. 1.2.A.3.2 Sheet No. 1 of ___

Date: June 5, 2004

Title: Work Orders, Change Orders, and Contract Amendments
CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Responsibilities
3. Application—Work Orders
4. Application—Change Orders
5. Application—Contract Amendments
6. Exhibits (Note: see Appendices in Chapter 10 for what are referred to as Exhibits in the following sample)

1. Purpose

The purpose of this procedure is to establish the manner in which the Project Team will modify contracts through the use of Work Orders, Change Orders, and Amendments.

2. Responsibilities

2.1 The Contract Engineer assigned to construction contracts is responsible for the application, preparation, and documentation of supporting material, drawings, and the like, receiving, where relevant, the Contractor's quotation for the extra work; obtaining the Company's "fair price" estimate; negotiating and recommending approval by the Company Representative; and processing and distributing Work Orders, Change Orders, and Amendments.

2.2 The Cost Engineer, when requested by the Contract Engineer, will prepare a "fair price" estimate for the proposed extra work.

3. Application—Work Orders

3.1 The Work Order, a model of which is presented in Exhibit 1 (see Appendix 4 in Chapter 10) to this Procedure, will be used in situations where extra work is required to be performed within the general Scope of Work and unit or other prices for such work is clearly written into the Contract.

3.2 When signed by both parties, the Work Order formally requires the Contractor to perform the modification in accordance with the terms and conditions of the Contract and at the prices contained therein. Work Orders will be issued at Lump Sum prices by application of the Contract rates for extra work against the agreed period and labor force required for the Work. Work Orders will not be issued with a “not to exceed” figure or in circumstances where the Company does not wish to use the extra work rates in the Contract.

4. Application—Change Orders

4.1 The Change Order, a model of which is presented in Exhibit 2 (see Appendix 3 in Chapter 10) to this Procedure, will be used in situations where extra work is required to be performed within the general Scope of Work but clearly applicable unit or other prices are not available in the Contract or such prices are available but the Company does not wish to use them.

4.2 Should the extra work proposed not be within the general Scope of Work, neither the Change Order nor the Work Order will be used, but the Work or modification will be implemented by means of a Contract Amendment.

4.3 Change Orders will have space for the signatures of both parties and will contain the following information:

4.3.1 Type of payment (fixed, estimated, or “not to exceed”).

4.3.2 Backup information and correspondence leading to the change.

4.3.3 Who initiated the change proposal (Company or Contractor)?

4.3.4 Scope of the extra work complete with drawings.

4.3.5 Reasons for the change.

4.3.6 Cost and Cost Codes.

4.3.7 Start and completion dates for the extra work.

4.3.8 Effect on baseline schedule, if any.

4.3.9 Whether Change Order represents an increase in the Contract Lump Sum or a decrease (negative change).

5. Application—Contract Amendments

The Contract Amendment, a model of which is presented in Exhibit 3 (see Appendix 2 in Chapter 10) to this Procedure, will be used as follows:

5.1 Where the proposed change does not fall within the general Scope of Work.

5.2 To change or modify the terms of the Articles of Agreement.

5.3 To alter terms in parts of the Contract other than the Scope of Work.

5.4 To alter the Contract Price or Unit Rates.

5.5 To settle claims.

5.6 To add or delete substantial sums related to the Scope of Work but that require more formal language and documentation not found in Change Orders.

5.7 To change the baseline master schedule, milestone dates, or completion date(s).

5.8 To add to the Contract Price when the total cumulative value of Work Orders and Change Orders reaches ___ percent of the value of the Contract as amended.

Procedure No. 125

File No. 1.2.A.3.3 Sheet No. 1 of ___

Date: June 5, 2004

Title: Claims

CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Definition
3. Responsibilities
4. Handling and settlement of claims
5. Appointment of "Expert"
6. Arbitration
7. Legal proceedings

1. Purpose

The purpose of this procedure is to establish the *modus operandi* in the receipt, examination, processing, and settlement of contractor performance claims against the Company and the preparation and pursuance of counter-claims against the Contractor. This procedure is concerned only with Contract-related claims. Claims for loss or damage to property, personal injury, or death are properly dealt with by the Company's Insurance Department and do not form part of this procedure.

2. Definition

2.1 A claim is a demand in writing from the Contractor to the Company for payment for services performed, expenditures incurred, or losses suffered that cannot be resolved within the terms and conditions of the Contract. A claim may arise from a variation order proposal initiated by the Contractor for work that the Contractor believes to be extra to the Contract Scope of Work, but that the Company declares to be part of that Scope of Work.

2.2 A counterclaim is a demand in writing from the Company to the Contractor to deduct from the Contract Price or offset against a claim any monies that may be due to the Company through services provided by the Company that the Contractor had agreed to provide within the Contract Price but had failed to do so.

3. Responsibilities

3.1 The Contract Engineer is responsible for receiving, acknowledging, and coordinating the processing of Contract-related claims.

3.2 The Company Claims Review Board is responsible for convening to attempt to reach settlement of claims when requested to do so by the Contract Engineer. The Board shall seek the advice of the Law Department if appropriate.

4. Handling and Settlement of Claims

4.1 The Contract Engineer will be aware of a pending claim usually by receiving a variation proposal from the Contractor for a Work Order or a Change Order for alleged extra work. Should the Contract Engineer consider that such a proposal is not justified, he will disallow the whole or part and attempt to reach an agreement with the Contractor to withdraw or negotiate the part not in dispute. If the disputed portion still remains, the matter will be registered as a claim.

4.2 Immediately upon the recognition of the existence of a claim, the Contract Engineer will log the details as described in Procedure No. 123—Contract Administration (Field).

4.3 If the amount claimed is less than _____ and within the authority of the Company Representative to effect settlement, the Contract Engineer will first convene a meeting of the Project Team members involved in the claim including the Cost Engineer. This group will arrive at a recommendation as to the amount to be offered to the Contractor by way of settlement and will refer the matter to the Company Representative. Following negotiating

meetings with the Contractor, the Company Representative will authorize payment within the limits of his authority.

4.4 If the amount is greater than _____ and the Contractor persists in its claim, the matter will be referred to the Claims Review Board, which will receive all details and backup information on the claim from the Contract Engineer and will request an estimate from the appropriate estimating unit to assist in assessing and resolving the claim. The Claims Review Board will convene negotiating meetings with the Contractor as necessary and will attempt to arrive at a satisfactory settlement in accordance with Company policy. In the event of a satisfactory settlement being reached and the amount settled is less than _____, the Contract Engineer will prepare a Change Order as a vehicle for settlement. If the amount settled is greater than _____, a Contract Amendment will be processed to change the Contract Price accordingly.

5. Appointment of “Expert”

Should the Company and the Contractor be unable to reach an agreement on a satisfactory settlement of a claim, the Contractor may be invited to agree to the appointment of an “expert” to adjudicate in the matter. This arrangement is offered as a less expensive and less time-consuming alternative to arbitration. The expert will be a person of considerable knowledge in the field of construction related to the matter in dispute. Both the Company and the Contractor must reach agreement on the appointment and must be satisfied as to the complete neutrality of the candidate. The decision of the expert will be final and binding on both parties.

6. Arbitration

6.1 Should the Company or the Contractor form the opinion that the dispute is too complicated or too important to rest on the decision of a single expert, the matter may be referred to Arbitration.

6.2 The initial step will be the filing of a request for arbitration with the appropriate Arbitration Institute. This body will determine the number of arbitrators, usually three. A list of names of possible arbitrators will be sent to the parties by the Arbitration Institute. The parties will examine the list and will have the opportunity to delete the names of the persons against whom they may have objections. Once this is done, or if the parties have no objections, the arbitral tribunal will be formed. A hearing will take place where the parties may present their respective cases. The decision of the arbitral tribunal will be final and binding on both parties.

7. Legal Proceedings

Should the Company or the Contractor not agree with the appointment of an expert or an arbitral tribunal, or either party becomes in breach of contract by failing to comply with the decision of the expert or the arbitral tribunal, or for any other reason the dispute remains unresolved, the matter may be the subject of legal proceedings. In this event, the matter on behalf of the Company will be handled entirely by the Company's Legal Department. All Project Team participants involved in the claim shall provide the necessary support to the Legal Department as requested. The Contract Engineer, in addition to placing all relevant files and backup information at the disposal of the Legal Department, will obtain statements from all project personnel who may have been involved with the claim for future possible use by the Legal Department.

Other Project Procedures

The following model procedures are representative of definitions and guidelines used by other departments prior to project construction. Notwithstanding the traditional links between contracts and procurement departments, particularly in the home offices, the contract engineer in field conditions works more closely with the cost engineers than with any other discipline. It is only fitting, therefore, to include cost control and estimating procedures alongside those of contract administration. In addition, because of contractor involvement, the gathering of *as built* information is also included in the model procedures.

Procedure No. 126

File No. 2.1.A.1.1 Sheet No. 1 of ___

Date: June 5, 2004

Title: *As Built* Documentation

CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Definitions
3. Responsibilities

1. Purpose

1.1 The purpose of this procedure is to define the practices to be adhered to and the associated responsibilities in effecting a change to Approved for Construction engineering documentation during fabrication, construction, installation, and commissioning.

1.2 The procedures also define the practices to be adopted in the approval, distribution, recording, and filing of the revised documents that will detail an *as built* system.

2. Definitions

2.1 *DEC*: Design Engineering Contractor.

2.2 *Vendor*: A manufacturer, distributor, or fabricator who supplies a material, machine, component, or tool for a special purpose.

2.3 *Contractor*: Shall mean any person or company entered into a contract to perform work and/or to provide a service.

2.4 *Site Representative*: A supervisor appointed from the Project to act on its behalf in the monitoring, review, and coordination of the Contractor.

2.5 *Site*: The place or places where construction activities are carried out.

2.6 *Engineering Document*: A document developed by the project organization that upon completion of a successful review cycle and subsequent approval becomes a justification for engineering development and/or description of work to be performed.

2.7 *AFC*: Approved for Construction.

2.8 *Site Inquiry*: A technical query raised at the site by either the Contractor or Site Representative requiring clarification on or revision to an engineering document by the Project Team.

3. Responsibilities

3.1 The necessity for maintaining a record of any deviations from AFC documents subsequent to DEC completion up to and including plant start-up is fundamental to the successful completion of the Project. The incorporation of these changes onto the aforementioned documents will provide a complete package of *as built*s and hence be suitable for certification and records.

3.2 To maintain a common approach and format throughout all site locations when recording and processing engineering queries, the requirements of the relevant procedure governing site inquiries are to be fulfilled

by the Contractor. The inquiry form is to be completed by the Contractor and actioned upon according to procedure requirements.

3.3 Where such a form details a proposed change to engineering design or philosophy, review and approval by project engineering is a necessary requirement.

3.4 Project engineering in conjunction with the associated DEC or other responsible parties will review and recommend approval or rejection.

3.5 During the construction and installation phases it will be the responsibility of the Contractor to bring to the attention of the Site Representative any requirements for clarification on and/or changes to the AFC documentation produced by the DEC.

3.6 This is to be effected by completing the Site Inquiry form.

3.7 This query will then be actioned upon by the Site Representative.

3.8 For every query and subsequent approved change the Contractor will be responsible for maintaining a record of changes to design documentation.

3.9 Where the query involves a revision change, this will be marked up on the site-working print copy by the Contractor.

3.10 Subsequent to completion of the Scope of Work according to the Contract, the Contractor will then be responsible, within a time period to be agreed with the Company, for a complete set of engineering documents marked up with all revisions and changes, including material changes and certifications. Where documents have not been subject to change, this must be clearly marked on the front sheet or title block.

3.11 The DEC will be responsible for incorporation of these changes to the original documentation.

Procedure No. 127

File No. 2.1.A.1.2 Sheet No. 1 of ___

Date: June 5, 2004

Title: Cost Control

CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Definitions
3. Responsibilities
4. Descriptions

1. Purpose

To outline the basic methods and requirements for Project Cost Control and to explain the types of Contract Values, Performance Analyses, and Cost Forecasts used.

2. Definitions

2.1 List of Abbreviations

ACWP: Actual cost of work performed

AFE: Approval for expenditure

BCWP: Budgeted cost of work performed

BCWS: Budgeted cost of work scheduled

CCE: Current control estimates

CCV: Current control value

CO: Change Order

CPR: Cost performance ratio

CWE: Current working estimate

CWO: Contract Work Order

ECV: Estimated Contract value

ITC: Indicated total cost

MCE: Master control estimate

OCV: Original Contract value

PCE: Preliminary control estimate

PCF: Project control forecast

SPR: Schedule performance ratio

WBS: Work breakdown structure

WP: Work package

2.2 WBS: A subdivision of the complete project Scope of Work that will:

- (a) Identify the major end items or products needed to accomplish the project activities.
- (b) Provide the necessary framework for the establishment of Project Baselines for cost, time, and resources.
- (c) Provide a structure for orderly summarization of work performance to selected levels of detail.
- (d) Assign responsibility for task accomplishment to specific organizations or persons.

The WBS is subject to revision every six months to reflect the current situation and revised contract strategy.

2.3 WP: A defined work element or task that is clearly identified in the WBS as a discrete level of work where cost, schedule, and/or resources can be expressed.

2.4 Project baseline: Includes an identification and organization of the Scope of Work and a cost estimate and schedule agreed at completion of the pre-engineering phase. Normally, the following documents would be included:

- (a) WBS
- (b) WBS description sheets
- (c) MCE
- (d) Master control schedule

2.5 Project calendar: The number of calendar weeks during the defined project duration.

2.6 Measurable work: Items or areas of the Scope of Work that are quantified and progress related.

2.7 Nonmeasurable work: Items or areas of the Scope of Work that are indirect and/or not progress related.

2.8 Contractor's baseline: This is similar to the Project baseline but applies to a particular Contract and Contractor. It includes an identification and organization of the Scope of Work and a cost estimate and schedule agreed upon at Contract award. Documents include:

- (a) WBS
- (b) ECV
- (c) Contractor's schedule

2.9 Project Control Estimates

2.9.1 PCE: These are based on the preliminary project baselines and prepared from conceptual data before the preengineering design is complete.

2.9.2 MCE: This is the basic reference cost estimate produced at the end of the preengineering phase. It is built up in the WBS format by calculating costs for each individual work package.

$$\text{MCE} = \text{Base estimates} + \text{Escalation} + \text{Contingency}$$

2.9.3 CCE: Based on revisions to the WBS, this estimate is approved by management based on:

- (a) Current information from the various technical disciplines.
- (b) Base estimates for future contracts/purchase orders.

- (c) Bid evaluations.
- (d) Contract awards.
- (e) Forecasts to complete.

The CCE replaces the MCE for cost control and reporting purposes and is revised as required, but normally this is every six months.

2.9.4 Check estimates: These are prepared prior to the Contract award and based on the relevant bid package. They are used for bid evaluation and control of CCE accuracy.

3. Responsibilities

3.1 The project cost control group is responsible for cost control generally, including cost reporting against approved cost estimates and Contractors' baselines, logging and analyzing changes, compiling cost forecasts based on current information and cost appraisals, and maintaining the work breakdown structure and cost code systems of the organization.

3.2 Site surveillance is responsible for cost control at the Work location including monitoring and analyzing costs as Work proceeds, reporting to the project cost control group, and instituting and monitoring corrective action.

3.3 Project management is responsible for approval of contract values, commitments, and so forth; review of potential changes and cost forecasts; and direction of corrective action where appropriate.

4. Descriptions

4.1 Basic Objectives

4.1.1 Cost control is concerned with anticipating future costs in conjunction with the tracking of ACWP. Accurate monitoring of costs as work proceeds provides a basis for forecasting final costs. By definition, ACWP is cost already incurred and cannot be altered; whereas forecast costs can be influenced by management action. In this respect, cost control helps maintain budgeted costs and gives early warning of deviations from the established plan, enabling corrective action to be taken where appropriate.

4.2 Contract Values

4.2.1 Contract values represent the established and approved value of a Contract at any given time and are involved in the formulation of project control estimates, cost forecasts, AFE, and commitment values.

4.2.2 The OCV is the initial value of a Contract, agreed between the Contractor and the Company based on the defined Contract Scope of Work at the time of Contract award.

4.2.3 The ECV adds allowances to the OCV for provisional sums to be used as required and a calculation of the effects of escalation over the Contract period.

4.2.4 The above Contract values are obtained by way of a commitment value report prepared by the Contracts Department at Letter of Intent stage and agreed with project cost control group.

4.2.5 As a contract progresses, the current CCV is developed based on the ECV to reflect approved changes. The CCV is prepared by the project cost control group and is used to adjust commitment values.

4.2.6 The OCV and ECV are fixed values set at the start of a Contract while the CCV will change as the Contract progresses.

4.2.7 The above values apply to committed Contracts only. For noncommitted work packages the approved control estimate forms the base value until such time as a Contract is awarded.

4.3 Potential Changes

4.3.1 Although a potential change will require careful consideration and evaluation in any new forecast, it does not, in itself, constitute a new forecast nor does it substitute for the change control process.

4.3.2 The project cost control group will review and analyze potential changes and make suitable allowances for forecasting purposes. Those of a significant nature will be brought to the attention of project management.

4.3.3 Corrective action, if necessary, will be determined by the project cost control group or project management, depending on the magnitude of the potential change concerned, after due analysis and discussion.

4.3.4 Corrective action may be any modification that will bring the potential change into line with Scope of Work, budget, and schedule or results in a minimum adjustment to these. If a potential change has a significant impact after corrective action or if no suitable corrective action is available, it must be accepted by estimating the total consequences and including this in new forecasts. Or, if there is a resultant change in the Contract Scope of Work, by initiating a Change Order in accordance with project procedures.

4.4 Cost Appraisal

4.4.1 A cost appraisal involves trends and performance analyses.

4.4.2 Site surveillance will monitor trends against the established baselines and cost plans and carry out the following performance analyses:

- (a) BCWP
- (b) BCWS
- (c) ACWP

4.4.3 The project cost control group will review the above and carry out the following performance analyses:

- (a) CPR
- (b) SPR
- (c) Cost variance
- (d) Man-hour cost

4.4.4 Information gained by the cost appraisal will be used in the development of cost forecasts.

4.5 Cost Forecasting

4.5.1 The purpose of forecasting is to provide an estimated final cost based on information and experience accumulated, up to the forecast date, by the participating groups within the project.

4.5.2 Forecasting is carried out at Contract level by the project cost control group using progress information and analyses provided by site surveillance. The CCV forms the basis for calculation of final costs and there are three distinct phases involved in the process.

4.5.2.1 The ITC is the result of the first phase formed by the addition to the CCV of the most probable cost items, that is, pending changes and potential changes.

4.5.2.2 The PCF forms the next phase by adding to the ITC allowances based on the Contract cost appraisal and any claims situations that may have arisen, thus representing the most probable final cost.

4.5.2.3 The CWE is the third phase and represents the maximum foreseeable costs at any given time based on the PCF with allowances for future potential changes.

4.5.3 The above forecasts are reported to project management for action where appropriate. Such corrective action as designated by project management will be implemented by site surveillance and subsequent progress will be monitored and reported to the project cost control group.

4.5.4 The CWE is used in CCE and AFE updates and contingency release where appropriate.

4.6 Monitoring and Reporting

4.6.1 To achieve effective cost control, Contracts must be closely monitored and information analyzed to produce control data.

4.6.2 It is the Contractor's responsibility to develop baselines and cost plans and to report progress in an accurate and timely fashion, providing cost-performance and cost-management reports.

4.6.3 Site surveillance will review, check, and analyze the Contractor-provided information and report to the project cost control group.

4.6.4 Reporting will include the following:

- (a) An assessment of progress against the established baselines and cost plans.
- (b) Status of Change Orders.
- (c) Cost appraisal.
- (d) Advice of potential changes with classification.
- (e) Status of corrective action currently in progress.
- (f) An assessment of claims where appropriate.

4.6.5 The project cost control group will utilize such information to establish current project status and develop cost forecasts. Status reports and forecasts will be forwarded to project management for review and action where necessary.

Procedure No. 128

File No. 2.1.A.1.3 Sheet No.1 of ___

Date: June 5, 2004

Title: Estimating

CRUDE OIL COMPANY INCORPORATED

Approved Project Manager

O. Y. Knott

1. Purpose
2. Definitions
3. Responsibilities
4. Descriptions

1. Purpose

To outline the basic objectives of project control estimating and to describe the stages in the eliminating process and functions within the overall control system.

2. Definitions

For all definitions and list of abbreviations refer to Procedure No. 127—Cost Control.

3. Responsibilities

3.1 Project cost controls will prepare, maintain, and revise all project cost control estimates and AFEs as required and report to project management.

3.2 Project management is responsible for the approval of all project control estimates and AFEs and designation of corrective action where necessary.

4. Descriptions

4.1 Basic Objectives

4.1.1 Estimating is a means of predicting the project costs and forms the cost measurement baselines for comparison purposes. Cost monitoring and reporting reflect the actual costs to date. Forecasts based on actuals are compared with the current estimate and corrective action to be taken is suggested where appropriate.

4.1.2 To initiate an estimating exercise a “Request for Estimate” is prepared by the estimating group and approved by the Cost/Estimating supervisor.

4.1.3 All estimates will be kept in a secure place and files maintained by the estimating group.

4.2 PCE

4.2.1 The PCE is prepared from conceptual data in the early stages of the project to give an overall base value and enable initial budget values to be established.

4.2.2 At the time of compilation of WBS description sheets, each work package is allocated an estimated cost using the information available. Base estimates are used in the formulation of project control estimates by raising to Contract level and subsequently to project level.

4.3 MCE

The MCE represents the basic project investment cost estimate and takes into account the following:

- (a) Project schedule.
- (b) Preengineering and design drawings and information.
- (c) Scope of Work as defined in the work breakdown structure (WBS) sheets.
- (d) PCE.
- (e) Tender documents and Contracts existing at the time of preparation.

4.4 Check estimates

A bid evaluation provides a firm basis against which to check incoming bids. Check estimates are compiled as required, using the same information as that supplied to the Contractor or supplier. This is normally carried out before bid packages are released or during the Contractor's or supplier's bid preparation.

4.5 CCE

4.5.1 Where the MCE represents a fixed base cost reference, the CCE is a dynamic cost reference, developed from WBS revisions, Contract awards, Contract changes, and project forecasts.

4.5.2 The CCE takes into account the following current information at the time of compilation:

- (a) Bid evaluations.
- (b) Check estimates.
- (c) Contract award data.
- (d) Baseline revisions.

4.5.3 CCE updates are based on the CWE that is regularly revised to reflect current status. The CCE is revised as necessary, but normally this is every six months.

4.5.4 The project cost controls group prepares and distributes all CCE updates as required. Each estimate or revision to the same is put to project management for approval.

4.5.5 Where a revised estimate exceeds the AFE value, it must receive the approval of the Company.

4.6 AFE

4.6.1 AFE values are developed at the Contract level, generally from the approved MCE or CCE and issued prior to Contract award. Each AFE contains a portion of the total escalation and contingency allowances. Subsequent revisions to the CCE are used as a basis for revising AFEs.

4.6.2 AFE values are prepared by project cost controls group.

4.7 Baseline Revisions

4.7.1 Adjustments to the existing baselines are produced at the Contract level by the appointed Contractor and agreed upon with the appropriate site surveillance team.

4.7.2 The project cost controls group uses the adjusted baselines for baseline revisions, with the addition of approved Change Orders and escalation.

5.3 Contractor's Procedures: The Work Procedure

The terms of the construction contract require the contractor to produce a work procedure for each phase of construction before that phase is scheduled to commence. The contractor's work procedures (variously job instructions, work instructions, job procedures, etc., depending on the nomenclature in use at the time and place) are, together with the contractor's QA manual, its detailed description of how the work is to be performed.

Work other than administration and mobilization should not be allowed to commence until the work procedures are presented and approved by the client. The client should make it absolutely clear at the bid stage exactly what is required in the procedures as the severity of these requirements varies considerably depending on the client, the government, the area, the climate, and the nature of the work. For the same reasons, the cost of work procedure production can also vary from a moderate sum to a very large amount involving extra staff, consultants, and a great deal of time and effort. Traditionally, all bidders on a large project tender are required to produce samples of the proposed QA manual and work procedures gratis. On critical contracts it may be worthwhile to require submission of such documents with the bids (or at least a substantial outline) with an offer to pay the unsuccessful bidder a fixed sum for this work. Indeed, contractor work procedures for highly specialized undertakings, such as deep-water pipe laying from sophisticated lay barges, are often priced out as part of the response to the ITB. The unsuccessful bidder will receive a previously agreed upon sum for its efforts in producing the work procedure and QA/QC manuals. The successful bidder will, of course, include the cost of these publications in the contract compensation section. Unfortunately for the contractor engaged in other construction ventures, the amount of work required in the production of such manuals is never fully explained at preaward conferences or given much importance until the kick-off meeting. Contractors have been shocked when they are given the eventual

explanation of what is expected by way of quality and quantity of the work procedures, especially when work is not allowed to start until the procedures have gone back and forth between contractor and client many times before final approval.

The following sample work procedure describes the excavation, back-fill, and final landscaping of a trench. For the purpose of this exercise, it is not necessary to dwell on the objects to be interred in the trench because the model is intended only to illustrate what some clients may expect from such a procedure.

Crude Oil Company Terminal Project

Section 1. Civil Works

Revision ____

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DITCH DIGGERS INTERNATIONAL INC.

Work Procedure

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Specifications

SP-AA-123 Rev. A: General specifications

SP-AB-124: Concrete construction

Drawings

D-001-01: Road crossings

D-001-02: Drainage channels

D-001-03: Existing pipe crossings

D-001-04: Existing cable crossings

D-001-05: ROW restoration and drainage

D-001-06: Typical water stops

D-001-07: Typical ditch dimensions

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D-001-10: Typical ROW dimensions

D-001-11: Typical overhead telephone line and high tension line crossings

D-001-12: Ditch route map from East point to West point (1:1000)

Standards

STD-1234: Concrete structures—construction and control

STD-5678: Methods for testing concrete

STD-9101: Safety in trench excavations

Data Sheets

DS-011-01: Coordinates for traverse stations and benchmarks

DS-011-02: Coordinates and horizontal partial distances of turning points

Crude Oil Company Terminal Project

Section 1. Civil Works

Revision __

Date of issue: 05.06.04 Page 1 of __

DITCH DIGGERS INTERNATIONAL INC.

Work Procedure

1.1 Setting out

1.1.1 Checking centerline

The data sheets DS-011-01 and DS-011-02 will be used for the setting out and checking of angle point, angles, and levels of the centerline.

The equipment for the setting out will be normal survey equipment: Theodolites and Distomat.

Reference points will be marked outside work area and identified by coordinates.

1.1.2 Longitudinal profile

The longitudinal profile is to be taken over the centerline.

Profile will be drawn up in scale 1:200 on Format A3.

The points where cross sections are taken are to be indicated on the profile using wooden stakes with the centerline in the form of a cross. Stakes will be 3 ft. in length at a distance from one cross section to another, depending on variations in the longitudinal profile, and not more than 200 yards.

Cross sections are marked outside the work area with temporary markers to retrieve measurement.

1.1.3 Cross sections

Following determination of the station of the cross sections, the cross sections will be drawn up in a scale 1:100 on Format A3.

Cross sections are identified by number plus distance from one toward the West point.

Both longitudinal profiles and cross sections will be verified by the use of a stamp as illustrated:

	FOR COCTP	FOR DDII
CROSS SECTION		
BOTTOM TRENCH		
TOP CONSTRUCTION ROAD		
ROCK LINE		

(Step to be used for identification.)

The longitudinal profile and the cross sections are for measurement purposes only.

1.1.4 Bottom of trench and top of construction road

The senior engineer is responsible for putting the bottom of trench line on the longitudinal profile. Trench and construction road lines will also be shown on the longitudinal profile. Both lines will be signed for on the stamp reproduced above. These lines are for measurement purposes only.

1.1.5 Determination of rock line

If, in certain areas, rock is covered by silt and/or peat, this will be removed where trench and construction roads are to be established.

The line shall be signed for measurement purposes on the stamp shown above.

1.1.6 Information for drilling and blasting

On every cross section a white plate measuring 12" × 6" and attached to a stake will be placed, bearing the following information:

1. Level indicating top of plate.
2. Depth of trench in inches.
3. Distance in feet between centerline of trench and roadside at trench.

The marker will be placed in the centerline of trench.

1.2 ROW principle

1.2.1 Preparation of ROW

In principle, the ROW is a strip of land at a maximum of 100 feet wide and situated so that 60 feet is at the side where the construction road is to be and 40 feet is at the other side of the centerline.

The working area is a strip 50 feet wide, particularly including the construction road but also the trench.

For each section and prior to commencement of work, a plan will be prepared. The plan will show proposal encroachments and resulting landscape requirements and all activities will be within limits for terrain encroachments shown on work area plans.

1.2.2 Soils handling

The ROW crew will carry out brush clearing, removing the organic topsoil and storing it along the working area. In the rock area, the subsoil will then be removed from the trench to render it suitable for drilling. Topsoil and subsoil will be stored separately. Soil will be stored according to the working plan for the actual section.

1.2.3 Determination of rock line

The depth of the topsoil will be established by using a thin reinforcing rod or alternatively with a backhoe.

1.3 Water disposal

1.3.1 Method

In wet areas or after rainfall, the water will be disposed of in the following manner, using the alternative methods as applicable:

- (a) Surface water will be drained away at the side of the construction road. If necessary, a ditch will be excavated.
- (b) Water in trench will be pumped away into the above-mentioned ditch or into existing waterways.
- (c) Where an existing waterway is crossing a trench, rigid steel pipes will be used to carry water across at the top of the trench.

1.4 Drilling and blasting

1.4.1 Mode of operation

The drilling and blasting crew will follow the ROW crew. Drilling will be performed to a loading and drilling plan.

The blasting pattern and loads will be adjusted as necessary to stay within specification and obtain a degree of fragmentation that makes the rock suitable for filling in the construction road or backfilling the trench.

The type and amount of explosive will depend on local geology.

For their measurement, the drilling and blasting crew uses the information prepared by the setting-out crew as given on the plates mentioned in the section on “Setting out” (subsection 1.1.6).

Before blasting in areas where other constructions may be damaged or for general safety, the rock surface will be covered by net or fiber cloth to prevent falling stones. General fragments falling outside the limits will be removed as a part of the landscaping.

1.4.2 Safety measures

- (a) Before blasting:
 - Five minutes of siren sound.
 - Guards will be posted as necessary depending on the surrounding area.
- (b) After blasting:
 - Three short signals with intervals between the signals.

1.5 Construction road

1.5.1 Construction road materials

Construction road will be built of rock fill from blasting inside working area.

In the area where the construction road must be built before drilling and blasting in the trench, rock fill from the main construction dump will be used.

1.5.2 Construction road in bog areas

In bog areas, fiber cloth will be used under the construction road. In minor bog areas, the peat will be replaced by rock. This will be done according to approved working plan.

1.5.3 Crossing of trench

Where the construction road crosses the trench, bridges of prefabricated slabs will be used.

1.6 Trenching

1.6.1 Type of trench

For the purpose of this work procedure, trenches will be classified as follows:

Type A: Trench in solid rock.

Type B: Trench with rock bottom where the rock is covered in silt and/or peat.

Type C: Trench completely in silt and/or peat.

1.6.2 Type A

The size of Type A is determined by blasting. Trenches in rocky ground will be carefully finished, eliminating all projections and roughness, and at the same time removing surplus rock fragments from the trench bottom. Where the trench is overblasted, the rock fragments from the trench bottom will be compacted with a mechanical road roller to produce a bottom free from projections.

1.6.3 Type B

The same instructions apply for Type B trenches after removal of top soil, silt, and/or peat.

1.6.4 Type C

Type C trenches may be excavated closer to other working parties.

1.6.5 Excavated material

Excavated material will be used for building the construction road or stored at the side of the trench to be used for backfill according to the civil construction plan given in advance for the different cross sections and depending on the quality of the material. Surplus material will be transported to the dump area.

1.6.6 Quality control

The survey crew will check the level and width of the trench bottom.

Special attention will be paid to assure that the correct cover and width is obtained in particular at:

- (a) Bends.
- (b) Road crossings.
- (c) Utility crossings.

The QC inspector will inspect the trench visually and should any adverse comments arise, the necessary steps required for rectification will be taken.

1.7 Laying bed

1.7.1 Start of work

The laying bed will be installed under the object to be buried. Work will not start before inspection and approval.

1.7.2 Specification

The laying bed will consist of a 4" layer of gravel $\frac{1}{4}$ "–1" and a 4" layer of 0"– $\frac{1}{4}$ " sand. Both layers will be compacted by a mechanical roller. The top of the layers will be marked out prior to the laying operation.

1.7.3 Quality control

The laying bed will be inspected by the QC inspector.

1.8 Backfill

1.8.1 Methods

Backfill will be executed by backhoe.

Sag bends will be backfilled and compacted before overbends in straight sections.

Where compaction is required, the layers will not exceed 12".

1.8.2 Quality control

The surveying crew will check the top of the surrounding backfill and will make a longitudinal profile.

The QC inspector will check each layer.

1.8.3 Materials

The material will consist of well-graded sand and gravel 0"– $\frac{1}{4}$ " at horizontal bends, road crossings, and stream banks around the buried object. Following this, a first layer of pebbles and rubble mixed with sand and loose earth will be used together with material from the trench. The final layer will consist of material not larger than 12" that is free from peat and organic soil.

1.8.4 Road crossings

The backfill will be compacted at horizontal bends, road crossings, and stream banks. The layers will not be more than 12" deep. Small hand-operated compactors will be used.

Road crossings will be carried out in accordance with Drawing D-001-01 and the final layer will be covered with a layer of asphalt where previously asphalted.

Road crossings will be checked and approved by the civil inspectors.

1.9 Land drains

1.9.1 Specifications

The drainage system will be installed in accordance with Drawings D-001-02 and D-001-05. Minimum fall of the ditch will be 1:100.

1.9.2 Drainage

Where drainage piping already exists, the trench will be excavated with care to avoid damaging the existing work. Damaged pipe will be replaced before the installation of a buried object.

Concrete drainpipes without sealed joints will be installed. When the depth of a trench is greater than 15 feet, reinforced concrete pipes will be used.

Fine chips $\frac{1}{2}$ "- $\frac{3}{4}$ " will be placed around the concrete pipe. Minimum cover for the sides and top will be 12".

1.9.3 Drainage of working area

Drainage of working area will be carried out in accordance with Drawing D-001-02.

The trench will be blasted and excavated 3 feet wide to obtain sufficient cover sideways.

1.10 Water stops

1.10.1 Specification

Water stops will be located and constructed in accordance with Drawing D-001-06.

The water stops will consist of woven polyvinyl chloride (PVC) bags filled with fine sand. The bags will be placed to create a convex with the curvature that is oriented upstream.

1.10.2 Installation

In rocky ground, loose material will be removed by an excavator with the last small pieces being taken out by hand so that the sandbags may be laid directly on the rock surface.

The first 9" of the water stops will be laid down at the same time as the laying bed.

Backfilling on both sides of the water stop will be compacted.

1.11 Concrete construction

1.11.1 Specification

Concrete construction will be carried out in accordance with Specification SP-AB-124 and Standards STD 1234 and 5678.

1.11.2 Application

Concrete will be placed in the formwork using concrete pump, a crane, or directly from the truck mixer. Pouring will not commence until the formwork and dimensions are inspected by the senior civil engineer.

The concrete will be vibrated.

The fresh concrete surface will be treated as required by tamping and steel troweling. Curing will be secured by use of water or by using a membrane where necessary.

1.11.3 Formwork

Formwork will be constructed in material specified on relevant drawings and/or in the Bill of Quantity. Dimensions will be in accordance with required tolerance class.

Formwork will not be removed until the concrete has attained the required strength.

1.11.4 Reinforcement

Reinforcement will be in accordance with the relevant drawings and standards mentioned above.

Reinforcement bars will be placed as shown in the drawings. Reinforcement bars will be free of any coating that may reduce bond with the concrete.

Plastic spacers will be used to ensure the specified cover of the reinforcement bars. Should reinforcements have become contaminated, they will be cleaned using the appropriate technique or dumped.

1.11.5 Positioning

The surveying crew will set out for cast-in parts in accordance with the drawings. After the parts are placed, it will check that they are within tolerances.

The cast-in parts will be secured in their positions by nailing them to the formwork or welding them to foundation bolts.

1.11.6 Firm rock foundations

If the foundation is to firm rock, all loose material will be removed by excavation, hand digging, and finally cleaned by water/air jet.

1.12 Cleanup and landscaping

1.12.1 Locations

Landscaping will be carried out at the work area, disposal and storage areas, and access roads.

Landscaping will return the landscape as close as possible to its original shape. All waste will be removed.

1.12.2 Contours

Generally, cutting edges will be rounded off and filled to rounded edges using subsoil and/or surplus rock stored along the ROW and in the construction storage area.

Sharp edges or rock will be removed by blasting.

In areas where the construction road is filled higher than the original terrain, the edge will be rounded off.

Surplus spoil will be graded in the terrain where possible. In flat areas where this is not possible, the surplus spoil will be used in landscaping elsewhere or transported to dump areas.

1.12.3 Dump areas

Edges of the dump areas will be rounded off in the same way as mentioned in 1.12.2 or graded into the side terrain.

1.12.4 Fences

Fences destroyed by installation works will be restored.

1.12.5 Topsoil

Following completion of the above-mentioned work, the organic topsoil stored along the ROW will be graded on top.

1.12.6 Revegetation

Revegetation will be carried out as Specification SP-AA-123 Rev. A.

1.13 Inspection of civil works

1.13.1 ROW and grade

Inspection shall be carried out to:

- (a) Determine that necessary permits have been obtained before commencement of clearing and grading activities.
- (b) Ensure contacts with landowners and/or tenants before any fence is cut.
- (c) Check that all openings made and other fencing details are in accordance with specifications and, where practical, in accordance with the wishes of landowners and/or tenants.
- (d) Ensure that the centerline, clearing limit, grain, and other stakes are set at sufficiently close intervals to accurately locate and set out the required construction.

- (e) Check that temporary offset stakes and reference benchmarks are provided as required for rapid and accurate checking of locations and elevations.
- (f) Check construction staking for sufficient accuracy to ensure installation with tolerances as specified or shown on drawings.
- (g) Ensure that no false fill is deposited in the ditch line.
- (h) Ensure that spoil, brush, and debris are disposed of in the correct manner.
- (i) Ensure preservation of ROW boundary markers and that ROW clearance is kept minimal.
- (j) Report in detail any off-ROW damages to private property, roads, fences, and the like, and photograph such damage as appropriate.
- (k) Ensure that all existing structures that interfere with construction are protected, relocated, or removed as required.
- (l) Ensure that temporary drainage facilities are constructed in accordance with specifications where grading interferes with natural or previously installed drainage.
- (m) Ensure the maintenance of required retaining structures against possible flooding and/or restriction of flow in natural channels.
- (n) Determine that required permits are obtained before any blasting operations commence.
- (o) Ensure that all applicable safety measures, codes, and restrictions are complied with during blasting operations and that any debris is removed and disposed of in accordance with specified requirements.
- (p) Prepare daily reports and submit these along with any other required documentation.

1.13.2 Trenching

Inspection shall be executed to:

- (a) Ensure the maintenance of up-to-date copies of alignment sheets, construction line lists, and permits on the ROW and approved work plans.
- (b) Determine that all restrictions and permit conditions are complied with.
- (c) Report in detail any off-ROW damages to private property, roads, fences, and the like, and photograph such damage where appropriate.

- (d) Determine that centerline stakes and offset reference stakes and markers are provided at sufficiently close intervals as to permit accurate positioning of the ditch.
- (e) Ensure that offset reference stakes and markers are preserved at all times during construction.
- (f) Determine that existing underground structures and lines are located and protected.
- (g) Ensure that excavation of the trench is centered on the stake centerline unless otherwise shown on construction drawings.
- (h) Check trench dimensions against typical trench section dimensions shown on construction drawings.
- (i) Ensure that overexcavation is corrected and ditch bottom is filled to the required level.
- (j) Determine that placement, grading, and compaction of bedding material is in accordance with all specified requirements.
- (k) Ensure that the ditch walls are supported and slope where necessary to prevent cave-ins and sloughing.
- (l) Ensure that any ditch left open is in accordance with specifications, contract documents, and applicable government codes.
- (m) Ensure that temporary bridges of adequate strength and dimensions are provided as required in locations where ditches cut access roads, paths, walkways, or similar facilities and may therefore interfere with normal traffic.
- (n) Ensure that proper warning signs and markers are provided and maintained.
- (o) Report all rock trenching and be familiar with applicable laws, codes, safety requirements, and techniques.
- (p) Determine that required permits are obtained before any blasting operations commence.
- (q) Ensure that all applicable safety measures, codes, and restrictions are complied with during blasting operations and that any debris is removed and disposed of in accordance with specified requirements.
- (r) Monitor operations at road and other crossings to ensure that depth of cover as well as other requirements comply with specifications.

- (s) Prepare daily reports and submit these together with any other required documentation.

1.13.3 Backfill

Inspection shall be carried out to:

- (a) Ensure that backfill material contains no rocks larger than allowed by the specifications.
- (b) Measure the amount of cover both before and after backfilling as necessary to determine that the required depth of cover has been achieved using transits, probes, or other devices as required.
- (c) Ensure that any required compaction of backfill material is performed in designated locations and check to ascertain that compaction meets the specified requirements.
- (d) Ensure that agreements made with landowners and/or tenants for waste disposal are complied with.
- (e) Prepare daily reports and submit these together with any other required documentation.

1.13.4 Cleanup and landscaping

Inspection shall be carried out to:

- (a) Be familiar with requirements for final grading, fencing, marking, backfill, and revegetation of the ROW and maintain copies of specifications and other controlling documents for reference during cleanup and revegetation work.
- (b) Ensure that grading of the ROW is completed in accordance with specifications and that any required terraces and breakers are installed as specified.
- (c) Ensure that in areas where the topsoil has been set aside it is used for the final backfill layer.
- (d) Ensure that all foreign material, stumps, debris, and rocks larger than allowable size are removed from the backfill material.
- (e) Prohibit the practice of burying debris on the ROW or in the backfill.
- (f) Verify that all temporary works such as access roads, diversion ditches, and dams are removed and the sites restored.
- (g) Ensure that all tiles and drains that have been broken or removed are replaced as required.

- (h) Verify that all temporary gates are removed and fences replaced in accordance with specified requirements.
- (i) Verify that ground and aerial markers are set as specified.
- (j) Ensure that all vents, markers, and other appurtenances are painted as specified.
- (k) Monitor sodding, seeding, and planting activities to verify that all re-vegetation is accomplished in accordance with specified requirements.
- (l) Ensure that agreements made with landowners and/or tenants, as well as specification requirements for waste disposal, are complied with.
- (m) Ensure that the necessary and required acceptance signatures from landowners and/or tenants are obtained.
- (n) Prepare daily reports and submit these together with other required documentation.

Note: Sample specifications, drawings, standards, data sheets, and forms are not included in this model work procedure.

Contracts Management

6.1 The Contract Manager

Contract administration as a separate department of a client company or a large engineering contractor is a comparatively recent addition to the construction industry. Forty or fifty years ago, producing oil companies would arrange construction agreements with their lawyers and engineers for major works but most small civil undertakings were often carried out by companies' own construction divisions. Gradually, over the years, the producers embarked on a policy of local purchasing for their material and materiel requirements followed by a cautious entry into the employment of local contractors for selected work. Understandably, the first contract administrator was usually someone from the local purchasing department.

Major engineering contractors followed a similar practice. They were directly engaged by the energy industry as hands-on contractors. They employed their own labor force in most disciplines of construction, only subcontracting out in areas where they did not have expertise or where it was uneconomical to attempt the work themselves. The contractors' buyers were also required to make agreements with subcontractors, and even when separate contract departments evolved, they became attached to the procurement sections as a matter of expediency rather than logic. Although

many companies still have their contract engineers report to the procurement manager or the contract manager report to the vice president of procurement, the two departments have little in common in the field compared to the close relationship between contract and cost/scheduling personnel. This is especially apparent in the day-to-day contacts between the managing contractor and the subcontractors when they meet to discuss contractual matters. The contract manager would not wish to attend the meeting without the presence of a cost engineer or the scheduler but only occasionally would he require the attendance of a representative of the procurement department. The exception would be when information is required to expedite material.

The title of *contract manager* is not new to the construction or manufacturing industry, but the job description is not the same for both. In manufacturing, the contract manager is concerned with sales to customers rather than the direct administration of a number of construction contracts that make up the project in hand. The emergence of the contract department in the energy industry brought about a similar development within the organizations of the larger contractors. They were invited by client companies to manage projects and supervise the work of other contractors, a role for which the clients very often had insufficient personnel or even the expertise to perform. In the past, the very largest engineering and construction contractors were narrowly focused on the management of super projects on behalf of the oil companies. Some of these ventures employed more contract personnel than the client's contract staff.

Sometimes the contract documents were written on the client's paper, but on many projects the managing contractor's procedures were used and the contracts issued by them with the client maintaining a fairly passive surveillance.

Most contract managers and contract engineers make their way to the department through various engineering disciplines within the parent organization. In times of high unemployment in the field, many are attracted by the comforting thought that the contract man is one of the first on a new project. This is because he must issue invitations to bid and produce and execute contracts before construction begins. The contract manager is also certainly one of the last to leave a job owing to the need to settle claims and arrange final closeouts.

Not all contract managers have engineering backgrounds. Some have trained as lawyers and others have a business degree. A few have transferred

from project management and as contract managers have been requested by clients to double as construction supervisors. It has been mentioned that the contract manager is often the last to leave the project. Because he cannot depart until the very last claim has been settled and the last closeout document has been completed, there is not a great deal to do in these closing stages. Clients have been known to observe this inactivity and with the agreement of the managing contractor, found work of a different nature albeit in the same area. At one refinery in Texas, the client became dissatisfied with the incumbent project manager and asked the managing contractor to replace him with their contract manager. The reverse situation can exist in some client organizations who tend to look upon the contract manager as some sort of technical clerk regardless of his past experience and performance. A more accurate idea of the contract manager's perceived value may be gained at the bidding stage and during the managing contractor's presentation to the client. When an owner decides to embark on a new construction venture and elects to appoint a management contractor to take charge, much of the same bidding procedure applies to this prime contract as in others. During the evaluation process, the client will request a presentation meeting with each contractor during which the proposed method of construction management will be discussed and the contractor will be asked to nominate key staff, including the future contract manager. Quite often, the client will ask for a particular contract manager by name, subject to his availability. That manager has, no doubt, worked for the client in the past and has earned its trust and satisfaction.

6.2 The Contract Engineer

The nomenclatures of contract engineer and contract administrator are not normally meant to differentiate between those of a technical background and others of a commercial or legal calling. The client or the upper echelons of management often decide on the title. In the head office of a large managing contractor in California, objection was raised to the practice of using the term *contract engineer* when applied to personnel who were not academically qualified to use the title. Rather than segregate the staff, everyone below the rank of contract manager was addressed as contract administrator. Throughout this book, both titles are used without consciously distinguishing one discipline from another.

It is an advantage if the contract engineer who is to administer the contract in the field also compiles the bid package and sits on the bid evaluation

team. This seldom happens in fact and the field contract manager often inherits the contract from the home office without the benefit of knowing its early history. The reverse is true and the contract administrator in the home office works diligently on a bid package from its birth to contract award but never gets the opportunity of working on that contract in the field.

The authority of the contract engineer, as in the case of the contract manager, varies from project to project. In some construction undertakings he is the client's primary contact, chairs every meeting with the contractor, and carries a great deal of clout. In others, he may be placed in a lower rank. Generally, he has the administrative management and control of all contracts assigned to him and will be accountable for communications, documentation (files maintenance), status reporting, pricing, payments, changes, back charges and offsets, claims, and business practice. Of all members of the construction team, the contract engineer is the one especially governed by project procedures. Every step he takes through the paperwork jungle of contract variations is preordained. There is even a procedure for stepping out of procedure!

Contractor personnel coming into the sphere of oil or petrochemical company construction for the first time find it difficult to understand the rigid adherence to procedure imposed by the client. The same applies to some of the contractor's own construction personnel. "Let's get on with the job and worry about the paperwork afterward" is a cry often heard in the field. It is not often *repeated*, however, around the larger client organizations who make an issue of *compliance or else!*

6.3 The Client's Team

The numbers and formation of the client's project team in the field will depend to a large extent on how the project will be managed. It has been mentioned, in Chapter 1, that there are a number of options available including the employment of a managing contractor. If this option is adopted, the managing contractor will field the following departments and disciplines:

- Construction supervision—all disciplines
- QC
- Safety and security
- Material management
- Cost/scheduling and estimating

- Administration and finance
- Contracts management

The field contract manager will deploy his contract engineers according to the size of each contract. The largest, usually the civils and mechanicals, will probably each require the undivided attention of a contract engineer. The smaller and later activities, such as electrical, instrumentation, insulation, refractory, and painting, will be administered by the remainder of the contracts team with perhaps two or three contracts per person. The contract manager, while not normally directly supervising any of the contractors, will be present at each progress meeting and other meetings and will keep a watchful eye on the daily proceedings of the overall project and its contract activities.

6.4 Distribution of the Contract

After the contract has been printed, bound, and executed by both parties, three issues are selected as the original, the duplicate original, and a copy. The original is sent to the company's archives, the duplicate original is sent to the contractor, and the copy is sent to the field contract manager. Other copies are made available to certain disciplines on a need-to-know basis, but several copies minus the compensation section may be distributed to field construction personnel. Other involved staff should at the very least receive copies of the relevant scope of work. It behooves all recipients to read and understand the language of the contract. The contract engineer must know exactly what the contract requires of the client and of the contractor and should insist on compliance with the terms and conditions.

In the field it is important that priced copies of the contract are kept under lock and key, particularly after job-site working hours. A sure sign of sloppy contract administration is the desktop display of highly confidential documents left unprotected against dishonest attention. Even an old and closed out contract may be of value to a contractor bidding for a future but similar job.

6.5 Execution

By the time the contract is signed and distributed, the successful contractor may have started to mobilize its equipment and forces. Provision is usually made for this in the opening paragraph of the contract, thus: *This Contract is made effective as of the 5th day of June 2005.* This date could be a

week or so before the contract is executed and is covered by the previously written letter of intent, if such a step was taken to enable the contractor to prepare for the work.

6.6 Mobilization

During mobilization, there is a mass of paperwork for the contractor to prepare and present to the client before it is allowed to start construction. For example, it would certainly not be allowed to start work or even bring a single item of equipment on site before the client can see proof that insurance obligations have been met, as required in the contract.

It is helpful if, before the preconstruction (kick-off) meeting, the contract engineer prepares a list of documents required before and during the work. Below is a list taken from a typical refinery construction contract.

<i>Description</i>	<i>When Required</i>
Resumes and qualification of all supervisory personnel	Within 15 days of award
Appoint contractor's representative	On award
Proof of insurance	Before work starts
Obtain all necessary permits	Before work starts
Submit working plan area	Within 30 days of award
Welding procedures	Within 60 days of award
Construction work plan	Within 90 days of award
Hydrotest procedure	90 days before testing
Daily reports	Daily
Weekly reports	Weekly
Monthly reports	By the 10th of the following month
Bank guarantee (if allowed in lieu of retention)	Before first invoice
Taxation reporting requirements	As required
Contractor organization chart	Before work starts
Update chart	As required
Monthly safety reports	Monthly
Baseline plan progress	Weekly and monthly
Baseline plans	Immediately after award
Manpower baseline	Within 45 days of award
Cost baseline	Within 45 days of award

<i>Description</i>	<i>When Required</i>
Schedule narrative	Monthly
Problem analysis report	Monthly
Manpower reporting	Monthly
Cost reporting	As required
Cash flow forecast	Monthly
Purchase order status	Monthly
Material control system procedures	Within 60 days of award
Over, short, or damage report	As required
Material closeout report	On completion of work
Material reconciliation report	On completion of work
<i>As built</i> documentation	On completion of work
Manuals to be prepared:	
QA	Within 30 days of award
Safety	Within 30 days of award
Planning detailed schedules baselines	Within 30 days of award
Progress measurement reporting	Within 30 days of award
Procurement	Within 30 days of award
Material control	Within 30 days of award
Work procedures for each phase of construction	Before each phase starts

6.7 The Kick-off Meeting

During the administration of a multimillion dollar, two- or three-year mechanical contract, the contract engineer will be required to conduct correspondence on contract matters, be totally responsible for all activities concerning contract matters, and chair, or at least attend, regular site meetings with the contractor. The very first meeting to take place will be the preconstruction (or kick-off) meeting. The first object of this meeting is to officially introduce the contractor to the client's construction team. In theory at least, the contractor's staff have only dealt with the client's contract department during the preaward stages. Every discipline of the client's supervisory team, relevant to the contract, will be present and will speak on the actions required and expected from the contractor.

The following is an example of a kick-off meeting agenda:

- A. Opening
 - 1. Introduction
 - 2. Scope of work
 - 3. Project philosophy
- B. Organization
 - 1. Client organization and personnel
 - 2. Contractor organization and personnel
 - 3. Signature authority (contract, correspondence)
- C. Communications
 - 1. Oral
 - 2. Site instructions
 - 3. Correspondence
 - 4. Schedule for progress review meetings
- D. Schedule
 - 1. Overall work plan and schedule
 - 2. Manpower curve
 - 3. Coordination with work schedule of others
 - 4. Contractor's schedule submittal
- E. Materials
 - 1. Planning for contractor-supplied materials
 - 2. Schedule need dates for free-issue materials
 - 3. Transport and off-loading procedures
 - 4. Storage and/or requisitioning procedures
- F. Client or contractor furnished facilities
 - 1. Utilities
 - 2. Accommodations or camp facilities
 - 3. Tools
 - 4. Shops
 - 5. Manpower
 - 6. Equipment
 - 7. Other services
- G. Contractor's equipment planning
- H. Lay-down and work area planning
 - 1. Location

2. Buildings or materials located in lay-down area
 3. Conditions or restrictions on use
 4. Access
 5. Maintenance of access
- I. Labor relations
1. Labor relations
 2. Situation with unions
 3. Site agreements
 4. Dispute handling
 5. Jurisdictional procedures
- J. Work rules
1. Work week
 2. Overtime procedures
 3. Security provisions
 4. Other
- K. Safety
1. Regular safety meetings
 2. First-aid and medical provisions
 3. Safety inspections
 4. Contractor safety program
 5. Safety committee establishment
- L. QC program
1. Contractor's QC plan schedule
 2. Inspection and testing
 3. Unique requirements
 4. Independent laboratory
- M. Measurements of units or progress
- N. Invoice procedure
1. Agreement of progress measurement
 2. Submittal of *pro forma* invoice
 3. Format of actual invoice
 4. Client internal invoice procedure
 5. Cut-off dates
 6. Method of deductions (back charges, retention, etc.)
 7. Bank guarantee (if in lieu of retention)

- O. Variations to the contract
 - 1. Work orders
 - 2. Change orders
 - 3. Amendments
- P. Claims handling
- Q. Reporting requirements (the previously listed documents and their due dates)
- R. Drawings and specifications
 - 1. Contractor requirements
- S. Subcontractors
 - 1. Appointment
 - 2. Approval by client
- T. Insurance
 - 1. Production of proof of insurance cover
 - 2. What type of insurance required
- U. Other business

6.8 Indemnity and Insurance

The contractor is required to procure and maintain certain insurance covers before and during the performance of the work, including protection and indemnity insurance holding the client harmless from claims arising from death or injuries to third parties and/or damage to or loss of their property. The fiscal limit of this cover is set by the terms of the contract or is governed by the applicable laws of the country. The possibility of damage to the client's property by the contractor, however, receives a special consideration. Construction of a new plant in the middle of an existing refinery, for example, increases the vulnerability of the contractor to penalties for damage far beyond the amount for which it would reasonably insure. Even if such cover was obtainable, the premium may render its bid not competitive. The client may ask the contractor to insure against serious damage to the permanent work or to adjacent property in a nominal sum, say \$100,000. Thus, the contractor is not released entirely from all responsibility, but is indemnified against liability for the remainder. In certain circumstances where the risks are great, the client may go further and indemnify and hold the contractor harmless from all claims by the client for damage as follows:

- (a) Any damage to or loss of client-supplied materials during transport by the contractor.
- (b) Any damage to the work or facilities as described in the preceding text exceeding \$100,000 per occurrence prior to final acceptance.
- (c) Any damage as mentioned in the preceding text after final acceptance to the extent that such claims are not covered by the contractor's insurance.
- (d) Any damage to third-party life and property not covered by the contractor's insurance.
- (e) Any damage arising from the use of vehicles supplied by the client to the contractor for use in the work.
- (f) Injuries or death of employees of the client caused by the contractor.
- (g) Any damage caused by loss of crude oil or other products due to the contractor's negligence.
- (h) Any damage caused by pollution.

There are certain types of insurance coverage that the contractor must assume at its expense. Oil company clients, because they own vast assets, such as refineries in which the contractor may be working, will accept coverage of major risks either by self-insurance or by worldwide brokerage. Consider a situation in which the anchors of a contractor's work barge damage a submarine pipeline, causing eruptions of great quantities of oil. Or a small contractor on a painting contract inside a working refinery accidentally backs its truck into a place where it should not be. The premium for either contractor to insure against such a disaster may be greater than the contract is worth. Clients can always insure more economically in this direction.

However, the contractor will be required to insure against (for) protection and indemnity, general third-party liability, personnel, and, in some cases, automobile liability. The contractor must produce proof of these covers before work is allowed to start. In the following text is a complete list of covers used in the industry although not necessarily all of these would be required in any one project.

1. Contractor

Title: Personnel insurance (workman's compensation)

- Cover includes contractor's employees for illness, personal injury, and accidental death—to the full extent required by law and applicable at any site and/or where the contractor's employee's contracts of employment are made.

2. Contractor

Title: Comprehensive bodily injury and property damage liability

- Covers all contractors' work under the particular contract.

3. Contractor

Title: Public liability and property damage

- Regarding all contractors' vehicles and moveable plant.

4. Contractor and Company

Title: Builders "all risk" insurance

- Covers all property used in the performance of the work, that is, damage to machinery, materials, and other property that will become part of the work (i.e., free-issue materials stored by the contractor for future installation in the work—pipe, etc.). This cover shall apply, inter alia, while any such property is awaiting erection or installed or being tested.

5. Contractor and Company

Title: General third-party liability insurance

- Both contractor and company may take this cover with the contractor's liability being limited to a smaller amount than that of the company.

6. Company

Title: Property transit insurance

- Covers loss or damage to the permanent works while they are being moved or transported.

7. Contractor

Title: Protection and indemnity insurance

- Covers the contractor's liability to hold the company harmless from and against all losses, expenses, and claims for death of or personal injury to third parties and/or damage to or loss of their property. The company will usually protect the contractor in a like manner.

Note: The company may take out a general contingency policy to protect against, for example, invalidity or lapse by nonpayment of a premium of a contractor's policy.

6.9 Liquidated Damages

Should Contractor fail to complete the work within the time for delivery, then Company shall be entitled to deduct from the contract price a sum equivalent to ___ percent of the contract price per day or part thereof as liquidated damages up to a maximum of ___ percent of the contract price. All sums payable to Company by Contractor pursuant to this clause shall be paid as liquidated damages for delay and not as a penalty. (quotation taken from Articles of Agreement)

If the work is not completed within the time stated in the contract, subject to any extension allowed by the contract, and as a result the company has suffered loss, it may claim damages from the contractor in compensation. Failing agreement between the parties, the extent of damages would be decided by arbitration or litigation and would depend on the losses proven by the company to have been suffered. The risk for the contractor is such that the damages are unlimited. If, however, the parties agree beforehand on the level of damages to be paid by the contractor in the event of lateness (i.e., liquidated damages), then those liquidated damages become due in the event of lateness, irrespective of the actual loss suffered. The attraction to the contractor is the quantification of its liabilities.

6.10 Progress Reporting

With all contracts, particularly reimbursable cost agreements, the contractor must keep the client fully informed and provide regular progress reports. The client must have the opportunity to review the status of the work and to mitigate its costs if the budget and schedule should overrun. Decisions may have been taken without the client's higher management authority who may not be closely involved in day-to-day activities. From the beginning of every project, the contractor will be obliged to issue a

monthly progress report to the client's representative. As a minimum, each progress report should include the following:

1. Highlights of significant accomplishments during the report period, expressed in relation to the total amount of work to be done in each category.
2. Current status of the work. Project progress information shall be provided in the form of a monthly project update report showing actual progress versus scheduled progress for:
 - (a) Detailed engineering
 - (b) Materials commitment
 - (c) Materials received at site
 - (d) Field construction

An explanation shall be given of deviations from the target schedules, their consequences, and corrective actions to be taken.

3. Problems encountered, together with actions taken to solve them.
4. Highlights of significant work items anticipated to be completed in the succeeding month.
5. Status of subcontracts.
6. Contract price forecast for the project, including the cost effect of approved and pending changes to the work.
7. Photographs of the site to indicate construction progress.
8. Safety report.

The necessity to produce a regular monthly report also acts in the interest of the contractor because the report draws its attention to outstanding matters that may have been overlooked as well as providing other essential information on trends and costs.

Following is an example of a typical Monthly Progress Report format issued as a guide to the contract administrator.

Section 1. General

- 1.1 Overall summary (as applicable)
- 1.2 Engineering—percent completion
- 1.3 Procurement—percent completion
- 1.4 Construction—percent completion
- 1.5 Weather summary

- 1.6 Milestones reached
- 1.7 Significant areas of effort
- 1.8 Next 60 days effort (indicating dates)

Section 2. Engineering (if applicable)

- 2.1 Progress—current status of each activity in the engineering plan
- 2.2 Problem areas (if applicable)
- 2.3 Planned progress, next 60 days
- 2.4 Summary engineering man-hours (when cost reimbursable)

Section 3. Procurement (if applicable)

- 3.1 Progress—current status of each activity on the procurement plan
- 3.2 List specific material shortages and potential shortages
- 3.3 Summary of commitments
- 3.4 Changes in material delivery schedule that affect present 60-day schedule
- 3.5 Status of bulk materials

Section 4. Construction

- 4.1 Progress—current status of each activity on the construction schedule (by area or activity as appropriate)
- 4.2 Milestones (physical completion)
- 4.3 Master project schedule update
- 4.4 Problem areas
- 4.5 Manpower summary (availability, shortages, absenteeism, problems, and the like)
- 4.6 Safety (accidents, deficiencies, lost-time action programs)
- 4.7 Critical activities summary (schedules, spool fabrication)
- 4.8 Major construction equipment status

Section 5. Cost (if applicable)

- 5.1 Progress summary
- 5.2 Trends
- 5.3 Project cost report
- 5.4 Project forecast

Section 6. Site photographs (if required)

- 6.1 Plot plan (index to photos)
- 6.2 Photographs

6.11 Contractor Scheduling Requirements

One of the most difficult tasks facing the client's management team is to encourage the contractor to produce timely production of schedule information. Under the terms of the contract, the contractor is required, as a minimum, to prepare an overall project schedule showing the start and completion dates for all major categories of engineering and field activities, vendor field delivery dates where applicable, and activities associated with subcontractors.

Reporting requirements are usually related to the monthly progress report and will indicate:

- Separate progress curves showing the projected and actual progress for overall engineering, material commitments, and construction.
- Estimated monthly manpower requirements to meet the progress previously projected including the scheduled levels of designers, draftsmen, engineers, and personnel for each construction discipline and phase. The manning schedule for these should be shown where approved subcontractors are involved.

In addition, the contractor will be expected to maintain progress curves (planned versus actual performance) for each discipline. Progress will be measured by physical measurement of work completed.

Construction schedules, when submitted and approved, are binding on the client as well as on the contractor. Although all due care must be exercised by the client in reviewing and approving the contractor's schedule submission, timely action by the client is equally important. Unjust delay or failure to approve a contractor's schedule may be a breach of contract if the contract indicates a breach or at least may place the contractor in a claim situation. The client always has a duty not to interfere with the progress of the contractor's work and delay or failure to approve the schedule may entitle the contractor to claim extra compensation. Of course, if the schedule is found to be unsatisfactory the client may reject it within a reasonable period of time according to the terms and conditions of the contract, but failure to do so may be regarded as acceptance thus binding the client to an unsatisfactory schedule.

The approved construction schedule, although mentioned in it, may not be a part of the original executed contract because the contractor is usually given a period of, for example, 14 days to prepare it after the con-

tract has been signed. Nevertheless, it has the same legal importance as any other part of the contract proper. Once a contract has specified a scheduling requirement, all parties are legally bound to the resulting program. It is considered that a critical path network once submitted and approved rises to the level of a contract amendment. Some companies will incorporate the approved schedule and subsequent revisions into a properly executed contract amendment.

Once a contractor's schedule has been approved, several sequences flow from this action:

- The client has agreed that the schedule is reasonable.
- The client is also bound by the schedule and is expected to meet its obligations thereunder.
- The client must perform its contractual obligations, such as the supply of materials, equipment, drawings, and specifications, in accordance with the schedule.
- The schedule becomes the definition of "reasonable time" in which to perform the tasks required.

Toward the end of the work, usually not later than 60 days prior to the date on which the contractor anticipates that the facilities will be complete and ready for final acceptance, the contractor will submit a schedule for demobilization from the work site.

Throughout the project, all the updating, changes, and revisions to the schedule do not have the effect of amending or modifying in any way the scheduled completion date or critical milestone dates or of limiting the contractor's obligations under the contract. Changes of this major importance may only be accomplished by a contract amendment.

6.12 The Change Order

Construction contracts, with very few exceptions, include a clause that gives the client the right, at any time, to make variations in the character, quality, or quantity of the work that the client feels necessary.

Having signed the contract, *the contractor must carry out such work*. There are a few exceptions to this rule; one of them being a request from the client to perform work patently outside the general scope of the contract. In most client organizations, all such variations are made by means of a work order, a change order, or an amendment.

The proposal for a change may be initiated by the contractor or by the client. If it is the contractor, it may draw the client's attention to work that it has been required to carry out but that, in the contractor's opinion, is not covered by the contract scope of work and therefore deserves extra remuneration. The client will study this proposition and, if it agrees, will issue a work order if the compensation can be covered by applying rates in the contract. If there are no applicable unit rates, the client will initiate a negotiation for a change order. However, if the client is of the opinion that the work is not a deviation from the scope, it may reject the contractor's proposal and thereby place the contractor in a claim situation.

When the client proposes a change in the scope, it is most likely to be as a result of a design change, in which case the client will ask the contractor for a price for the extra work. At the same time, the client will make a fair price estimate of its own. If the two calculations are a match, say, within 5 or 10 percent of each other, the change order may be executed. As with contracts, the client will endeavor to process a change order on a lump sum basis, but if this is not possible and a unit rate, day work, or reimbursable deal is unavoidable, some indication of the final cost should be given. This may be in the form of a notation to the effect that "The value of this change order is not to exceed \$100,000" (known as a *not to exceed change order*).

A change order is issued to:

1. Revise the work or specifications affecting the work.
2. Perform repairs to deficient work (in cost reimbursable contracts only).
3. Correct or modify changed or unforeseen field conditions.
4. Revise the work schedule, either at no cost if it is a result of a *force majeure* situation or at a cost if it is a delay caused by the client.
5. Authorize or approve standby time for client-caused delays.

Eventually, all change orders should terminate within an amendment. There are many different procedures regarding this practice and it must be said that some client organizations allow the change order to stand alone and affect the contract price without the benefit of an amendment. In most cases, change orders are issued and authorized quite legitimately and in accordance with company procedures by client representatives who themselves were not signatories to the original contract. On a large proj-

ect these variations may be carried out in several areas. Although the project management receive regular reports showing the cumulative effect of changes to the contract price, it is possible that the total value of change orders issued in one month escape the immediate attention of the hierarchy. It is also possible that the total value of such changes, legitimately issued, may gallop out of control. Some companies insist that *all* change orders must be incorporated into an amendment with the proviso that small changes in work generated in the field may be accumulated in a reasonable number and then incorporated into an amendment. The accumulated value allowed in this procedure may amount to \$5,000. However, a more usual practice is to gather all change orders issued in a single month and process an amendment. Another method is to collect change orders until the cumulative value approaches 10 percent of the contract price and then make an amendment.

Somewhere in every change order are the words, *Contractor is hereby ordered to proceed with the work described hereunder*—or something to that effect. The inference is that the contractor has no choice but to carry out the dictates of a change order, even if there is an argument about how much money the contractor expects to be paid for the work. Furthermore, the contract usually states that if the contractor should start the extra work without a signed change order, it may not get paid at all. This condition has led to many an altercation in the field, particularly when oral instructions have been given to the contractor to start the work required urgently but no written instructions have been issued. *After the fact* change orders have been known to bounce back on presentation for signature. Of course, there are nonroutine situations in which it would be very expensive to delay operations until a change order is fully executed. Consider, for example, a pipe-laying barge costing the client in excess of \$300,000 a day that faces a substantial change of scope far beyond the signature authority of the client's representative onboard and requires approval by a vice president. This happens, naturally, during the weekend when the vice president is playing golf onshore and the lay barge is 150 miles offshore. If the barge is operating 24 hours a day, 7 days a week, there has to be an operations room onshore with a manned telephone and facsimile facilities. The client's representative faxes the operations room with the full details of the proposed change, someone goes out to the golf course, waits until the vice president hits one of his better shots, presents the fax, gets the go-ahead,

and informs the client's representative accordingly. The change order may then be executed the following day. Most companies still want that vice president's authority *before* the fact, even if it has to be scribbled on a scrap of paper.

One client, finding that delay over the negotiation of a change order price and subsequent delayed payment was seriously disrupting a large fabrication contract, decided to introduce a clause into the contract that obliged the contractor to make an immediate start on the work even before agreement on price. However, the company agreed to pay the price asked by the contractor provided the details were fully documented. In the event of serious dispute, the matter was to be referred to arbitration. If the company requested that the contractor should perform work that, in the contractor's opinion, was not in its scope of work according to the contract, the contractor would then ask for a change order and the client would issue one. If the company considered that the work was indeed part of the scope, this would be duly reported on the change order. Now here is the interesting part: if the client, within six months of a disputed change order, has not announced its intention of appealing to arbitration, then it is considered that the matter is no longer in dispute! This novel arrangement was short-lived.

A more conservative experiment was carried out in the Middle East a few years ago in which a fairly large lump sum contract was awarded with the proviso that no change proposal would be presented by the contractor for work below the value of \$3,000. In other words, the contractor included in its bid a sufficient amount to accommodate small packets of work extra to the scope of work and could only request a variation order when the work to be done cost more than \$3,000. This arrangement worked very well and there is no record of the contractor being out of pocket. There were, of course, safeguards to discourage the contractor from saving up the smaller jobs until it reached the magic figure.

The old established companies in the industry are generally absolute sticklers for obedience to the rule that change orders must be executed before work may commence, even if there is a deadlock over the price and a *not to exceed* order must be issued. Where clients and their procedures are comparative newcomers to the game, the rules seem to be relaxed to the extent that *after the fact* change orders are accepted for signature without much fuss. Such laxity is not recommended and the client who condones such practices must eventually squander a good part of the project budget

unnecessarily and encourage a *rubber stamp* attitude from the site team toward their signature authorities.

Contracts should include, wherever possible, the unit price and day rate schedules for pricing attachments associated with change orders. The simplest type of change order to issue is one that contains previously agreed upon prices from the contract for specific tasks. Failing this, the valuation of change orders will have to be made by prorating the sums, rates, or prices contained in the contract by estimating the man-hours and materials to be expended and the pricing in accordance with known rates or by negotiation with the contractor. Whatever the method used, it is desirable (from the client's point of view) that a firm lump sum for the work emerges as the end result.

Change orders may be used in most extra work situations provided they fall within the general scope of the contracted work. Most change orders contain the following information:

1. Who initiated the change order—contractor or client?
2. Type of payment agreed:
 - Lump sum
 - Day rate
 - Unit rate
 - Reimbursable
3. Back-up information and correspondence leading to the change.
4. Instructions to contractor regarding the change.
5. Reason for the change.
6. Cost, including cost codes, and so forth.
7. Start and completion dates for the work.
8. Details of escalation, if any.
9. Currency in which contractor is to be paid.
10. Whether the price stated is fixed, an estimate, or a *not to exceed* (NTE) value.
11. Effect on contractor's baseline schedule, if any.
12. Whether the change order represents an increase in the contract price or a decrease (negative change).

The change order should give some indication of how much the client is expected to pay, even if the amount stated in the change order is only an

estimate. No client should allow a change order to remain open in this respect. If the work is expected to be ongoing, it is preferable to estimate a likely sum, add a percentage for contingency, and apply a *not to exceed* figure on the change order. This will mean that the contractor cannot go past that amount or even approach it without alerting the client. There is no requirement for a *not to exceed* change order to be reissued should the value of the work performed be less than the NTE value. It will be necessary to issue another change order if the work looks as though it will be greater than the NTE amount before completion.

6.13 The Negative Change Order

From time to time, an item in the scope of work may be deleted by mutual agreement between the client and the contractor. Sometimes this is because of a design change or perhaps simply because the task is no longer necessary. To avoid payment being made for work not carried out, especially in a lump sum contract, the client may issue a negative change order. The amount to be deducted will be negotiated in the same manner as a regular change order or interpolated from existing rates in the contract. In this situation, however, the contractor will be debited with the amount against the contract price. The negative change order is issued on a regular change order form but is stamped: *NEGATIVE CHANGE ORDER*.

6.14 The Change Order Closeout Form

This is a simple one-page form signed off by the contractor and the client confirming that the work described in each change order has been completed and the full amount due has been paid. At first introduction, this seems to be just another unnecessary form flowing out from the head office, but in fact it is one of the better ideas in contract form production. It is particularly valuable in the closeout of *not to exceed* change orders where the final amount paid to the contractor is less than the NTE estimate on the change order. The closeout change order form signals the difference and assists in the reconciliation of the final contract price.

6.15 The Work Order

Within certain organizations, the work order is another name for the change order and is used in exactly the same way and in the same situations. However, the preferred use of the work order relates to circumstances in which the extra work to be performed by the contractor is within the gen-

eral scope of the contract and the cost of such work is clearly described in contract unit rates or in any other predetermined price structure. This eliminates the necessity for negotiation. In this application the work order does not replace the change order but facilitates the expeditious performance of extra work by application of prices already negotiated.

6.16 The Amendment

Because the use of contract variation documents is developed in different ways from one company to the next, there is no hard-and-fast rule to be quoted for amendments, change orders, and work orders. Some organizations use amendments for all contract changes, use work orders only for extra work against unit rates already established in the contract, and do not process change orders. Others use change orders for practically every contract change and will only issue an amendment if an alteration is required to the Articles of Agreement. However, a study of major oil company procedures and those of managing contractors shows that change orders are usually employed to change the terms of the scope of work and for extra work for which there are no prices in the contract. Work orders are used when extra work is to be carried out but pricing may be obtained from the contract. Work orders may also be used for service jobs of comparatively low monetary value (e.g., an electrician's time for hooking up a power line to the client's site offices). Both work orders and change orders when properly executed are perfectly legal as far as the contract is concerned. The amendment, however, is a more formal document requiring different language and signed preferably by the original signatories of the contract or, at the very least, by company officers of equal rank to the first signatories. For these reasons, the use of the amendment tends toward significant changes requiring more formal treatment. These may be:

- To change the terms of the Articles of Agreement.
- To alter terms in parts of the contract other than the scope of work.
- To suspend or terminate the work.
- To alter the original contract price or unit rates.
- To settle claims.
- To add or delete substantial sums related to the scope of work but that need more formal language not found in change orders.
- To enable payments to be made to a party not specifically named in the contract (e.g., in a joint venture when one of the partners wishes

payment to be made over to the other party rather than to the joint venture).

- Where there is a change of company title (of the client or of the contractor).
- To change the baseline master schedule, milestone dates, or completion date.
- When the total cumulative value of change orders has reached an amount equal to 10 to 15 percent of the original contract price as amended (in some organizations this is a safety measure to curb the excessive issue of change orders within the approval of the hierarchy).
- Any other major modifications not within the general scope of the contracted work.

The main structure of the amendment is in three sections and explains:

1. Amendments—how and where the contract must be modified.
2. Pricing summary—what effect the modification has on the contract price.
3. Status of contract—the execution.

An amendment may contain more than one change to the contract including unrelated changes. Some systems involve the collection of a month's issue of work orders that are then incorporated into an amendment. This practice is not recommended. Work orders and change orders should be collected in chronological order until the total value reaches the predetermined percentage of the contract price as previously noted.

The beginning and end of an amendment are couched in legal jargon but the person preparing the technical and commercial parts should use simple language so that both sides may understand exactly what is being done.

6.17 The Short Form Contract

The short form contract (SFC) is a useful device for contracting work of a simple and nonrecurring nature with a limited value. The monetary limit of the SFC will vary from client to client but will not usually exceed \$50,000. The following rules govern the issue of an SFC:

1. Lump sum prices or unit rates only will be used.
2. No progress payments will be allowed. Payment of the total amount of the SFC will be made at the end of the work.

3. Work completion should be within six months of the date of commencement. Should unscheduled events occur to extend the work beyond the six-month period, the SFC will be terminated and the contractor paid off. If necessary, a new SFC will be negotiated to complete the work.
4. No variation orders or amendments will be made to an SFC. Should changes occur in the scope of work that were not anticipated at the time of issue of the SFC, the existing SFC shall be cancelled and a new contract issued incorporating the necessary changes.
5. Bid procedure shall be similar to regular contract bid procedure excepting that selective bidding may be employed with a minimum of four bidders participating.
6. A client estimate shall be prepared for the SFC work and shall be kept in a sealed envelope until bid opening.
7. The SFC Articles of Agreement are not as comprehensive as the standard format.

Note: Examples of amendment, change order, work order, and SFC forms may be found in the Appendices in Chapter 10.

6.18 Completion and Acceptance

In considering the division of responsibilities between the client and contractor for activities that occur during the completion period, it is necessary to regard the approach to completion as having three separate phases:

1. Substantial completion.
2. Mechanical completion.
3. Commissioning and “ready for start-up.”

Unfortunately, some construction contracts used in the oil, gas, and petrochemical industry are less than crystal clear in the definitions of these stages and some contract documents fail to mention them entirely. The following words could be part of a construction contract between the client and the contractor for the mechanical portion of the work:

When in Company Representative’s opinion, the Work has been completed and has satisfactorily passed all tests that may be prescribed by this Contract and Contractor has provided all data necessary for the operation of the Permanent Work, Contractor shall be

entitled by written notice to Company's Representative to request a Completion Certificate. Company's Representative shall thereupon within a reasonable time of receipt of such notice from Contractor either:

- (a) Issue such Completion Certificate stating that the Work is complete and has been satisfactorily performed, or
- (b) Notify Contractor in writing of any work that remains to be performed before the Work shall have been completed in accordance with the provisions hereof.

On receipt of such notice as mentioned in (b), the contractor shall forthwith proceed to perform all outstanding work prior to making a further request for the completion certificate.

However, the contractor may not have had a hand in the design of the facility and may not be responsible for commissioning and start-up, although it may leave a few of its key personnel to assist in this effort. The client's operation division that will eventually control the plant will want to reduce the number of contractor personnel to a level that will not interfere with safe operation. Therefore, one may accept the premise that, aside from a complete turnkey arrangement, the contractor will be removed from responsibility involving commissioning and start-up and will be aiming at mechanical completion or possibly substantial completion.

The contract continues as follows:

Contractor warrants through the Guarantee Period that the Permanent Works will be new and suitable for the purpose and use for which they are intended and not defective. The Guarantee Period shall commence at the issuance of the Completion Certificate and expire 36 months thereafter or 12 months after the Permanent Works have come into commercial operation, whichever period shall first expire.

The contractor can only guarantee work that it has performed. Unless they are its subcontractors, it cannot vouch for the work of the electrical, instrumentation, refractory, insulation, and civil contractors who will be required to sign similar and individual guarantees. It follows, therefore, that when the start-up button is pushed and the plant does not work or disappears in a cloud of smoke, the mechanical contractor is not necessarily to blame and before that stage and when certain conditions are satis-

fied, it is entitled to an honorable completion certificate. It is also possible that our contractor has progressed as far as it can toward mechanical completion, but through circumstances beyond its control, such as nondelivery of free-issue material or delay caused by another contractor, it cannot complete the scope of work. The contract extract given in the preceding text does not mention mechanical completion or the steps to be taken when the contractor is prevented from achieving completion through no fault of its own.

6.19 Mechanical Completion

The work shall be considered to have reached mechanical completion when the permanent works described in the contract scope of work or a portion or portions thereof, have been mechanically and structurally put in a tight and clean condition and otherwise constructed as provided in the contract. All deficiencies, including those that could prevent or delay safe and orderly pre-start-up or start-up procedures by the company or timely achievement of permanent works operation at the conditions specified in the contract, to the extent that such deficiencies may be determined, must have been corrected.

As the contractor moves toward mechanical completion or an acceptable degree of substantial completion, the client's representative will present the contractor with a checklist or punch list of items requiring attention before a completion certificate may be issued. These items should be of a fairly minor nature because, in theory at any rate, the contractor has declared that the work is complete. The failure of the contractor to affect a thorough cleanup of work debris around the plant is a common item on the punch list.

6.20 Substantial Completion

The construction of the permanent work may have reached a stage where only a few punch list items remain but the client considers that this work should not delay the issuance of a completion certificate for the purpose of bonus or progress payments to the contractor. It is also possible that such a stage has been reached in the work, but for a number of reasons outside the contractor's control it is unable to proceed further. In these events, the client may, by agreement with the contractor, issue a notice of acceptance based on substantial completion. The definition of substantial completion, in this case, is: *Substantial completion shall be considered to have been achieved*

notwithstanding that some amount of work, such as hydrotesting, minor repairs to coating, and/or insulation, finish painting, removal of temporary facilities, or general cleanup, remains to be done by the contractor, or some deficiency not affecting operation requires correction.

During work on a petrochemical plant in the Netherlands, the piping contractor had completed installation of pipe and was about to commence hydrotest when the instrumentation contractor removed all the valves for calibration. The piping contractor insisted on recognition of substantial completion because it was unable to proceed. This was readily granted in this interface situation and the piping contractor was able to claim the appropriate benefit.

6.21 Standardization

Favorite words throughout these pages seem to be *usually* and *varied* and such when applied to clients' methods and procedures, because no two oil company contracts are alike. In civil construction of buildings, bridges, harbors, docks, and dams, there is an element of standardization of contracts through such bodies as the International Federation of Consulting Engineers, the American Institute of Architects, the Associated General Contractors of America, the American Society of Civil Engineers, and European associations such as the Federation Internationale des Ingenieurs—Consuls (FIDIC), the Institution of Civil Engineers (ICE), and, for the process industry, the Institution of Chemical Engineers (ICChemE). Where these bodies publish general terms and conditions of contracts, they have been approved and adopted by clients and contractors in the industry. In the oil, gas, and petrochemical business, as a general rule, contract document formats are produced without the benefit of outside consultation.

The ICE Conditions of Contract were prepared by the ICE, the Association of Consulting Engineers, and the Federation of Civil Engineering Contractors. The FIDIC Conditions of Contract for Works of Civil Engineering Construction were prepared with the cooperation of the European International Contractors (EIC), the Confederation of International Contractors Associations (CICA), and the Associated General Contractors of America (AGC). The FIDIC is very similar to the conditions of the ICE and its headings are almost the same. The ICChemE Red Book contains a "Model Form of Conditions of Contract for Process Plant—Lump Sum Contracts." Originally published in 1968, the Red Book was followed by a model form suitable for reimbursable contracts, the Green Book,

published in 1976. These model forms attempted to deal with the complex way in which client and contractor divide the responsibility for creating a new process plant.

A significant difference between contracts governed by the previously mentioned conditions and those of oil, gas, and petrochemical companies is that the former agreements introduce a third party with defined responsibilities, namely the engineer (FIDIC and ICE) or the project manager (IChemE). At this point it should be mentioned that certain titles differ somewhat and although, for the sake of simplicity, we have been referring to the client and the contractor, the FIDIC and ICE conditions refer to the client as the *Employer* and IChemE refers to the client as the *Purchaser*. The engineer or project manager is usually a representative of a third company of consulting engineers who hold a contract directly with the employer or purchaser (“client” in this book). The general duties of this third party are, *inter alia*:

- (a) To monitor the preparation of the design of the works and the supply, installation, construction, testing, commissioning, completion, and maintenance of the works, and as an independent consultant, to verify that the works are being carried out by the contractor within the budgetary limits and in accordance with the programs to be submitted and approved in and to the standards safety, quality, and performance required by the contract.
- (b) To monitor the admissibility of the contractor’s cost in accordance with the contract for reimbursable cost work and procurement items and/or to monitor the contractor’s valuations in accordance with the contract for lump sum works.

The engineer acts as the agent of the client but also has a duty of fairness to the contractor. For example, the engineer has the authority to order and approve variations in most agreements with the client. He must act in favor of the contractor if he feels that this is in accordance with fair treatment and the terms and conditions of the contract even if, by doing so, the client is disadvantaged. However, the engineer may not, without the prior approval of the client, authorize any modification of the works involving a substantial extra cost. In some situations the engineer may struggle to maintain an independent role. The engineer is, after all, paid by the client and not by the contractor, but generally, if the engineer follows the tenets held by the organization to which he belongs, his integrity will be secure.

In recent years, there has been a move toward standardization of contracts for the offshore oil and gas industry. A number of producers, contractors, and consultants responded including Amerada Hess, Shell UK, BP Exploration, Santa Fe, Kvaerner et al., and model contracts for use in the industry were introduced. The purpose of model general conditions of contract was to provide a commonly known and understood foundation around which the client and the contractor could build their particular requirements. The model aimed to eliminate much of the effort historically spent reviewing the many sets of general conditions offered by the industry. This praiseworthy attempt to standardize deserved wider appreciation.

We may well ask if the oil companies and the petrochemical industry worldwide would benefit from standardization in their contract documents. One contract system based upon the best of all systems would surely save time, money, and paper in the long run. We have seen that most clients, about to embark on a super project, tend to engage outside help for one particular undertaking. There would seem to be an advantage in having these temporary employees arrive already trained in a standard system instead of having to move through a learning curve in grappling with yet another client's methods. Contractors would know what they may or may not do. Claims should be fewer because there will be fewer ambiguities from one client to another. Most major companies have systems that over the years have cost thousands of dollars to produce. Some of the smaller companies and most of the foreign national companies have no particular system and rely on the managing contractors to supply one. This means that for every different managing contractor there will be another different system.

For the managing contractors, every time they bid on a client's project, they are expected to supply personnel already versed in the client's procedures, particularly contract personnel. This is fine if that staff just happens to have worked for that client in the past. When the project is over, the same people are obliged to tackle a different set of procedures for the next client.

To use a universal system would mean that majors may have to make expensive adjustments, but these would be offset by advantages. Companies could pool their experiences with the problems of past contracts and when a super project is planned, this information could be shared to the benefit of all. At present, when faced with a contractual problem, clients and contractors can point to only past court cases, but, as we know, these cases form only a small part of disputes arising from contract claims. Every now and then a company will declare that it does not have claims, aside from a

few small squabbles that are quickly resolved. Or that it has installed a new set of procedures that will eliminate practically all disputes arising in the field or elsewhere. One only has to look at the abundance of construction claims firms springing up like mushrooms in and around our cities and wonder how they make their money. (But they do.)

If central guidelines were laid down for everyone in the industry, at least some rules could be followed. If these rules were known in advance, bidders on a contract would know what to expect. The days of contractors bidding low and making up on claims would be limited. The attraction for the larger, older, and more developed companies is that many of their own procedures would be used anyway. For the smaller companies and inexperienced nationals, the possibility of expensive claims would be partly eliminated. Of course, there may be objections from the contract managers of the major companies based on the conviction that their procedures and systems are the best procurable. But because they probably have not really studied anyone else's procedures and systems, how can they be sure? It follows, therefore, that an internationally agreed upon system, drawing the best from all methods, must be the best of all!

The first step is the creation of a panel of experts to draw up a universally acceptable set of model contract administration procedures as a foundation for each future project. The oil, gas, and petrochemical companies worldwide will be asked to assist in this worthwhile endeavor and to accept and abide by the precepts of the constituted panel. It would be of considerable assistance if the major producers would make their own contracting manuals and procedures available to the panel. The object is not to reinvent the wheel but to make it turn more smoothly and to emerge with some form of standardization taken from the mass of existing documentation.

The initial task of the experts would be to develop a framework of headings that may be presented as follows.

6.22 Contract Management Policy

1. High standards of ethics and fairness are to be maintained in client/contractor relationships.
2. All contracts are to be in writing.
3. Every effort shall be made to realize execution of the contract documents prior to start of work, but if this is not possible then adequate documentary cover must be in place before commencement.

4. Only technically and financially qualified contractors shall be invited to bid for major project work and competitive bidding shall be employed. Negotiated contracts shall only be considered in exceptional circumstances and where there is no alternative method available.
5. Lump sum contracting is to be the preferred practice.
6. Contractor performance claims will be examined promptly and resolved in a fair and reasonable manner. Every endeavor will be made to produce contracts that are succinct and precise in intent to minimize ambiguities and to lessen the likelihood of disputes. Claims that cannot be resolved within the confines of project management may, as a last resort, be referred to arbitration. Details of arbitration procedure will be described in the contract Articles of Agreement. Should access to suitable arbitration be impractical or uneconomical, the articles may provide an alternative in the appointment of an expert acceptable to both parties, whose judgment in the matter would be final and binding.

6.23 The Contract

A standard oil company contract will consist of several parts sometimes called exhibits, schedules, or even parts, as follows:

Part I *Articles of Agreement*—the permanent and general part of the contract, otherwise known as the *General Conditions* or *The General Terms and Conditions*

Part II *Scope of Work*

Part III *Master Schedule*—the timetable for the work with milestone dates and critical path

Part IV *Compensation*—details of contractor's remuneration and in some cases, unit rates, and bill of quantity

Part V *Material*—details of client furnished materials and materiel, if applicable

Part VI *Specifications*

Part VII *Drawings*—list of numbers

Part VIII *Adjustment*—the section that alters or deletes those Articles in Part I that, by mutual agreement between the client and the contractor, are considered irrelevant or unnecessary

There are many variations and permutations in the selection of contract format suitable for the work (see Chapter 1) but broadly contracts may be classified as follows:

- Lump sum
- Lump sum with unit prices
- Unit rate
- Cost reimbursable
- Day rate

These formats are listed in the order of desirability (to the client) and there is no doubt that the lump sum contract is preferred. This is provided that the scope of work is well defined, materials arrive on time, few design changes are anticipated, and engineering is well advanced before the issue of the request for quotation. The lump sum contract, which given these conditions also offers the best cost saving potential, is likely to be more competitive, and provides incentives to meet schedules, because additional time carries costs intended for the contractor's account. The lump sum method would be an obvious choice for the next project in a situation where three or four projects have been completed in the same area and each one is a replica of the others. Most problems will have been overcome and design changes will be at a minimum. Unfortunately, such conditions are rarely encountered. Bidders are not always confident that they can accurately estimate the cost of the work without including excessive contingencies or assuming inordinate risks.

To a certain degree, this may be overcome by adopting a lump sum arrangement for the portions of work that the client may be reasonably sure of and using unit rates for the uncertain areas. In a large contract, this method may not be recommended because the unit rate portions tend to become open ended. Contractors are obliged to accept lump sum or even turnkey conditions when times are difficult, business is slack, and competition is fierce. In boom times, contractors can afford to be more selective. In the prosperous days of 1979 and 1980, certain large contractors in the United States would accept contracts of less than a million dollars only from old and valued clients. Ten years later, they would pave your driveway, if given a chance!

As we have seen, reimbursable cost contracts can carry a fixed fee for the contractor or a fee based on a percentage of the ultimate cost. Clients consider

cost plus jobs only when they think that there is no alternative. This may be a situation in which little or no engineering is completed and the scope of work is so vague as to prevent bidders from giving a meaningful offer. Nevertheless, contract managers have a duty to advise the adoption of the reimbursable cost route if circumstances prescribe, provided there are adequate contract compliance and audit surveillance measures in place.

6.24 Contract Documents

When new drawings and specifications are introduced, for example, in connection with extra work through a change order, these should be included in the wording of the order, for example,

Contractor shall procure materials, fabricate, and erect one building in accordance with Drawing A-BC-123 and Specification D-E-456 that, by this reference, are hereby made part of this Contract.

It is important that engineering specifications and drawings should contain only essential technical instruction to the contractor. Particularly in the matter of specifications, no attempt should be made to turn the document into a sort of “mini contract” by adding words that more properly belong in the scope of work.

6.25 Conclusion on Model Contracts and Procedure Standardization

It is again emphasized that the model contract documents and the client's procedures found in the Appendices in Chapter 10 and Chapter 5 of this book are only examples upon which the proposed standardization panel could build a universally acceptable work of reference for use in the energy industries. They are, by necessity, brief and incomplete. It was not the intention of this work to offer a comprehensive treatise on conditions of contract and procedures but merely to propose an idea. The only way to realize an efficacious standard is to borrow all model contracts and procedures from the major operators and have the panel sift through them, eventually emerging with one set of references forged into uniformity. The fruits of this endeavor could be offered to colleges and universities for the education of future project engineers, contract administrators, and contractor personnel of all disciplines and, at the same time, made available to all presently engaged in the industry. The panel of experts selected for this task would presumably be drawn from the ranks of the petroleum,

petrochemical, and process industries and from the leading engineering contractors and consultants. The composition of the panel may alter with each part of the model contract. For example, it would be necessary to have legal assistance with the articles, but not with the technical content. An experienced manager of contracts would need to be a permanent member of the panel.

6.26 Conflict of Interest

In the construction industry, conflict of interest means transference of money, personal services, credit, or any other item of value, whether made in expectation of favors or not, from a contractor to a client's employee or managing contractor's employee. Most companies allow gifts such as advertising giveaways in the form of pens, pencils, calendars, and the like or the reasonable cost of business entertainment. Throughout the bid evaluation period and the subsequent administration of contracts in the field, the contract engineer is subjected to more temptation in this direction than most of the other company employees. Very often, relaxed security within the client organization will encourage conflict of interest situations to arise. Sometimes even senior officials will pass information to a contractor believing that they are doing nothing that could be described as dishonest. The same officials will see no reason to hand back that case of scotch or that gold watch at Christmastime. However, a contractor does not normally hand out expensive gifts with no thought of getting something in return. During the course of a very large project in the Middle East, the client lost a considerable amount of money through malpractice by contract and procurement staff. Conflict of interest of this nature is also cause for concern in other parts of the world. Most fraudulent actions are eventually detected but in a super project involving multimillion dollar contracts and unscrupulous contractor and client staff, it is difficult to close the net completely.

It is almost impossible for anyone on the client's staff to cheat and get paid for it without connivance from the contractor. It takes two to finagle. The relationship between higher management of a reputable international contractor and the lowest rank of field contract engineer is so remote that fraudulent manipulation of the contract is unlikely but among smaller or indigenous contractors, the danger is ever present. For a contract engineer to swindle the client it is necessary to have the cooperation of the contractor and in some areas this is not difficult to obtain. Indeed, the initial

approach often comes from the contractor. A contract engineer who is not on the client's permanent staff is usually engaged for the duration of the project. In a super project with a life of perhaps five years or more, personnel may be taken on for a determined period. In overseas service this could be one year on single status or two years married status. A contract engineer may see the opportunity to make a considerable sum over his salary in a short time. It is possible that there will be no prosecution if he is caught, just the next aircraft home.

On a large gas-gathering project worth over six billion dollars, the plant in construction was spread over a very large area, sometimes with buildings many miles apart. An international contractor managed the project on behalf of the client. Its contract staff consisted of 40 or 50 contract engineers and administrators. All contracts were written up on client paper and typed up in the client's administration building known affectionately as the "Kremlin." There were hundreds of contracts in various stages both closed out and in progress, but there was an acute bottleneck in the distribution of newly awarded agreements. It was strictly forbidden to start work without a fully executed contract or a letter of intent, so there were delays. The client's staff tried desperately to clear the logjam in the typing pool, but it seemed to be a losing battle. Up to this time, the managing contractor, who also had a typing pool, had not been asked to help out, but as the situation became more acute, the contractor offered to type some of the contracts at its office. At first, the client was reluctant to take advantage of this offer for security reasons but the contractor pointed out that because it was administering most of the contracts on the project and the current typing difficulties were causing a delay to its own schedule, this offer of help seemed a reasonable solution to the problem. One of the managing contractor's contract administrators saw an opportunity to make a bundle of money from this move and worked out what looked like a watertight plan, which might have been successful, had it not been for a visiting student who knew nothing about contracts in general.

We will call the contract administrator with an eye to making a fast buck Joe Bloggs, and this was his plan:

1. No fraud could succeed without the cooperation of a subcontractor already working on the project. This was not difficult to arrange.
2. To extract money from the client's finance department, the relevant contract had to show the item and its price. The finance department was issued with copies of all contracts. When a request for payment

was made by a subcontractor, the code number of the work had to be quoted and the request form countersigned by a representative of the managing contractor as confirmation of the whole or that part of the work. Provided the item was clearly shown as part of the scope of work and the price or unit rate defined, the finance department would issue a check.

3. Contracts, once awarded and executed were distributed as the original, which went directly to the client's archives; the duplicate original, which was given to the contractor or subcontractor; and a limited number of priced copies, one of which went to the finance department. All copies were placed within a plastic cover and comb-bound, a process that allowed removal and separation of separate sheets of the document. This separation facility was not intended and was not exactly easy, but it could be done without detection from the exterior of the document. The plan was to remove some sheets from the finance department's copy, increase the scope of the work, and add certain unit prices to the compensation section. The client's authorization signature was virtually "rubber stamped" since everyone was busy and Joe Bloggs was trusted.

In fact, Joe was very highly regarded by his manager of contracts as being neat and tidy in his work with all his files and documentation in perfect order and paperwork processed in good time in spite of the adverse circumstances prevailing. Joe had been put in charge of the contract administration of 10 gas/oil separation plants (GOSPs) in Area 1 and had been there since the beginning of their construction. He had taken over the old site office at GOSP No. 1 because most of the construction work was virtually completed at all the GOSPs and the main subcontractor had moved out leaving one local contractor to finish off with painting, fencing, and other completion and remedial tasks. There was a special relationship between this local firm and Mr. Bloggs.

Joe was due for a month's vacation and after that, upon his return, he was scheduled to move to another area. He did not appear to be keen to leave his post and suggested to his manager that he should stay until the final completion of the GOSPs, but he was needed elsewhere and was told to take his vacation without delay.

About this time, homecoming students of the client's families stationed in the "Kremlin" area were encouraged to take on temporary work within

the project during their holidays to keep them out of mischief more than anything else. The manager of contracts was requested by the client to find work for two or three of these young men. One was sent to Joe's office with instructions to keep it tidy, answer the telephone, and, should there be a call for a change order or any other action, contact the manager for instructions. The manager made a routine visit shortly afterward and the young man reported that all was quiet, but there was something he saw that he did not understand. To keep from getting bored, he had looked through some of the contracts and drawings kept in the office. In the contract of the remaining subcontractor left on the site, he noticed that there was an item in the scope of work and in the pricing section for blacktop throughout the plant. When he checked the drawings and the previously closed-out contracts, he discovered that all the asphalt paving was done some months previously by others. A check on the remaining nine GOSPs revealed that the sting had been made on all of them. A search of the archives showed the original contract as it should have been and without blacktop in the scope of work or in the compensation section. Joe was told not to return from his vacation and all future contracts were bound in such a way that they could not be tampered with and the client's auditors were instructed to examine new contracts and check them against the contractor's bid.

Today, many contracts and other sensitive documents may be found in accessible lever arch files or even with the sheets just stapled together. To combat the practice of sheet substitution the contract must be bound in such a manner that the paper cannot be removed without detection. The chief officers of both the client and contractor should initial each sheet of a freshly executed agreement as an extra safeguard.

This would possibly have thwarted Joe Bloggs who altered contracts *after* execution, but companies must also guard against attempts to make alterations before signature. One method is to have the auditors check the new contract against the contractor's bid documents immediately after award and also by checking the drawings and specifications against the scope of work to satisfy themselves that there have been no recent and unauthorized additions to the scope of work.

Another and more common deceit occurs in the processing of change orders and claims. The hard money or lump sum contract of any size that does not include a schedule of unit rates for future variations to the work extends an invitation to the contractor to make an extra profit on change orders and claims. Where rates have to be negotiated, there is always a

chance that more will be paid out than is justified. Although the contract engineer does not finally approve negotiations, he is undoubtedly in a position to influence the end result. If he is of the Joe Bloggs' sort, he will know that there are varying levels of signature authority for the settlement of change orders and claims. To facilitate the passage of these forms, some clients will allow claims and variation settlements below the sum of, say, \$10,000 to be authorized by a project manager rather than appear before a committee or some such body. It is possible to ease the path of a \$9,500 claim through an unsuspecting, but busy project manager with Joe Bloggs on hand to support the contractor.

There are signs that may indicate the possibility of impropriety and included among these are:

1. Staff who do not want to go on vacation when scheduled and when there is no good reason for delay.
2. Staff who stay late on site or come in on weekends when they should be off duty.
3. Inappropriate fraternization with contractors, especially outside work area and work hours.

6.27 The Diplomatic Brush-off

A senior contract manager involved in a large construction venture was approached daily by contractors offering a thousand dollars here or a couple of thousand there to fix or use his influence in the matter of a spurious claim or change proposal. He would sit the contractor down in his office, close the door, and say, "Look, I am not averse to taking a bribe." The contractor's eyes would light up. "It is really a question of how much. You see, I would stand to lose a lot if this was discovered. To start with, there is my salary of about \$100,000 a year plus bonuses. I reckon that I have about another 10 years with the company so I would stand to lose at least \$1,000,000 if I get fired. Then there is my pension and trust fund. Let's say about \$500,000. So, I am quite prepared to do business with you provided we start talking in the region of, say, \$2,000,000 as a minimum. So what sort of deal did you have in mind?" Rapid exit of a contractor who was thinking in terms of \$1,000!

Claims

7.1 Construction Claims

There are many excellent works in existence dealing with the law and construction that, with every justification, are in constant use by contractors, energy companies, and students of contract management. The authors have a mainly legal background and include case histories and legal decisions made in the law courts in connection with contractors and clients in their books. It is generally accepted, however, that for every claim that reaches arbitration or litigation, there are numerous disputes that are settled between the parties involved without a lawyer in sight. No public announcement or record is made of these situations and it could be said that such events are of no concern to anyone outside of the contractor/client conclave. Nevertheless, it would be a pity if the circumstances leading up to a contractor claim were not examined as a matter of interest and possibly for the future guidance of proponents from both sides.

In the following pages, an attempt is made to bring out into the light, dust off, and inspect some past claims made on oil, gas, and petroleum projects in various countries and against various clients. In a claim situation, it is an advantage for the contractor to understand client reaction toward claims. To do this it is necessary to probe right back to the bidding

stage and the emergence of the bid package to find out the most likely causes of claims in the first instance.

For the purpose of this exercise, a contractor claim may be defined as a demand for payment or time believed to be due that is, at least in the initial stages, denied by the client. If it is not disputed, then it is not a claim, and it becomes the subject of a variation order. If only partly disputed, then that part not in dispute will be allowed and the balance will remain in a claim situation.

When a claim of comparatively modest proportion is firmly rejected by the client, some contractors will capitulate not wishing to take the matter any further (certainly not to the law) perhaps fearing loss of position on future bidders' lists or considering that continuing the struggle is just not worth the effort.

It is worth noting that the larger international contractors will pursue a claim with far more determination than the smaller and perhaps indigent contractors. It is also interesting to observe that the latter will usually do better on realization of claims when in joint venture with the former. Is this by virtue of superior preparation or presentation or some anticipation in the early stages of the contract? It is probably a combination of all three together with the staff to handle it. Is it possible that some contractors examine the bid package, not only to offer the lowest bid but also to expose the weak links in the undeveloped contract's armor against claim invasion? The indication is that not only is it possible but all too prevalent particularly in times of recession.

7.2 A Claim by Any Other Name

Foremost among the claim champions are those contractors who, while they do not hesitate in the normal conduct of their business to call a spade a spade, are remarkably coy about calling a claim a claim. To them, all requests for more money are change proposals and only at the moment of final rejection should a change proposal be called a claim. There is, of course, an element of psychology in this approach and the aim is to get the client thinking along the lines of a case for contract variation, rather than claim rejection, at the onset. As a result, even the most outrageous claim is presented in wide-eyed innocence on a change proposal form as if the change order will follow almost automatically.

An international civil contractor engaged in the construction of facilities worth \$25 million closed out the job without once ever submitting a

claim. He forwarded 216 change proposals though, only 58 of which were immediately accepted as bone fide design changes, extra work, and the like. The remainder, all claims really, were argued over and debated. In the end, he won a large proportion mainly by pretending that they were not claims to start with and by persisting until he had at least some concession from the client, worn down by tenacity rather than the merits of the submittals.

In some obscure way, the client is also nervous whenever the word is mentioned. It is noticeable that, although project procedures on change orders may run into several pages, the client procedure on claims, if there is one, is usually a modest affair, almost as if the client does not want to dwell on the subject too long.

It should be mentioned at this stage that we are discussing contract-related claims, the responsibility of the client's contracts department. Claims for loss or damage to property, personal injury, or death would be dealt with by the insurance department.

7.3 The Breeding Ground—Source of Claims before Contract Award

7.3.1 Faulty Project Planning

Construction claims occurring midway through a project may stem from errors or omissions made in the early stages of the venture, before contract award, and even during project planning. The consequences of incomplete or incorrect design may not surface as disputes until long after award, as illustrated in one of the claim scenarios presented later in this work.

7.3.2 Errors and Omissions in the Bid Package

In spite of the numerous check sheets available, inadequately defined scopes of work still appear in bid packages and contracts giving rise to claim situations during construction. Owners may spend months pondering and debating during the planning stage. But once minds have been made up and instructions given to develop bids, there never seems to be sufficient time allowed for the contract engineer to comfortably produce comprehensive invitations to bid, arrange a suitably attended job explanation meeting, and insist upon a site visit by all potential bidders.

A bid package assembled for a major construction contract that is completely error- and omission-free and that describes succinctly the obligations and intentions of both parties is a rarity. Nevertheless, it pays to strive toward this goal by thoroughly checking the package over and over

until the proponent is reasonably satisfied that the finished article is ready for issue. The contract engineer, checking his ITB prior to release, is often found attempting to proofread his own work without assistance owing to time limitation. We all know that after hours of document examination, the words tend to swim around and although small grammatical or typographical errors are caught in the net, large and potential anomalies may go undetected. It is a worthwhile practice to enlist the help of a colleague in a final check of the package even if that person has no direct link to that particular part of the overall project. It is often the case that such a person may spot a hazard overlooked by the author of the package and mention, "Do you really mean to say this? Because if you do you may run into this problem." Some of the claims scenarios in these pages illustrate costly errors that could have been avoided during the bid package stage.

7.3.3 Poor Material and Materiel Planning

Where free-issue materials are involved it seems elementary to suggest that orders on vendors should be prepared in good time to meet the proposed schedule delivery deadlines, but many a claim has been made on the grounds that client free-issue material did not arrive on the promised date. Once the orders have been placed, frequent checks should be made on lead times and availability.

7.3.4 Contract Format

Fixed-price lump sum is usually the preferred format, but rigid insistence on this method is ill advised if the bid package is not accompanied by sufficient engineering. To proceed with an ITB on a lump sum basis without an adequate specification is inviting claim possibilities.

As explained previously, the lump sum or hard money contract may be applied when detailed design engineering, drawings, specifications, and a defined project scope of work are complete or nearly so.

There are numerous workable alternatives to the lump sum format that may be applied to the situation without much problem provided they are carefully administered. These alternatives have been described in previous chapters.

7.3.5 Short Cuts

Occasionally, a contract engineer will depart from an established format in the scope of work during preparation of the bid package and introduce a

formula that, with the best of intentions, is expected to cut down cost or paperwork or both. The introduction of previously untested short cuts needs close examination for potential trouble.

7.3.6 Acceptance of Ultra-Low Bidder

During the bid evaluation process, the owner will compare the bidders' offers with its own fair price estimate. Occasionally, the lowest bidder's price will be so far below this estimate that the contract could only be awarded in the certain knowledge that the contractor would lose money in the process. When the contractor discovers that this is indeed the situation, there may be damage-limitation attempts by the submission of claims during the progress of the work. In addition, the contractor may be tempted to remove key personnel in the event of another, more attractive, job appearing during the contract and replace them with inferior supervision. Low bidders will often explain that they made a low offer simply to keep men and equipment employed during a period of recession, but this is no justification for the client to accept the bid for the reasons given in the preceding text.

7.3.7 Failure to Highlight Scope Requirements Necessary for the Satisfactory Performance of the Work

The specifications or other scope of work requirements may call for unusual or difficult work applications and although these requirements may be plainly shown in the bid package, and subsequently in the contract documents, it is essential that the owner's representatives should indicate to the bidders where these occur. This should be done at the job explanation meeting and in the bid clarification sessions.

7.3.8 Perfunctory Examination of Contract Documents by Successful Bidder in Haste to Affect Execution of Contract

General Terms and Conditions or Articles of Agreement

Contractors who are used to responding to ITBs based on institutional terms and conditions, would expect to be familiar with the jargon and would require very little reference to the publications during the bid stage. However, on receipt of an ITB from a noninstitutional source, an oil company for example, many bidders will skip lightly over the Articles of Agreement assuming that because these clauses are preprinted as a permanent part of the proposed contract, they are unassailable and may not be questioned. This is not necessarily the case and the articles should be scrutinized as

closely as the other parts of the package to check whether there are clauses that may not be acceptable.

Scope of Work

Obviously, the scope of work will receive close attention to grasp an understanding of the work required, but because the scope of work provides the most likely breeding ground for future disputes, it should be examined for possible pitfalls that may be encountered during the life of the project.

7.3.9 Failure by Owner to Introduce Strict Controls, Audit, and Contract Compliance Arrangements on Reimbursable Cost Contractor

There are occasions when the acceptance of a reimbursable cost arrangement is unavoidable. Lump sum formats may be out of the question owing to the absence of engineering or perhaps when the contract calls for special equipment, such as pipe lay barges, where the contractor will not consider any other form of payment.

7.4 After Contract Award

After award of contract, the contractor may be in a claim situation when the client has:

- (a) Given incorrect information that misleads the contractor in the performance of its work.

Example: Accepted contractor's procedures and plans for drilling and blasting over the proposed site without mentioning that there were some areas where the use of explosives was forbidden by local authorities although this information was known to the client before contract award.

- (b) Not passed on information to the contractor necessary to the satisfactory performance of its work.

Example: Issued site preparation drawings that fail to indicate the existence of buried pipelines and electric cables whether abandoned or in service.

- (c) Instructed the contractor to carry out tasks in the scope of work using a particular method when the contract does not specify any

particular method; or assumed direction of parts of the work that are properly the responsibility of the contractor without good reasons covered by the contract documents.

Examples:

Directed the contractor to use ready-mixed concrete from a plant close to the site when the contractor had intended to use a product from its own plant although this plant was some distance away. The contract was lump sum and gave no indication as to where the concrete should be batched and delivered.

Interfered with the contractor's *modus operandi* in cable laying during trench crossing when such method did not offend the terms of the scope of work or safety on site.

- (d) Failed to have work performed by others that is scheduled to precede the work of the contractor.

Example: Two separate contracts are awarded. One is for a civil contractor to construct a trestle out to a sea island upon which a pipeline contractor is engaged to lay a line along the trestle. The civil contractor is behind schedule resulting in delay to the pipeliner who becomes involved in a claim situation.

- (e) Rearranged the contractor's schedule in a way that obliges it to carry out work in adverse conditions.

Example: Caused work that the contractor had intended to carry out in the summer to be delayed until winter.

- (f) Failed to inspect the contractor's work within a reasonable period.

Example: Most institutional and other terms and conditions provide for the client's representative to inspect the contractor's work without *unreasonable delay* when the contractor has given due notice that the work is ready for examination, particularly before the work is about to be covered. Although the client's representative may not strictly be in breach of contract for failing to inspect within a reasonable period, there would seem to be a case for a claim unless the client advises that examination is considered unnecessary.

- (g) Caused delay that could have been reasonably avoided.

Example: Possession of site and access thereto may be delayed through client procrastination resulting in delay in contractor mobilization.

7.5 Types of Construction Claims

- (a) Errors, omissions, and vagaries in the contract language (see sources of claims before contract award).
- (b) Dispute over contract intent.

If the contract language is vague and the actual intent is unclear, the claimant may possibly successfully protest that this (clause) was not its intent when the contract was executed even though the wording was clear and not hidden in the small print. A much-quoted example is that of the old lady who wanted to sell her house for \$100,000 and signed an agreement to that effect. When the buyer came to take possession, he took her furniture as well. The old lady protested but the buyer pointed out that the agreement read, “the sale of the house and contents.” The matter went to litigation and the court found for the old lady on the grounds that it was patently not her intention to sell her furniture with the house regardless of what she had signed. In construction disputes the courts may not take such a lenient view, but nevertheless, it pays to present a succinct bid package with little chance of being misunderstood.

- (c) Disputes over extra work—in the scope of work or not?

If the bid package, and therefore the contract, contains the following preamble to the scope of work, there is not much room for argument:

Except as otherwise expressly provided in this Contract,
Contractor shall supply all

- labor
- supervision
- installed and consumable materials
- consumables
- materials
- consultation
- services
- tools
- storage

- equipment
- testing devices

and each and every item of expense necessary for the

- supply
- fabrication
- erection
- installation
- application
- handling
- hauling, unloading, and receiving
- construction
- evaluation
- design engineering
- testing
- assembly and production of _____, hereinafter called the Work.

- (d) Client agrees that work is extra to the contract, but disputes the amount of money claimed.

This is probably the type most common to all claims. The client orders extra work to be carried out or accepts the contractor's proposal for a variation to the scope of work. There is no disagreement over the fact that the proposed work is extra to the contract, but when the contractor submits its figure for the task, the amount quoted is far in advance of the client's fair price estimate. No amount of discussion or negotiation will persuade either side to settle a price and a claim situation seems inevitable.

- (e) Interest on late payment.

The law on this subject differs from country to country and there is no general guidance. In parts of the world there are provisions for penalizing companies who deliberately operate on a *pay when paid* practice, that is, in the case of a main contractor who withholds payment to its subcontractors until paid by its client, but this is difficult to impose.

(f) **Unscheduled events.**

The contract allows the client to issue variation orders changing the scope of work and the contractor is obliged to carry out these changes. There are exceptions. The change must be within the general scope of work. For example, if the contractor is engaged on civil and mechanical work in a refinery extension and the client issues a variation order to construct a helicopter pad five miles outside the work perimeter, this work could not be considered as within the contractor's current scope of work and the order could be declined. Of course, most contractors would not pass up the chance of earning extra paid work even if a subcontractor had to be employed to do it. Some contracts include a clause that allows the contractor to refuse extra work if the contract price, as adjusted by variation orders, already exceeds 10 percent of the original contract price, but these clauses are the exception rather than the rule.

Assuming, in the first case, the contractor accepted the work and a price was agreed, the variation would be an unscheduled event for which the contractor had not planned as part of the contract base case. In the event of dispute over the contractor's quoted price for this extra work, which may have included a contingency amount merely for being an unplanned event, the contractor may be moved to claim for an adverse impact on the even tenor of its work plan. Other unscheduled impacts may be caused by requirements of regulatory bodies other than the client, such as local authorities, government departments, and the like.

(g) **Sympathy claim.**

When all else fails and a stalemate situation exists, the client refuses to budge, and the contractor has tried everything short of arbitration, there is sometimes one final ray of hope through an appeal for a sympathy claim. This may involve an approach by the contractor's managing director to the client's vice president or CEO pleading penury, loss of profit, or worse and appealing on this level to the client for special consideration. It sometimes works.

(h) **Delay.**

A claim for delay may be described as compensation for time lost by inaction or inability to proceed with the scheduled program. Delay is comparatively simple to establish. Either there was a delay or there was not. Compensation calculations are also fairly easy to

process. A team of five men, for example, is through no fault of its own, prevented from proceeding with its scheduled work and is delayed for five hours for whatever reason. Five men at say, a contracted rate of \$30 per man per hour = a claim for \$750.

(i) Disruption.

There is no universally accepted method of assessing disruption costs and court records have illustrated that, where there is a series of interacting disrupting events on a project, it is impossible to apportion additional costs to the individual cost-generating events. Disruption almost always follows delay, but even if each occurrence of delay can be substantiated and qualified, the amount of disruption may not be attributed to each delaying event. There is a domino effect to disruption that affects the work overall. In a plant construction of say, ten areas, where nine areas are directly subjected to delay and disruption, it does not follow that Area 10 is completely free from disruption.

Disruption is the interruption of flow or continuity. The dictionary quotes: “Disrupt: to break apart, to throw into disorder, to cause to break down.”

Disrupting events:

- (a) The effect upon productivity of having to move plant and labor teams more frequently from one activity to another.
- (b) Using inappropriate plant and labor teams on an activity because a resource constraint arises following work changed earlier. (Change orders are therefore potential disrupting events.)
- (c) The effect upon productivity of working in a climate of uncertainty and frequently changing instructions.

A rather far-fetched example of (c), but illustrative nonetheless, would be the case of a draftsman who spends eight hours producing a detailed drawing and almost immediately is called upon to scrap the original and work another eight hours on revision 1. No big problem at that stage but after revisions 2, 3, and 4 on virtually the same design, a sense of weariness is apparent and the draftsman's efficiency is impaired. Stretch this situation (and the imagination) to include revisions 9 and 10 and the man is feeling distinctly unwell and ready to quit.

In spite of the tendency of some owners to refuse to consider disruption claims, courts and tribunals will now acknowledge the possibility of disruption, but even where they take a favorable view, they will sometimes only agree to award net costs for successful delay and disruption claims. This means that in calculating such claims for a tribunal hearing the proponent is well advised to be ready to subtract reasonable profit from value cost minus contractor's inefficiencies. Even if the claim is not going before arbitration, the proponent in all situations should always proceed with backup information and records as if it were.

This brings us to consider another question. Upon what basis should the cost recovery proceed where arbitration is not a consideration?

- (a) Recovery of net cost? Recovery of value cost (value cost in this case being the contract selling price, assuming a lump sum contract)?
- (b) As much as you can get?

It is suggested that the aim should be to recover the total *as built* value cost in a lump sum contract as rates are easier to substantiate and any breakdown of the lump sum price may be defended with confidence.

- (j) Breach of contract.

The burden of proof applicable to every claim, whether based on a variation to the scope of work or on a claim for compensation for breach of contract, rests on the party making the claim (the proponent). To successfully present a case for a breach, the proponent must be able to quote chapter and verse of the contract and pinpoint the relevant clause therein. *Where the client has an option in the contract, it cannot be in breach!*

7.6 Claim Review

When the contract engineer receives a change proposal that he considers is not a justifiable prelude to a contract variation order, he will disallow the whole or part and attempt to reach an agreement with the contractor to withdraw or negotiate that part not in dispute. If the disputed portion still persists, the matter will be registered as a claim. Every client organization has levels of signature authority in the settlement of claims. This can range from an agreement by the site team in the field to the establishment of a claim review panel somewhere in the higher echelons. Most clients also maintain an appeal board that will convene if the claims review panel has

finally rejected the contractor's claim and/or an agreement cannot be reached. The client will advise the contractor that the decision by the appeals board is final, but if the contractor refuses to accept the "final" offer, the matter will be handled by the law department either in arbitration or in court. Both sides are naturally reluctant to take this step.

A contractor may notice a certain anomaly in the contract shortly after award, but will do nothing about it until it actually starts to hurt commercially. Most contractors start thinking about claims too late in the contract and will only file a claim months after the problem first appears. This is mainly because it does not seem to be costing too much money at that stage. By the time they get around to it, records have been lost, key personnel have moved away from the site, and their case has been weakened by lack of documentation.

Many contractors will not pursue a claim rejected in the early stages on the grounds that such action will jeopardize their chances of obtaining future work. The indications are that this fear is generally without foundation and clients are more likely to remove a contractor's name from future bidders' lists owing to indifferent performance or technical shortcomings rather than the propensity to make claims. At the closing out of each major contract, clients will prepare a performance report on the contractor and it is unlikely that an adverse report will be written only on the claims situation. It is very difficult to prove that the contractor deliberately set out from the start to produce spurious claims.

In a claim situation, it is likely that the client is able to field more researchers on the job than the contractor with more time to go through the files to find ammunition for claim defense or counterattack. This is all the more reason why the contractor should start in as early as possible and build up each case with full supporting documentation. In the construction of its claim plan, the contractor should start at the bid response stage to refresh the memory of what exactly was promised at the time. The importance of keeping daily logs and full backup information, including time sheets in support of standby, cannot be too strongly emphasized.

The client's staff is required to justify each variation to the contract and leave a verifiable trail by way of detailed backup information in each change order file. The contractor, on the other hand, seldom has such inhibitions and its primary target is to get its money paid without deferring to auditors. Nevertheless, it needs the backup and records to support and strengthen its claim.

In the oil construction industry, very few contractor claims reach arbitration or litigation considering the number of contracts awarded. For this reason, only a small proportion of claims histories are released for posterity or as a study for the industry in law or in general. Owners are somewhat reluctant to release details of claims with contractors settled out of court as there are sometimes skeletons in the closet that are best forgotten. There are many excellent works produced by lawyers who specialize in contract law and who quote from judgments in cases that have appeared before the courts, but these amount only to the tip of the iceberg when one considers all the cases that have been settled out of court. It is not in the client's interest or that of the contractor's to reach court appearance until every conceivable avenue has been explored. It is a pity, of course, that details of such claims are not released to the public domain for the benefit of all who wish to study the pitfalls of this contracting business and to learn from the mistakes of others. In many of our major industries and professions, conferences and seminars are held regularly to exchange ideas and information for the free use of all in the business. Industrial secrets and processes are not unwrapped in front of competitors, naturally, but useful updates on safety, security, and the like are discussed. Details of claims settlements, however, are seldom disclosed possibly because most claims are indirectly related to mistakes made in the preparation of the contract and few administrations are willing to admit to such errors.

7.7 Contractor Tenacity in Claims Promotion

A surprising number of claims seem to be presented without merit and even without foundation, but many of these result in victory for the contractor. Some old hands in the business, particularly field superintendents, might say, "We would not pay those claims and the contractor would be wasting its time even thinking about it." Faced with this, some contractors would withdraw the claim. But what of those who do not back off; who keep pounding away and resubmit the claim at each progress meeting? They get paid, that's what. Why do they get paid? Because most clients in the upper echelons will afford the benefit of the doubt to a contractor who claims that it did not include that particular item in its bid, especially if the client can persuade itself that there may have been an anomaly in the contract. However, the contractor must be tenacious in its determination to promote its case and be ever watchful for that chink in the contract's armor.

Following a large refinery expansion job in South America, analysis was carried out on claims presented during the three years' duration of the work. Out of 100 contracts, 85 were awarded to indigenous companies and the remainder to large international contractors. The total value of construction was split about equally between the locals and the internationals. The amount of performance claims successfully pursued by the international contractors far outnumbered those of the South American companies. The local contractors would present fairly sound claims, but on the first rejection would withdraw and never be heard from again on the subject. The foreign contractors, on the other hand, lined up their claims teams and went to battle.

7.8 Change Order and Claims Meetings

In field operations, the contractor will be obliged to meet with the client at regular intervals to participate in a site progress meeting. The client will often include in the agenda a status report from the contractor on potential change orders and claims. The object of this requirement, particularly in respect of claims, is to have the contractor declare its current intentions in this direction. Some clients do not include this item as they believe that it encourages the contractor to think about claims long before they exist. However, the practice is being widely adopted on the grounds that a declaration in the minutes to the effect that a contractor has no claims at that time may not prevent the production of one at a later date but at least will give the client some warning. It may also help to prevent the surprise presentation of a carefully constructed claim six months after the event or just toward the end of the work.

The contract engineer is not necessarily a lawyer, in some cases he is not even an engineer. The contract engineer is not required to interpret the legal aspects of the contract or to form an opinion of the likely outcome of court action between the client and the contractor. This is properly the domain of the client's legal department. Nevertheless, he must define and defend the client's position on contractor claims, most of which will not be brought to the attention of the company lawyers. By holding regular change order meetings with the contractor and by generally keeping his finger on the pulse of contract activities, the contract engineer will sense the arrival of a claim long before it is formally submitted. By that time he will have prepared backup information, started a daily log on the

subject, opened up a file on the claim, and given it a number. When the claim arrives, probably as a change proposal, the contract engineer will be prepared for it and will have held preliminary discussions about it with the rest of the site team.

It has been noticed that sympathy for the contractor's claim will broaden as it progresses up the management ladder. The client's construction team closest to the work will tend to reject most claims at first sight, but if the contractor persists and the claim reaches the attention of the project management, a more benevolent attitude will usually prevail. *Attitude* is the key word here as, contrary to popular misconception, the legal merits of such cases receive scant attention at the lower levels. In the absence of guidance from contract documents, the position taken by the site team is very often based on the conviction that the contractor is trying to get away with something to which it is not entitled. A common cry is heard to the effect that, "We have paid this contractor enough already and we are not paying any more!" This sentiment is often expressed before the merits of the claim have been fully discussed.

It must be admitted that the contractor's progress with a difficult claim is sometimes made easier by a chat between principals, that is, the client's project director or vice president and his opposite number in the contractor's camp. Therefore:

Contractor: Bring up the big guns as soon as possible when a sizeable claim is having a rough passage. Ask for an appointment at the highest level in the client organization and keep the lower ranks out of sight, but handy for fact updating.

Client: Avoid these chummy meetings like the plague. Unless there is no escape, insist on claims being dealt with by those paid to handle them. The same applies to proposed meetings with contractor's lawyers.

7.9 Contractor's Claims Preparation and Presentation

A number of reasons have been forwarded as to why a claim succeeds or fails. This includes attitude of management, priority of schedule, project budget status, and so forth, but any claim, whatever its merit, will be difficult to promote if insufficient care is given to preparation and presentation. Confidence and optimism are the first ingredients and that is why change orders should be prepared as change proposals in the first instance as if the next step is automatically the change order or amendment.

Contractors should abandon the change proposal only when the case is obviously hopeless and then contrive to do it as if it were a magnanimous gesture of cooperation and goodwill. If this advice seems to contain an element of cynicism, it should be remembered that large oil or petrochemical industry construction contracts that are breaking new ground technically or planned for comparatively undeveloped parts of the world, seldom if ever contain complete information on the nature of the work. This fact, coupled with an almost traditional haste to produce the bid package and the limited time allowed for submission of quotations, invariably results in errors and omissions in the contract. Some of these mistakes may not be apparent in the bid stage even if the client's team has all the time in the world to produce the bid documents. In a lump sum contract, the bidder is often expected to provide for most contingencies, foreseen or not.

The contractor who deliberately bids low hoping to win the contract and make up the difference in claims deserves no assistance, but the honest bidder, driven to accept loose conditions by circumstances of economic recession, needs all the help available. Most state-controlled oil companies want their national contractors to make a fair profit for their services, but quite often neither side knows how to handle a complicated claim and welcomes specialist assistance in this direction.

If it is thought that some of these views are heavily biased in favor of the contractor, it must be indicated that the client has a partial remedy and that remedy is to allow plenty of time for the preparation of the ITB, provide maximum design engineering, review the package thoroughly before release to the bidders, and always conduct a job explanation and site visit. There is a further observation to be made in defense of the contractor. In civil construction works outside the oil industry, the client is usually represented by an engineer who is appointed by the client or owner but is, at the same time, an independent member of a professional body. The engineer of integrity provides a buffer between the contractor and the client and will often persuade the client that a contractor's claim is fair and reasonable. In oil industry construction, the contractor is lined up against direct employees of the client or the managing contractor who are there to look after the interests of the company.

The passage of a relatively small claim, not worth bringing to arbitration or the law, is entirely in the hands of the client's management. Contractor claims should be prepared in close consultation with engineering and construction personnel. Preparation should not be left to someone on

the contractor's staff who is far removed from the situation at site or from where the claim originated. Provided the facts are sound, everything should be put into the claim that credulity will bear. Better to retreat and concede a point or two than have nothing to concede. In the actual presentation to the client, the claim should be neatly printed and contained in a good quality cover. A sloppy presentation will get the attention it deserves.

The contractor should not put the blame for the claim situation on the client's site team as if the contractor was the essence of purity and innocence. If the contractor was wrong in certain areas, it should admit it. This may have the effect of pulling the rug from under the site team's argument and may gain sympathy from client project management. If all seems lost and the contractor is faced with the choice of arbitration or nothing (a choice it may not particularly relish), it is time to plead poverty, misunderstanding of the contract, and different intention at the time of bid ... anything that will improve its chances of salvaging something from the wreckage in the way of a sympathy claim. It is surprising how often this works.

Claims should be presented as soon as possible and at the highest vantage point on the progress curve. Contractors should not wait until the last stages of the job when half of the key personnel have been demobilized and those remaining know little or nothing of the claim history; when the schedule is met, and when the client has little to gain by being generous.

The curve shown in Figure 7.1 illustrates the comparative negotiating strengths of the contractor and client over claims and change proposals throughout the life of the contract. During the bid period, the client has the advantage particularly when it dawns on the bidder that it may be in with a chance of success. Following contract award, the happy pair begins the "honeymoon" phase when all is sweetness and light and the contractor is anxious to please. At this time it is not unknown for the contractor to carry out little tasks of extra work for free, tasks for which, later on in the contract, it will most certainly seek payment. The honeymoon period is, alas, soon over and the client starts worrying about the schedule often accusing the contractor of not getting on with the job with satisfactory dispatch and of insufficient manpower and/or equipment. There are even times when the client contemplates dissolution of the marriage, but is dissuaded by the realization that it would have to go out to bid again (more expense and time) and that it will probably not be much better with a new partner.

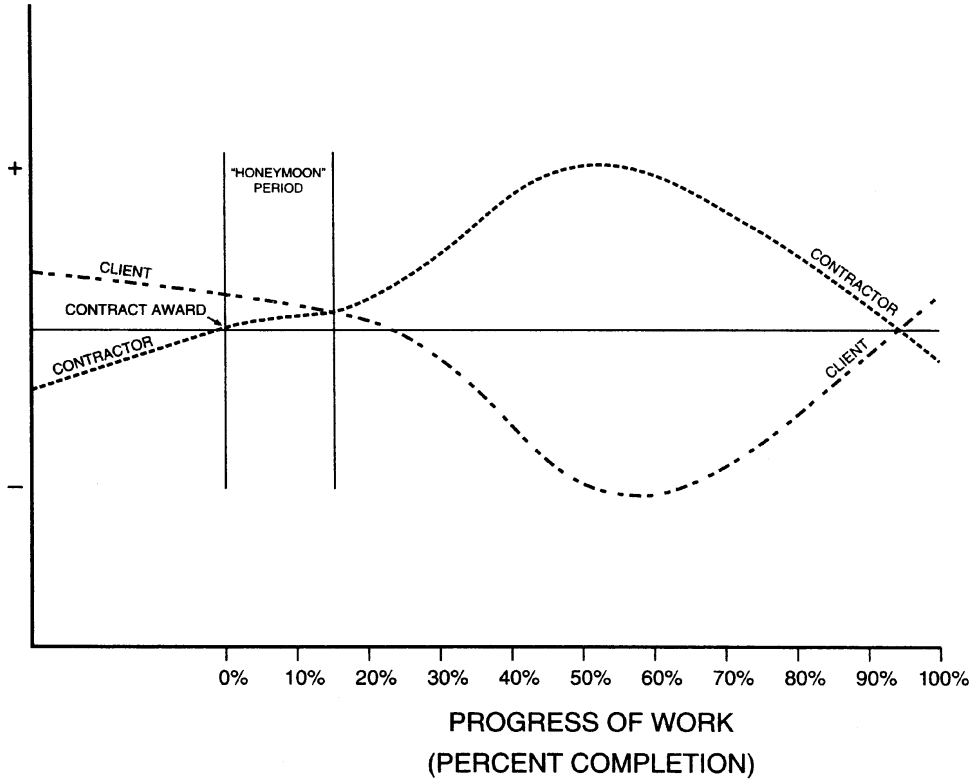


Figure 7.1 Comparative negotiating strengths of the contractor and the client over the life of the contract.

Adherence to the schedule becomes important. It is important to the contractor as well, but to a lesser degree. The client’s curve now moves to a position of weakness and the contractor is in the bargaining saddle. However, as the contract moves toward its close, the client begins to regain negotiating supremacy and when, say, 95 percent completion is achieved and only small tasks and punchlist items remain, contractor claims are viewed with less sympathy. The lesson here and the reason for the inclusion of this little chart is again to remind contractors that keeping claims back until the last stages when the job is almost finished is not recommended.

7.10 Claim Preparation—The Claims Consultant

The contract has been executed in the sum of \$1,000,000. Throughout the two-year life of the project, variation orders for the value of design changes and other items of extra work have been approved and issued totaling a further \$500,000. At the end of it all, the contractor is facing a total *as built* value of \$2,500,000, but the client stubbornly refuses to consider the

release of payment over and above the \$1,500,000 already approved. The work is completed, the contractor's plant and personnel have moved off-site, and most of the management and superintending staff have transferred to other projects or left the company altogether.

The contractor's requests for claim consideration have fallen on deaf ears or if not deaf ears, at least not particularly sympathetic ones. The client is unwilling to even consider further discussions on the subject unless the contractor is able to produce sufficient records and backup information supporting a reasonable, detailed, and accountable claim. This is proving difficult to provide and suggestions of a global claim are firmly rejected. The contractor's managing director is demanding cost recovery and after unsuccessful attempts at recovery by various members of the staff, the contractor turns to an outside agency in the form of a claims consultant.

When initially approached, the consultant knows very little about the details, but wastes no time in getting to grips with the situation. He needs an office or desk space in the contractor's premises, access to all correspondence and documents, and *carte blanche* to interview and question all involved staff, even if they are engaged on other projects and must be brought to the office for discussions. If the latter request meets with some objection over time and money, the consultant may point out that he is, after all, trying to recover a shortfall of a million dollars. That usually gets attention.

The first step for the consultant is to read and learn the contract to the extent that he is able to commit most of the salient points to memory. This stage may take some days and needs to be done in a quiet corner away from interruptions. Very often, the consultant will call for a copy of the contract to be delivered to him before he visits the contractor's office with the purpose of assuring peace and quiet during the reading.

Next, the consultant will examine correspondence and minutes of meetings files. The consultant may expect to find unexplained gaps in these files and may enlist the help of an assistant to trace the missing documents. It will be useful to list, in chronological order, significant letters and minutes of meetings to partially eliminate the necessity to search through all the files at various intervals during the investigation to find an important reference. After a week or so, depending on the complexity of the claim, the consultant should have a clear understanding of the problem facing the contractor in its desire to recover costs and the client in its reluctance to negotiate without evidence of money lost by any other reason than incompetence.

The next move is to examine all site diaries of the period and to interview all available site personnel able to shed some light on the appropriate plug hole down which it seems the money has disappeared. Depending on the consultant's tact and approach to these discussions, it is usually possible to trace a considerable portion of recoverable funds in various ways, namely:

- (a) Work done without charge (and without a variation order) to encourage and maintain goodwill with the client in the early days of the contract (the honeymoon period).
- (b) Work done that the client regarded as within the contract scope of work; an opinion not challenged at the time by the contractor.
- (c) Occurrences not recorded in the site diaries of incidents that could be the subject of change proposals such as:
 - Power failures causing stand down and delay.
 - Clashes with interfacing subcontractors employed independently by the client and leading to waiting time.
 - Design faults directly the responsibility of the client and causing extensive remedial work by the contractor, but not recorded or charged out.
 - Goods received from suppliers the total of which may not be reconciled in the *as built* situation. It has been known for the consultant to trace materials that seem to have entered through the front gate and disappeared out of the back gate.
 - Late delivery of free-issue materials.

During these interviews, grounds for a change proposal will often be uncovered but the interviewee will explain that no action was taken because the problem was "our fault" and not the client's fault and it was decided not to press the matter. The consultant should indicate with the utmost tact and diplomacy that such decisions should be in the hands of the contractor's commercial manager, contract engineer, or quantity surveyor and field personnel are required only to report the circumstances without arriving at a conclusion affecting financial consideration.

The consultant should now be in a position to produce an accurate assessment of the contract base case, that is, exactly what the contractor promised to do for the \$1,000,000 before amendments, change orders, work orders, and the like.

The next move is to construct the *as built* situation or what the picture is now at the end of the project or, if the work is still ongoing, a projection of the estimated situation at completion.

At this stage, the client should be asked to confirm the base case value plus agreed amendments, change orders, and the like, in this case, \$1,500,000.

(a) Above the line.

For the purpose of this exercise, we will consider that anything *above the line* is the \$1,500,000 already agreed plus negotiated change proposals for extra work that it may be possible for the client to accept. Anything *below the line* will be claims for delay, disruption, and, possibly, breach of contract.

Using information gained so far from interviews and other investigative sources, the consultant will begin to prepare and put a value on change proposals for presentation to the client. These presentations should be accompanied by as much backup information as possible, using graphics, drawings, photographs, and full documentary evidence to support each change proposal. Inevitably, some of these proposals will be rejected or at least debated—a hopeful sign, particularly where the client admits to a possible liability, but disputes the number of man-hours or the amount of money claimed.

(b) Below the line (delay, disruption, and breach of contract).

Delay may be described as time lost by inaction or the ability to proceed. It has already been noted that delay is comparatively simple to define and quantify. Thus, if five men are delayed for one hour and the contract rate is \$30 per man per hour, then the delay claim will be \$150.

Disruption inevitably follows delay and is the result of the interruption of flow or continuity. *Change orders are potentially disrupting events even when accepted and negotiated by both parties.* A further example of disruption is as follows.

On a lump sum contract, the contractor's electricians are attempting to unreel heavy duty cable on the floor of a building with the intent of installation on wall-mounted brackets, but progression is delayed due to work being carried out in the path of the cable route by other contractors. It is not possible to leave the cable in situ overnight for fear of likely damage and it is therefore necessary to rewind the cable on the reel until the crew is able to proceed. The following day a further attempt is made to unreel the

cable but the crew is held up again and it is three days before they are able to successfully achieve installation. Altogether, the crew was delayed for 30 working hours. Three men are involved and the delay costs \$2,700. However, in the continuation of the cable laying, future productivity is affected and disruption is caused. The crew, having to unreel and re-reel cable in what might seem to them to be an unnecessary waste of time, are displeased and frustrated to the extent that their productivity factor suffers.

Trying to get over the first hurdle of persuading the client to consider disruption claims is often an uphill battle.

There are many weird and wonderful ways adopted by claimants to promote delay and disruption cost recovery, the simplest being the approach such as, “The contract price was \$1,000,000 and now I discover that the job has cost me \$1,100,000 so I should be grateful if you would pay me \$100,000.”

Another, slightly more sophisticated angle is the calculation by productivity factor. It works like this:

The man-hour (m/hr) value rate is say, \$30 excluding materials.

$$\begin{aligned} \text{The Productivity Factor (PF)} &= \frac{\text{Earned m/hrs}}{\text{Expended m/hrs}} \\ &= \frac{\text{Base case} + \text{agreed variations in m/hrs}}{\text{As built m/hrs}} \end{aligned}$$

For example: $\frac{75,000}{100,000}$. Therefore, PF = .75.

$$\text{Disrupted m/hrs} = \frac{75,000}{.75} - 75,000 = 25,000 \text{ m/hrs.}$$

$$\begin{aligned} 25,000 \times \$30 &= \$750,000 = 25\% \text{ of } (\text{as built m/hrs} \times \$30) \\ &= 100,000 \times \$30 = \$3,000,000 \times 25\% = \$750,000. \end{aligned}$$

The proponents of this method are offering an improvement over the former, “this is what the job has cost me approach,” but there are weaknesses, to say the least. In the first place, the suggestion seems to be that the disrupted man-hours are all the fault of the client and the contractor has no inefficiencies that may bring benefit to the client by way of credit for contractor errors. More importantly, however, there is no defense against the client’s natural reluctance to pay anything at all on a lump sum contract above the figure involving the base case and approved variations unless the contractor can produce evidence that there was delay and disruption caused by the client.

The layman is trespassing into lawyer territory when he attempts to pin an accusation of breach of contract on to the client. Should the proponent suspect that there is a breach, he would be well advised to refer the matter to his legal department, if possible. The burden of proof applicable to every claim, whether based on a variation to the scope of work or on a claim for compensation for breach of contract, rests on the party making the claim (the proponent). To successfully present a case for breach, the proponent must be able to quote chapter and verse of the contract and pinpoint the relevant clause therein. There is great danger in pursuing an accusation of breach that may have no foundation except in an action for delay. For example: *caused delay that could have been reasonably avoided*. In one of the narratives used as a workshop exercise in this book, a clause in the contract obliged the client to fix a rate in the event of disagreement. If the case had come to arbitration without the client fixing a rate, it would undoubtedly have been in breach of the contract. If the contract had read *may fix* or *has the option to fix* the contract would not have been breached. Similarly, if the contract had stated, *Client shall fix rates within 14 days of the disagreement* or words to that effect, then any delay after 14 days would normally constitute a breach. It follows, therefore, that where the client has an option in the contract, it cannot be in breach.

If too much reliance is placed on breach of contract that eventually proves to be unsafe, the chances of advancing a claim for delay and disruption may be damaged. Remember that, in a construction contract of more than average proportion, there are numerous clauses that may place the erring contractor in breach but very few that put the client in similar danger. After all, who writes the contract?

7.11 Arbitration

On the face of it, arbitration seems simple enough to arrange. In broad principle, each side chooses one person to be an arbitrator and the two chosen arbitrators select a third to sit with them in judgment. Most Western countries have an arbitration institute and will arrange to provide arbitrators who are experts in the construction business or in whatever field the dispute lies and will fix the venue and the procedures for the hearings. The fees of the arbitrators will be determined by the time spent on the case, the amount in dispute, and the complexity of the matter. There will also be costs for travel and lodging, secretarial assistance, mail and telephone, e-mail and facsimile services, and so forth. In addition to all this, a fixed amount for administration costs will be due from the claimant to the arbitration institute. The

administration costs will be based on the amount of the claim. In practice, the problem with arbitration is the time it takes, not only to get started, but also in reaching some sort of decision. It has been known for the hearings to be spread out over a year or so. Nonetheless, to settle disputes by arbitration is usually faster and less costly when compared to litigation.

7.12 Negotiation Meetings

7.12.1 Notes for the Client

Previous meetings and correspondence have indicated that the contractor believes that there is an unresolved dispute that requires further discussion. From the client's viewpoint, the first meeting is requested by the contractor and the client is required merely to listen to the presentation of the contractor's case. Nevertheless, the client will have a sound idea of the contractor's probable stance and will have a predetermined argument in defense.

The client will already have some advance notice of the order of magnitude of the claim and will have contemplated the possibility of arbitration in the event of outright rejection. The client will obviously be in a stronger position if the amount is not considered by the contractor to be worthy of the expense of arbitration or litigation.

- (a) It is important that the meeting is held at a venue chosen by the client and that will most likely be at the client's premises. It is not advisable for the client to agree to attend the contractor's offices for this purpose. There are advantages for either side to be on home ground, but the most obvious of these will be realized when separate discussions are necessary. For example, a point is reached at a meeting when one side has to leave the room to allow a brief discussion by the other team on a position or an offer revealed. Without requiring a lengthy break and a return to their respective offices, one side may request the other to wait in an anteroom or even in the corridor while the matter is discussed. If the meeting is held in the contractor's office, it may be uncomfortable or even embarrassing for the client to wait in the corridor. Therefore, it is to the client's advantage to have the meeting at its own premises.
- (b) The client must control the meeting and set the agenda. It is, after all, the client's money at stake and although basic courtesies and a calm atmosphere must be maintained, the client should endeavor to impose some authority on the proceedings and set the ground rules.

- (c) The contractor should be invited to speak first and explain why it requested the meeting and present its case.
- (d) If the meeting is liable to be prolonged, frequent refreshment breaks should be scheduled.
- (e) It is recommended that no official minutes should be taken at the preliminary meetings *but significant decisions or agreements should be recorded and confirmation of these sent to all participants in writing*. The reason for the absence of minutes in the first instances is to create a relaxed atmosphere and encourage freedom of speech without confrontation by printed minutes that may not completely reflect intentions made at the time. A tape recorder could be used by mutual consent provided it is recognized that nothing reproduced on the recording is legally binding in future references.
- (f) The client should not try to score points by proving the contractor to be absolutely wrong in any phase of its presentation; some leeway should be allowed together with a chance to correct erroneous statements.
- (g) The client should make sure that it is negotiating with the adequate level in the contractor's organization. If the other side of the table does not have authority to commit its company, the client may be negotiating with the wrong person.

7.12.2 Notes for the Contractor

- (a) The fact that the contractor has requested the meeting indicates that it is ready to present a logical argument in support of its claim. The importance of records has been stressed many times previously and the contractor should not attempt to open these discussions without the maximum possible backup information.
- (b) During the proceedings, only one spokesman should be chosen to present the contractor's case. It may be necessary for the leader to call upon one or more of his team to make part of the presentation where that member has the expertise (e.g., in the explanation of breakdown of figures). However, it is imperative that only one person speaks at a time.
- (c) Throughout the meeting, the contractor should encourage the client to agree on basic matters. It may be helpful to start with the

contract base case and establish the amount of money for which the contractor agreed to do the work. From this follows the client's agreement on approved change orders and other instructions not in conflict. By encouraging the client to form a *habit* of agreeing, this approach may ease the way into the more difficult channels.

- (d) The contractor should leave the introduction of delay, disruption, and possible breach of contract until last, concentrating on change proposals and extra work hitherto denied by the client.
- (e) The contractor should make up its mind whether it would be prepared to refer the matter to an arbitration tribunal or even to the courts in the event of failure to convince the client of the legitimacy of its case. If it is not prepared to take this route for reasons of expense, it should nevertheless proceed with its facts and backup data as if the case *would* go to arbitration.
- (f) The contractor will be helped by three key words of advice:
 1. *Preparation* of the facts and figures.
 2. *Presentation* in understandable and businesslike form.
 3. *Perseverance* or single-minded tenacity in the promotion and realization of the claimed amount.

7.12.3 Notes for Both Sides

- (a) Before the meeting both sides should arrange a rehearsal independently to anticipate awkward questions and work out a procedure strategy. The spokesman should be chosen and presentation material should be prepared and rehearsed.
- (b) A fallback level of flexibility should be reached in advance. Maximum and minimum levels should be kept in reserve.
- (c) As a general rule, no lawyers should be present at the preliminary meetings and should only be employed when arbitration seems inevitable. For some clients, the appearance of the contractor's lawyers without similar representation from its own side would eliminate further discussion at that time.
- (d) The basic approaches to negotiation could be described as:
 - Bargaining
 - Compromise
 - Coercion

- Persuasion
- Appealing for sympathy
- Logical reasoning

Bargaining

Unlike other forms of negotiation, such as those between buyer and seller, employer and employee, and employer and unions, simple bargaining is rare in the settlement of construction disputes involving previously rejected claims. Cynics may say that logical reasoning is rare also, but we have to believe that this is not the case.

Compromise

In a situation where a client acknowledges the existence of a claim but considers that the contractor is asking for too much, there is the possibility of compromise. Very often the contractor is up against a *stone wall* attitude, where the client recognizes the basic contract value plus agreed variations but steadfastly refuses to consider attempts to establish claims for delay and disruption, arguing that these are contingencies that should have been written into the contract or subsequent change orders.

Coercion

Coercion may involve a veiled threat that the contractor should expect to be excluded from future bid lists if it persists with the claim. This is not a stance adopted by reputable clients. Contrary to popular misconception, the indications are that exclusion from future bidders' lists is more likely due to indifferent past performance or technical shortcomings rather than the propensity to make claims.

Persuasion

Reaching agreement usually means that one party will have to retreat from its original position. It is possible that gentle persuasion by one side or the other could facilitate this retreat.

Appealing for Sympathy

This is a *last resort* approach and involves an appeal to the client's better nature. It probably entails an admission from the contractor that things have gone wrong on the project and that its case is not completely water-

tight. This approach is best made at the highest level between both managements but in negotiation sessions a little groveling may not come amiss.

Logical Reasoning

In addition to the absolute necessity of arriving at the negotiation meeting armed with full supporting backup information, logical reasoning may also be applied when there is a dispute over contractual interpretation of the contract. This may be over vagaries in the contract language, a clause that may be regarded in more than one way, or a matter of contract intent.

The client may argue, "You and all the other bidders attended the job explanation meeting and subsequent bid clarification meetings, yet no one, particularly yourselves, objected to this paragraph. You signed the contract without question. The contract is lump sum therefore the size of your profit or loss is unknown to us. We do not know whether or not you have included a contingency amount in the contract price." This line of argument can only be met with a logical rebuttal. If the contractor can only offer a vague explanation such as, "We didn't notice it at the time," then the client's position is strengthened. If, however, the contractor takes the offending clause apart, line by line, and presents a detailed logical justification demonstrating that the clause was badly written and contractually unsound, the client's position is weakened and made difficult to maintain.

7.12.4 Claims after Contract Completion

The certification and release agreement, signed by both parties at the completion of the work, is accompanied by the client's final payment to the contractor. This document affirms that the client has paid in full for all labor, services, materials, and other items furnished by the contractor in connection with the performance of the contract. The contractor agrees to indemnify and hold the client harmless from and against any and all claims, liability, and loss that they or either of them may incur as a result of a breach of the agreement. Nevertheless, there have been situations where a contractor has submitted a claim to the client even after signing the release agreement and receiving the *final* payment. When this occurs, the client will undoubtedly advise the contractor that, by signing the release, it has surrendered its right to claim under the contract. If the contractor feels that it has a good chance of persuading the law courts that its claim is worthy of attention despite the release agreement, it may pursue

the matter with the client for some *ex gratia* payment. In this endeavor, it needs plenty of patience and determination because the work has been completed, presumably satisfactorily, in which case the client will not be in too much of a hurry to hand over any more cash. More often than not, a successful claim of this nature originates from a third party, such as a supplier, to the contractor for materials used in the completed project or a subcontractor for services rendered but not previously invoiced and not protected by the mechanic's lien statutes. If the client believes that there was a genuine oversight it may be persuaded to pay up. On the other hand, this may not be the case!

7.12.5 Substantial Claims

Very large claims, say, in excess of \$50,000,000, are seldom settled in the field. The contractor will almost certainly engage the services of a claims consultant to prepare and present its claim to the client or to a panel of experts who are convened under the terms of the contract or perhaps to arbitration. On the arrival of the consultant's team, a familiar pattern would involve the division of the group into writers and leaders. The first task of the writers would be to create a library of copies of all correspondence between the client and the contractor and documents relevant to the claim. Assuming that the team had already studied the contract, the next step would be to read through all the correspondence alternating this exercise with discussions on the claim's history with the contractor's project staff.

Large construction claims are segmented, that is, divisible by nature of the work and cost, but perhaps joined to the others in forming a *global* claim for delay and disruption. Each writer would start on one or more of the segments. One may create a dossier on the civil portion of the claim, another would research and gather information on the mechanical part, a third may undertake the electrical and instrumentation section, while a fourth would work on the miscellaneous remainder embracing insulation, painting, and so forth.

During the completion of his dossier or "box," the writer will need to research and read through every document and correspondence relevant to his subject. An important aid in this endeavor is the storage and retrieval systems available on computer software packages in most large establishments. All the correspondence between contractor and client is transferred within the database to the main computer and users may track documents in accordance with the selected criteria. The writers, in col-

lecting material for their separate boxes will prepare an historical narrative on that part of the claim beginning with contractual references and a description of exactly what the contractor promised to do according to the scope of work and other relevant parts of the contract. This will be followed up by a chronological order of events leading up to the claim, backed up by references to correspondence, change order proposals, and other supporting documents. At this level, there will be no mention of cost, loss of profit, or any aspect of finance but only a well-documented history showing how the contractor was placed in a claim situation. The other part of the consultant's team, the leaders, will examine the material in the boxes and from this information will prepare the total claim submission and also put a price on the collection plus an amount for delay, disruption, inefficient working, and the like.

7.13 Computer-Aided Quantification of Delay and Disruption Costs

In spite of constant reminders of the importance of records, it is all the more surprising that—when even the largest contractors are struggling to recover construction income lost in disputes—site diaries, notes of important activities, minutes of meetings, correspondence, and other data all vital to the support of claims are found to be woefully inadequate. Indeed, even more astonishing is that the same contractors, having seen their profits dissolve through disputes on one project will embark on another with the same attitude toward recordkeeping and will lose for a second time. Why don't they start off from day one of a new project by recording every activity and every unscheduled event for future use? One excuse is that this action may be interpreted as a deliberate provision for the future submission of claims. A contractor, operating a fabrication yard dedicated to the construction and maintenance of offshore platforms, was heard to remark that if the client suspected a move to record all unscheduled events at the beginning of a job, the close relationship and trust built up over the years would be in jeopardy. The maintenance of proper records is not only good housekeeping, but if, hopefully, there are no disputes to be resolved at the end of the project, the contractor is provided with a perfect day-to-day record of the work as built. A further objection was that it would be difficult to get the site personnel to cooperate in such a scheme. The view of most contractor managing directors is that the site supervisors would willingly participate if it would demonstrably benefit the company.

Assembling an *as built* program manually and retrospectively is time consuming and relies on what records are available and memories. A conventional project-management computer information system may be used provided it has the facilities to collect the total costs from resources and other types of costs allocated directly to activities. The computer operator, preferably located at the site office, may gather data from the site at regular intervals and feed this into the *as built* model as work progresses. Reference to the accompanying chart in Figure 7.2 will show that the *as built* Model A is fed, preferably daily, with details of events taken from correspondence, site diaries, work orders, change orders, and unscheduled events, such as power cuts and adverse weather. Model A will absorb every activity that has happened on the site relevant to the project from its commencement. It will not be necessary, at this stage, for the operator to distinguish which event or activity might be subject to dispute or to screen some activities as not relevant. Because this screening will be carried out later by others, everything occurring in the initial stages may be “poured into the hopper.” At the end of each week, month, or life of the project, Model A will contain the contract base case plus unplanned events and conditions in time (man-hours), resources, and costs. Model A will be developed, probably by others, as follows:

- Time (Man-hours)
Schedule all activities by area, start and finish times, dates, and sequence of action.
- Resources
Identify labor, plant, and other resources used on each activity, including subcontracted activities but excluding materials.
- Cost
Assign the costs incurred to each resource or activity.

Model A, the *as built* situation, is based on factual records fed into the system at regular intervals and because this information originates from what actually happened on site, no assumptions, judgments, or assessments are necessary and Model A is therefore capable of being jointly agreed with the client.

At agreed intervals, say, weekly, the operator will pass to the commercial manager, contract administrator, or quantity surveyor the compilation of events in Model A from which disrupting events and potentially disrupting events will be identified and scheduled. Disrupting events are

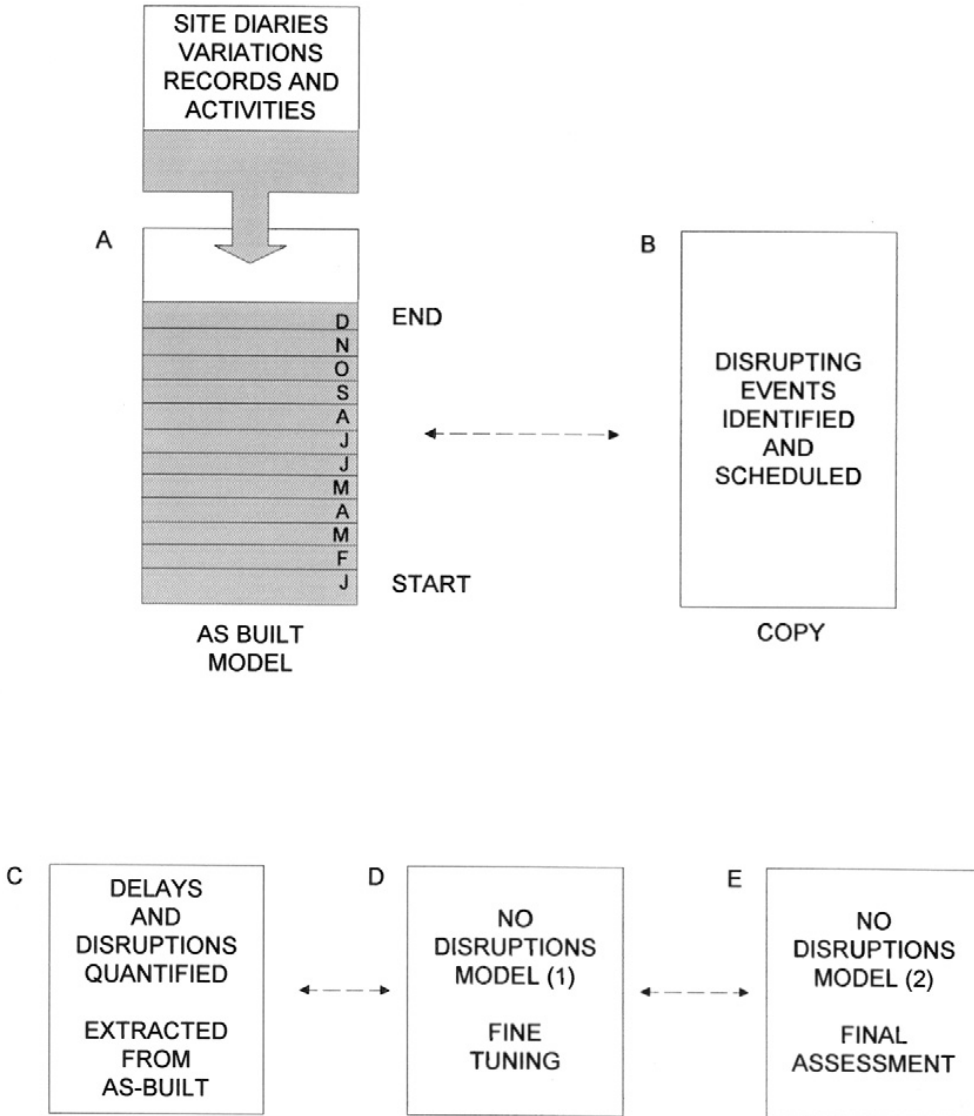


Figure 7.2 $A - C = D$. Total cost of “A” minus total cost of “E” = assessment of the additional costs caused by delay and disruption and allowing for contractor inefficiencies.

those that affect the schedule and arrangements for construction and that arise from causes entitling the contractor to compensation for additional costs. Potentially disrupting events could be the issue of variations to the scope of work even if those variations are approved and contain the contractor’s profit for extra work. Identification and scheduling will be carried out in Model B.

Quantification of delay and disruptive events identified will be calculated in Model C and extracted from the *as built* model and transferred to

Model D, which will then become the *no disruptions* model. In other words, what the picture would have shown had there been no disruptions to the project. It will probably be necessary, at this stage, to “fine-tune” the *no disruptions* model. Certain adjustments may have to be made to the contractor’s original program through events revealed in the *no disruptions* model. For example, the original schedule may have allowed five days for a task programmed during a period of expected inclement weather, but the development of the *no disruptions* model has brought the task back into calm weather that would need only three days to accomplish. To compensate, two days must be added to the *no disruptions* situation in Model E. In this way, inefficiency by the contractor occurring in the *as built* model will be included in Model E and the cost of this inefficiency is present in both sides of the equation so that Model A and Model E both include contractor inefficiency.

Therefore, the total cost of Model E subtracted from the total cost of Model A will be the assessment of the additional costs caused by delay and disruption and any costs incurred by the contractor due to its own inefficiency will remain in that quarter.

A by-product of computer-aided quantification and the construction of an *as built* model and a *no disruptions* model is the production of a time-based cash flow pattern for both models. Consequently, nothing is lost if there is no claim and there is an instant calculator for escalation and inflation where the contract allows.

Payments and Contract Closeout

8.1 Invoicing and Verification

The client is concerned with getting the work completed as specified, on or ahead of schedule, and on or under budget. Whether or not these aims are realized, the daily transactions of the contract must be supported throughout its life with auditable documents, right up to the final invoice and beyond. Unfortunately, fully executed documentation is not always on hand when it comes to paying the bill.

The contractor wants to leave the job with its reputation intact (if not enhanced), but above all it wants to be paid regularly and on time. The regularity and the timeliness of its payments will depend to a large extent on the systems and controls adopted by the project.

No client finance department is going to pay the full value of an invoice on presentation and without verification. There must be an agreed method of checking that the work has been done or the milestones achieved. There must also be an agreed upon period between presentation and payment (usually about 30 days) for verification and clearance. In addition, the timing of invoice submission should be reasonable. It would be absurd for a contractor

to invoice every day or every time a yard of concrete is poured or a length of pipe is laid. Payment may be made against milestones achieved, progress per month, or on measured work. In certain situations, special arrangements may be made to allow frontend payments for mobilization, setting up of camps, and so forth. Even without these special arrangements, the contractor will be well advised to cram as much opportunity for frontend payments as it can into the agreement at the time of bid. To eliminate delay in payment, a cutoff date should be agreed upon for the month's work, assuming payment is to be made against a percentage of progress or measurement or both. If the cutoff date is fixed at, say, the twenty-first of each month, the contractor would prepare a *pro forma* invoice to be presented to the site team for approval.

This is where the contractor's cost engineer or quantity surveyor and the client's contract engineer are able to work in tandem to expedite verification and help sustain the cash flow. On receipt of the *pro forma* invoice, the contract engineer will consult with the rest of the site team on the progress made by the contractor and will adjust the *pro forma* invoice accordingly. Eventually (but hopefully before the end of the month), an agreed amount is reached and the contractor may then present the invoice proper for payment. Ideally, both *pro forma* and final invoices should be divided into sections or work packages that represent the segments of the contract and total the original contract price with variation orders being kept separately. Payment will be made according to the terms and conditions of the original contract and subsequent variation orders. The finance or accounts payable department will expect verification of the contractor's invoice by the site team but will also check the contract and variation orders to find authority for payment. In certain projects, this detective work is done by an offshoot of the finance department, known as "contract compliance," that also has other functions of investigation as the title suggests.

8.2 Work Breakdown Structure

Many client organizations use a "family tree"-type of subdivision of the complete project scope of work to provide the necessary framework for the establishment of project baselines for cost. This is known as cost control or work breakdown structure (WBS). Each contract in the project is

identified as a branch of the WBS tree. A recent trend is to extend the WBS into the compensation section of the contract in the form of a series of work packages relating to the priced scope of work. In a \$100 million refinery contract, for example, the work package may appear as follows (payment is to be made against monthly progress):

Work Package No.

1. Site preparation	\$18,000,000
2. Fireproofing	\$2,000,000
3. Civil work	\$15,000,000
4. Mechanical work	\$20,000,000
5. Insulation	\$10,000,000
6. Painting	\$5,000,000
7. Electrical	\$15,000,000
8. Instrumentation	\$15,000,000

Each work package will be broken down into identifiable elements of work:

Work Package No. 1 — Site Preparation

<i>Activity Description</i>	<i>Cost (U.S. \$ millions)</i>	<i>Man-hours</i>
Earthmoving	6,000	15,000
Trenching	3,500	8,500
Access roads	4,500	11,250
Grading	2,000	5,000
Paving	2,000	5,000
TOTAL	18,000	44,750

Assuming a lump sum contract and monthly progress payments, an agreement must be reached on the percentage of achievement of each work package. Table 8.1 is an example of a typical invoice summary. It is presented in the form of an accumulative value invoice indicating the cost of work performed to date, less the total value of all previous payments. Thus it reveals the actual value of all authorized work completed in the period.

Table 8.1 shows that, barring change orders, the original contract value is depleted by 60.5 percent, leaving a balance of \$39,500,000. Site preparation

Table 8.1 *Invoice No. 011 (in U.S. \$ millions) for January 2005*

<i>Work Package Description</i>	<i>Contract Value</i>	<i>Previously Invoiced</i>	<i>This Invoice</i>	<i>Accumulative Total</i>
1. Site preparation	18,000	18,000	nil	18,000
2. Fireproofing	2,000	1,000	500	1,500
3. Civil work	15,000	12,000	1,000	13,000
4. Mechanical work	20,000	10,000	2,000	12,000
5. Insulation	10,000	2,000	1,000	3,000
6. Painting	5,000	1,000	1,000	2,000
7. Electrical	15,000	5,000	2,000	7,000
8. Instrumentation	15,000	3,000	1,000	4,000
TOTAL	100,000	52,000	8,500	60,500
Change orders		20,000	5,000	25,000
TOTAL		72,000	13,500	85,500

Gross value of work from summaries: 85,500

Less amount previously invoiced: 72,000

Value of this invoice: 13,500

is 100 percent complete and paid for. The following progress was achieved for this month:

Fireproofing	25%
Civils	6.6%
Mechanicals	10%
Insulation	10%
Painting	20%
Electrical	13.34%
Instrumentation	6.6%

The client's team will also be in a position to advise the finance department on the probable cash flow through the completion of the work and what should be reserved for payments in each future month. How many variation orders will be issued is not so simple to forecast but the contract engineer can probably offer an educated guess.

8.3 Measurement of Progress

The verification of invoices relating to contracts with unit rate or bill of quantity arrangements may involve site-approved time sheets for man-hours, measurements from drawings or profiles, or even physical checks

such as weighing station tally sheets for truck loads or transit mixers. Where the contractor is engaged in a unit rate activity in which precise measurement cannot be guaranteed (e.g., in rock blasting and excavating for a pipe trench), physical methods must be abandoned for a theoretical calculated amount. Otherwise, the contractor would have no incentive to keep to the specification and, if it were paid for the rock and spoil actually removed, overblasting would be charged to the client's account. In these circumstances, the contract would be written so that the client will pay only for theoretical quantities calculated in accordance with the standard in the area.

The contractor will produce a profile and draw a cross-section of the trench that is checked against a cross-section produced by the client's surveyor. Both parties will sign against the agreed profile as a base for calculation of theoretical quantities. This way, if the contractor blasts deeper than the agreed theoretical measurement, it does so at its expense.

Measurement of progress from construction drawings, profiles, or isometrics is always preferable to physical measurement in the field. The drawing measurement is less costly and provides a record against which future progress may be compared. Where project engineering involves the production of a large number of isometric drawings, it is an advantage to have each isometric on the computer screen as soon as it is issued "Approved for Construction" so that future design changes or revisions may be measured against the original for addition to or deletion from the contract price using a variation order.

8.4 Retention

It is customary for clients to pay only 90 or 95 percent of each invoice presented and retain the balance against the possibility of defective work or even abandonment of the work by the contractor. As each monthly invoice is submitted, the retained amount will accumulate until job completion is satisfactorily achieved. At that stage, half of the retention money will be repaid, leaving the balance to safeguard the work through the maintenance or warranty period, if the contract demands one. There are exceptions to the retention rule and in certain types of contracts (e.g., consultancies), the client may waive the requirement for withholding a percentage of the invoiced amount. A onetime invoice for work of a short duration may also be free of retention. Some clients do not extract retention from invoices

relating to change orders or compensation for standby periods. Although the latter concession is understandable, it is not clear why payment for extra work should be free of retention. It seems fair to adopt the general rule that payment for anything to be incorporated into the permanent works through the original scope of work or by change order should be subject to retention. Clients do not normally pay interest on the money they withhold, but a contract worth \$100 million with a retention of 10 percent and a life of 12 months could realize over \$600,000 if the contractor were able to invest that money instead of leaving it in the client's hands each month. It is, therefore, a considerable saving to the contractor if it is able to negotiate with the client the acceptance of a bank guarantee in lieu of retention. It is an even greater saving if it can arrange a bank guarantee for each monthly payment as shown in Table 8.2. This table is offered as an example only because percentages or retention and bank charges differ from year to year and from country to country.

Table 8.2 assumes that the contract price is loaded at the frontend for mobilization payments and for workload peaks between the fifth and eighth months. It also assumes that there will be no variation orders, or if there are, no retention or bank guarantees will be levied on them. An

Table 8.2 *Savings Realized from Bank Guarantees vs. Retention*

<i>Invoices</i>	<i>Contract Worth \$100m</i>	<i>10% Retention = \$10m</i>	<i>Probable Bank Guarantee Charge = 1.5% per annum</i>	<i>Interest on Retention at 10%</i>
1st	15m	1.5m	22,500	150,000
2nd	5m	.5m	6,875	45,834
3rd	6m	.6m	7,500	50,000
4th	8m	.8m	9,000	60,000
5th	10m	1.0m	10,000	66,667
6th	12m	1.2m	10,500	70,000
7th	15m	1.5m	11,250	75,000
8th	10m	1.0m	6,250	41,667
9th	9m	.9m	4,500	30,000
10th	5m	.5m	1,875	12,500
11th	3m	.3m	750	5,000
12th	2m	.2m	250	1,667
TOTAL	100m	10m	91,250	608,335

Note: m = million.

imposition of retention on 10 to 15 percent extra work will, of course, make the bank guarantee that much more desirable. Further savings, for the contractor, may be achieved if the client will agree to impose retention or the bank guarantee requirement only on invoices directly related to the permanent work.

A charge of 1.5 percent per annum of the amount guaranteed is mentioned as the probable fee charged by the bank, but much will depend on the contractor's rating. It has been known for the contractor to hawk the contract around several banks and emerge with small parcels of guarantees because one bank would not risk the whole package.

8.5 Warranty Period

When the contracted work has been completed to the client's satisfaction, the agreement may then enter into a warranty period. During the warranty period, the contractor *warrants* that the works completed will conform to the drawings and specification and that they will be new and suitable for the purpose for which they were intended and will not be defective. The warranty period will begin at the issuance of the completion certificate given by the client to the contractor and will expire (usually a year later). If anything goes wrong with the works during the warranty period, the contractor will be obliged to return to the site and put the matter right at its own expense. To encourage the contractor in this responsibility, the client will keep half of the retention on paid invoices until the end of the warranty period. In the case of the bank guarantee, the client will only release 50 percent of the guarantee. Some clients, on expiration of the warranty period, will issue a Final Acceptance Certificate and, at the same time, give back to the contractor's bank or the contractor the balance of the guarantee or the remainder of the retention.

8.6 Contract Closeout

When the last claim has been settled and the final invoice paid, the client will ask the contractor to sign a release confirming that no further monies are owed and there are no further claims to be considered. This "certification and release" sometimes accompanies payment of the final invoice. The format of the release document may vary between a simple agreement as shown in the following text and quite a formal affair couched in legal jargon and beginning with:

Know all men by these presents: For and in consideration of the payment to Contractor of the below balance by Company for labor, materials, equipment, and services furnished in connection with the performance of Contract No. _____, Contractor ____ does hereby agree and acknowledge that the balance due for said labor, materials, equipment, and services is _____.

This continues for about another 200 words. The simple version, sometimes called the “final receipt and release agreement” merely states:

In consideration of the payment by Company of \$_____ less applicable deductions, Contractor hereby releases Company from any further liability of any nature whatsoever arising from or relating to Contract No. ____ as it may have been supplemented or amended or arising from or relating to _____.

That is all there is to it, apart from provision for the signatures of both parties, and it seems to give sufficient protection within most organizations.

For the contractor, much of what follows is fairly straightforward and it may silently fold its tents and steal away, laughing all the way to the bank or licking its wounds, as the case may be. For the client, however, there now begins the task of closing out the contract documents, writing the contract history, and recording the problems encountered and the solutions arrived at. Finally, the contract engineer will complete the “contractor performance evaluation” and when he comes to the question, “Do you recommend using this contractor again?” hopefully he will be able to answer in the affirmative.

The client’s contract administration staff are among the first to be inducted into a new project and the last to leave the field. They generally remain to settle claims long after construction is completed and, of course, they close out each contract. On a large project, the closing-out process may take several months. The task of documentation is formidable. This is not to suggest that all the project contracts are saved until the very end before being completely discharged. The site preparation, civil, and other early contracts are closed out as soon as possible during the course of the project. However, the finalization of all documents for the mechanical, electrical, painting, and other contracts in the last stages of the project will continue long after the remainder of the construction team has departed.

8.7 Contract Closeout Checklist

For each contract, the contract engineer will complete a checklist of all actions necessary to close out the contract.

<i>Activity</i>	<i>Status*</i>	<i>Date</i>
1. Contractor’s notice of completion	_____	_____
2. Outstanding requirements memo		
Input received from:	_____	_____
Project	_____	_____
Construction	_____	_____
Construction manager	_____	_____
Site superintendent	_____	_____
Engineering	_____	_____
Procurement	_____	_____
Inspection/QC	_____	_____
Cost/scheduling	_____	_____
Accounts payable	_____	_____
Contracts home office	_____	_____
3. All work orders finalized	_____	_____
4. All change orders finalized	_____	_____
5. All amendments finalized	_____	_____
6. Claims resolved	_____	_____
7. Back charges debited	_____	_____
8. Certification and release	_____	_____
9. Contractor’s final invoice	_____	_____
10. Final invoice approvals	_____	_____
11. Final invoice to accounts	_____	_____
12. Final payment to contractor	_____	_____
13. Bank guarantee	_____	_____
14. Retention	_____	_____
15. Contract closeout report	_____	_____
16. Closeout notice to contractor	_____	_____
17. Contractor performance evaluation	_____	_____
18. All closeout documentation files	_____	_____
19. Final acceptance	_____	_____

*Note: R: received; I: issued; W: waived; C: completed; T: transmitted; N/A: not applicable.

On a large contract, the checklist may be in the contract engineer's possession for some time and it will be advisable to prepare a note of activities that must be completed to satisfy each stage of the closeout process. When the contractor believes it has completed the work that it agreed to perform under the terms of the contract, the contractor will submit a notice of completion to the client. Usually, the notice is required within 10 days of the declared completion.

The contract engineer will liaise with other disciplines to determine whether the contractor has indeed completed its obligations according to the contract. If this is not so, the contract engineer will issue a note of rejection to the contractor and will not proceed with the checklist until the contractor has rectified the outstanding deficiencies. Following settlement of all claims, back charges, and other credit and debit balances, all relevant invoices will be reconciled against the contract value together with all work orders, change orders, and amendments. This is done to ensure that final payment is inclusive of all financial arrangements and transactions of the contract. The contract engineer then prepares the contract closeout checklist that will eventually be distributed and placed in the appropriate file. For his own benefit he will compile the separate notes previously mentioned to assist him in the satisfactory completion of the checklist. These notes may take the form of questions as follows:

1. Confirmation from site representatives that all tests, inspections, and QA/QC matters are cleared?
2. All checklists well documented and on file?
3. Any credits to the contractor covering the value of work in the checklists that will not be completed by the contractor?
4. Clearance obtained for the following technical documents required by the contract?
 - (a) Inspection release certificates
 - (b) *As built* drawings
 - (c) *As built* dossier
 - (d) Mechanical completion file
 - (e) Other
5. Satisfactory material reconciliation data prepared by the contractor with respect to company-issued material and contractor-furnished reimbursable materials?

6. Scrap materials sold and credited to the company?
7. Surplus material from company issue transported to nominated location and loaned supplies and equipment returned?
8. No back charges outstanding?
9. Final value of all work orders, change orders, and amendments agreed with the contractor?
10. Retention details confirmed?
11. Bank guarantee details confirmed?
12. All claims settled?
13. Final account prepared and arrangements made for execution by both parties including release of claims?
14. Site files complete and ready for shipment to the home office?
15. Site office closed and all office equipment not presently in use packed for shipment or returned to the contractor?
16. All delegated signature authorities such as the site/company representative cancelled?
17. Contract Closeout Report and Contractor Performance Report completed? (See Item 8 on p. 219—Contractor's Performance Report.)
18. Certification and release issued?

The client may issue a provisional notice of acceptance in situations where the work is substantially completed and all tests passed to the satisfaction of the company representative. The contractor may provide a written undertaking to complete certain outstanding items by an agreed upon date. Details of a provisional notice of acceptance, should one be issued, will be included in the contract closeout report, which will also contain the contractor's performance report.

8.8 Contract Closeout Report

Note: All members of the client's site team will provide information for this report but the contract engineer will be responsible for coordinating its preparation.

Contents

1. Introduction and summary

2. Commercial and financial
3. Contractual
4. Subcontractors
5. Material reconciliation
6. Technical documentation
7. Cost and schedule comparison
8. Contractor's performance report
9. Photographs

1. Introduction and summary

- 1.1 Contractor's name _____
- 1.2 Contractor's address _____
- 1.3 Contractor's representative _____
- 1.4 Description of the work _____

2. Commercial and financial

- 2.1 Final contract value \$ _____
- 2.2 Agreement of final account Date agreed: _____
- 2.3 Retention
Release of first half Date: _____ Amount retained \$ _____
Release Date: _____
- 2.4 Bank guarantee(s)
Guarantee amount \$ _____
Received Date: _____
Accepted Date: _____
Return Date: _____
- 2.5 Accounting—commitment
Original commitment \$ _____
Add/omit to commitment:
- | | |
|----------------------------|----------|
| Work orders | \$ _____ |
| Change orders | \$ _____ |
| Amendments | \$ _____ |
| Escalation (if applicable) | \$ _____ |
- Total revision commitment \$ _____
- 2.6 Reason for over/under-run of original commitment value:

Original contract price \$ _____
 Total work orders \$ _____
 Total change orders \$ _____
 Amendments to contract total price \$ _____
 Total increase \$ _____
 Final contract value \$ _____

2.8 Insurance claims

Amount claimed \$ _____
 Amount agreed \$ _____

2.9 Construction claims by contractor

Amount claimed \$ _____
 Amount agreed \$ _____

2.10 Counterclaims and back charges by company

Amount claimed \$ _____
 Amount agreed \$ _____

2.11 List of work orders

Date	Description	Amount (\$)

2.12 List of change orders

Date	Description	Amount (\$)

2.12 List of amendments to contract

Date	Description	Amount (\$)

3. Contractual

3.1 Contract document

Execution Date: _____
 Completion Date: _____

Contract amendmentsDescription: _____

Execution dates:

001 _____

002 _____

003 _____

004 _____

3.2 Extension of time

Initial extension: _____

Subsequent extension(s): _____

3.3 Milestone completion certificates

Description: _____

Date issued: _____

3.4 Notice of rejection: Date issued: _____

Notice of acceptance: Date issued: _____

3.5 Certification and release: Date issued: _____**4. Subcontractors**

Scope of work: _____

Name: _____

Scope of work: _____

Name: _____

5. Material reconciliation**5.1 Details of scrap materials:**

Material: _____

Quantity: _____

Value of sale: _____

Date of sale: _____

5.2 Details of surplus materials:

Material: _____

Quantity: _____

Deposition: _____

Transported: _____

Stored: _____

Location: _____

6. Technical documentation**6.1** *As built* drawings

Accepted: ____ Date: _____

6.2 *As built* dossier

Accepted: ____ Date: _____

6.3 Mechanical completion file

Accepted: ____ Date: _____

6.4 Spare parts lists

Received: ____ Date: _____

6.5 Startup, operating, and maintenance manuals

Accepted: ____ Date: _____

7. Cost and schedule comparison**7.1** Actual and planned progress comparison

A graphical presentation of the actual and planned progress curve together with a weekly tabulation of progress is inserted here.

7.2 Actual and planned man-hour comparison

Final manpower (man-hour) performance report is inserted here.

7.3 Actual and planned manpower comparison

A histogram showing actual and planned manpower is inserted here together with a weekly tabulation of manpower.

7.4 Contractor's cost management report

This report should include contractor's final cost in accordance with the contract terms if applicable.

8. Contractor's performance report**8.1** Management and administration

Engineering: _____

Project Management: _____

Procurement and subcontracting: _____

Materials management: _____

Construction management: _____

Project administration (including contract administration, cost control, scheduling, and accounts): _____

Adequacy of facilities: _____

Overall: _____

8.2 Construction labor and foremen

Attitude: _____

Workmanship: _____

Productivity: _____

Safety consciousness: _____

8.3 Cooperation with company: _____

8.4 Summary of strengths: _____

8.5 Summary of weaknesses: _____

8.6 Problems arising through contractual terms, conditions, inadequate contract language, and so forth: _____

9. Photographs

Attach any photographs made throughout the course of the project that may be useful as a record of progress or outstanding activities such as heavy lifts, and so forth.

The contract closeout report may take some time for the contract engineer to complete, mainly due to the difficulty of obtaining input from the various site team disciplines involved. It is not uncommon for the contract engineer to fill in the gaps when he finds that a site superintendent who promised the information has disappeared on another project. Eventually, the work is done and all that remains is to distribute an interoffice memo for signature by the company representative to the effect that work has been completed under Contract No. _____, all monies owed and due to the contractor have been paid in full, and the contractor has furnished the company with a properly executed certification and release document to notify all interested parties that the contract is formally closed. In some organizations, the contract engineer will also prepare a letter to the contractor reminding it that the work has been performed to the full written acceptance of the company and all outstanding financial obligations against the work have been paid in full. The contractor is notified that the contract is closed and no further work will be performed and no further payment will be made. The letter may express the company's appreciation for the manner in which the work in the contract was carried out and may assure the contractor that on future invitations to bid for work for which the contractor qualifies, every consideration will be given.

Workshop Exercises

9.1 Vagaries in Contract Language—Claim 1 Installation of Pipelines in a Tunnel

A pipeline contractor was awarded a contract to construct a 36" and a 24" pipeline over 30 kilometers (km) across country involving, at one stage, the installation of the lines through a tunnel under a river. The construction of the tunnel was carried out by another (civil) contractor.

In view of a sag bend midway in the tunnel, it was necessary to install prefabricated bends for the pipeline. These prefabricated bends were to be anchored in a concrete block. The relevant section of the contract read as follows:

Within ninety (90) days of Contract award, Contractor shall submit to Company for approval a comprehensive construction work plan setting out in detail the procedure proposed for installation of pipelines in the tunnel. It should be noted that the design of the pipelines within the tunnel is based on anchor blocks in the sag bend in the bottom of the tunnel that will anchor prefabricated bends equipped with two (2) anchor flanges each. These prefabricated

bends shall be preinstalled by Contractor at the tunnel low point and the contractor will also be responsible for the casting of anchor blocks by others who will provide all formwork, reinforcement, concrete, and associated labor. This work will be carried out sufficiently in advance of the start of pipe laying to allow for concrete to cure.

Similar wording and provision for payment was also inserted into the civil contractor's contract.

Although not mentioned in the contract, the purpose of having the pipeline contractor supervising and being responsible for the casting of the concrete anchor blocks was to achieve accuracy in the alignment of the prefabricated bends to the incoming and outgoing pipelines. This was mentioned at the job explanation meeting during the bid process and there were no objections raised by the bidders. The civil contractor who bored the tunnel provided all materials and labor up to foreman level for the anchor blocks and mixed the concrete at a separate plant. Following the initial pour, the concrete failed the required break tests and the structure had to be dismantled and the faults remedied. The civil contractor claimed the cost of this remedial work on the grounds that the pipeline contractor was responsible for the work even though none of its workforce or materials, concrete, and so forth was involved. The pipeline contractor complained that it could not be held responsible for the actions of others and obviously the concrete failed through poor workmanship or faulty materials or both. The pipeline contractor admitted that the subject had not been raised at the job explanation meeting or subsequent bid clarification meetings, but it had read the relevant clause in the contract assuming that the responsibility referred to the alignment of the bends. The client replied that because this was a lump sum contract, it had no way of knowing whether or not the pipeline contractor had included for all contingencies in its bid. The pipeline contractor had accepted responsibility by signing the contract and should now pay the bill for the remedial work.

9.2 Contract Intent—Claim 2

This exercise concerns a contractual dispute and a matter of *contract intent*.

Contracts were awarded for a petrochemical plant extension and the mechanical portion of the project required the contractor to maintain a

fabrication yard about a mile from the site, purchase pipe material, fabricate spools to isometric drawings, deliver to the site, and install.

At the bid package stage, there were six bidders, all of whom were experienced in contracts of this nature. At the job explanation meeting, the client's contract manager, who put the package together, drew attention to a clause in the schedule of prices. The clause read as follows:

If a change neither involves an increase or decrease in the length of pipe to be installed by CONTRACTOR nor affects pipe that has already been fabricated then CONTRACTOR agrees and accepts that no adjustment will be made to the total compensation to CONTRACTOR—CONTRACTOR having included allowances for such changes in the CONTRACT PRICE.

This clause was inserted as a time-saving device when design changes were introduced before the pipe stock was fabricated into spools. In which case, the contractor would agree to reissue the isometric, fabricate to the new design, and install at no extra expense other than the amount provided in the contract, provided the length of the pipe had not increased.

None of the bidders objected to this clause, either at the job explanation meeting or at the clarification meetings that followed. The contract was lump sum with unit rates for extra work.

During construction, there were occasions when design changes called for a change in pipe diameter but without altering the length of the proposed spool. The contractor claimed for these changes in view of the extra expense in procurement of different pipe stock. The claim was rejected on the grounds that the contractor should accept any cost involved according to the terms of the contract.

9.2.1 Contractor's Case

The contractor accepted that the contract excludes compensation for changes that do not involve a change in the pipe length, but suggested that it was not the intent of the contract to have the contractor bear the cost of an increase in diameter. The contractor believed that changing the diameter resulted in a decrease in the length of one diameter and an increase in another. The client, therefore, should receive a credit for the omitted pipe and be charged for the replacement.

The contractor accepted that it had not raised the matter at the job explanation or bid clarification meetings because the possible implications were not noticed. The contractor suggested that the contract manager who drafted the bid package had missed it also and was now trying to pretend that it was always the intent to include diameter differences. Furthermore, it was the client's responsibility to emphasize these probable costs at the preaward meetings.

9.2.2 Client's Response

The client's contract manager replied that the relevant clause was fully highlighted at the job explanation meeting and not only did the contractor accept the terms without question, but so did all the other bidders.

It was assumed that all parties would include a sufficient contingency in the bid to take care of all extra costs related to this clause including changes in diameter. It was now pointless and completely irrelevant to suggest that the client had missed the implication at the bid package stage. The clause is crystal clear and contains no ambiguity or vague language. In addition to the many discussions on the bid package, a copy of the contract was in the contractor's hands long before execution.

Regarding contract intent, the client's stance is that it was its intention to include all diameter changes in the clause, but obviously the client was not in a position at the bid stage to foresee such changes. The client noted that where there had been a design change involving a decrease in diameter, the contractor had not offered a credit to the client for this cost saving and was quite happy to benefit from such a decrease, while at the same time was determined to claim for the cost of an increase.

Finally and without revealing details of the other bids, it may now be said that the contractor did not submit the lowest offer but was chosen for other qualities of experience, management, and so forth. The higher figure was therefore assumed to encompass all costs in all circumstances related to this clause.

9.3 Direct and Consequential Costs—Claim 3

A lump sum contract, plus unit rates for extra work, was awarded to an international contractor for the construction of the onshore portion of a trenched 750 mm diameter pipeline to be brought in from a North Sea gas field and laid 20 km overland to a terminal in Western Norway.

The design engineering was carried out by a world-renowned engineering company who produced the specifications and drawings for the work. Each circumferential weld on the line was to be subjected to 100 percent radiography (nondestructive testing) during construction. The terms of the contract allowed the owner to order cutouts of one weld in every thousand for subjection to destructive testing. One of the destructive tests specified was the “Charpy V notch impact test.”

In pipeline construction, as in any other high-quality welding operation, the contractor must submit, for the owner’s approval, the detailed welding procedure it intends to employ to join one piece of pipe to another. The proposed procedure must pass visual and nondestructive tests (X-ray), inspections, and destructive tests to be qualified. All this must be done before construction commences. Because the contractor would probably be in the mobilization stage at that time, the search for a suitable procedure would most likely be carried out in controlled conditions away from the job site. However, the contractor would be expected to ensure that the procedure would also work in actual field conditions.

Having passed the visual and nondestructive inspection, the weld is subjected to various mechanical tests. In this case, these consisted of a test for tensile strength, a hardness test, and a “Charpy V notch impact test.” In preparation for the latter, three samples or “coupons” are cut out from the test weld. From each of these samples, a small specimen of predetermined dimension is taken and a notch cut in the specimen. One end is held in a clamp while the other end above the notch is struck with a weight on a swinging pendulum until the specimen fractures. The energy required to fracture the specimen is measured in joules. The impact energy required for the pipeline contractor’s test weld was an average of 45 joules. Three tests were taken on the specimens, one at the center of the weld, one at the fusion line between the weld metal and the pipe, and the third at the root weld, which is the first pass made by the welder between the beveled pipe ends.

The first procedure failed the test at the root, but after several attempts a procedure was found that satisfied all three tests. This procedure was duly qualified and construction began. When the owner (client) exercised its right to order a cutout of a field production weld for the purpose of destructive testing, all laboratory tests were acceptable with the exception of the root “Charpy” results. All production welding was halted until this problem could be solved.

The contractor suffered an expensive shutdown and claimed for direct and consequential costs on the following grounds:

- (a) Although the specification regarding the “Charpy” test was included in the bid package, no attempt was made by the client to emphasize the difficulty of meeting it.
- (b) The “Charpy” test on the root weld was an unusual requirement even for cold climates and was not called for in any other part of the world, including Alaska.
- (c) The root weld will always be vulnerable to impact tests because it is the first run laid and is therefore without the benefit of previously deposited hot metal. The root weld is not the strongest part of the finished fused metal and does not, therefore, warrant the severest test.

The contractor maintained that the client had *failed to disclose information necessary to satisfactory performance* by not giving more prominence to the “Charpy” requirement during the bid stage. The client initially rejected this approach declaring that the contents of the specification were in plain view throughout the bid stage and were not hidden in the small print. In any event, a contractor of international repute should have seen that the welding procedures would need special attention and, unusual or not, that was the requirement. If necessary, sufficient compensation for the extra work involved should have been included in the contractor’s bid. Nevertheless, in an effort to get production moving again before the approach of winter, the client referred back to the design engineer who wrote the specification to see if it could be amended. The design engineer was not too insistent on its retention and it was decided to issue a waiver to the contractor reducing the average joule value to 27. The welding procedure now easily passed the test and production was resumed. The contractor issued a “modest” claim of about \$800,000 for delay from the time production was halted to the time the waiver was given.

Disaster struck from an unexpected quarter, however, when a government agency nominally responsible for all land transportation of combustible substances decided not to agree with the waiver. Whether this came about as a result of bruised feelings by not being consulted or just bureaucratic awkwardness is not clear. Production was stopped again while a new search was made for a procedure to suit the original specification. Meanwhile, back on the line, welders were chafing at the enforced

inactivity and loss of production bonuses; a few quit, seeking work elsewhere. A mood of despondency settled over everyone and production in civil work and other areas suffered as well. Winter approached and the pipeline route was covered in a blanket of snow.

After experimenting with several welding procedures, one was found that successfully passed the laboratory tests on the root weld and production slowly started up again. This time a massive claim was launched by the contractor almost equal to the original contract price.

The client called in a claims consultant who recommended that the claim should only be considered for costs incurred from the time the waiver was given to the time it was withdrawn—for the following reasons:

- The requirements of the specification were known to the contractor at the time of the bid.
- No objection was raised to this requirement before contract award.
- The contractor is responsible for the efficacy of the welding procedures in field conditions as well as in shop conditions.
- The specifications were revised to assist the contractor, but following the objections of the government agency the client was obliged to revert to the original specification. When the contractor resumed production based on the original specification, it was, in effect, back to square one and it became its responsibility to find a welding procedure that would satisfy the original requirements. Indeed, had the client not given the waiver, this would always have been the case and the delay in finding the right procedure would have been entirely at its expense.

The contractor persisted with the full claim and pointed out that if the original specification was able to be revised, it should not have been imposed in the first place and was therefore unnecessary. If a test mentioned in the specification is considered to be unnecessary, then, technically, it must remain unnecessary. Although the client has every right to reintroduce the test, it should only be doing so at extra cost.

For the purpose of this exercise, we will concentrate on the contractual situation.

Summary

Phase I

All bidders attended the job explanation meeting with their teams of project engineers, cost/schedulers, estimators, and the like. The details of the

Charpy requirements were not mentioned separately, but were clearly stated in the specifications that were part of the contract. No comment was made by the bidders on this requirement either at the job explanation or bid clarification meetings.

Phase II

Welding procedures were qualified under shop conditions.

Phase III

Destructive test failed in field conditions.

Phase IV

Charpy requirement reduced to 27 joules. Production started again and continued for another 30 days.

Phase V

Contractor claimed \$800,000 for delay from the time production was halted to the time the waiver was given.

Phase VI

Government agency disallowed the waiver and insisted that the 45-joule test be reimposed.

Phase VII

Winter conditions set in during which time welding work was halted, but finally the original procedure was achieved and production began when the weather finally improved.

Notes:

The initial claim of \$800,000 over delay period of 15 days = \$53,334 per day = \$6,667 per hour assuming 8 hr/day.

Labor per hour =

20 welders @ \$40 = \$800

20 helpers @ \$33 = \$660

30 laborers @ \$30 = \$900

10 supervisors @ \$60 = \$600

TOTAL \$2,960

Rounded to \$3,000

Plant	\$1,500
Transportation	\$500
Accommodation and food	\$667
General overhead	\$1,000
TOTAL	\$6,667 per hour

Discuss the contractual implications only.

1. If the destructive test requirement is plainly in the specifications that are made part of the bid package and therefore part of the contract, is the client at fault by not specifically mentioning the Charpy requirement at the job explanation meeting?
2. If the severe Charpy test on the root weld is an unusual requirement even in the coldest climate, does this exonerate the contractor from the responsibility of attaining it?
3. Does the contractor's initial claim of \$800,000 have any merit considering that if the waiver had not been given, it would have to achieve the original requirement in any case?
4. Obviously, the client would have been better advised if it had consulted the government agency before granting the waiver, but because the object was to assist the contractor, was the client sufficiently at fault to warrant a claim from the contractor?
5. When it was plain that the waiver was not to be granted and the contractor eventually achieved the desired test in the field, it may be argued that this was possible and only what it should have done from the start. Is the contractor, therefore, entitled to a claim consideration for delay and disruption in the last phase?
6. Is there any merit in the contractor's point made previously that if the original specification was able to be revised, it should not have been imposed in the first place and was therefore unnecessary? Although the client has every right to reintroduce the test, it should only be doing so at extra cost.
7. In the Articles of Agreement to this contract there is a clause reading as follows:

For each day or part of a day by which the completion of the Work or the attainment of the milestones detailed in the Contract Schedule is delayed, Contractor shall, irrespective of Contractor

negligence, pay to Company an amount equal to 0.2% of the Contract Price for the Work or the value of the Work completed at achieving such milestones up to a maximum cumulative amount of 10% of the Contract Price. Such penalty for delay shall be recoverable from Contractor by any means available to Company under the terms of this Contract or at law.

Discuss this clause as liquidated damages relating to the preceding scenario.

9.4 Extra Work Dispute—Claim 4

9.4.1 Introduction and History of Events

This workshop exercise, as in all our scenarios, has been taken from an actual occurrence. The names, dates, and location have been altered to protect confidentiality. In this exercise, participants have been arranged in teams of contractors, clients, and “experts” who will adjudicate if required to do so.

The client has planned a ten million bbl/day crude oil loading terminal and decided to build the roads, administration block, school, living quarters, dining halls, commissary, recreation facilities, and all utilities in advance of the marine work. This is as a separate “design and build,” lump sum contract, the overall value of which is not relevant to this exercise but may be taken to be worth in excess of \$1 billion.

The location had a temperate climate in the summer and a cold, but not too severe, winter. Heating of all the buildings was provided for in the contract, but air conditioning or cooling was delayed and not made part of the lump sum. This was partly for economical reasons because the complete project of the terminal and the sea islands would not be finished for some years. It was decided that the contractor’s workforce and the vanguard of the client’s project staff would use the living quarters and some of the other facilities until the project was handed over, whereupon the remainder of the client’s staff would move in.

Although cooling of the buildings was not provided for in the lump sum, the contractor was required to examine the cooling situation and recommend the type of cooling to be installed. The contract carried the following instructions:

The provision of equipment for the cooling of the terminal buildings and the installation of the system will not be part of this Con-

tract. However, this Contract lump sum will include provision for engineering studies concerning space requirements for the proposed system, power requirements when dimensioning the power distribution system, and the substation main equipment. Contractor will also produce recommendations regarding the most economical method of cooling the entire terminal building layout and will provide the necessary drawings and documentation to be used at a later date.

The contractor recommended that the cooling system should be installed with the development of the buildings rather than at a later date because any attempt at installation when the buildings were completed would be uneconomical and would delay the project.

The recommended method provided for pumped sea water to be used in an open loop system to remove heat from a fresh water closed loop cooling main throughout the building complex. Cooled fresh water was to be pumped through the cooling main to fan coil units situated in the buildings where heat would be removed. The warmed water leaving the fan coil units would be returned to a cooling plant to be re-cooled and complete the loop. A sea water/cooling water heat exchanger plant was to be situated in the terminal area near the coast.

The contractor proposed that a change order should be issued to enable the work to proceed without delay and quoted a provisional sum of \$50 million for the supply and installation of the system.

The client sent a letter instructing the contractor to proceed but estimated that \$35 million would be an appropriate amount for the work. The contractor would not give way on its original price but by June 30, 1992 was in a position to present the client with a detailed breakdown of its original offer of \$50 million. No further advance was made in the settlement of a price and on April 27, 1993, Change Order No. 3 was issued for the extra work with the price still unsettled and to be advised. At the beginning of 1995 (21 months later), there was still no agreement on the price settlement for Change Order No. 3. In an attempt to alleviate the situation, the client agreed to fund the supply of pipe work and fittings, but when the contractor suggested that the supply of plant should also be funded by the client this suggestion was refused and payment terms reverted to monthly invoices.

There was a clause in the contract designed to break deadlocks of this nature and that read as follows:

All extra work done by order of Client shall be valued at the rates and prices set out in the Contract or in the breakdown of the Lump Sum Price. If the Contract or such breakdown does not contain any rates or prices applicable to the extra work, then suitable rates or prices shall be agreed upon between Client and Contractor. In the event of disagreement, Client shall fix such rates or prices as shall, in its opinion, be reasonable and proper.

If Contractor does not accept any rate or price fixed by Client as reasonable and proper, the dispute shall be referred to the Panel.

The Panel referred to in the preceding text is also mentioned in the contract as follows:

If any dispute or difference shall arise between Client and Contractor during the progress of the Work, such dispute or difference shall, at the instance of Client or Contractor in the first place, be referred in writing to and be settled by a Panel of three persons who shall state their decision in writing and give notice of same to Client and Contractor.

To maintain its schedule, the contractor had ordered the pipe work and plant and had begun installation through subcontractors on May 1, 1995. On June 30, 1995, the contractor wrote a letter to the client advising that the failure to agree to a lump sum price was causing delay to the work. On November 26, 1995, the client wrote as follows:

It is our view that the time is rapidly approaching when we will have no alternative but to fix the price under the relevant clause of the Contract. However, before doing so, we wish to give an opportunity of resolving this matter by mutual consent. We therefore make our final offer of \$40 million for the complete supply and installation of the cooling system, which sum includes all payments made to date.

The contractor rejected this offer.

On March 19, 1996, the client decided to base its payment arrangement on the preceding valuation. When monthly payments for the cooling system reached a total of \$40 million they stopped. The price stalemate continued until October 15, 1997, when the client finally fixed the price under the terms of the contract at \$40 million. Installation of the cooling system was finally completed on December 1, 1998, the alleged extra cost being funded by the contractor.

9.4.2 Contractor's Claim Position

At the time of issue of Change Order No. 3, the contractor had already prepared a schedule as follows:

Procurement of pipe work and plant	03.01.92–12.31.93
Installation and hydrotest of pipe work	06.01.92–12.31.95
Installation of plant	06.01.93–12.31.95
Commissioning of system	01.01.96–09.30.96

The contractor was ready to place orders and appoint subcontractors in accordance with this schedule, but was unable to do so without either the client fixing the price when presumably the contractor would appeal to the panel or the client agreeing with the \$50 million.

After months of negotiation, the price of the change order had not been agreed and the contractor was facing a commercial risk. Nevertheless, to progress the project, the contractor began procurement, awarded subcontracts, and commenced installation on May 1, 1995—almost three years after originally scheduled.

Of course, work was not at a complete standstill as the construction of the main onshore installation was still in progress, but to catch up on the cooling system work schedule the main installation workforce had, on occasions, to stand aside to allow the pipe work to proceed thus causing delay and disruption.

9.4.3 Summary and Significant Dates

- Main contract engineering study: 7.1.91–12.31.91.
- Approval period—1.1.92–1.31.92—following which all work carried out under Change Order No. 3 is paid on monthly progress without retention.
- Contractor quote breakdown for \$50 million: 06.30.92.

- Change Order No. 3 issued (no price mentioned): 04.27.9.
- Contractor starts procurement of pipe work: 02.01.95.
- Contractor started installation pipe work: 05.01.95.
- Contractor advises work delayed over failure to agree to lump sum price for extra work: 06.30.95.
- Client increases offer to \$40 million: 11.26.95.
- Contractor starts procurement of plant at own expense: 01.01.96.
- Contractor starts installation of plant: 05.01.96.
- Client fixes price at \$40 million (more than five years after instruction to proceed): 10.15.97.

See Figure 9.1 for a bar chart.

9.4.4 Cooling System—Breakdown of Contractor's Preliminary Estimate Given on 06.31.92

<i>Item Description</i>	<i>Qty/Time (hrs)</i>	<i>Rate (\$)</i>	<i>Amount</i>	<i>Total (\$)</i>
1. 300 mm dia. pipe work bolts coating, jointing, brackets	100,000	150	15,000,000	
2. 300 mm dia. ball valve	40	10,000	400,000	
3. 50 mm dia. ball valve	150	300	45,000	
4. 20 mm dia. ball valve	50	100	5,000	
5. Installation items 1–4	490,000	33	16,170,000	
6. Testing and commissioning	25,000	60	1,500,000	
7. General overhead			4,500,000	
8. Subtotal—pipe work				37,620,000
9. Cooling plant and pumps			10,000,000	
10. Installation	44,000	33	1,452,000	
11. Hire of heavy lift equipment			28,000	
12. Testing and commissioning	8,000	60	480,000	
13. General overhead			420,000	
Subtotal—plant				12,380,000
OVERALL TOTAL				50,000,000

9.4.5 Cooling System—Client's Fair Price Estimate July 1992

<i>Item Description</i>	<i>Qty (No./measure)</i>		<i>Amount</i>	<i>Total (\$)</i>
	<i>Time (hrs)</i>	<i>Rate (\$)</i>		
1. Pipe work and fittings at cost	100,000	120	12,000,000	
2. 300 mm dia. ball valves at cost	40	8,000	320,000	
3. 50 mm dia. ball valves at cost	150	240	36,000	
4. 20 mm dia. ball valves at cost	50	80	4,000	
5. Subtotal				12,360,000
6. Plus 15% markup (on items 1–4)			1,854,000	
7. Subtotal				14,214,000
8. Installation: (Items 1–4)	200,000	33	6,600,000	
9. Testing and commissioning	10,000	60	600,000	
10. Subtotal				7,200,000
11. Plant at cost			8,000,000	
12. Plus markup on plant (Item 11)			1,200,000	
13. Subtotal				9,200,000
14. Installation	40,000	33	1,320,000	
15. Hire of heavy lift equipment			28,000	
16. Testing and commissioning	7,600	60	456,000	
17. Subtotal				1,804,000
18. General overhead for pipe work and plant @ 7.5% (Items 1–16)				2,431,350
TOTAL				34,849,350
Rounded to:				\$35,000,000

9.4.6 Cooling System—Contractor's As Built Costs

<i>Item Description</i>	<i>Qty (No./measure)</i>	<i>Rate (\$)</i>	<i>Total (\$)</i>
1. Pipe work and fittings at cost	100,000	135	13,500,000
2. 300 mm dia. ball valves at cost	40	9,000	360,000
3. 50 mm dia. ball valves at cost	150	250	37,500
4. 20 mm dia. ball valves at cost	50	90	4,500
5. Installation subcontractor			19,500,000
6. Hydrotest			2,000,000
7. Commissioning			1,000,000
8. Plant at cost			9,000,000
9. Installation subcontractor			3,500,000
10. Heavy lift equipment			30,000
11. Testing and commissioning			500,000
TOTAL COST			49,432,000

When this part of Chapter 9 is used as a workshop exercise, the contractor's team may decide not to show the client's team the preceding financial numbers on the grounds that the client may be tempted to settle in this amount.

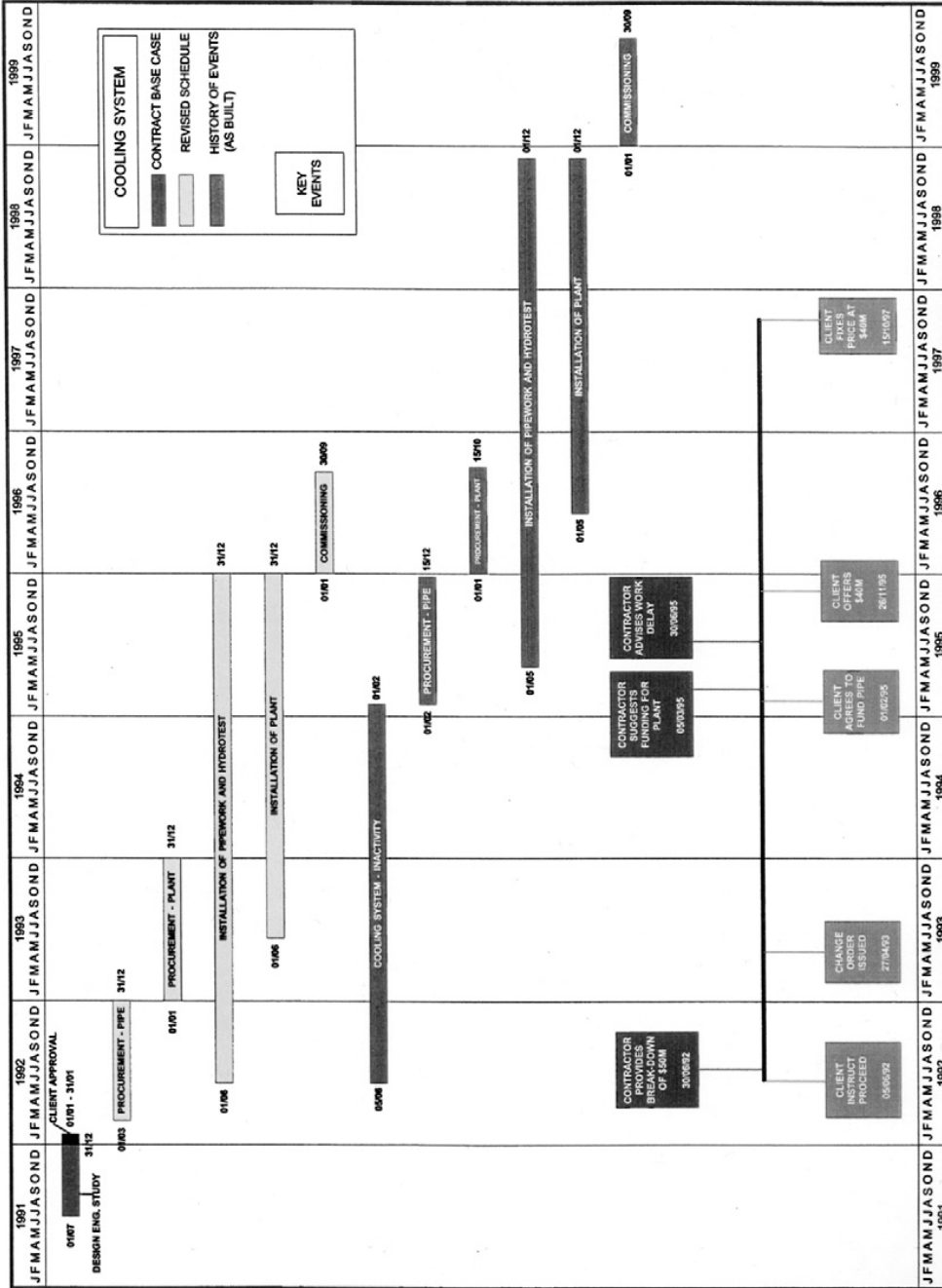


Figure 9.1 Schedule bar chart showing contract base case, revised schedule, and history of as built events.

9.4.7 Relevant Extracts from the Terms and Conditions of the Contract

Variations to the Work

The company has the right at any time to make any variation in the character, quality, kind, or quantity of the work or any part thereof that may in the company's opinion be necessary and the company has the right to require the contractor to do and the contractor shall do any or all of the following:

- (a) Increase or decrease the quantity of the work.
- (b) Omit any part of the work.
- (c) Vary the character or quality of any part of the work.

All such variations shall be made by means of a change order and shall, unless otherwise instructed by the company, not commence until the contractor has received the completed change order duly signed by a company representative.

The contractor shall, before it undertakes any variation in the work, inform the company of the effects, if any, such variations may be expected to have on the contract price and contract schedule. All of the contractor's obligations under this contract shall become applicable to such variations.

All extra work done by order of company shall be valued at the rates and prices set out in the contract or in the breakdown of the lump sum price. If the contract or such breakdown does not contain any rates or prices applicable to the extra work, then suitable rates or prices shall be agreed upon between the company and the contractor. In the event of a disagreement, the company shall fix such rates or prices as shall, in its opinion, be reasonable and proper.

If the contractor does not accept any rate or price fixed by the company as reasonable and proper, the dispute shall be referred to the panel of experts as provided for under Clause 67 of the Articles of Agreement. The contractor shall, in every case, continue to proceed with the work and the company, and the contractor shall give effect forthwith to every decisions of the panel.

9.4.8 Notes for the Teams

It is suggested that each team, contractor and client, select some members to concentrate on the contractual aspect and some to deal with number crunching, especially the contractor's team.

(a) The contractual situation:

- Read and understand the narrative, particularly extracts from the contract.
- Observe that work on the cooling system was a variation to the main contract. The only exception being a requirement to produce engineering studies concerning space for the proposed system and future power requirements together with recommendations and the provision of drawings and documentation, which may or may not have been used pending the client's decision. Therefore, the base case of the cooling system and that part of the main contract ended on 12.31.91. Had the client decided not to proceed with the cooling system, the main contract would have carried on without it.

(b) The consideration:

The contractor's claim or the client's counterclaim, if there is one, is unlikely to be successful on the basis of a global figure. For example, "Our claim is \$10,000,000 plus another \$3,000,000 for delay and disruption over and above the \$40,000,000 already paid." The client will, no doubt, require a breakdown of exactly how this figure is arrived at, supported by well-documented records. For the purpose of this exercise, a certain amount of relaxation of detail must be permitted and some imagination accepted. It is not required for items to be costed to the last cent and rounding off will be permitted. Calculations may be based on a 40-hour week, 8-hour day, and 2,080 hours per year. The contractor's selling price for labor will be at \$33/hour and supervision will be at \$60/hour.

The contractor planned to start procurement, which would also include appointment of subcontractors on 03.01.92, but had a period of inactivity from 06.05.92 to 02.01.95. During this inactivity there were no subcontractors appointed.

(c) The panel:

The panel will normally consist of up to three persons. They will have the authority to move around between the client's and the contractor's teams, listen to their discussions, and observe the direction of each team's deliberations. The panel will not attempt to advise the teams or relay details of the other's progress.

(d) The negotiations:

During the claim preparation and rebuttal, the teams will occupy separate rooms or areas to protect confidentiality. It is possible, but unlikely, that settlement will be achieved at the first meeting. There could be several meetings before an agreement is concluded.

In the event of a stalemate, the panel will consider both positions and will decide upon a solution that will be final.

Note: In the actual contract, the panel's decision was not final and the parties were free to seek a ruling from an arbitration tribunal or the courts. In this workshop exercise there will be no time for this.

9.5 The Great Asphalt Robbery—Claim 5

9.5.1 Confusion in the Choice of Contract Format

It has been observed that no construction contract of any substance is entirely claim proof and now and again one or two remarkable examples come to light that are true candidates for the contracts museum of horrors. In these gems, the contractor does not even have to claim, but just sits back and lets the money come to it!

A Middle Eastern contract was awarded for site preparation and paving. The contract had the familiar Articles of Agreement followed by a brief scope of work involving earthmoving about one million yards, bringing to grade, and paving with asphalt. The compensation section gave day rates for equipment and operators. There was no schedule in the contract.

The work progressed painfully slowly, but the contractor's invoices came in promptly every month based not on measurement, but on daily hire.

Somehow final grade was reached several weeks behind the client's schedule, but when the first part of the paving was attempted, it was below specification (also not in the contract) and although the contractor had the right equipment, it became obvious that the contractor was not very expert with it. The client's civil superintendent had the contractor do the paving over again.

When the invoice came in, including the second attempt, the client at first rejected it. The contractor objected. "You have my equipment on daily hire," he said, "it is the responsibility of your supervision to see that the work is up to specification. If it has to be done again, you should pay for it."

The client took another look at the contract. It seemed there was no obligation on the part of the contractor to do anything but supply and operate its equipment. The contract was, in effect, an equipment rental agreement.

“Alright,” said the client, “we will terminate your contract under the relevant clause in the Articles.” “You can’t do that,” replied the contractor, “I have a scope of work and I am entitled to be given the opportunity to finish it and since there is no specification in the contract, I cannot be in default for being behind schedule or out of specification.” In the event, the client had to buy the contractor out of his contract.

What had happened, of course, is that the contract engineer, who put the bid package together, started out with the intention of writing a normal equipment rental agreement, but got sidetracked into the inclusion of a brief scope of work and this altered everything. It should be observed that the work took place in a developing country where the client engaged indigenous contractors who possibly had the benefit of preferential treatment in these matters. However, this is not to excuse the contract engineer who drew up the documents and seems to have made a complete mess of it.

9.6 The Reimbursable Cost Offshore Bonanza—Claim 6

Caused by:

- (a) Insufficient preconstruction site investigation.
- (b) No preaward inspection of contractor’s equipment.
- (c) Lack of client control over cost and schedule.
- (d) Poor organization of contractor’s work program.

It is a small wonder that clients try to avoid agreements involving cost reimbursable contracts as this type of transaction can get wildly out of control even with a cooperative and not necessarily avaricious contractor doing the work. The whole object of the cost plus option is to have the contractor perform for a fee, fixed or otherwise, when the exact nature of the work is not fully disclosed and design and engineering completed is at a minimum.

Some cost reimbursable contracts are satisfactorily administered with strict financial control and frequent audit but now and then a company will embark upon a venture that develops into a nightmare of terrifying proportion.

Such a situation was encountered when a producer needed to extend gas lines from an onshore terminal to a sea island six miles offshore. Several methods were considered, but finally the accepted design involved a concrete trestle on driven concrete piles. The trestle was composed of

1,500 precast, posttensioned concrete cylinder piles, grouped in 250 bents with an average bent-to-bent span of 125 feet. The piles supported 300 precast pile caps weighing up to 240 tons each. The pile caps in turn supported 900 precast concrete girders as deck sections weighing up to 230 tons each.

A cost reimbursable contract was awarded to one contractor for the offshore concrete construction of the piles and trestle and a lump sum contract was awarded to a second contractor for laying the gas lines on the trestle.

Two factors were apparent at the onset. One was that the progress of the trestle construction would be controlled by the pile-driving rate and the other was that the schedule of the pipe-laying contractor would be governed by the progress of the trestle contractor.

The latter arrived on site with its fleet consisting of a jack-up pile-driving barge, a heavy lift barge, and various other tugs and barges. The estimated cost of the trestle contract was \$40 million.

Pile driving into the seabed proved more difficult than anticipated and it was decided to predrill the pile locations. A drill barge was engaged for this purpose together with more floating equipment. There were still severe problems with pile installation, but in addition the predrilled holes began to collapse and fill up with sand. Drilling mud was selected to prevent this and that necessitated more expensive equipment.

A test of grout pile installation procedure was conducted at one location and during installation the tug serving the grout barge ran aground and the barge drifted toward the shore. The pile barge set its hammer on the pile, waiting in this position for the grout to set. When the pile was released after two days, it fell over and on to the pile-driving barge.

Every offshore contractor can confirm that, troubles, once they arrive, come not singly but in battalions. So, the heavy lift barge went to the assistance of the pile driver and in the process damaged its crane boom. A supply barge went adrift and collided with one of the more successful pile-driving efforts, breaking off the pile below the mud line. A tug, towing a work barge needed to get to the other side of the trestle and rather than going all the way around the outboard piles, decided to steam under the trestle as a short cut. The tug made it through, but the work barge did not, colliding with the piles, knocking them over, and bringing down the trestle beams. It just happened that this was the first section to be given to the pipelay contractor so as not to hold him up unduly.

When the trestle was only 50 percent complete, its forecasted total cost was \$140 million, three and a half times as much as the original estimate. Nothing seemed likely to reduce this figure and so the work lurched on to some sort of conclusion.

9.6.1 Analysis

Basking in the wisdom of hindsight, it can be safely suggested that most of the extra cost of this fiasco and the pipelay contractor's inevitable claim could have been avoided by a thorough sea bed investigation before construction began. There should have been a better inspection and selection of marine equipment before contract award, the preparation of approved work procedures before startup, and a more efficient organization of the pipelay contract so that the contractor was not allowed access until a clear run was guaranteed and so on.

There were no incentives to control costs or to maintain a schedule. In fact, incentive seemed to be provided to do exactly the opposite as the further the schedule slipped, the more costs increased. The painful progress of the trestle contractor through its learning curve was paid for by the client. Nevertheless, the contractor profited through the rental of its equipment and the employment of its personnel, in addition to the fee.

9.7 The "Life" of the Contract—Claim 7 Caused by: Disagreement over Hourly Labor Rates

In most of the claims histories related in this chapter, it would seem that the client never wins and inevitably pays out. However, the battle is not always so one-sided. Here is one dispute that went to the very brink of arbitration.

It was a lump sum petrochemical plant construction contract and in accordance with normal practice, the bid package had included provision for hourly labor rates for changes and extra work. The unit rates for each discipline were supplied by the contractor in its successful bid. It is worth reproducing the page in the contract that deals with these rates for potential extra work and authorized contract variations:

HOURLY LABOR RATES FOR CHANGES AND EXTRA WORK

Contractor submits herein its all-inclusive Hourly Rates for all classifications of labor up to and including Supervisor. These rates shall be used to

calculate the Day Work Labor Rates for Changes or Extra Work where existing lump sum or unit prices do not apply.

Supervisor mechanical	\$55
Supervisor piping	\$50
Foreman mechanical	\$45
Foreman piping	\$45
Foreman rigging	\$45
Foreman scaffolding	\$45
Welder	\$45
Fitter	\$40
Millwright	\$40
Scaffolder	\$35
Laborer	\$30
Overtime: Monday thru Friday	Standard rate + 23%
Saturday	Standard rate + 33%
Sunday	Standard rate + 45%
Standby rate	95% of Standard time

The labor rates given in the preceding text include for the following:

- (a) Labor–Wages, piecework, other allowances (traveling, wet money, etc.) all statutory and other related charges such as National Insurance, Graduated Pensions, Insurances, Company Pensions, Holiday Pay, Sick Pay, Workmens’ Compensation and Employer’s Liability Insurances, Industrial Training Levy, Redundancy Payments Contributions, and any other similar charges.
- (b) Small tools such as ladders, chisels, hand saws, buckets, hammers, hard hats, protective clothing, and other items of a like nature.
- (c) Consumables—gases, welding rods, oils, lubricants, electricity, and other items of a like nature.
- (d) All maintenance charges on facilities, plant, and equipment used and required.
- (e) All supervision and management necessary.
- (f) All establishment charges, overheads, and profit.
- (g) All necessary engineering services.
- (h) All temporary facilities, personnel transport, and the like.
- (i) All delay and disruption caused as a result of performing work on an hourly rate basis.

This type of format is in general use throughout the petrochemical construction industry (although some contractors might question the last item [i]). The rate includes for all burdens, overheads, management charges, and profit. Contractors are usually quite happy to enter into hourly rate conditions because they are careful, at the bid stage, to negotiate rates that will bring them in a reasonable return over and above the lump sum consideration. Indeed, most contractors would be delighted to continue on an hourly rate basis for the remainder of the contract.

In the dispute we are presently examining, the project had fallen badly behind schedule mainly due to the late arrival of client-supplied material. The contractor proposed that the lump sum arrangement should be discontinued and the work should proceed on a “time and material” basis using the quoted hourly rates, but advised that the rates would no longer include for overheads and profit. When asked to justify this stance, the contractor explained that as the last milestone date in the schedule had been reached and passed through no fault of the contractor’s, the unit rates as quoted in the bid were no longer valid. The cost of overheads and profit were contained in the lump sum and were estimated to take effect only over the “life of the contract.” Because the last proposed milestone date had been passed, the amounts allowed in the estimate for burdens and profit had been consumed. Although the contractor would agree to continue work on a time and material basis using the existing unit rates, there would be no provision in the rates for staff above the field supervision, such as engineers and management and the cost of supporting this establishment.

The client’s view was that there is no contractual term that recognizes the “life of the contract.” According to the terms of the contract, the client had the right to order the contractor to continue with the work as long as there was work to be done and as necessary to complete the job in hand. The very purpose of the hourly labor rates was to accommodate extra work and extra work may mean running over the scheduled term of the project. There was no provision in the contract for altering the unit rates when the date of the last proposed milestone had been reached. There was also no escalation clause in the contract permitting the contractor to apply for an increase or a revision of rates after an agreed upon period of time. The contractor, upon signing the contract, had agreed to carry the hourly labor rates through to the satisfactory completion of the work. The client believed that the contractor was well aware of this fact at the time of bid. It would be beneficial if contracts could be completed on or before sched-

ule, but unfortunately this does not happen very often in the real world. Contractors know this and they also know that extra work generates extra profit and they develop their unit rates accordingly. During bid evaluation, the client examined the bidders' proposed unit rates very carefully as it was anticipated that there would be extra work. There was no indication that the contractor's proposed rates were not commercially sound, indeed, they were on a par with or even higher than the other bidders.

The client further pointed out that the Articles of Agreement in the contract give the client the right at any time to order changes in the contractor's work including increases and decreases. There is no provision that indicates that the contractor may abandon the work or impose changed rates for the reason of being time barred. The governing factor is that the contractor is still doing work and has not demobilized. The contractor is not entitled to declare that the contract is at an end. The contractor has a clear obligation to complete the work.

Both sides seemed to have reached stalemate at this point. Further meetings were apparently of no value at even the highest level. The Contractor indicated that unless its demands were met, there would be no choice but to abandon the project and withdraw its workforce.

The client responded as follows:

We have taken legal advice on this matter and it would appear that there is no possible ambiguity regarding the soundness of the relevant Contract clause. We are further advised that any attempt by you to abandon the work to the extent that we are obliged to make other arrangements would lead to a claim against you for substantial direct costs.

We do, however, recognize your entitlement to seek the appointment of an arbitration board and in order to assist you, we are prepared to confirm that acceptance by you of the Contract terms as interpreted by us does not in any way prejudice your entitlement to seek such an appointment.

We would suggest that the appropriate course is for the contractual works to be concluded by you with all possible and proper speed, at the conclusion of which, we will be prepared to discuss arbitration arrangements.

Regarding your declared intention to abandon the work unless your demands are met, we are further advised that this course of

action would certainly place you in Breach of Contract. In the event of abandonment we would be obliged to put the unfinished work out to tender and the resulting costs would be to your account. We would also claim for the costs of retaining our staff on site for the necessary period together with cost of claims from other subcontractors being delayed as a result of your action.

9.7.1 Analysis

The suggestion to convert the lump sum condition of the contract to a time and material arrangement came from the contractor, so obviously the conversion was acceptable to the contractor provided the hourly labor rate no longer included overhead and profit. This meant that the cost of management, engineers, site facilities, and transport plus profit would be extra to the rates. The contractor's case was based on the premise that the rates were originally calculated to include overhead and profit up to the scheduled completion date of the lump sum contract.

Presumably, if this date was not realized due to default by the contractor, then it may have been obliged to continue on the hourly rates as written in the contract. But the delay was occasioned mostly by failure of the client to deliver free-issue material on time. The "life" of the contract had expired according to the contractor and a new arrangement was in order. However, unless the contract specifically states otherwise, the scope of work must be completed. In the absence of an escalation clause, work must continue at the contract rates. An exception to this would be in the event that the client ordered work to be carried out that was completely unrelated to the scope of work. If, for example, the client proposed the building of a facility outside the perimeter fence for a purpose not connected to the plant process—a dock or a heliport perhaps.

The contractor has said that if its demands were not met it would abandon the project and withdraw its workforce from the site. Should this come to pass there is very little chance of the client obtaining any form of injunction to prevent this from happening and obviously it could not actually bar the contractor's exit from the site. Financial claims against the contractor would necessarily have to exclude all consequential loss, but could include all extra direct costs that could be quite substantial.

This case is deliberately paused at the brink of arbitration to enable you to make conjectures as to the likely outcome of the hearing.

9.8 Unproven Technology—Claim 8 Caused by: Lump Sum Format Without Preengineering

An important and expensive lump sum contract was planned for the construction of an automated plant. The design engineering had progressed to the extent that a hard money contract could proceed without difficulty except in one section of the work.

There was a requirement for a fleet of unmanned mobile units, rather like intelligent golf buggies that would operate along guidance tracks to perform inspection and maintenance tasks throughout the plant at predestined stops. Preliminary designs involved rail-mounted units but this idea, although the least expensive, was rejected in favor of battery-powered vehicles moving along a *buried wire* guidance path. On occasions, the units would be required to move away from the track, either under remote control or manual steering, hence the second thoughts on the rail-mounted plan.

The client's outline design, which required development by the successful bidder, involved guide cables laid in the concrete floor throughout the plant that would carry a weak alternating current around which an electromagnetic field would be generated. This would induce alternating voltages in antenna coils centrally mounted on the front of the vehicles. These voltages would then compute from the signal the necessary correction of steering angle to make the appropriate adjustments to the steering wheels. The onboard computer would control the stops and tasks of the machine.

The client did not wish to depart from the lump sum concept of the rest of the contract although the client could and perhaps should have made a separate cost reimbursable agreement for the design and supply of the vehicles.

Part of the *buried wire* system could easily be included in the civil works because the route of the buggies was known and planned in advance. This left only the vehicles themselves for which there was just a rudimentary design.

Bidders were invited to quote for the complete work (civil, mechanical, electrical, instrumentation) and for the vehicles. The scope of work included, but was not limited to, design engineering, prototype development, construction, and installation. The successful bidder, in accepting the design and supply of *unproven technology* was also accepting the risk of producing a system within the lump sum price.

From the contractor's point of view, it was obliged to provide a method that performed adequately and carried out its intended tasks efficiently,

but at the least cost to the contractor. The contractor did not intend that the client should have the very best system procurable at whatever the cost to the contractor in designing, developing, and supplying such a system.

The number of buggies had not been specified in the contract as the intention was that the client would be buying the overall system and the contractor would supply such a system to be fit for its intended purpose.

Obviously, it became in the contractor's interest to minimize both the number of buggies and the refinement or *extras* being built into them.

In accordance with the terms of the contract, both sides were obliged to seek and arrive at a balanced solution. That is "balanced" between the very best possible and a suitable and working system. The actual words in the contract were as follows:

It is recognized by the parties to this Contract that the process of developing and finalizing the design of the work will require the closest consultation, cooperation, and coordination between them. It is further recognized that it will be necessary for the parties to develop and agree to methods and procedures to enable that process to be carried out. It will also be necessary to ensure that the Work represents a balanced solution in terms of capital cost without increasing the Lump Sum Price or extending the completion date, provided that such developing and finalizing remains within the Scope of Work of the Contract.

The system was designed, built (by subcontract), and installed with very few hitches and to this day the little buggies are running around the track happily carrying out their automated tasks.

The contractor's problem was that it was costing more to install the system than allowed for in the total lump sum. The design and development work involved in arriving at a suitable electronic guidance method together with the installation of the manipulative gadgets on the buggies proved far more expensive than the contractor had anticipated and certainly more than a conventional rail-mounted system would have done. The contractor also maintained that features were included that were not strictly essential to performance efficiency. In other words, the client had insisted on Rolls Royce quality when a less expensive model would have suited perfectly well in performance and endurance. There was no "balanced" solution as originally intended.

The contractor maintained that it only agreed to carry out this part of the work for a lump sum on the basis that there was certainty as to the work and the obligations to be performed. The client had produced the outline design and although the contractor had agreed that it was to be responsible for the subsequent design phases through final design, the contractor maintained that the client's role was to approve each phase and if there were extra requirements, to issue a variation order. Instead, the client had insinuated refinements under the guise of suggestions or safety measures and when the contractor raised objections, it had delayed approval and progress payments until the time taken over submitting and resubmitting designs was encroaching on the critical path of fabrication. In addition, the client had frequently failed to provide information required by the contractor at each stage of design, interfered in the design process on a continuing basis, and refused to observe the contractual time limits for the return of comments on documents submitted.

The contractor intended that the lump sum work would be based upon proven technology in that the contractor would be able to foresee the consequences as to time and cost, of integrating, adapting, and committing such technology to meet the requirements of the project. However, the client required the contractor to exceed the limits of such proven technology while at the same time reasserting the lump sum price constraints upon the contractor. The contractor argued that the validity of the lump sum price provision is regarded as dependent on the continued existence of the fundamental bases upon which it was originally contemplated that the contract would be performed. Once those circumstances change, the condition ceases to be satisfied and the fixed price provisions cannot be relied upon. Furthermore, the contractor held, the risk inherent in a lump sum price contract is balanced by the circumstances in which the parties intended that the contract should be performed. If these circumstances change and the balance is upset, the lump sum price ceases to be applicable.

The contractor entered a claim for the difference between that part of the lump sum set aside for the vehicles and the actual cost plus profit plus a further sum for delay and disruption not only to the design, development, and installation of the vehicles, but by "domino" effect on the overall project.

The client rejected the claim in its entirety and defended its position as follows:

- (a) Any embellishments that the contractor may have added during the design process were all part of the natural development of the work, even if the client had added a suggestion or two.
- (b) The client's preliminary outline design was not intended as a tender document, but as an indication of the client's approximate requirements. It is not a condition that a lump sum project should be defined to any particular degree of precision at the time of contract formation.
- (c) Any delay and disruption arising from development of the design was not as a result of any failure by the client, but was the direct result of a general failure by the contractor to adequately perform its obligations. Regarding the "domino" effect, it is standard practice on construction projects to assess the changes and delays that occur during the design and construction to determine if they have caused or will cause any impact to the overall project. To the extent that the project has experienced delay and disruption, it had been caused largely by the contractor's failure to design a system that satisfied the contract's performance requirements.
- (d) The client did not wrongfully interfere with the design process, but simply insisted on an adequate workable design. That it took more time and money to produce such a design is testament to the inadequacy of the contractor's initial efforts.
- (e) The contractor's account is misleading in that it suggests that the client "instructed" the contractor to carry out design alternatives. The client did not issue instructions; it merely made a request to which the contractor agreed.
- (f) The contractor ignores its own shortcomings with respect to any delay in the design process. In many of the instances in which the contractor contends that the client changed its requirements, the client was simply rejecting the contractor's inadequate design.
- (g) The contractor had no intention of fulfilling its obligation to provide a balanced design, but prepared a design that would result in the lowest capital expenditure that could in any way be argued to comply with the contract's performance requirements.
- (h) Rather than interfering with the design process, the client had worked hard to assist the contractor, frequently helping it to solve

its own problems, suggesting viable technical solutions, and assisting in design coordination.

- (i) The contractor claims that design solutions involving anything other than “standard equipment” or “standard design” involve the use of *unproven technology*. This is an oversimplistic presentation of the realities of construction projects and mechanical engineering design. Some aspects of a project will inevitably call for a unique solution for which special equipment has to be designed and developed. This does not mean that the materials, components, mechanical principles, or design methods used in developing that equipment are *unproven*. The *buried wire* guidance system uses proven principles and only the vehicles need development, although much of this work is already proven technology. The client was entitled to expect a design developed in accordance with good up-to-date engineering practice.
- (j) The contractor claimed that any “investigation” of an alternative design should be treated as extra work; whereas the client held that it was a quotation for extra work to be made into a change order in the event that the alternative design was adopted. If it was not, there was to be no change order.
- (k) Finally, the client maintained that the contractor had made a great deal of money on the bulk of the contract and even if it lost some on the vehicle design, development, and supply, it was more than compensated through the remainder of the work.

9.8.1 Analysis

It would be irrelevant to dwell too long on the folly of entering into a lump sum agreement without the benefit of at least some design engineering. It was done in this case history and judgment may only be made on the facts outlined in the preceding text.

The choice was open to the client to arrange separate design and construction contracts for the vehicles, but it chose not to do so, preferring a single design and build-type hard money contract and thus accepted the possibility of constraints on design and construction.

The client has offered a good defense against the claim and was doing reasonably well until it mentioned that the contractor had made a large profit from the civil, mechanical, and electrical part of the contract so the contractor could afford to lose on the vehicles. The client should not have

argued in this direction. In a lump sum contract, the contractor's cost is no business of the client. Even if the contractor had made a large profit out of the vehicles as well, it would still be entitled to bona fide variation orders or payment of a genuine claim.

If the contractor can observe the performance requirements with a lower level of quality and services in its design, then it follows that it is free to do so without reduction in the contract price. Equally, if a higher level is required to meet the performance criteria, then the contractor must provide it without additional recovery.

The client is correct on the subject of *unproven technology*. It is difficult to imagine how the contractor can succeed with this line of argument. The only major difference between the original conception of the rail-mounted vehicles and the *buried wire* guidance system is the method of keeping the vehicles on their intended paths and both these methods have been used before and are therefore proven technology.

The part that gave the contractor trouble was the manipulative arms and gadgets on the buggies, but these were intended for installation on both the rail-mounted and the wire systems.

The whole nub of the argument seems to lie in the contractual agreement to arrive at a balanced solution. The expression is out of place in a formal arrangement. It cannot be precisely defined and expects too much of either party to adhere to it. Obviously, the client wants the best possible equipment for the purpose and the contractor does not want to spend too much time and money in producing anything but an adequate system that will perform satisfactorily.

The contractor acknowledged that it was to be responsible for the design phases from contract award and insisted that the client should have approved each phase as submitted. If the client wished to add or alter anything, these additions and alterations should have been the subject of variation orders.

This attitude seems to have ignored the "balanced solution" philosophy, but in any case the contractor did not mention that it had submitted change order proposals that had been rejected. The accusation that the client did not respond to submittals within the time limits imposed by the contract has more substance and would support the claim for delay and inefficient working.

On balance, it would seem that the client has a stronger case than that of the contractor and the argument that circumstances had changed to the

degree that the lump sum price was no longer applicable would not appear to be completely logical.

Under the admittedly exceptional terms of the contract with its “balanced solutions,” surely the client is entitled to comment on the contractor’s proffered designs without causing delay and disruption provided it does so within the contractual time limit. If, in fact, there is no contractual time limit then the client cannot be held in breach for anything other than unreasonable delay.

Manuals and Models

10.1 The Quality Manual

The project quality manual produced by the contractor will include the QA and QC programs. The format and content of this manual should cause no problem for the experienced contractor and the client will expect that a firm written policy on quality is already in existence and an established part of the contractor's organization. The contractor's QA program should provide the client with confirmation that adequate measures have been taken to perform the assigned construction activities in accordance with the terms, conditions, and requirements of the contract documents. QC is the management of the activities of the contractor and its suppliers and subcontractors to comply with the requirements of the contract specifications.

The client will usually insist that the QA/QC manager has a direct line of approach to the contractor's representative or whoever is the contractor's senior manager on the project. The QA/QC manager will plan and maintain the quality programs and quality audits and will have the authority and responsibility for assuring that all phases of the quality manual are implemented. He will also be empowered to stop work in areas that have a quality problem, in the same manner as the safety officer will halt unsafe practices until they are rectified.

The manual will usually begin with a declaration of the contractor's policy on QA/QC and will explain the various responsibilities of the contractor's staff in connection with the implementation of the manual requirements. The manual may contain one or two pages of relevant definitions and also include the contractor's organization chart for its QA/QC department. The manual will deal in sufficient detail with document control and distribution, materials and process control including certain aspects of purchasing, source inspection, material receipt, and issue and identification. The remainder of the manual will be concerned with the technical details of the work according to the contract and will conclude with descriptions of reporting and auditing methods, corrective actions, and the transfer of final records and *as built* documentation to the client.

10.2 The Project Proposal

There is one other volume issued by or on behalf of the client, perhaps by the design and engineering contractor. It is made available to the more important contractors on a large project and although it is not mentioned in any contract documents nor indeed has any strict contractual value, it is nevertheless worth considering in these pages. It is known as the *project proposal* and it provides detailed design information on the complete facilities or plant, including requirements applicable to mechanical features and construction materials.

Let us assume that a major operator has decided to build a new plant and has issued a project proposal. The introduction will include a general description of the facility and of the planned engineering and construction work to be carried out. The type and quantity of feedstock will be mentioned together with the major products expected. The location of the various production areas to be constructed will be explained, as will the overall master schedule, milestones, and proposed completion dates. Flow diagrams, storage and terminal facilities, and utilities (including electric power distribution, process water, and gases) will receive mention together with general support facilities, administration buildings, roads and fencing, location of heliports, and so forth.

The introduction will be followed by a detailed project description with plot plans and technical data of the facilities, area by area, including utilities, buildings, pipelines, instrumentation and control, data logging systems, and communication system. Unless the units are protected by patents, the details of which are not to be divulged, chemical processes

will be explained, including the reasons for the employment of special materials in construction.

Not all contractors will be allowed access to the project proposal and its issue will be on a strict “need to know” basis. There is no doubt of its interest and value, particularly to the mechanical contractor. Even to the smaller cogs in the system, the acquisition of a bootlegged copy gives the possessor some idea of what he is helping to create.

The project proposal should not be confused with any document issued during the bid stage, either by the client or by the bidding contractor.

10.3 The Project Record Book

This book is a bound collection of drawings and data relating to the project that the contractor is required to furnish as a ready reference for all important equipment items installed in the work. It is intended to assist in the initial start-up of the plant and to aid client personnel in subsequent operation, maintenance, and inspection. It also provides information necessary for future checks of equipment performance or for planning of plant expansion or redesign. The book will be used as an additional reference together with the project drawings, *as built*, and specifications and will contain other important information not found in these documents (e.g., vendor drawings and data sheets, manufacturers’ information sheets, etc.).

10.4 The Construction Control Plan

This manual is produced by the client’s construction team for the guidance of its field staff in the day-to-day supervision of the contractor’s work. Each contract in the project that involves substantial hands-on construction work will have a construction control plan produced as part of the QC system. The extent to which the contractor is made responsible for QA/QC activities varies from project to project but generally there are three levels of control.

- First, the contractual requirement that the contractor is fully responsible for its own QA/QC activities until released from the contract.
- Second, the responsibility of the client or management contractor’s site team and is performed by site inspectors for each discipline.
- Third, the responsibility of the project’s QA/QC department to verify and audit all construction control activities.

The manual will include the scope of work for the relevant contract, job descriptions and duties of all supervisory field staff, and samples and explanations of all forms used in the control process.

10.5 Appendix 1 Model Contract Document

10.5.1 Standard Contract Forms

The Contract document will consist of eight parts as follows:

Part 1	Articles of Agreement
Part 2	Scope of Work
Part 3	Master Schedule
Part 4	Payment details
Part 5	Company-supplied materials and equipment
Part 6	List of specifications
Part 7	List of drawing numbers
Part 8	Special terms and conditions

10.5.2 Part 1 Articles of Agreement

1. Definitions

For the purpose of the Contract, the following titles shall be defined as follows:

Company shall mean The Crude Oil Company Incorporated.

Company Representative shall mean the representative appointed from time to time by the Company in writing to act in such capacity for the purpose of this Contract.

Company Furnished Items shall mean the materials and equipment listed in Part 5.

Contractor shall mean Acclaim Contracting Incorporated.

Contract shall mean this contract including all parts but excluding all annexes hereto.

Contract Parts are as follows:

Part 1	Articles of Agreement
Part 2	Scope of Work
Part 3	Master Schedule
Part 4	Payment details

- Part 5 Company-supplied materials and equipment
- Part 6 List of specifications
- Part 7 List of drawing numbers
- Part 8 Special terms and conditions

In the event of any conflict between the provisions of any of the Articles of Agreement of this Contract and the provisions of the other parts, the provisions of the Articles of Agreement shall prevail.

Contract Price shall mean the agreed upon compensation specified in Part 4 of this Contract, as such sum may be increased or decreased in accordance with this Contract.

Contract Schedule shall mean the schedule for the Work as described in Part 3 of this Contract or as it may from time to time be amended in accordance with this Contract.

Contractor's Representative shall mean the representative appointed from time to time by the Contractor in writing and approved in writing by the Company's Representative to act in such capacity for the purposes of this Contract.

Completion Certificate shall mean the certificate issued by the Company's Representative denoting completion of the work as provided in these Articles.

Drawings shall mean the drawing numbers referred to in Part 7 of this Contract. Such drawings may from time to time be supplemented or amended in accordance with the terms of this Contract.

Facilities shall mean all such property, services, and equipment as may be needed by the Contractor in order to perform the Work including, but not limited to, the site, workshops, equipment, stores, offices, accommodations, and temporary works.

Final Acceptance Certificate shall mean the certificate issued by the Company's Representative denoting the expiration of the Guarantee Period as provided in these Articles.

Guarantee Period shall mean the period described in these Articles.

Permanent Works shall mean the completed construction of _____ as described in Part 2 of this Contract.

Quality Assurance Program shall mean Contractor's written description of systems, plans, organization, job instructions, and control measures that will be used to ensure that the required quality will be achieved in performing the Work. The description shall relate to all aspects of the Work execution

including, but not limited to, Work planning, Work management, Work instruction, quality control, inspection, testing, safety, and documentation.

Site shall mean the place or places where the Work or any part thereof as described in Part 2 of this Contract shall be performed.

Specifications shall mean the specifications referred to in Part 6 of this Contract. Such specifications may from time to time be supplemented or amended in accordance with the terms of this Contract.

Subcontract shall mean a Contract entered into between the Contractor and any person or company in the manner and to the extent permitted under the terms of this Contract.

Work shall mean all work to be performed in accordance with this Contract.

2. Company Obligations to the Contractor

The Company shall, in accordance with the terms and conditions of this Contract:

2.1 Make available to the Contractor information necessary to the satisfactory performance of its work.

2.2 Provide permanent materials and equipment for the Work in accordance with Part 5 of this Contract.

2.3 Obtain all permits, licenses, and other authorizations that must be obtained in the Company's name and that are necessary for the performance of the Work.

2.4 Allow the Contractor access, subject to normal security and safety regulations, to the Work site as required for the performance of the Work.

2.5 Provide such security at the Work site as is to be provided by the Company.

2.6 Appoint a Company Representative.

2.7 Perform all other obligations required of it by the terms of this Contract.

3. Contractor Obligations to the Company

The Contractor shall, in accordance with the terms and conditions of this Contract:

3.1 Carry out the work in a professional and diligent manner to achieve the timeframe and milestones specified in the Contract schedule.

3.2 Provide permanent materials and equipment for the Work that are to be provided by the Contractor in accordance with the Contract.

3.3 Obtain prior to commencement of the Work and at the Contractor's cost, all necessary information regarding taxes, laws, and regulations and other conditions for carrying out the Work.

3.4 Obtain all permits, licenses, and other authorizations that are necessary for the performance of the Work except those that must be obtained in the Company's name.

3.5 Provide support facilities, construction plant, and each and every item of tools and equipment as required by this Contract.

3.6 Provide all of the labor and supervision required to perform the Work.

3.7 Provide such security at the Work site as is to be provided by the Contractor.

3.8 Provide *as built* drawings to facilitate operation and maintenance of the completed Work.

3.9 Appoint a Company Representative for the duration of the Work.

3.10 Perform all other obligations, work, and services as required by the terms of this Contract.

4. Contractor Personnel

4.1 The Contractor shall provide sufficient competent and fully qualified supervisory personnel to execute the Work in the manner and within the time required by this Contract.

4.2 Upon the Company's written request, the Contractor shall, at its own cost and expense, remove from employment in the Work any Contractor personnel determined unsuitable by the Company.

4.3 The Contractor personnel assigned for the performance of the Work and approved by the Company shall not be removed or transferred by the Contractor without the prior approval of the Company Representative.

5. Contractor Site Investigation

5.1 The Contractor agrees that it has thoroughly investigated and satisfied itself as to the general and local conditions affecting the Work or has had the opportunity to do so, including but not limited to, transportation and access to the Work site including the availability and conditions of roads, disposal, handling and storage of materials, availability and quality of labor, water and electricity; climatic conditions, tides, and ground water; and equipment, machinery, and materials required by the Contractor prior to and during performance of the Work.

5.2 The Contractor agrees that it has thoroughly investigated and satisfied itself as to the condition of the Work site and approaches to the site including but not limited to, topography and ground surface conditions, subsurface geology, and the nature of surface and subsurface materials and obstacles to be encountered such as buried pipelines, in service or abandoned, drainage systems, and the like.

6. Duration of Contract and Work Schedule

6.1 The Contractor shall commence performance of the Work on the appropriate date set forth in the Contract schedule and shall continue the same in an expeditious manner and in accordance with the completion date and the milestones set forth in the Contract schedule. Should the Work extend beyond the scheduled completion date for whatever reason, the Contract will remain in full force and effect until termination under the terms of the Contract.

6.2 The Contractor acknowledges and agrees that actual delays in activities that, according to the baseline schedule, do not affect any milestone or completion dates shown by the critical path in the schedule, do not have any effect on the Contract completion date or dates and therefore will not be a basis for a change therein.

6.3 The Work shall be considered to have reached “mechanical completion” when the permanent works described in the Contract Scope of Work, or a portion or portions thereof, have been mechanically and structurally put in a tight and clean condition and otherwise constructed as provided in the Contract and all deficiencies, including those that could prevent or delay safe and orderly pre-start-up or start-up procedures by the Company or timely achievement of permanent Works operation at the conditions specified in the Contract, to the extent that such deficiencies may be determined, have been corrected.

6.4 The Contractor shall notify the Company Representative of possible delays to the schedule or achievement of milestone date or dates for whatever reason. Notification must be in writing and made within 24 hours of the date the Contractor first had cause to believe that the performance of the Work may be delayed. Such notification will include:

- (a) The amount of delay the Contractor considers will or could be incurred.
- (b) Any remedial action the Contractor proposes to adopt to avoid delay.

6.5 If at any time during the performance of the Work, the Company considers that the Contractor's progress is insufficient to meet or keep pace with the schedule, the Company may instruct the Contractor to take the necessary action to improve its progress. Should the Contractor's performance not improve within a reasonable period following this instruction, the Company may instruct the Contractor to increase its labor force, number of shifts, introduce overtime work, and/or additional days of work per week at the Contractor's expense.

7. Variations to the Work

7.1 The Company has the option at any time to make changes within the general scope of this Contract including, but not limited to, changes in the sequence of performance of the Work, alterations to or in the design of the permanent Work, or increase or decrease the quantity of the Work, and the Contractor shall perform the Work as changed.

7.2 Changes to the Scope of Work shall be made in writing by means of a Work Order where there is a fixed price or agreed unit price in Part 4 of this Contract and in accordance with the conditions governing the issue of a Work Order as described in Procedure No. ___ that, by this reference, is made part of this Contract.

7.3 Changes to the Scope of Work shall be made in writing by means of a Change Order where there is no fixed price or agreed unit rate in Part 4 of this Contract and in accordance with the conditions governing the issue of a Change Order as described in Procedure No. ___ that, by this reference, is made part of this Contract.

7.4 Where a change does not affect the Scope of Work or affects the Scope of Work but of sufficient substance to warrant a fully executed codicil to the Contract or changes the Articles of Agreement after the initial execution of the Contract, the change or addition shall be made in writing by Contract Amendment in accordance with the conditions governing the issue of a Contract Amendment as described in Procedure No. ___ that, by this reference, is made part of this Contract.

7.5 All the Contractor's obligations including guarantees contained in this Contract shall become applicable to each and every variation.

7.6 Any variation made necessary directly or indirectly by any error or omission of the Contractor shall not constitute a change in the Work and shall not affect the Contract Price or Contract schedule.

8. Guarantees, Remedy of Defects, and Final Acceptance

8.1 The Contractor warrants that it shall perform the Work in a professional and workmanlike manner and that the permanent works as constructed shall conform to the final Drawings and Specifications and shall be free of defects, suitable for the purposes intended and not defective.

8.2 The Guarantee period shall commence at the issuance of the Completion Certificate and expire __ months thereafter or __ months after the Permanent Works have come into commercial operation, whichever period shall first expire. If at any time prior to the Final Acceptance of the Permanent Works by the Company or within the period specified in this Contract thereafter the Company discovers that the Permanent Works as constructed by the Contractor do not conform with this warranty, the Contractor shall, after receipt of notice in writing from the Company, promptly perform or arrange for the performance of any remedial work required to make the Permanent Works conform to this warranty. Such remedial work shall be performed to the Company's satisfaction and at the Contractor's expense.

8.3 If the Contractor repairs or replaces any part of the Permanent Works, the provision of this guarantee shall apply to any part of the Permanent Works so repaired or replaced. The Guarantee Period for any part of the Permanent Works that is repaired or replaced shall be extended with the number of days that has passed from the issuance of the Completion Certificate until said part of the Permanent Works are repaired or replaced.

8.4 Upon expiration of the Guarantee Period, the Contractor shall request from the Company's Representative, a Final Guarantee Certificate. Within 30 days of such request, the Company's Representative shall issue to the Contractor a Final Acceptance Certificate in respect of the Work. No certificate other than a Final Acceptance Certificate shall be deemed to constitute approval or acceptance of the Work.

9. Drawings and Specifications

9.1 Contractor shall keep at the Work site a copy of all drawings and specifications as amended from time to time. Anything mentioned in specifications and not shown on drawings, or shown on drawings and not mentioned in specifications, shall be of like effect as if shown or mentioned in both.

9.2 During the performance of the Work, the Contractor shall maintain a set of construction drawings to reflect the current *as built* status of the Work. The Contractor shall submit to the Company one set of final trans-

parencies redrafted to reflect all changes to the Permanent Work prior to the submission of the Contractor's final invoice to the Company.

10. Tests, Inspections, and Measurements

10.1 All materials and workmanship to be provided by the Contractor under the terms of this Contract shall be subject to such tests, inspections, and measurements at such locations as the Company's Representative may direct. Except as may otherwise be expressly provided in this Contract, the Contractor shall provide all such assistance, instruments, machines, labor, materials, and consumables as are requested for the tests, inspections, and measurements.

10.2 The cost of making any inspection, measurement, or test referred to in Article 10.1 hereof shall be borne by:

- (a) The Contractor, if the test, inspection, or measurement is provided for in the Specifications and/or Scope of Work—Part 2 hereto.
- (b) The Company, if the test, inspection, or measurement is not provided for in the Specifications and/or Scope of Work—Part 2 hereto.
- (c) If the test, inspection, or measurement is provided for in the Specifications but is ordered by the Company Representative to be performed by an independent third party at a place other than at the Work site or at the place of manufacture or fabrication of the items to be tested, inspected, or measured, then the Contractor's payment shall be adjusted by the incremental difference between the cost of the planned test, inspection, and measurement under Article 10.2.a and the cost of the test, inspection, and measurement ordered under this Article 10.2.c, provided, however, that the Contractor shall bear the cost of any test, inspection, and measurement that reveals that the tested, inspected, or measured item does not conform to the requirements of the Drawings or Specifications.

10.3 The Contractor shall, at its cost, furnish to the Company's Representative testing samples of such of the materials to be used in the Work as the Company's Representative shall specify.

10.4 No part of the Work shall be covered up or put out of view without the approval of the Company's Representative. The Contractor shall give advance notice to the Company's Representative whenever any such part of the Work is ready or about to be ready for examination. The Contractor

shall afford full opportunity for the Company's Representative to test, inspect, and measure any part of the Work that is about to be covered up or put out of view.

10.5 The Contractor shall uncover such part of the Work or make openings in the same as the Company's Representative shall direct in writing and shall reinstate and make good the same to the satisfaction of the Company's Representative. All costs of providing such access and of reinstatement shall be borne by the Contractor if:

- (a) The Contractor failed to advise the Company's Representative that such part of the Work was about to be covered or otherwise failed to afford to the Company's Representative access to such part. Or,
- (b) Upon uncovering such part of the Work, such part contains a fault, defect, or imperfection requiring correction that arises from the Contractor's failure to perform such part of the work in accordance with this Contract.

10.6 The Contractor shall at all times control the quality of the Work and be prepared to explain and defend the Work at the request of the Company's Representative to such governmental, testing, inspecting, and/or verification authorities or agencies. The Contractor shall, at its cost, perform and document the Work in such a manner as to permit the timely verification thereof (or of any relevant part thereof) by such authorities.

10.7 The Contractor shall inform its vendors and its subcontractors that all materials, equipment, and workmanship are subject to the previously mentioned inspection, testing, and/or verification and approval or rejection by the Company's Representative.

10.8 Neither failure of the Company's Representative to make any inspections, tests, or measurements nor failure to discover faults or defects in connection with such inspections, tests, or measurements shall be deemed to imply acceptance of the Work or any portion thereof or in any way relieve the Contractor from the responsibility for the accuracy or adequacy thereof.

11. Liability and Insurance

11.1 Subject to the terms and conditions of this Contract, the Contractor shall defend, indemnify, and hold the Company harmless from any and all claims, losses, expenses, costs, or damages arising from or related to the

injury to or death of any person and the damage to or loss of any property resulting from any and all acts or omissions of the Contractor, its Subcontractors or the personnel or agents of any of them.

11.2 The Company shall release, indemnify, and hold the Contractor harmless from all claims by the Company for injuries or death of employees of the Company or loss or damage to the Company property or the Permanent Works to the extent that such claims, losses, expenses, costs, or damage are not recoverable under insurance policies purchased by the Contractor in accordance with the requirements of this Contract.

11.3 The Contractor shall procure and maintain at all times during the term of this Contract the insurance policies described below:

11.3.1 Such Workmens' Compensation and Employer's Liability Insurance as shall be necessary and adequate to cover all the Contractor's personnel while engaged in the Work.

11.3.2 Comprehensive Bodily Injury and Property Damage Liability Insurance covering all the Contractor's work under this Contract.

11.3.3 Public Liability and Property Damage Insurance covering the Contractor's owned or hired vehicles and equipment.

12. Suspension of Work

The Company may at any time, with or without cause, suspend performance of all or any part of the Work by giving the Contractor prior notice in writing specifying the Work to be suspended and the effective date of such suspension. Such suspension may continue for a period of up to ___ calendar days after the effective date of suspension during which the Company may direct, in writing, the Contractor to resume performance of the Work. The Contractor shall take all actions necessary to maintain and safeguard the suspended Work. The Company shall not be liable for loss of anticipated profits or for any damage or any other costs incurred with respect to suspended Work during the period of suspension, except for reasonable and auditable costs that:

- (a) Are incurred for the purpose of safeguarding the Work and materials and materiel in transit to or at the Work site.
- (b) Are incurred for such Contractor or Subcontractor personnel or equipment that the Contractor continues to maintain, at the Company's request, at the Work site.
- (c) Are otherwise reasonable and unavoidable costs of suspending the Work and of reassembling personnel and equipment.

If at the end of the ___ calendar days period the Company has not required a resumption of the Work, that portion of the Work that has been suspended shall be deemed terminated as of the effective date of suspension unless the Company and the Contractor shall agree to a further extension of the suspension period.

13. Termination at Company Option

13.1 The Company may terminate this Contract or any part of the Work by giving notice in writing to the Contractor specifying the Work to be terminated and the effective date of termination.

13.2 Should the Company give notice to terminate this Contract or any portion of the Work, the Contractor shall stop performance of the Work involved on the effective date of termination. The Company shall pay the Contractor all amounts properly due up to that date. Additionally, the Company shall pay the Contractor auditable costs incurred as a direct result of such termination including but not limited to, reasonable cancellation charges paid by the Contractor to its Subcontractors or Vendors, reasonable demobilization charges, and reasonable costs incurred in preserving or protecting materials and/or materiel or Work in progress at the time of termination, plus an amount equal to ___ percent of the foregoing termination costs.

14. Termination for Default

14.1 Should the Contractor commit a substantial breach of this Contract, the Company may demand, in writing, that the Contractor shall comply with the terms of this Contract. If within ___ days after receipt of such a demand, the Contractor has not complied or has failed to take satisfactory action to comply or within ___ days the Contractor has not remedied the breach, the Company may terminate this Contract by giving the Contractor written notice to that effect.

14.2 If the Contractor shall become insolvent, or if insolvency or bankruptcy proceedings shall be commenced against the Contractor, or if the Contractor shall assign or transfer this Contract or any right or interest herein as not permitted hereunder, or shall persistently disregard laws or injunctions from the authorities on instructions from the Company, or if the Contractor shall fail at any time during the course of the Work to provide services or labor or to perform the Work within the Contract schedule, or if the Contractor should be in substantial breach of its obligations

hereunder, then, in any such case, the Company may terminate this Contract by giving written notice of termination to the Contractor.

If the Company should elect to terminate this Contract pursuant to the terms of Article 14.2:

- (a) The Company shall have the right to finish the Work itself or with the assistance of any third party. In such case the Contractor shall pay to the Company the amount of all costs incurred by the Company in completing or causing the completion of the Work in excess of the costs that would have been incurred by the Company if the Contractor had not defaulted (including, without limitation, any and all costs and expenses for rectifying faulty Work performed by the Contractor).
- (b) The Contractor shall assign to the Company or to any other person or company designated by the Company such subcontracts as the Company may specify.
- (c) Execute and deliver such documents and shall take all such actions as may be required in order to vest in the Company all title, rights, and any other benefits held by the Contractor in connection with the performance of the Work.

14.3 For each day or part of a day by which the completion of the Work or the attainment of the milestones detailed in the Contract schedule is delayed, the Contractor shall, irrespective of contractor negligence, pay to the Company an amount equal to ___ percent of the Contract Price for the Work or the value of the Work completed at achieving such milestone up to a maximum cumulative amount of ___ percent of the Contract Price. Such liquidated damages for delay shall be recoverable from the Contractor by any means available to the Company under the terms of this Contract or at law, including without limitation the deduction by the Company of such liquidated damages from any monies then due or that may become due to the Contractor under the terms of this Contract. These liquidated damages for delay shall be subtracted from any liability for delay that the Contractor may have under Article 14.4.

14.4 The rights pursuant to the terms of this Article shall be without prejudice to any other remedies available to the Company by virtue of law or this Contract.

(Explanatory note: All sums payable to the Company by the Contractor under the terms of the above clauses, are paid as liquidated damages for delay and NOT as a penalty.)

15. Force Majeure

15.1 Neither the Company nor the Contractor shall be considered in default in the performance of their obligations to the extent that the performance of such obligations has been delayed, hindered, or prevented by *force majeure*. The term *force majeure* as used in this Contract shall mean, cover, and include the following: Acts of God, acts or restraints of governmental authorities, fire, explosions, wars, hostilities, blockades, public disorders, quarantine restrictions, embargoes, strikes, or other disturbances or any other act, event, cause, or occurrence rendering a party unable to perform its obligations that is not in the reasonable control of such party, whether or not similar to any of the foregoing.

15.2 If an event of *force majeure* should occur, the party affected shall notify the other party of such occurrence within ___ days thereof. Should such an event continue without interruption for a period of ___ days or more, either party shall have the right to terminate this Contract by giving at least ___ days notice in writing to the other party specifying upon which such termination shall occur and provided that the state of *force majeure* does not come to an end before the date specified for termination in said notice, this Contract shall terminate on the date so specified.

16. Contract Price and Payment

16.1 As full and complete compensation for the Contractor's performance of the Work and all of the Contractor's obligations hereunder in accordance with the terms and conditions of this Contract, the Company shall pay the Contractor the price set forth in Part 4 of this Contract.

16.2 The Contract Price shall be increased or decreased only by Amendment. When the total value of current Work Orders and/or Change Orders reaches ___ percent of the value of the Contract as amended, a Contract Amendment shall be raised to adjust the Contract Price.

16.3 Payment of the Contract Price shall be made as provided in Part 4 of this Contract.

Note 1: This model Articles of Agreement is offered as a foundation on which Contracts Department personnel may build a standard docu-

ment. It is obviously not complete because many of the missing clauses will relate to different areas, laws, and customs. It is also intended for use with Lump Sum contracts with or without unit rates for extra work. Further clauses would need to be added to accommodate reimbursable cost contracts and the like.

Note 2: Space for the addresses and signatures of the Company and the Contractor are usually placed on the last page of the Articles of Agreement.

10.5.3 Part 2 Scope of Work

1. Scope of Work—Summary

Except as otherwise expressly mentioned in this Contract, the Contractor shall provide all labor, supervision, engineering, and services, quality control, inspection and testing, transportation, installed and consumable materials, equipment, tools, storage, construction camp accommodation, and each and every item of expense necessary for the supply, fabrication, erection, installation, application, handling, hauling, unloading and receiving, construction, evaluation, design engineering, testing, assembly, and production of _____.

(Hereinafter called the Work.)

2. General Description of Permanent Works

Note: Here will follow a brief description of the facilities the Client proposes to build in the overall project. This section will describe all of the new structure even though the Contractor to whom this Contract refers is only concerned with a portion of the Work.

3. Scope of Work—Detailed

Note: The detailed Scope of Work must be tailored to each specific project, but must be sufficiently comprehensive to cover every aspect of the proposed Work.

10.5.4 Part 3 Master Schedule

The Permanent Works shall be mechanically completed by the scheduled completion date of June 30, 2006.

Critical Milestones shall be completed as specified below:

Plant A	January 1, 2005
Plant B	March 1, 2005
Plant C	August 1, 2005
Plant D	December 1, 2005

10.5.5 Part 4 Payment Details

1. Contract Price

1.1 As full and complete compensation for the Contractor's performance of the Work and of all of the Contractor's obligations in accordance with the terms and conditions of this Contract, the Company shall pay the Contractor a Lump Sum Contract price of _____.

1.2 Except as provided hereunder, the Contract price constitutes the entire compensation due to the Contractor for the Work and all the Contractor's obligations in accordance with the terms and conditions of this Contract. The Contract price includes, but is not limited to, compensation for all applicable taxes, fees, overheads, profit, mobilization, and demobilization and all other direct and indirect costs and expenses incurred or to be incurred by the Contractor. The Contract Price includes for all overtime premiums and payments when such overtime is necessary to meet the scheduled completion date and critical milestone dates.

2. Variations

Compensation for authorized changes to the Work shall be made as follows:

2.1 Lump sum basis.

2.2 Unit rate basis as set forth in Attachment 1 to this Part 4.

2.3 Labor and equipment rate basis as set forth in Attachment 2 to this Part 4.

Note 1: Equipment rates will constitute all inclusive payment to the Contractor per hour that the Contractor's equipment is operable and available. These rates shall apply to actual hours that equipment is operating or available at the Work site for use at any time of day or night or any day of the week. They are inclusive of mobilization and demobilization, labor and costs for all maintenance, repairs, refueling and lubrication, spare parts, tools, consumables, depreciation, insurance and taxes, and all overheads and profit. They are inclusive of the cost of operators.

Note 2: Labor rates will constitute all inclusive payment to the Contractor and will include for the following: wages, piecework, other allowances (traveling and the like), all statutory and other related charges such as National Insurance, Graduated Pensions, Insurances, Company Pensions, Holiday Pay, Sick Pay, Workmens' Compensation and Employer's Insurances, Industrial Training Levy, Redundancy Payments Contributions and any similar charges, small tools such as ladders, chisels, handsaws, buckets, hammers, hard hats, protective clothing, consumables, gases, welding rods, oils, lubricants, electricity, all maintenance charges on facilities, all supervision and management required, all administration and establishment charges, overheads and profit, all necessary engineering services, all temporary facilities, personnel transport, and all delay and disruption caused as a result of performing work on an hourly rates basis.

3. Payment

The Company shall make payment against the Contractor's invoices for actual progress of the Work performed in accordance with the provisions of Article __ of this Contract.

Note: The previously mentioned Clause is not included in the model Articles of Agreement in Part 1 as the terms will have to be fashioned to suit the Client requirements in each separate project. For details of various payment arrangements, see Chapter 8.

4. Retention

The retention amount that will be withheld by the Company from payments due to the Contractor in accordance with Article __ of this Contract will be __ percent. Alternatively, the Company may agree to an arrangement whereby the Contractor may provide an irrevocable bank guarantee in a form acceptable to the Company, in lieu of retention, for __ percent of the cumulative amount to be paid by the Company against the Contractor's invoices over the duration of the Contract.

5. Pro Forma Invoice

Contractor shall submit a *pro forma* invoice to the Company Representative __ working days prior to the Contractor's submittal of any progress invoice under this Contract. The *pro forma* invoice shall be clearly marked "not an application for payment" and will be complete with all relevant supporting

documentation in order that the Company and the Contractor shall have a period of review of the Contractor's claim for payment and agree or adjust any contentious items prior to formal invoice submissions.

10.5.6 Part 5 Company-Supplied Materials and Equipment

Note: During the planning of a very large project, most clients will elect to purchase and supply to the contractors the material and equipment to be used in the permanent Works or will have the managing contractor do so. The client's organization is usually better placed to procure, inspect, and expedite large amounts of material and materiel and to arrange shipping and customs clearance to site. A major oil company would probably have an economical advantage over a single contractor although it is not unusual for the client to arrange bulk procurement of all permanent materials and negotiate the financial terms leaving the contractor to find the actual funds to pay for the goods and bring them to site as part of the contract deal. Where the client is to furnish materials and equipment for the permanent works and deliver to site, Part 5 would list the items to be supplied and may also record the expected delivery dates.

10.5.7 Part 6 List of Specifications

Note: Part 6 will contain only the reference numbers and titles of the specifications to be used on the project. The actual specification documents will be delivered to the contractor before commencement of the work.

10.5.8 Part 7 List of Drawing Numbers

Note: Part 7 will record the drawing numbers and titles of all drawings to be used on the project. A large project may issue over 50,000 drawings including vendor drawings and the total will almost certainly not be delivered to the contractor before start-up.

10.5.9 Part 8 Special Terms and Conditions

Note: Part 8 is only used where it is required to deviate from the pre-printed Articles of Agreement or to introduce special conditions not provided for in other parts of the contract.

Not all construction contracts require a Part 8, particularly where adjustments, even to the Articles, are made before execution. However, once a suitable model is made for the purpose of standardization and the Articles are separately printed, it would seem advisable to make adjust-

ments through an insertion into Part 8 on the rare occasions when this becomes necessary. This is especially appropriate where the aim is to produce a model Articles of Agreement for international acceptance and use.

10.6 Appendix 2

Contract Amendments

Amendment to Contract

Contract No. 123456

Amendment No. 002

This Amendment is entered into, effective as of the day of _____ 2005

By and between

The Crude Oil Company

Having its registered office at:

Shale Beach, San Francisco

California, U.S.A.

(Hereinafter referred to as Company)

and

Acclaim Contracting Incorporated

Whose address is:

1 Sandy Lane, Los Angeles

California, U.S.A.

(Hereinafter referred to as Contractor.)

In consideration of the agreements herein contained, the parties hereto agree as follows:

1. Amendments

The Contract heretofore entered into by the parties dated effective as of the day of _____ 2005 and identified by the Contract number set forth above, hereinafter referred to as the Contract, is hereby further amended as follows:

1.1 Part 1 Articles of Agreement

1.1.1 Article 16. PATENT DESIGN AND COPYRIGHT INDEMNIFICATION Subsection 16.1

Delete this subsection in its entirety.

1.2 Part 2 Scope of Work

1.2.1 Section 3.0 Welding Subsection 3.4

Change the first sentence to read:

“Contractor shall qualify the welding procedure to be used within thirty (30) days of the award of the Contract.”

1.3 Part 3 Master Schedule

1.3.1 Section 2.0 Contract Completion

Change the Contract completion date from March 1, 2005 to February 1, 2005.

1.4 Part 4 Compensation

1.4.1 In consideration of the change described in 1.3.1 above, the Contractor shall be paid an acceleration fee of Twenty Thousand U.S. dollars (\$20,000.00) upon the achievement of mechanical completion as defined in the Contract by the amended date of February 1, 2005.

2. Pricing Summary

2.1 The Contract Price set forth in the Contract is hereby changed as follows as full compensation to the Contractor for full and complete performance by the Contractor of this Amendment in full compliance with all terms and conditions of the Contract.

Total net addition to Contract Price: \$20,000.00

2.2 Original Contract Price: \$1,000,000.00

Net adjustment of Contract Price pursuant to previous Amendments: \$500,000.00

2.3 Net adjustment of Contract Price pursuant to this Amendment: 20,000.00

2.4 Total Contract Price: \$1,520,000.00

3. Status of Contract

As Amended herein, the Contract Price shall continue in full force and effect, *IN WITNESS WHEREOF*, the parties hereto have executed this Amendment on the day and year written below but effective as of the day and year first set forth above.

Acclaim Contracting Incorporated

The Crude Oil Company

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

Note: Note that the Amendment, similar to most Contracts, is not necessarily made effective on the same day that the document is signed. Unlike the Change Order, an Amendment does not have to be fully executed before work

relating to the Amendment may commence, although the period between the effective date and the signature dates should not be too protracted.

It will be seen that our sample Amendment is the second one issued on our fictitious Contract and some Clients, under Section 1.0, would draw attention to this by writing:

“The Contract heretofore entered into by the parties dated effective as of the __ day of _____ 2005 and identified by the Contract number set forth above, *as previously amended by Amendment Number(s) _____ thereto*, hereinafter referred to as the Contract is further amended as follows: ...”

It is usual practice to have the Contractor sign first for both Amendments and Change Orders although the practicality of the latter method is debatable because the Change Order is, in effect, an instruction from the Client to carry out extra work and one would imagine that the Client should sign first, but no one seems to raise much objection.

10.7 Appendix 3

Model Change Order

Contract Change Order

Date: _____ Contract No.: _____

Change Order No.: _____

The following changes shall be performed by the Contractor before _____ 2005:

Payment for all work described in this Change Order shall be

1. \$ _____ Lump Sum
2. Estimated at \$ _____
3. Shall not exceed \$ _____

The Payment described above shall include the Contractor's profit and shall be in full and final settlement of all costs, expenses, and overheads, whether direct or indirect, incurred by the Contractor and arising from or related to but not limited to:

- (a) The extra work described in this Change Order.
- (b) Any delay caused to the schedule or any change in the completion date of the Project resulting from said extra work.
- (c) The cumulative effect, if any, of said extra work in conjunction with extra work described in any other Change Orders.

Description of Work: _____

Backup information attached: _____

Change Proposal initiated by: _____

Justification for the Work: _____

Anticipated completion date: _____

Effect on baseline schedule: _____

Cost Code(s): _____

Increase in Contract Price or Decrease (Negative Change) Order: _____

Company: _____ Date: _____

Contractor: _____ Date: _____

10.8 Appendix 4 Model Work Order Contract Work Order

Date: _____ Contract No.: _____

Work Order No.: _____

The following changes shall be performed by Contractor before
_____ 2005:

Payment for all work described in this Work Order shall be \$_____.

This sum includes the Contractor's profit and shall be in full and final settlement of all costs, expenses, and overheads, whether direct or indirect, incurred by the Contractor and arising from or related to but not limited to:

- (a) The extra work described in this Work Order.
- (b) Any delay caused to the schedule or any change in the completion date of the Project resulting from the said extra work.
- (c) The cumulative effect, if any, of said extra work in conjunction with extra work described in any other Work Orders.

Description of Work: _____

Backup information attached: _____

Work proposal initiated by: _____

Justification for the Work: _____

Anticipated completion date: _____

Effect on baseline schedule: _____

Cost code(s): _____

Company: _____ Date: _____

Contractor: _____ Date: _____

10.9 Appendix 5 Model Short Form Contract

(For Lump Sum or Unit Rate work valued at less than \$50,000.00.)

THIS CONTRACT IS entered into effective as of _____ by and between _____ (hereinafter referred to as “Company”), whose address is

_____ and _____ (hereinafter referred to as “Contractor”), whose address is

_____.
In consideration of the agreements herein contained, the parties hereto contract and agree as follows:

Part 1 General Terms

Article 1. Contract Documents

This Contract shall consist of the following Parts:

Part 1 General terms of Agreement

Part 2 Scope of Work

Part 3 Schedule

Part 4 Commercial terms and the exhibits, drawings, specifications, and documents referred to therein, all of which, by this reference, are made part of this Short Form Contract that sets forth the entire agreement between the parties and supercedes all previous communications, agreements, and commitments, whether written or oral.

Article 2. Variations

No variation orders or amendments shall be made to this Contract. Should the Scope of Work require changes, this Contract shall be cancelled and a replacement Contract shall be executed incorporating the change or changes.

Article 3. Insurance

Contractor shall, at its own expense, maintain during the entire progress of the Work, insurances of the following descriptions and limits:

3.1 Workers' Compensation in accordance with the provisions of the applicable Workers' Compensation law or similar laws of the state, territory, province, or division having jurisdiction over the employee and Employer's Liability with a limit of liability of \$_____ for each occurrence.

3.2 Automotive Liability covering use of all owned and hired vehicles with a combined single limit of liability of \$_____ per occurrence for bodily injury and property damage.

3.3 Certificates of insurance satisfactory to the Company shall be supplied by the Contractor confirming that the above insurances are in force.

Article 4. Work Rules, Laws, and Regulations

The Contractor shall comply with the Company's work rules and with all local, municipal, state, federal, and governmental laws, orders, codes, and regulations applicable to the Contractor's operations in the performance of the Work and shall obtain and comply with, at its own expense, all permits, certificates, and licenses required of it by governmental authority.

Article 5. Guarantees

Contractor guarantees the Company that the Work shall strictly comply with the provisions of this Short Form Contract and all drawings and specifications relevant to this Contract and shall be free from defects in design, materials, construction, and workmanship.

Article 6. Cleanup

Contractor shall keep the Work site and the vicinity thereof clean and free from any debris and rubbish caused by the Work and on completion of the Work shall leave such areas clean and ready for use.

Part 2 Scope of Work

2.1 Except as otherwise provided in this Short Form Contract, the Contractor shall supply all labor, supervision, installed and consumable materials, equipment, tools, consultation, services, testing devices, storage, and each and every item of expense necessary for the supply, fabrication, erection, installation, application, handling, hauling, unloading and receiving,

construction, evaluation, design engineering, testing, assembly, and production of _____.

(Hereinafter called the Work.)

(Insert detailed Scope of Work including lists of drawings and specifications.)

Part 3 Master Schedule

3.1 Work shall be completed by: _____

3.2 The Company shall schedule and coordinate the Contractor’s performance of the Work with the work of others and the Contractor agrees to comply with such scheduling and coordination. Specific scheduling requirements are: _____

Part 4 Commercial Terms

4.1 Full compensation to the Contractor for complete compliance with all provisions of this Short Form Contract shall be as stated below. This compensation shall be firm for the duration of the Work and shall include all of the Contractor’s costs, taxes, duties, license fees, expenses, overhead, and profit.

No progress payments will be made and the Contractor shall submit a single invoice for the Work to the total value of this Short Form Contract following completion and acceptance of the Work.

\$ _____

IN WITNESS WHEREOF, the parties hereto have executed this Short Form Contract on the day and year below written but effective as of the day and year first set forth above.

Company: _____

Contractor: _____

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

Glossary of Terms

This glossary is a collection of terms and definitions commonly used in the oil, gas, and petrochemical construction business. These may include legal terms, terms used in standard contract documents, insurance terms, common shipping terms, or general terms. To obtain uniformity in the usage of these terms, the definitions found in this glossary are the author's definitions for contract management purposes.

Acceleration The process of intensifying the rate of progress on the work in order to meet a preexisting deadline or to ensure early completion of a project.

Acceptance, final A client's approval of the contractor's work based upon certification that the work is complete and is in accordance with contract requirements.

Access to the work The right of the contractor to enter, leave, and occupy the work site as required to reasonably perform the work described in the contract documents.

Addendum Any written alteration or addition to an existing published and released RFQ, ITB, bid package, and the like that is attached to the bidding documents during the bidding process.

Advance mobilization payment When considering a contract in which the contractor has massive front-end expenses in the form of establishment of camps, purchase of equipment especially for the work, and the like, the client may agree to make an advance mobilization payment free of interest or with low interest payable through invoice deductions over the life of the contract. This arrangement may be announced in the bid package so that bidders may be competitive in their bids, always assuming that the client is able to obtain money cheaper than the bidders. There would normally be a requirement by the client for a bank guarantee to cover this loan.

Amendment A fully executed, written alteration to an existing contract. The contract amendment will be used rather than any other form of variation when the alteration does not fall within the general scope of the contracted work. The amendment is signed by both parties as a codicil to the contract, preferably by the original signatories of the contract. The contract Articles of Agreement, for example, should only be changed by amendment. Another example is in the case of the contractor changing its company title during the course of the work. More seriously, a very substantial alteration to the compensation would merit an amendment.

Arbitration A process for the resolution of disputes by an informal tribunal in which a panel of three or more persons with specialized knowledge of the industry renders a decision on the dispute. Arbitration is usually quicker and less expensive than litigation. In a situation where the contractor rejects the client's final determination on a claim, the contract may make provision for the dispute to be settled in court or by reference to arbitration. If the latter course is available in the contract and not all contracts carry an arbitration clause, both parties will each choose a person to act as arbitrator and, usually, a third person is appointed by the two chosen arbitrators. The arbitrators so appointed will hear the dispute from both sides and will base their decision on the rules of law and the terms of the contractual arrangement between the parties. For their part, the parties may agree that the award of the arbitrators shall be final and binding upon the parties.

Articles of Agreement The "preprinted" part of the contract, collated by the client's legal department and appearing, normally unaltered, in every one of that client's contracts. The articles cover definitions of terms used in the contract, variations, guarantees, audit rights, subcon-

tracts, indemnity and liabilities, insurance requirements, default, *force majeure*, suspension, and termination. The articles may only be altered by amendment.

As built documentation A complete record of the final situation of the work on completion. This record is handed to the client by the contractor in the form of marked-up drawings, alignment sheets, test reports, certifications, and other documents necessary for the operation of the work.

Authorized representative A client representative or a contractor representative appointed in writing by the respective parties to direct the contracted work.

Back charge A sum deducted from the compensation due the contractor, supplier, or manufacturer. This charge may be incurred as a result of unilateral corrective action due to:

- (a) Unacceptable performance by the contractor.
- (b) Unacceptable standards of material by a manufacturer or supplier.
- (c) Predetermined charges for equipment, services, or materials supplied by the client to the contractor and not designated as free-issue material.
- (d) Authorized sale of scrap metal, such as pipe pups and cutoffs, surplus to requirement.

Bank guarantee A client may accept an irrevocable bank guarantee in lieu of retention, thus saving the contractor's funds that would otherwise be tied up, but at the same time placing money within easy reach of the client in the event of default.

Beneficial occupancy The advantageous possession and utilization of the work by the client following completion or at a stage (substantial completion) when the building or facility may be used for its intended purpose.

Bidder A contractor submitting a proposal in response to an RFQ.

Bid evaluation An assessment of completeness and overall acceptability of the bids received for a given contract including an evaluation and comparison between contractors for cost, schedule, reliability, and ability to perform in accordance with the RFQ.

Bid summary A record of all bids received and evaluations made on such bids.

Bill of quantities Usually concerned with the civil work in a contract. The bill of quantities is a list of items in the contractor's work with columns for the estimated quantity per unit of measurement, that is, linear feet, cubic yards, and so on, the contractor's quoted unit price, and the sum.

Bonds

Bid bond A type of surety bond that is submitted with a contractor's bid for work. It demonstrates good faith and protects the client against loss incurred when the selected bidder fails to accept the contract award. The bid bond may stipulate that a performance bond and labor and material bond will be provided upon award of contract.

Labor and material bond (payment bond) A type of surety that protects the client against the contractor's default in the supply of material, equipment, or labor.

Performance bond A type of surety bond designed to protect the client against loss caused by acts or failures of a contractor in the performance of its contract.

Surety bond An agreement by a *surety* (guarantor) to assume the debt, default, or miscarriage of the *principal*. The primary types of surety bonds are the bid (proposal) bond, the performance bond, and the labor and material (payment) bond.

Breach of contract Violation of agreement between contractor and client.

Cash flow profile A chart showing expenditure on a project and income from the project over a period of time.

Certificate of insurance The document used as evidence of insurance in lieu of a policy. It includes a statement of coverage in general terms and the limits of liability for each category of coverage shown. The contract Articles of Agreement oblige the contractor to furnish to the client a certificate of insurance listing all policies carried by itself and its subcontractors. This proof of cover must be produced prior to work affecting such policies.

Certification and release The document that some clients use to affect a lien release. It is most often used when closing out a contract. It should be notarized and transmitted with the contractor's request for final payment.

Changed conditions A substantial deviation in the physical conditions of the job site from that anticipated in the contract documents or from conditions typically expected to be encountered on such a project.

- Changed work** Work resulting from nonquantitative additions and deletions and/or modifications to the work contemplated by the contract that may result in a design change or some field requirement. It may be, but is not necessarily, a scope of work change. It may cost money or result in a price reduction.
- Change order** A formal document, issued by the client to authorize a change in the contract scope of work.
- Change order closeout form** A simple form signed by the client and the contractor, closing out each completed change order with the final amount to be paid.
- Claim** In this context, a claim is a unilateral action by a contractor wherein it claims extra compensation or time based upon its own evaluation of a situation in relation to its own interpretation of the contract. When a contractor considers that it is in a claim situation, it will advise the client accordingly, with a view to receiving compensation often in the form of a change order. If the client does not reject all of the claim, the undisputed portion may be settled in this manner. The balance of the claim may be debated or in extreme cases, referred to arbitration or the law courts.
- Clarification meeting** A meeting held with the bidders during the bid evaluation period, the purpose of which is to exchange information clarifying the bidder's intentions and explain the *modus operandi* regarding bidders' offers.
- Client** (also owner, company, employer, or the abbreviated title such as Mobil, Exxon, Shell, and the like). The party with whom the contractor makes an agreement or contract for the performance of work. In some super projects, the client may appoint a managing contractor to control the work and issue contracts in the client's name or in the managing contractor's name on behalf of the client.
- Code of ethics** An accepted system of principles and professional standards of conduct in the performance of business activities.
- Company estimate** Client appraisal of what it would cost the average, efficient contractor to perform the work, plus a reasonable profit.
- Company representative** Duly authorized representative of the client as defined in the contract.
- Conflict of interest** When involving the contract engineer or administrator, this amounts to a betrayal of trust and the abandonment of responsibilities in return for the promotion of private gain.

Construction control plan A manual developed in-house by the client's construction department for the guidance of its supervisory staff in the field.

Contract An agreement between the client and another party (the contractor) for the performance of work through the supply of labor and materials.

Contract documents As a minimum, these will consist of the contract as mentioned in the preceding text, the specifications, and the drawings plus any other documents or references that are specifically described in the contract.

Contractor An individual, firm, corporation, or other legally recognized entity performing work under the terms and conditions set forth in a contract. In most contracts and other legal documents, the contractor is referred to as "it" and never as "he/she" or "him/her." (For example, *Contractor shall at all times keep its work area in a neat, clean, and safe condition.*)

Control institution An organization or company of high repute used by the client to perform specially defined approvals and verification work including, in some cases, laboratory testing and reporting. Welding procedures, for example, may be witnessed by such a body during the contractor's initial production. American Bureau of Shipping, Bureau Veritas, and Lloyds are companies specializing in this work.

Cost control As practiced by the client's cost engineers, it provides the project management with ongoing analyses of costs for individual contracts and for the project as a whole. The principles of cost control are:

Analyzing The cost engineer, with construction staff and the contract engineer, discusses this information and uses it to make forecasts.

Estimating In the very early preengineering stages of a project, preliminary control estimates of probable cost are made from conceptual data. These lead to the master control estimates at the end of the preengineering phase, which include base estimates from more detailed engineering information plus escalations and contingency appraisals. In the construction stage, current control estimates are used to provide information from ongoing bid evaluations, contract awards, and forecasts.

Forecasting The probable end result is predicted, enabling management to take the appropriate corrective action.

Monitoring Checking closely on contracted work in progress and watching for deviations from the original plan.

- Reporting** Regular and timely reporting makes client management aware of events as they arise.
- Cost and freight (c&f)** The type of shipping contract in which the seller provides the product and the vessel and delivers the product to the nominated discharge port.
- Cost, insurance, and freight (cif)** The type of shipping contract in which the seller provides the product and the vessel, procures the insurance, and delivers the product to the nominated discharge port.
- Cost plus** *See* Reimbursable cost contract.
- Critical path method (CPM)** Detailed scheduling method used to allocate the time required for a construction project and a means of controlling costs and manpower.
- Day rates** Day rates are utilized for equipment rental where work is not clearly defined or carries a degree of risk. They are often used when contractors provide specified equipment or personnel services such as offshore pile-driving barges or diving services.
- Delay and disruption** Interruptions to a contractor's performance caused by indirect impacts arising from direct impacts associated with unscheduled events, such as scope of work changes, which are not part of the contractor's planned management and work processes. Quantification of costs allied to delay is comparatively straightforward, but there is no universal method of quantifying disruption costs. The importance of records is the key factor in any disruption claim.
- Document audit** In project management terms, this is a documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of the quality program have been developed, documented, and implemented in accordance with specified requirements. A documented audit does not include surveillance or inspection for the purpose of process control or product acceptance.
- Effective date of contract** The date of commitment to a contractor or the date on which the contractor began performance of work, whichever is earlier. The effective date of the contract is not necessarily the date on which the contract is signed.
- Escalation** This is a clause included in the contract when inflation is unpredictable. Its purpose is to protect the contractor against loss due to rising prices.

Expert Where a dispute arises between the contracting parties that cannot be resolved by mutual agreement, some contracts will make provision for an expert, or panel of experts, to be appointed by both parties as a preliminary step before arbitration. The expert, whose qualifications are somewhat similar to the arbitrators, will study the disputed matter and hand down his ruling. The judgment is not necessarily binding, but if the disputants can agree with it, a considerable amount of time and money is saved.

Extra work Any work not contemplated by the contract. Always a scope of work change, always costs money, and always results in a contract variation order.

Fixed rates Arrangements to pay the contractor for certain costs that it will incur in connection with work under a cost reimbursable contract, such as overheads, but not including profit.

Force majeure An unexpected and disruptive event or circumstance that may operate to excuse a party for delayed performance under a contract. If a party is delayed in the performance of a contract and such delay is caused by acts of God, war, riots, civil insurrection, acts of the public enemy, strikes, lockouts, accidents, acts of civil or military authority, fires, floods, earthquakes, or wind storms *beyond the reasonable control of the party delayed*, such delay shall be added to the time for performance of the obligation delayed, unless the date, schedule, or time period for the performance of the obligation is expressly stated in the contract to be guaranteed. The contractor is not normally entitled to additional or extra compensation by reason of having been delayed, but may have the period of delay added to the contract completion date or nearest milestone date. Of course, if the client wishes to buy back this period to finish on the original schedule, it may do so.

Free-issue material This is construction material (or materiel) issued to the contractor by the client for the work, usually because the client's organization or that of the managing contractor has a more effective procurement, inspection, and expediting facility than the contractor. In many areas, the client has a duty-free arrangement with the government that may not be available to the contractor.

Free on board (FOB) The type of shipping contract in which the buyer provides the ship and the seller provides the cargo at the port of loading.

Hold point An agreed quality control inspection stage beyond which work may not proceed except by written agreement from the inspector.

Incentive plans Financial schemes or packages designed to encourage performance by the contractor. They may be selectively used in lump sum contracts to motivate a contractor to meet or improve the work schedule and in cost reimbursable contracts to improve cost and/or schedule while maintaining work quality.

Incentive plans normally involve, (a) establishing targets for cost and/or schedule and then measuring the contractor's performance against these targets and (b) improving the contractor's motivation and performance by offering attractive bonuses for meeting or beating targets and by providing for payment of liquidated damages for overrunning them. Some incentive plans may be without bonus features and may only have liquidated damages for overrunning scheduled targets.

In the case of cost plus and day rate contracts, no liquidated damages are paid by the contractor where a unilateral incentive plan is set by the client.

Indemnity and insurance Before work may begin, the contractor is expected to provide proof of insurance against certain risks. The client may indemnify the contractor against certain other risks that are not recoverable under insurance policies held by the contractor. The parties may spread insurance liabilities under the following policies although not necessarily *all* of these policies may be involved in any one contract.

Contractor

1. Proof of insurance before work starts.
2. Personnel insurance (workman's compensation)—cover includes contractor's employees for illness, personal injury, and accidental death to the full extent required by law and applicable at any site and/or where the contractor's employees' contracts of employment are made.
3. Comprehensive bodily injury and property damage—covers all of the contractor's work under the particular contract.
4. Public liability and property damage—regarding all the contractor's vehicles and moveable plant.
5. Protection and indemnity insurance—covers the contractor's liability to hold the client harmless from and against all losses, expenses, and claims for death or personal injury to third parties

and/or damage to or loss of their property. (The client will usually protect the contractor in a like manner.) Note: The client may take out a general contingency policy to protect against, for example, invalidity or lapse by nonpayment of a premium of a contractor's policy.

Contractor and Client

1. Builder's "all risk" insurance—covers all property used in the performance of the work (i.e., damage to machinery, materials, and other property that will become part of the work; e.g., free-issue material stored by the contractor for future installation in the work, pipe, etc.)
2. General third-party liability insurance—both contractor and client may take this cover with the contractor's liability being limited to a smaller amount than that of the client.

Client

1. Property transit insurance—covers loss or damage to the permanent works while they are being moved or transported.

Invitation to bid (ITB), also request for tender (RFT), request for quotation (RFQ) A bid package issued by the client to solicit proposals by contractors (at this stage, bidders). This package contains information to bidders, which is a set of standard and specific instructions to bidders together with data that defines the basis for bid preparation and bid submission. It may also include exhibits such as specimen amendments, work orders, change orders, and other documents that may be used throughout the proposed contract. The contract eventually awarded from the ITB should be a replica of the ITB minus the information to bidders.

Job explanation meeting A meeting arranged by the client to explain to all bidders the nature of the work involved in the ITB or RFT. Ideally, the job explanation meeting should follow the distribution of the bid packages so that the bidders may have the opportunity to put questions to the client's project management at the meeting. It is usual for the job explanation meeting to take place on the same day as a site visit to the future work area, but in a large contract this is not always practical and the site visit may have to be held at a later date.

Kick-off meeting See Preconstruction meeting.