

THE CONCEPT AND PRACTICE
OF PROJECT INSURANCE
FOR MAJOR CONSTRUCTION WORKS

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ABSTRACT

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This report surveys the conception, management frame and implementation needs of construction insurance, as particularly applicable to large projects and as mainly seen from the owner's point of view. After an examination of the traditional approach to construction insurance, the attributes of insurance as a project-oriented service are defined and their relation to the Project Management approach (through risk-management) is established. The current trend of owner-supplied and controlled insurance (wrap-up) is analyzed in detail. The report presents in detail the insurance treatment in the construction contracts and describes the structure and content of the insurance policies. Risk analysis and its quantitative methods are briefly reviewed and the dependence of insurance decisions on them outlined. Sample texts of contract clauses, policies and insurance-related information are annexed for reference.

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CHAPTER 1

INTRODUCTION

1.1 Scope and Structure of Report

This report is intended to familiarize the technical reader with the subject of construction insurance and to introduce the concept and practice of project-oriented insurance, as employed on the large projects of today. It is therefore particularly addressed to participants of engineering and management teams for large construction projects, where the considerable portion of the overall project cost that risk and insurance management represent and the "natural" applicability of Project Management to their exercise, make the traditional knowledge gap between technical and risk-insurance matters a feature of sizeable inadequacy for the intendedly successful project.

The report is mainly width-oriented, aiming to cover both conceptually and practically the whole range of information pertaining to the justification, the alternatives, the particular industrial characteristics, the purchase and handling, and the project related matters of construction insurance for the project. The only "depth" dimension outlined is the functional dependence of insurance-related decisions on the overall exercise of risk analysis and treatment for the project, or what currently is called risk management. Adopting the owner's point of view, the report surveys and compiles information from related professional literature in a manner which will permit its eventual use by the PM group.

The contents of the report are structured as follows: Chapter 1 introduces construction insurance and focuses on it through the industrial environment of the large project. After briefly examining the traditional approach to insurance in Chapter 2, the qualitative criteria for the handling of project insurance are examined in Chapter 3. Chapter 4 details the contractual modalities involved in specifying and purchasing insurance. Chapter 5 reviews the functional role of the PM group in establishing and putting into effect an insurance management tool. The main points of the report are then summarized in Chapter 6.

The non-scholarly treatment of this subject to date and the attempt herein to put together in the text a wide variety of multi-disciplined professional opinion, reduce the applicability of this report's parts as independent tools of action for the project manager. Instead, its use is seen as an introductory text aiming to the formation of a possibly complete and instructed attitude towards decisions on project insurance.

1.2 The Industrial Environment of Today's Large Projects.

Technological advancement, ability for mass application of resources and economies of scale thanks to size, have increased in the last twenty years the feasibility of major, multi-discipline technical undertakings, in response to the equally increasing in size and complexity needs of the economy. The resulting projects are characterized by huge investment amounts, spread over many years of managed expenditures as well as by a multitude of industrial services for their realisation. Engineered construction work, as a major component of this trend, best illustrates the comprehensive control structures and

the formidable mobilization of resources required for the successful accomplishment of a large project.

The industry executes the construction of large projects through the traditional framework of owner-consultant-contractor bound together through a variety of contractual agreements. However, a number of major features which uniquely describe a large project have given to the industry quite a specialized commercial context:

1. Owners will most likely be public bodies, utilities or governments. They will justify the project investments using utility criteria which are complex and often imprecise or not strictly economical over the long term (workforce absorption, regional socio-economic development, etc.);
2. The projects themselves will often require exceptionally thorough and multi-disciplined engineering for their sound realization (e.g. power or process plants). In addition, engineers will be required to supply a wide variety of project procurement services;
3. Large projects are mostly "international", either because of owner and location or because of the necessary enlargement of the industrial market to which they appeal. Consequently, the economic and legal frames of the industry's operation are greatly affected;
4. Volume and rate of expenditures will usually forbid prime role to a single business enterprise. Pools or consortiums on the national and international level will be required to handle the construction services;
5. Lengthy construction durations combined with the high expenditure levels create attendant risks for the large projects;
6. Financing will come from a wide variety of specialized lending

institutions, from banks or consortiums of banks, to government agencies and international development grant programs. The input of the lending institution on the economic justification and management of the project will be significant; and

7. The multitude of parties and operations during project procurement will impose strict, meaningful and realistic drafting and enforcement of contractual relationships, aiming to clarify responsibilities and minimize conflict.

The above described industry constraints are further accentuated by the "traditional" construction industry drawbacks of product uniqueness and inherent inadaptability to theoretically assessed innovations. The highly variable environment of construction from project to project and the usually very restrained resources of its practice (through keen competition), will impose tailor-made and particularized solutions to problems, prohibiting repetitive application of theoretically assessed practices. Hence, the unique phenomenon in construction, of theoretical research being advanced beyond the industry's ability to use it (18). Reflecting such causes in its base functions, the industry still shows fragmented signs of awareness of the frame of operations required by large projects. Without the "normative" influence of a Project Management system in the project, the industry would be left with little incentive to treat the large project differently, in a modern, more effective manner.

1.3 The Project Control System

Cost consciousness and strict administrative responsibility through the owners' organizational structures developed over the last

ten to fifteen years, has enabled them to become more knowledgeable and more control minded over their expenditures than ever before. In reflection of the general conflict of interests problem for the economy that scarce resources represent, large project investments come under scrutiny from a wide variety of public and business interests from conception to completion, regarding the soundness of their feasibility and management. The suppliers of funds for construction, in their concern for a return on their investment consistent with their objectives will impose severe management and administrative criteria, guaranteeing the safety and appropriate handling of their money. And large projects constitute of course a prime area where concerns such as these come into focus.

In response to the requirements set above, as well as in section 1.2, the industry, through the consultants, the contractors and the rest of the supporting services suppliers, will have to operate through a soundly managed budgeting, planning and control system. Project Management, extensively defined and elaborated in the professional literature in the last decade, constitutes the most comprehensive form of such a system. In Project Management practice, a separate executive organization will be set up by or for the owner and put into effect the functions of planning, organizing, supervising and controlling for the whole project (21). Project Management will function basically as a central bank or screen for the project related information and will regulate its distribution to the project participants. And as a decision tool and medium, it will provide the necessary project oriented and "normative" technique for a consistent handling of problems.

This report assumes the Project Management point of view and

the effect that the existence of a PM process has on the handling of the issues of risk and insurance. Both elements of information handling and deciding will be examined as best serving the perceived interest of the owner and the project as a whole.

1.4 Project Risk Management and Insurance

For most large construction projects, expenditures are engaged (contracted), under an uncertain degree of knowledge for the final cost to the owner. The project's engineered design primarily and the estimation of the general procurement conditions on a second level by nature contain uncertainties regarding the final outcome of operations. These uncertainties, arising from controllable or uncontrollable sources as far as the project participants are concerned (efficiency of design vs weather, for example), oblige them to support risks for costs, time and resources which ultimately are transformable to dollar amount risks. Risk, can be defined then as the exposure to economic loss (or gain) under uncertainty (18), or stated another way, a variable in the process of constructing a project, whose variance results in uncertainty in the final cost to the owner (19). Thus, risk is measured by dollars.

Risks can and need to be identified (18),(19) in advance and have their order of magnitude assessed, to the best knowledge of the project management group. Risk management then, within the project management objectives, will try a) to minimize those risks and b) to properly allocate them through the project's contractual arrangements and the services available, both actions directed to the best interest of the owner. The need to incorporate the interaction of risks that take place through the various activities of the large and complex

project into the risk management policy to be adopted, best illustrates the benefit of pursuing such a comprehensive risk management approach. Traditionally, risk interaction was neglected since risks are treated separately for each project part (contract). The minimization and allocation of risks will be examined qualitatively in chapter 3 and quantitatively in chapter 5 (20)(19).

With such a risk management policy in effect, the owner and each of the other participants in the project will finally be left each with his share of the risk to bear through the industrial service he is offering. The transfer of risk at this level through the purchase of insurance will be defined through the following factors:

1. The business preferences and practices of the risk-taker;
2. The nature of the risk (i.e. whether it is insurable or not);
3. The applicability of contractual clauses requiring insurance;
4. The existing related legislation;
5. The standard industrial practices; and
6. Last but not least, the affordability of keeping the risk.

By buying insurance, the insurer assumes the financial impact of a particular risk, for a particular time period under a fee or rate. This is done through a contract between the insured and the insurer, backed as far as the legal relationship is concerned by the document called the insurance policy. The policy is more or less standard and the contract quantifies the deviations from it, particularly pertaining to the risk insured (18).

The insurance industry is a professional risk taker. Its social function is to provide the device for the accumulation of funds out of which losses are to be paid. The accumulation involves transfer and

combination (pooling) of risks (18). Put more illustratively, the insurance industry is one of the cogs which keep the wheels of the construction industry turning smoothly by absorbing risks which individual firms could not possibly afford to accept, as accidents will always happen, whatever protective measures are taken (8).

Insurance, operating on the law of large numbers distributes losses and converts the contingency (otherwise imposed by uncertainty) into a fixed cost (the premium). The insured pays a certain amount instead of facing the exposure to loss of an uncertain amount. It becomes decisive to note here that the total premium required for a certain risk cover will include the mathematically defined loss correspondent amount plus the value of other services provided by the insurer (inspection, expert advice etc) plus his administrative overheads. This composition of the fixed cost that insurance finally means to the insured becomes a critical factor for the management of insurance (18).

The significance of insurance as an investment protection cannot but be adequately emphasized. The financial institutions on the one hand and the professional engineering associations on the other, through the standard contractual conditions guides they publish continuously contribute to the efficiency of the industrial frame where the service is carried. Insurance is by far the most common and universal way of treating risks. In large project construction, after risks are minimized by sound engineering, procurement and control practices, what risk management essentially comes to is insurance management.

1.5 Trends in Insurance Cover Control

Traditionally the owner, through the contract conditions will transfer all, or nearly all risks of the project to the business entities with which he is in contractual relationship. Each of the participants then, will seek insurance within the context of the service he is performing for the project. The owner thus is indirectly protected against the risks. The size and multi-contract content of a large project impose severe constraints on the adequacy of this approach in protecting the owner. The multitude of policies will present interpretation uncertainties, gaps of overall cover or duplication of cover and cost. Hence, the trend toward comprehensive, owner-controlled insurance comes into focus.

It is only in the last ten years that the comprehensive approach of project insurance has been treated as a key constituent in the overall framework of risk management on the project level, and hence included by principle in the duties of the project management group. The economies of scale and the increased control offered by the comprehensive approach however, have long been recognized in the construction of major projects, under the "wrap-up" insurance concept in North America, or under various forms of owner-controlled insurance abroad. The U.S. Department of Transportation has recently investigated the trend under two reports, "Better Contracting for Underground Construction", NRC-1974 and "Insurance for Urban Transportation Construction", Barret-1977 (19). In Great Britain, the insurance industry was first to identify the merits of the trend, E.M. de Saventhem, "Introduction to the Insurance of Construction Projects" - 1968 (1), and continue through with an extensive dialogue in the professional literature up to now.

The trend towards large projects in the last twenty years, has definitely provided the ideal ground for the development of the project insurance concept necessary for effective control over the complex undertaking. The industry is still far from consistently adapting to the needs and practices of owner-controlled insurance, reacting to the feature of additional regulation over its business practices that the concept effectively implies and imposes. The difference of attitudes between Europe, where the concept mostly receives professional back-up, and the cautious regard towards "just another bureaucratic constraint" of North America, is quite illustrative of the ongoing controversy.

Project insurance must be understood as a project oriented attitude for decisions rather than a set of specific solutions for the desired cover. Both the traditional approach and the current trend towards owner-controlled insurance will have to be researched for adequacy of answers. In the following two chapters, these two constituents of the project insurance implementation are qualitatively examined.

CHAPTER 2

THE TRADITIONAL APPROACH

In this chapter the traditional approach to construction insurance will be outlined. A description of the contractual scheme which is usually followed in construction will show how risks are transferred, as well as the most common schemes through which insurance is provided. The most important characteristics of the traditional insurance practice, from the owner's point of view, will be sketched and qualitatively summarized in the end.

2.1 The Parties Involved and Their Contractual Relationships

There are innumerable types of contractual relationships that an owner can use for the construction of a project today. They vary in format, content, method of pricing and payment, who contracts with whom, what is contracted for and whether the contracts are bid or negotiated (4). In general the entities involved are:

1. The owner and his responsible agent(s) or PM group;
2. The consulting engineers and others providing professional services;
3. The construction contractors and suppliers of equipment, materials and industrial services; and
4. For the purpose of this report, the insurance companies.

Theoretically, the owner will contract out all the services required (engineering, construction, procurement and/or management) under four basic types of arrangements (4):

1. Construction by a general contractor, engineering and services by a consultant;
2. Turnkey package of engineering-procurement-construction;
3. Construction management contract(s); or
4. Many separate prime contracts and project management.

Whatever the project procurement scheme, the responsibility for the cost of making good any damage to the works or any liability claim against the owner during the period of construction and the commissioning/maintenance period, will be defined in the contracts' general and special conditions (12). The Institution of Civil Engineers (UK), the "Fédération Internationale des Ingénieurs Conseils" (FIDIC), as well as many other professional organizations, have issued standard contract conditions clauses to this effect, which establish the legal context of the owner-contractor relationship. The contractual transfer of risk and the required time-validity of the relevant policies, will have to be defined in relation to the passage of responsibility for the project property in whole or in elements from one party to another. In the traditional approach, through the use of "hold-harmless" and "indemnification" clauses, construction contracts typically require the contractor to assume the owner's and engineer's legal and financial liability for construction risks, or to provide insurance for the joint protection of himself and the owner (15). Except for the provisions which treat faulty design or lack of evidence of reasonable care on the part of the engineer, and which fall in the content of the standard professional liability cover for the engineer, all the other insurable risks of the project will be borne by the contractor. Any insurance

policy will be contracted in the joint names of the owner and contractor.

2.2 The Cover Policies: Types and Content

As mentioned in section 1.4, the insurance policy constitutes the basic document which defines the services of the insurance industry. A policy is qualitatively oriented, is written in legal language and is designed, as far as the content is concerned, to depict exactly the back-up formalities for the cover of a particular risk or a group of risks. The quantitative elements which will enforce and activate the policy are included in the insurance contract between the insured and the insurer. The long years of practice and interaction between the insurance and construction industries have conveniently standardized the grouping of construction risks, and the design of policies for the cover of these groupings of risks has also been standardized in consequence. So, regardless of the precise and desirable cover, a major construction project will normally encompass a number of different policies during the construction period and many others in its operation phase. The following list is meant to be read two-ways: first, as a listing of the major insurance policies to be required and second, as a comprehensive listing of construction risks with their content as a guide (1)(15)(7)(8)(16):

1. Contractor's All Risk (CAR) (or Builder's Risk in North America).

Covers loss or destruction and material damage of the project property and installations themselves, prior to the owner's contractual acceptance. It is the main and most direct protection of the invested value of the project.

2. Contractor's Constructional Plant and Property Covers loss or

destruction of the contractor's equipment and temporary installations for the project.

3. Third Party Public Liability Covers injury or death to members of the public, due to the project construction operations or damage to their property.
4. Contractor's Contingent Liability Covers liability for parties for which the contractor is responsible to the owner (i.e. subcontractors).
5. Contractor's Contractual Liability Covers the assumption by the contractor of the owner's legal liability as stipulated in the terms of the contract.
6. Automobile and Motor Vehicle This policy is always apart as it is mostly required by country or municipal laws.
7. Workmen's Compensation Covers liability for injury and indemnification of employees during the period of construction. The policies are mostly regulated by legislation and are standardized.
8. Owner's Liability Insurance Covers the owner's normal operations and protects him from liability that arises from negligent acts of himself or his employees.
9. Employer's Liability Insurance Gives broader coverage in conjunction with the legal requirements for Workmen's Compensation Insurance.
10. Umbrella Excess Liability According to needs, this policy will complement all other liability policies by covering their exclusions, for a more adequate overall protection.
11. Many other forms of secondary coverage policies, touching normal business practices of contractors or imposed by laws (Fidelity and

Forgery, Extra Expense and Business Interruption, Social Security, Care Custody or Control, Burglary Robbery and Theft, Completed Operations Liability, Vendors Liability etc.).

12. Professional Indemnity or Liability The policy protects the consulting engineer against error, omission or neglect in his duties to the owner during the design and construction phases of the project.

In addition to the above listed insurance policies, the owner and the project will need protection against the risk of business insolvency or failure of the contracted firms, due to their overall commercial operation. This is traditionally done through the requirement that each firm involved, posts in favor of the owner a variety (as required) of surety bonds or bank guarantees, guaranteeing to the owner the satisfactory accomplishment of the contracted service. Bonds and guarantees are issued and enforced through a separate industrial circuit. However, their effect as risk-management elements and their cost through premiums, require their consideration, comprehensively with insurance.

CAR, General Liability Risks (grouping policies 3, 4, 5, 7 and 8) and Professional Indemnity Insurances are of the most importance to the owner as directly affecting the performance of his investment. Bonding is equally important on another level. A closer look at them in the following paragraphs will facilitate undoubtedly the conception of the components of a comprehensive project insurance treatment.

2.3 Surety Bonds and Bank Guarantees

Given that one of the parties to a contract may be unable to fulfill its terms, the other party may require that the performance of the contract be guaranteed by a responsible third party. The third party

(surety or bank) guarantees the performance of the "principal" (contractor or owner) to the "obligee" (owner or contractor) to the full monetary amount of the contractual obligation (face value of bond or guarantee) (18). Surety bonds are most commonly used, while bank guarantees have to be specifically worded and formed, for equal effectiveness.

As already outlined, bonds or guarantees are a non-insurance method of risk transfer, but to the obligee, the financial protection provided closely resembles insurance. The main differences are: a) a loss under surety bond may be caused intentionally by the principal, while an insurance loss should be accidental and b) in the event of a loss, the surety or bank can turn to the principal for reimbursement, which is not the case in insurance. The issuance of a bond or guarantee is based on a sound investigation and assessment of the business performance of the firm. The issuer will rarely post a bond guaranteeing performance above the firm's real ability. The so called "bonding capacity" of a firm, thus defined, will constitute an objective third party liability, with real value as an investment protection. On a secondary level finally, the obligee certainly has interest in pre-qualifying sureties, as far as their financial capacity will permit them to undertake the principal's obligations in case of default (18)(15).

Practice and tradition have standardized the types of bonds and guarantees typically required by owners for their protection. The main types are (15)(18)(5):

1. Bid bonds, guaranteeing sound bidding by firms and acceptance of the contract by them, if awarded;
2. Performance bonds, guaranteeing the satisfactory completion of the

contracted work, are the obligee's most comprehensive protection through bonding; and

3. Payment bonds, guaranteeing the prompt payment by the contractor, for the procurement of labor and materials to the works.

While the face value of bid and payment bonds can be fixed at a reasonably sizeable amount, enough to provide the necessary incentive for the contractor to honour his bid and fulfill his obligations to his workers, performance bonds will normally be posted for the full amount of the contracted works. Gradual and timely receipt of the works by the owner (transfer of proprietorship) as well as the existence of separate labor and material payment guarantees, will significantly relieve the bonding level, and consequently the cost of its premiums (1)(6).

The cost of bonding premiums, borne indirectly by the owner through contractual payments, represents mainly the surety's investigation expenses and overheads, since the bill in case of default will finally be passed to the principal. A bond would not be enforceable by the owner except after a legal determination that the contractor was in default, a process that is often very time consuming and costly and during which, the project may have to be partially or totally abandoned. The practical difficulty for the surety to recuperate its expense from the contractor, in case of his default and declared bankruptcy, further reduces its readiness to assume the contractor's obligations to the owner, and the latter's effective protection from performance bonding. In fact, as experience demonstrates, the total amount spent by clients on performance bonding (directly or indirectly through the contract costs), by far exceeds the amounts ever collected from calls on such sources, on the occasion of contractor's financial failure (1). In an

effort to reconsider the applicability of bonding and consequently realize considerable savings on premiums, the owner can use the following "reducers" of the need to have warranties supplied:

1. Select an experienced, competent, responsible and financially sound contractor, through careful prequalification procedures;
2. Sign a suitably drafted and realistically priced contract, using as applicable, the experience and broad procurement scrutinizing capacities of his financier;
3. Minimize the unknown technical factors in the project conception; and
4. Adequately delegate and enforce the insurance coverage of the project risks.

In summary, these "reducers" help the owner to be certain that his project is executed in a normal, predictable and controllable way by the contractor, endangering the least the former's financial and business position. All extremes likely to be followed by contractors, such as unrealistically unbalanced prices and avoidance of insurance cover, should, as needed, be cared for and controlled by the owner.

2.4 Contractors All Risks Insurance

Though there is considerable variety in the way that policies can be written under this general title, the main purpose of an All Risks policy is to cover loss or damage, however caused, whilst on the site of the contract, to the permanent and temporary contract works and materials for use in connection with the contract (8). Following the particular features to be met in each project specifically affecting the nature and extent of its risks, the insurance contract must be tailor-made for each

job. Since the wording of policies has taken through practice standard forms, especially for each kind of construction, detailed additions to the texts will be required. The CAR policies will be issued jointly under the names of the owner and the contractor. Under a CAR policy, the insurer will be required to repair and make good any damage to the property insured, up to the full value of the property. However, policies may often include ceilings provisions, which will limit the total (versus individual claims) liability of the insurer. This may often be the case in large projects.

There are certain risks which normally are not insurable. These are referred to as excepted risks or exclusions, and are specifically stated in the policy. Typical of the principal exclusions to be found in a Contractors All Risks policy are:

1. Any consequence of war, riot, civil commotion etc.;
2. Loss due to contamination by radioactive material;
3. Penalties for non-completion of contracted work;
4. Cost of making good any faulty workmanship material or design. However this exclusion does not usually apply to damage resulting from such faulty workmanship, material or design (for example, if a structure collapses due to proven faulty design, the policy will indemnify the owner for all damages inflicted on the rest of the project property, but not for the collapsed structure itself);
5. Acts of infidelity, dishonesty or fraud; and,
6. Loss or damage to existing property or the permanent works, once in use.

Most of the excluded risks can normally be insured under different policies and through a differently assessed premium (12)(8).

CAR policies, as policies of all types, invariably contain clauses which protect the insurers from the vexation of claims for trivial sums. These constitute the "deductible" or "excess" clauses and are designed to exclude loss or damage which is inevitable and falls in the category of trade risks. Under the excess amount clause, there will be no liability for the insurer to pay the first part (deductible) of the value of each individual claim, but only the difference above it. The deductible amount and/or the modalities of its application can vary considerably among policies, since in its essence, it represents some measure of self insurance by the contractor and hence reflects his risk attitude. A higher deductible will mean a lower premium, and consequently the amount can be defined as a trade-off. A contractor will usually find that the administrative expense of making claims for sums with small margins above the deductible, outbalances the amount recouped. An alternative to the excess clause which avoids this disadvantage, while still excluding the possibility of trivial claims is the franchise clause. Following the set-up of a franchise amount, any claim under it will not be considered but any claim above it will be met in full (12)(3)(8).

The essence of insurance, as cover against only "accidental" loss, gives an interesting perspective to the "faulty design" standard exclusion. This exclusion typically denies the insurer's liability for the cost of making good the faultily designed part, but also typically assumes it for the consequential damage inflicted to any other parts of the contract works. The complications that will usually arise in such occasions will be firstly to decide what "faulty design" is, following the not so simple definitions about professional duty and its exercise and secondly to define where the design damage ceases and the other

damage begins. As indicated in the literature (1)(8)(5), the conflict in this area between CAR and Professional Liability Insurance (in the understanding of its abuse by contractors when they attempt to discharge their liabilities on engineers), most often results in complete absence of protection for the owner.

Contractors All Risks insurance premiums will include the amount corresponding to the loss expectancy plus all kinds of the insurer's overheads and administrative expenses. Premiums will be paid either gradually, reflecting the insured value of completed works as assessed through periodic reports, or as a lump sum in the beginning of the contract, reflecting a policy written for the full amount of the project value (15). The CAR insurance policy will cease to be in effect with the passage of the property to the other party's ownership.

2.5 General Liability Insurance

Among various specialties of liability insurance, the one covering third parties will usually be a major item for consideration for the contractor. The contract conditions along with the related legislation will usually establish the minimum requirements for such policies. Liability policies will always carry a limit to the insurer's financial responsibility in repairing damages, applicable to any claim. The full range of liability policies, as listed in section 2.2 would be the only way for comprehensive cover, since, in their standard wording, each policy will list all others as exclusions. The actual structure of liability policies, will not be much different from the one presented for the All Risks policy. The particularity of cover, the special requirements for legal terminology and the relative independence of the liabi-

lity risks from the project's main concerns (third parties versus the project property itself), will quite often cause misunderstandings and inadequacy or excess in the cover provided.

2.6 Professional Liability Insurance

Professional Liability insurance is bought by engineers to protect them from any claims made against them for the cost of remedying defects arising out of neglect, error or omission under breach of duty or faultily executed design and for which they will be held to be legally liable. Such policies can be bought in blanket form, to cover on an annual basis the professional operation of the insured, or specifically pertaining to a particular project. Before the insurer will be ready to meet a claim, the insured must have been proved liable at law, as per the counts mentioned above (8). Professional liability policies will always contain limits to the amount for the final insurer's liability. The variety of their wording, their complex legal content and their relation with the other policies written for the project, will often confuse their interpretation. It will be often not until the big claim occurs that the insured will know the efficiency and extent of the cover he bought (8)(28).

The legal definition of professional duty constitutes an ever present problem area, in drafting and most important, in calling to professional liability policies during litigation. The problem is especially magnified in the presence of the standard "faulty design" exclusions of the CAR policies. Under this exclusion, a contractor can escape liability on the fact that a design was faulty. If the owner then turns to the professional liability policy of his engineer, he will first

have to prove a breach of duty on the latter's part and obtain a judgment to this effect. Traditionally, the breach of professional duty has not been any more precisely defined than the duty to exercise the ordinary skills of a competent member of the profession. And the contractual duty to the owner was considered as no higher a contractual duty than that implied by law on professional men holding themselves out as experts (1). The combined effect of this situation could be that the owner may find that he is under no protection. And worst, he may find this after lengthy and very costly legal proceedings. Different jurisdiction and choice of law clauses, for international projects, may complicate the situation even more, to the detriment of the owner's claim.

A professional service is not measured strictly with the monetary dimension alone. Professional ethics, social purpose and essential scientific and innovative content, inherent in the rendering of professional services, are taken into consideration by the industry in order to relieve the design professional from an unfair burden for the unexpected occurrence and place it correctly with the owner, who finally collects the benefits from the use of these services. So traditionally, engineers operated considerably shielded from legal responsibility for a great part of commercial losses. Professional liability insurance has not only been considered unnecessary for engineers (he who has no assets cannot be sued), but also an undermining element for the professional's standing and his relations with his clients, as encouraging undue risk-taking. However today, the apparent "reduction" of the professional service to its "working" economic function and the legally complex undertakings of the economy, have created (especially in North America), a clear trend where the courts are rapidly moving from the doctrine of reasonable care,

to the doctrine of strict legal liability of all professionals (1)(22) (23). The markedly "litigious" attitude of business today and the transient state of the related legislation have caused the ratio of the yearly number of claims over the number of policies in force, in Canada, to jump from 1:20.8 in 1966 to 1:3.3 in 1977 (22). Parallel to that, it has been calculated for recent years in the United States, that the ratio of defence costs in professional liability cases over indemnities finally paid to injured parties is close to 6:1 (1)!

So, professional liability insurance is an important issue for the owner. Specialization, tradition and vested interests, have created a separate and distinct market in this area and the owner must contend with it on an entirely different basis and footing than for construction operations insurance. Even when the owner is able to establish a breach of duty, he may find that the engineer's resources (including his professional liability cover), are far below the damages suffered (1), because of the relatively moderate amounts that policy limits set to liabilities.

2.7 Closing Remarks Regarding the Owner

The salient features of the traditional approach used for covering the project owner, during the construction phase, from risks to third parties and the project itself, may be summarized as follows:

1. The owner defines only qualitatively, in the contract, his desire to be held harmless against a specified variety of project risks;
2. The definition and economic optimization of handling those risks, is passed to the contractors as "specialists" in the field;
3. The owner bears indirectly the cost of risk management through the

contractual payments to his contractors; and

4. Major risks are handled through the purchase of various standardized forms of insurance policies, by the contractors.

While this scheme works very well with small and medium-sized projects, where as experience shows, any effort to optimize risk management could be outbalanced by the additional administrative overheads, and where most likely the presence of a single general contractor would suffice for comprehensive control, the contractual complexity of a large project would work in the opposite direction. Apart from the problems that arise from the project itself, the scale of the undertaking will often require extra-project solutions (re-insurance or national and international pools of insurance contracts in view of the increased needs of cover), considerations which will constitute a valid reason for concern for the owner and his financiers on the global level of his enterprise.

Finally, current trends in the economy and society as a whole should be recognized as factors that ultimately shape the "business" attitudes of owners. They are:

1. The ever increasing appeal of "no-fault" insurance against strict liability, as a way to spread the costs of risks of large managed systems;
2. The need to "do something" about the extremely litigious attitudes of business today and the bottlenecks caused in settlement of disputes through the existing procedures of the legal system (27); and
3. The comprehensive, knowledgeable and sophisticated management increasingly required for purposes of public accountability.

Owner-controlled insurance for the project, as will be seen in the following chapter, offers a means to treat and provide answers to these issues.

CHAPTER 3

THE PROJECT INSURANCE CONCEPT

3.1 Project Risk Management

As outlined in chapter 1, risk management of a construction project includes the totality of activities oriented to a) identify, b) minimize and c) treat the risks of the project. Since the purchase of insurance is by far the predominant way of treating the major portion of the project risks, step c), through the risk-allocation action it contains, will have to take seriously into consideration the optimization of the insurance schemes available to the project. In the large project, the owner, through his appointed Project Manager, is the only entity with an appropriate legal position and an adequate functional and administrative authority to carry-out comprehensively the management of risks.

3.1.1 Identification of Risks (18)(24) Through the application of a methodology (see section 5.2.1) or by experience and exhaustive combing through of the project and its environment, the first task should be to identify qualitatively and quantitatively the risks of the project. A convenient grouping can recognize the following categories:

1. Damage to project property These risks, normally covered by tailor-made insurance include fire and related hazards, loss in transit or storage of project materials and equipment, loss due to Acts of God, weather influences on the project execution, loss due to theft,

burglary or malicious conduct, special risks as explosion, riot, aircraft accidents, boiler vessel failure etc. Consequential risks are also included here, like loss of income in delayed commissioning of the project, higher contractual cost of repairing damages etc.

2. Changed conditions risks The category would include, site access and availability difficulties, subsurface conditions of geology and groundwater, necessary project changes during execution and quantities variation within and outside of their contractual context.
3. Performance related risks These risks would include the contractors' failure to enter into contract, non-payment of creditors, failure to complete the project according to specifications (defective work) or on time, and subcontractors' failure. Defective design, conception failures and constructibility errors, would constitute engineer-borne risks. Lack of managerial competence can result in overhead excesses, delays and obstructions. Financial failure through the overall operations of each party should also be considered.
4. Third party liability risks These risks include bodily injuries, death or property damage due to the owner's or contractor's operations, use of the partially completed or completed works, insufficient plans and specifications, project related accidents as explosions, collapse or underground damage, use of transport vehicles, etc.
5. Economic risks Inflation, its trend and size should be investigated here. Also included are the so-called "Economic Acts of God", like OPEC decisions, large, country-wide strikes, tax law changes etc. Financing risks connected with the availability, cost and other conditions that funding is carried through, labor negotiations and agreements, materials and equipment cost and availability, and

finally imposed or necessary changes on the owner's or contractor's cashflows due to acceleration, suspension etc.

6. Political and societal risks These risks would include environmental and city or provincial regulations, government regulations on safety, insurance and business practices, public disorder or war risks, and union strike and work disruptions.

Such a list would rely finally on the competence and hard work of the risk manager. Risks 1, 3 and 4 are the ones usually insurable, and their quantification can be considerably helped by examining categories 2, 5 and 6.

3.1.2 Minimization of Risks The measures described further down, will aim to a reduction of the dollar value of the defined risks, or their zeroing, as a first treatment measure. In risk minimization, a critical feature of risks associated with large projects is their possible interaction. The practices of a civil contractor for example, outside the risk context of the civil works themselves, can create various risk-frames for the mechanical-electrical contractors that come later etc. Again, the owner through his project manager, is in a unique position to comprehensively assess the degree of minimization, by taking into account the interaction of risks or their consequential aspects through the project (20)(21). The steps involved include the following:

1. The project purpose, goals and objectives must be firmly established, and the total project realistically organized toward the achievement of the project objectives.
2. Thorough planning and engineering design criteria must be established before physical construction is undertaken and funds are committed.

Such planning must include comprehensive risk management policies and liability plans.

3. Careful selection of a consulting engineer and a project or construction manager, through prequalification.
4. Adequately assessed and justified subsurface exploration.
5. Disclosure of information (construction schedules and methods, risk minimization practices, advance notice of major operations) among the participating parties. This is currently a reversal on traditional practices.
6. Contractor participation in design specifically in the areas of constructibility of solutions and methods and in value engineering during execution. Current practices are not favorable to such contractor participation.
7. Contractor capability investigations, before bidding (prequalification) and during bid evaluation. This would require soundly selected and realistic bid-evaluation criteria and more thinking than just awarding to the lowest bidder.
8. Adequate and sufficient "machinery" must be established in advance to channel, evaluate and resolve contractual and outside disputes, with criteria directed to promptness, and litigation avoidance.
9. Considerable effort must be directed in developing a labor relations plan to assure continuity of work by avoiding labor disputes.
10. Adoption of an appropriate management structure with clear problem solving procedures and channels of decisions for action. Various elaborations of the project management structure must be considered (21).
11. Thorough investigation and assessment of the financial condition of

all participants in the project.

12. Securing and often pre-purchasing critical materials for the project, and further pre-establishing warehousing and maintenance plans.
13. Taking care in advance of government regulations, permits, rights of way, legal and institutional constraints etc. as best as possible.
14. Establishing sound contracting practices and planning construction packages for efficiency and economy.
15. Establishing and execution of strong, contractually enforced and comprehensive safety programs.
16. Implementing a management system which has as a central feature a production or extrapolation capability to anticipate risks arising during the construction phase.

With sufficient guarantees that measures such as those listed above have actually been implemented in the project, the impact on the cost of insurance could prove significant. The trade-off between reduced insurance premiums and the additional costs for the implementation of such measures will be the guide for designing efficiently a risk-minimization program. The need to apply such programs uniformly through the various contracts of the project, cannot but be again emphasized.

3.1.3 Treatment of Risks As very illustratively presented by G. E. Mason (18), the full range of treating risks will include one or more of the four alternative steps shown below:

1. Risk avoidance entails action to completely eliminate the situations or project features that generate the risk;
2. Risk abatement takes steps to reduce the size of the risk, without completely eliminating it. Risk minimization measures, as those

described in section 3.1.2 fall in this category. Of course, the initial cost of carrying the risk should be greater than the sum of costs of the minimization measures plus the remaining risk to carry, so that abatement can be justified;

3. Risk retention may or should be followed, when the risk is either small in amount or trivial in nature, or, on the other hand, if the risk is not transferable because of amount or nature. Risk retention can take the form of no-insurance (when no reserves are set to meet the loss), self insurance (when reserves of optimized size are set aside to meet the loss), or deductible insurance (small losses not compensated by the existing policy). The self insurance alternative will mean additional administrative expenses, probably a different tax situation as far as income deductions are concerned and maybe an obligation for the self-insured to supply other services that the insurance industry usually supplies (standard auditing, legal impositions of inspections and assessments etc.) as well as to be properly organized and staffed for them. In all the three cases, the excess liquidity to meet the losses must be costed and justified against the benefits of retaining the risks;
4. Risk transfer is done mainly by purchasing insurance, either directly or indirectly through a direct contractual transfer, using the "hold-harmless" clause. For the owner, the eventual question will be whether he buys the insurance himself or demands his contractors to do it for him.

The risk treatment choice cannot but derive from the comparison of a consistent quantification of the pros and cons of each solution, using interaction and allocation scenarios uniformly applied through

the whole project. Section 5.2 will discuss the techniques available to answer the risk treatment problem.

3.1.4 Risk Allocation and Insurance A sub-problem to the risk treatment question, which has the most critical importance for the implementation of a risk management policy, is risk allocation; namely the decision for the owner to keep the risk for himself or pass it to his contractor(s). Since again, the majority of risks are treated with insurance, the allocation decision will consist of whether the owner buys the insurance himself or lets his contractor do it for him. Therefore, as will be examined further down, the conditions of purchasing and using insurance will come as a major factor in the risk treatment process.

R. E. Levitt (19), following his definition of risk, measures its cost as the balance of "Contingency" versus "Incentive". With the

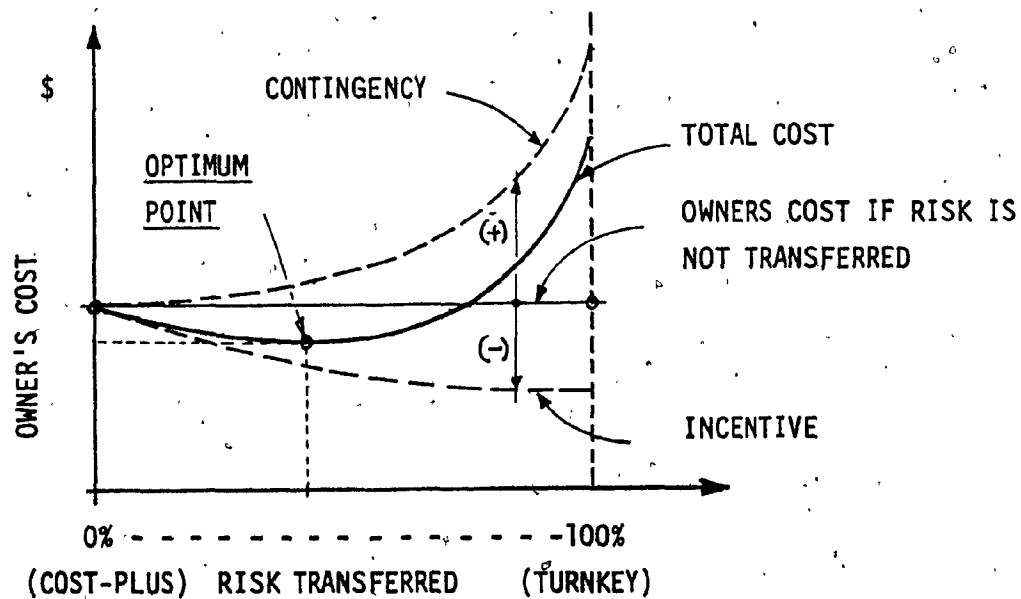


Fig. 3-1 Cost of risk through allocation

transfer of risk, the bearer will have to increase his costs by a contingency to account for the uncertainty introduced. On the other hand, the presence of risk constitutes an incentive for better performance and realization of an eventual saving. The balance of contingency versus incentive produces in general a variable final cost of the risk for the owner depending on the degree of transfer. Further from a certain point, the addition of risks will only increase the contingency, without adding any more incentive to the contractor. At the optimum point (if any), the savings realized by the contractor, will be partially enjoyed by the owner, if we assume the effect of a competitive market on the contractor's services' price. Figure 3-1 depicts the above cost trade-off.

Such an analytical picture of risk allocation, with presumably very difficult computation and limited chances for applicability, will necessarily have to be complemented by an endless list of experience and good common sense considerations (25)(26). The following guidelines are of such nature.

1. A risk should be imposed on the party which is in the best position and maintains the most appropriate qualifications to control it.
2. If a risk is imposed upon a party, an opportunity for reward to the party should exist for properly dealing with the risk.
3. The overall efficiency of the project should be borne in mind in allocating risks. Risk interaction should be investigated and allocation should be judge through all the consequential effects of a risk and the treatment that the bearer might decide.
4. It must be assured that risks get finally allocated as intended i.e. that the decided allocation policy is actually followed.

Following such considerations, it would not be too difficult to decide

the appropriate allocation of risks in construction. A thorough discussion on the subject by M. Abrahamson (25) suggests the following assignment of risks:

1. Clear owner's risks: Natural and physical, legislative, economic, engineering.
2. Clear contractor's risks: Control of works, on site liability, construction safety.
3. Shared risks: Site conditions changes according to size, third party liability according to nature, labor and materials costs depending on construction duration, any risk in general according to motivation generated.

The administrative and functional complexity of a large project, resulting in sizeable overhead costs, comes to deform considerably such "pure" thinking. In fact, administrative costs are large enough that their marginal optimization in regard to expenses for services often constitutes the key factor for functional decisions. That is, the owner may find that by keeping traditional contractor's risks for himself and comprehensively insuring them, the higher premiums that he is likely to pay and the loss of contractor's incentive are more than offset by savings in quick settlement of disputes, in litigation avoidance and in having to deal with one insurance company.

3.1.5 Frame of Insurance Scheme Conception Taking into account the full content of a risk management approach as outlined in sections 3.1.1 through 3.1.4, an endless list of objectives and criteria can be developed for efficient insurance cover for the large projects of today. The prime source of objectives is of course the project itself and its over-

all cost optimization. The increased role of the owner however, required functionally because of the project size or as a permanent activity in his organization if he is repeatedly involved in project investments, creates the need for an other set of objectives on a higher level than the project itself. These objectives will be aimed at the owner's capacity to "know" what is going on and "control" it as well.

In the same way as project financing is mainly arranged by owners in whose domain all analysis is likely to be concentrated by lending institutions, project insurance is starting and needs to be influenced by the permanent credit and operations characteristics of owners. Insurers will look to the past performance of an owner, his administrative structure and his supposedly consistent through his undertakings risk attitude, as important starting points in shaping the cover policies and contracts. The owner builds an industrial image through his operations and it becomes imperative to reflect this image in a set of higher level goals in considering the inputs to the cover decision for a particular project. So, control and knowledge in the general sense should be understood as the means of guaranteeing the presence of the owner's higher level objectives in decisions regarding the particular project. Though it is inherently difficult to quantify adequately and attach a cost to the result of such considerations, their clear understanding and explanation to the insurer will provide a basic frame for defining and costing the insurance cover.

Things become easier and clearer on the project level itself. As seen in the preceding paragraphs, the required cover cannot be defined until a thorough knowledge of the project has been gained and a comprehensive application of a risk-management program planned. From

the start of the project until a) premiums are established, b) insurance is bought, and c) contracts are awarded to contractors, systematic analysis on paper is almost all that is needed in order to satisfy the requirements of risk-management, allocation and policy premiums optimization. The cost of insurance cover though (in addition to the established premium), still remains to be heavily influenced by the efficiency of claims settling procedures and contract administration in general. Confusion and documents interpretation differences, contractor's "automatic" argumentative attitudes and defence tactics, insurers' standard "legal tricks" and hidden complications, all come eventually to contribute a major part to the overall cost of cover. Control and attainment of efficiency in this area will require on the one hand clarity and understanding by all parties of the content of documents and contractual relationships, and adoption on the other of clear, conflict avoiding administrative procedures, effective in contract administration.

So, in concluding this section, the conception frame of an insurance cover scheme can be presented by the four general steps listed as follows:

1. Develop and interpret the industrial and operations profile of the permanent business entity through the project, which is the project owner. Establish and use the owner's criteria in the domain of financing, risk and insurance. Design project insurance scheme in conformity with these criteria;
2. Establish a product-oriented risk-management approach for the project, aimed at comprehensive control of the required cover. Design project insurance scheme in conformity with the developed criteria for defining, treating and allocating risks according to the con-

- tractual roles of the involved parties;
3. Define and enforce contract administration procedures that guarantee mutual understanding and avoid conflict; and
 4. Cost-optimize the resulting operations as a whole.

Figure 3-2 depicts the above described process.

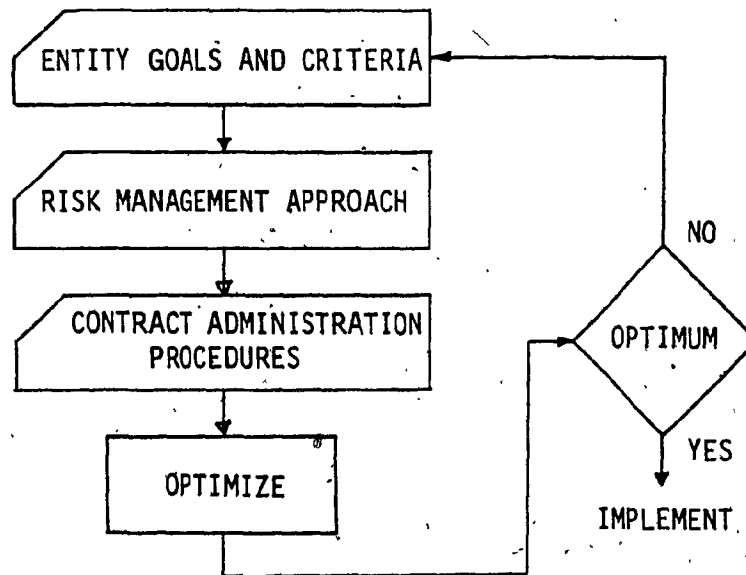


Fig. 3-2 Insurance scheme conception frame

3.2 Shortcomings of the Traditional Approach

As already outlined, the traditional approach implies contractor's control over the risk and insurance management of the project, through the contractual passage of the project's risks. In examining the shortcomings of the traditional approach in regard to the qualitative criteria of risk-management for the large project developed in section 3.1, a checklist-type collection of arguments is first followed, since the supporting literature is width-oriented in interpreting the

experience of long years of practice. At the end of this section, an evaluating summary is presented.

1. Risk may not be wanted At the far end of the incentive-allocation curve, an additional risk may not only contribute no incentive at all but drive the contractor into defensive or even counteraction attitudes. Contractors may increase unnecessarily their contingency, resort to conservatism in their construction or design methods or become extremely litigation and claim oriented in their relationship with the owner.
2. Financial pressure on contractors Contractors are not supposed to provide banking services and as such the excess liquidity that extra risks will require if retained (as a resort to more risky self-insurance attitudes), will penalize their traditionally undercapitalized operations.
3. Unclear risks If the owner, without doing his homework, passes obscure and ill-defined risks to contractors, it will be more likely for them to just charge a premium on their prices instead of studying the risks themselves.
4. Risk interaction negligence In the large project, the same risk may signify one thing for one contractor and his part of the work and quite a different thing for another. Or, the sequential effects of a risk, whether treated or not, may create quite a different situation for another affected part of the project. Through the traditional approach, treatment stays compartmentalized and with limited scope.
5. Risk attitude inconsistency In the large project, every contractor will have his own criteria for defining an attitude in front of the

risks borne by him. His attitude may differ considerably from that of the owner either as more conservative or more risk-inclined. Differences will become more extreme with the additional volume of risk transferred. As a result, the owner bears uncontrollable costs through the bid amounts.

6. Overlapping insurance The multitude of policies used in the traditional approach and the standardization of their contents will quite often produce overlaps of cover for the same contract package. Overlaps will be almost certain when many contract packages exist and many contractors purchase similar policies, each for his own part of the work. Unnecessary costs for the owner are incurred as a result.
7. Not tailor-made insurance Standardization of policies will cause purchase of unnecessary cover or loopholes in insurance contracts where desired cover does not exist.
8. Professional Liability exclusions It has already been seen that due to traditional conflict between a Contractor's All Risks policy and the Professional Liability policy of the consulting engineer, the owner may find himself without protection at all in the critical area of design errors and omissions. The problem is further aggravated by the legal complications and the procedural demands of litigation, if necessary. The construction contract usually contains no duty on behalf of the contractor to advise the owner of any design defects that he may detect. Thus, he can continue spending the owner's money without putting himself or his insurer in any risk for the consequences. In addition, insurers have increasingly argued that many design-inadequacy losses that happen are not fortuitous in origin. That is, they are "inevitable" because knowledge in the field

was not sufficiently advanced. Hence, since the loss, as bound to occur, was not a "risk" but a "certainty", insurance would not be liable to provide indemnity, by principle. Taking into account the extreme difficulty in reconstructing the precise interaction of events after a major failure, it is quite likely that the owner finally ends-up self insuring himself notwithstanding his expectation to be indemnified (1).

9. Superfluosness of bonding Apart from the initial guarantee for the business soundness of a contractor, a bond does little else, as suggested in ref. 1, during the construction phase, except doubling unnecessarily existing or easy to obtain insurance cover. In the event of a contractor failure, it will be more likely for the owner to do his best and help the contractor out, than resort to litigation aimed at compensation, which experience suggests is very doubtful in terms of the owner recovering. Even the initial role of a bond can be seen as reduced in large projects because of the universally followed strict contractor prequalification procedures and the fact that the industrial market to which the projects appeal contains mainly large, well known, specialized and experienced contractors with high and dependable professional standards.
10. Encouragement of contractors to extremes A contractor, in his competitive effort to acquire a contract, might play with the insurance alternatives to a degree unacceptable to the project's quality or to the owner's desires. The frequently met attitude of low initial bids with ceaseless pursuit of claims later will certainly not be to the owner's benefit. Or in a different case, deductibles might be carelessly set high in order to save on premium costs and later, liqui-

duty demands will be very penalizing.

11. Lack of owner's and engineers' knowledge The traditional approach does not help the owners or their engineers to realize at all their commercial interest in knowing and managing insurance and risks in general. Communication and interaction have traditionally been kept to the minimum resulting in inadequate knowledge of insurance by engineers and even worse understanding of technical information by insurers.
12. Legal and interpretation difficulties As mentioned, international large jobs might end-up having their insurance policies written under different civil code frames, and their interpretation might lead to confusion or dead locks. Choice-of-law clauses for international contracts or choice-of-jurisdiction ones can further delay and penalize the cost of settlements.
13. Inherent "win-loose" approach Strict liability in the traditional approach create an adversary climate among the major participants, fortification of positions when a loss occurs or when a risk threatens and inflexibility towards solutions. Confusion clouds mutual interest problems and a team approach is discouraged.
14. Information gaps-lack of communication The traditional approach does not permit full exploitation of the information on the project generated by the engineer in the prebidding stage (habitual disclaimer clauses). Uncertainties might be hidden from contractors and even the owners, only to increase the cost later through change orders or claims.
15. Unfavourable ground for risk minimization With the owner's role reduced, the chances to implement a comprehensive and consistent risk

minimization program in the multi-contract large project are reduced as well. With the risk coverage responsibility given to the contractors, interventions and guided value engineering by the contractors are difficult, because each will tend to follow his own chosen attitude.

16. Difficult management When a service comes from many sources, it is much more difficult to manage and control the cost than if dealings had to be had with one entity alone (communications and documents problem with many policies).
17. Owner's isolation Full responsibility with the contractor will encourage solutions of problems within procedures of the industry, excluding the owner's follow-up and his at times unique position to intervene constructively due to authority held or extra-industrial capacity. This is particularly true for international jobs where owners have to deal with a completely unknown industrial medium. The absence of the owner from the control phase of the project will not yield to him the benefit of establishing an industrial credit vis-à-vis insurers and financiers, so that he can benefit from it in his following projects.
18. Increased costs The main sources of cost-mark-ups, inherent to the traditional approach, by experience are: a) insurance premiums duplications due to multitude of cover b) contractor's overheads added on the net value of insurance premiums, as reflected in the bid prices c) increased administrative expenses and d) cost and delays associated with litigation and disputes.
19. Subrogation Depending on the clarity of the policy's insurance jointly under the names of both the owner and the contractor, sub-

rogation develops when one party is recognized liable towards the other. A parallel situation could develop in multi-contract jobs where each party looks at a different insurer for defense and settlement, and confrontation within the project develops. Cross actions between the contracting parties and their insurers only create additional loss to the owner.

20. Passage of ownership complications With policies being valid until contractual passage of control of works is effected, major duplications of cover can occur when this process is not clear or the contrary gaps of cover. This would involve the contractor's contractual relation with the owner as well as the one with his subcontractors, who buy insurance for themselves.
21. Contract-loss inconsistent relationship In a multi-contract job, it is likely that a small size contract carries important risks, not only for its own content but for the project as a whole. The size of the loss might by far exceed the value of the contract and it would be impractical to require a small contractor to arrange cover above his financial size or his usual insurance arrangements.
22. Loss of economies of scale With the purchase of insurance staying compartmentalized through the various contracts, the economies of scale due to the massive impacts of the project's financial effects on the market are completely ignored. Fragmenting the purchasing power may result in higher costs and inferior service from the casual assortment of smaller and marginally operating insurance firms.

Reviewing the arguments against the traditional approach in treating the insurance of large projects, we can summarize the drawbacks in the following general remarks:

1. The traditional approach creates a system of peripheral control, while modern project management and a large project require central and comprehensive direction. This "by principle" difference can be thought of as the most important organizational disadvantage embodied in the traditional approach.
2. In its content, the approach mistreats risks, exploits the existing traditional policies inefficiently and deforms the role of the business entities participating in the project by imposing on them a mismatch of burdens and services effected.
3. The approach creates additional costs for the owner, on the one hand through the unused mass purchasing power and on the other, through administration and litigation burdens inherent in its implementation.
4. The approach does not provide comprehensive coverage for the owner and there may very well be loopholes.

3.3 Owner-Controlled Insurance (Wrap-Up)

Owner-controlled insurance or what has come to be known in North America as "wrap-up" insurance during the practice of the last twenty years, is the approach that places the owner in the direct position of insurance contracts buyer, instead of letting his contractors do it for him. Initially, owners would purchase insurance for comprehensive cover against damage to project property only (CAR policies), providing thus a blanket over all contractors working in the project. The criterion of content consistency that led to such a decision would leave all other required policies to be bought by contractors individually, as applicable. Administrative complexity, cost overheads and country and provincial laws led gradually to the inclusion in "wrap-up" schemes of almost all

other standard forms of general and third-party liability policies, leaving to contractors only specialized policies applicable to their trade specialities.

Wrap-up insurance continues to be bought under the traditional standard forms of policies, as presented in chapter 2. The owner will arrange the cover on the basis of average performance and quality criteria, anticipated during construction in the absence of any specific information on his contractors and their performance records beforehand. The policies will be issued jointly under his name and those in contractual agreement with him. The owner will pay the premiums and his contractors will be so informed through the contracts. A comprehensive insurance scheme would not prevent contractors from protecting themselves with any additional insurance they might wish. When a loss occurs, the wrap-up policy will automatically eliminate any activity directed towards proof of strict liability or subrogation case, and a "no-fault" approach will be adopted for the settlement of a claim. All claims would have to pass through the owner, who manages the insurance, and who in turn deals with the insurance company.

The owner, as manager of the comprehensive policy, will implement his financial and operations criteria in choosing the amount of cover, and the deductibles that he decided to afford. Theoretically, as also mentioned in chapter 2, the deductible decision can be taken in the whole range of self insurance (less or no insurance) to full insurance. In many cases, cost-benefit analysis can show that self insurance can be a sensible course of action, in view of past loss-claim experience and lenders attitudes (1). In the overwhelming majority of cases however, passage of risks to the professional risk takers will be followed,

with deductibles established in view of each particular situation.

The main justification of an owner pursuing a wrap-up insurance scheme, apart from the in-built facilities for control, will be his expectancy for a reduction of his cost for the purchase of the goods and services that he buys from the insurance company, in relation to his cost if the same services were bought through his contractors. The elimination of the contractors overheads, the avoidance of policy duplication and the administrative simplicity of having to deal with one insurance company alone can lead to a safe assumption that indeed, the premium costs will be lower (1). However, since risks are not any more in the contractors' control, the loss of incentive will certainly act counter to the above described cost trend, reducing the potential savings that accrue to the owner. The very delicate and essentially marginal quantification of the economic pros and cons of owner-controlled insurance, leaves much room for argument against its purposefulness from a strictly economical point of view, as long as the benefits are counted only in the costs of obtaining and administering the policies. The overall impact of wrap-up insurance however, on the project, its control mechanisms, its management efficiency and most important on the total cost of compensating against losses, is increasingly establishing this form of action as a "must" in arranging large project insurance.

In the words of E. M. Saventem, pioneer in investigating and defining the applicability of owner-controlled insurance: "...Project insurance offers exceptionally flexible facilities to reserve for the local insurance market, the highest degree of participation compatible with the overall objective of maximum rationalization and economy." (1). In fact, wrap-up insurance "normalizes" the services of the insurance

companies by making them product-oriented (project) instead of business-oriented (protecting contractor "A"): It offers the possibility of collaborative, uniformly oriented insurance pools, against the eventuality of the traditional approach having two or more insurance companies fighting between themselves over their separate client's positions. And actually, it was the insurance industry that first developed the idea of wrap-up insurance, under the continuing protests of contractors and other members of the construction industry.

Owner-controlled insurance neglects basically the beneficial effect that a contractor's good name in safety and safe operations has on the conversion of risks into fixed costs (policy premiums). In the large project however, performance differences among contractors tend to be overshadowed by the objective risk criteria inherent in the project itself: the period of construction, the location, the danger from forces of nature, the nature and value of the equipment installed or used, etc. Thus, even before the names of the successful tenderers are known, the owner's brokers will be able to obtain reasonably precise rates and indications from the insurance companies (1). The independence from the particular risk behaviour of each of the participants in the project is additionally underlined by the essentially "no-fault" principle that the wrap-up insurance policy will use to avoid costly recourse claims and to route the growing costly tendency of strict liability.

Specialization and vested interests in the insurance industry have presented difficulties so far, in including in wrap-up schemes cover for professional liability of engineers and consultants. Though there seems to be no reason in insurance theory against such inclusion, insurers and contractors raise many arguments against the efficiency of

such an unconventional approach (see chapter 2). Expert evidence however points to project insurance as a means for providing much larger cover to the owner against faulty design damages than the traditional separate-policies approach. Midway in the evolution of the principle, varying deductibles borne by consultants (and in general all participants to the project) are used today with wrap-up insurance schemes, in order to maintain proper vigilance and professional standards according to responsibility.

Owner-controlled insurance is increasingly used today, through variable cover arrangements. The New York Power Authority used a very comprehensive form of wrap-up insurance in the St. Lawrence and Niagara projects, as early as 1950, and currently in the U.S. wrap-up insurance is standard practice for the construction of the multi-billion Rapid Mass Transit projects in many cities. In Canada, the James Bay Energy Corporation supplies very comprehensive wrap-up insurance cover paid by itself to contractors working in the various sites of the James Bay Project. And consulting engineers, rapidly repairing their traditionally weak position on matters of insurance and risk-management in general, are systematically advising their international clients on the benefits of owner-controlled insurance.

Perhaps, the basic nature of wrap-up, owner-coordinated insurance as a contract administration and management control tool is best described in D. G. Hammond's words (20):

"...If nothing else it seems to me to provide a mechanism whereby individual participants and their individual insurance companies are not permitted to be in a position to be saying "it was not me, it was him" and therefore it never turns out to be anybody."

It is beyond this report's scope but it could be just hinted here that, particularly through its potential use of the "no-fault" principle, wrap-up insurance reflects a much larger in scale social and business trend than could be narrowly explained in the particular features and circumstances of the construction industry.

3.4 Wrap-Up Insurance - The Immediate Benefits

Almost all of the arguments in the list of the traditional approach drawbacks can be reversed and presented as benefits, at least qualitatively, of the owner-coordinated insurance approach. Among the arguments, the ones where the effect of the wrap-up insurance is most pronounced are: relief of financial pressure on contractors; favorable ground for risk interaction consideration on the project level, and consistent risk attitude; elimination of overlaps or coverage gaps towards tailor-made coverages; favorable ground for all aspects of a knowledgeable handling of things by the owner; clarity; and lastly, apparent savings for the owner, thanks to a better exploitation of his purchasing power and procedural benefits on arranging policies and settling disputes.

As mentioned in the preceding paragraphs, the main benefit of owner-coordinated insurance is to be found in its "normalizing" effect over the whole issue of project administration. It supplies the necessary frame for the "team" approach in construction, where owner, engineer, contractors and insurer each contribute special expertise to common problems, so as to optimize project performance (25). Under wrap-up insurance, a basic guarantee is furnished to the project organization that the traditional throwing back and forth of risks and the conversion

of the construction scene into a battlefield of lawyers is to be avoided. Settlement of claims will be quicker and confidence among the parties will be restored. Through coordinated insurance, owners will have the best occasion to build a permanent and consistent industrial image as regards their project administration practices, towards their eventual benefit in their treatment by the business entities in their undertakings. In concluding this paragraph, we can summarize the dimensions of the procedural benefits of wrap-up insurance, as follows:

1. Risk management and insurance are integrated into the project management system, in its understanding as an administrative process.
2. Product oriented team-effort is guaranteed among project participants.
3. Economies are realized in:
 - a. mass purchase of policies
 - b. simplicity in administration
 - c. quick settlement of claims
4. Owners build a knowledgeable industrial image.

Among the considerations of owner-coordinated insurance on the quality and content of works, N. A. Nadel (26) deepens, once more, the question of the consulting engineers' professional liability situation and how its amelioration through transfer of the risk to the owner can prove to be of great significance to the project. He signals that the traditional approach that inevitably results in the notion of strict liability over the designer's work, combined with the inherent weakness of professionals in litigation, has made engineers deliberately follow a policy of protecting themselves from claims and criticisms of all sorts in their designs, at the expense of quality and ingenuity of

the work produced. The contractually adversary position of the engineer and the contractor also seriously curtails the efficiency of any value engineering effort during construction. As a result, the majority of designs today are of poor quality, conservative and unimpressive. Since the professional service by nature cannot operate under the contingency-incentive balance in treating construction risks, the only remedy would be either to incorporate the design in the contractor's service by awarding a turnkey contract (as suggested), or to have the engineer covered by owner-coordinated insurance. In both cases, the engineer works shielded from strict liability and the risks of his design are effectively borne by larger, purely quantitative monetary interests (the contractor's or owner's).

It has been mentioned already that the professional liability inclusion in wrap-up insurance programs, has not yet been "philosophically" overcome by the industry. And even in the case of its full inclusion, additional measures will be needed, as is currently the case, in order to guarantee quality and economic efficiency of design (monetary awards, or sound prequalification etc). It must be underlined however, that specifically for the owner provided cover for professional liability insurance in a wrap-up scheme, "a reversal of structure" is implied over the recently traditional principles of the business and legal context of professional services. And it is in this area that a major contribution to the project's quality must be justly credited to the innovative control and responsibility structures imposed by a centrally coordinated insurance program. And the same, to a certain extent, could be claimed for the contractor's services. Owner-supplied insurance removes from the contractor's industrial service the often

"deforming" business characteristic of insurance manipulation. This, along with additional measures to properly restore incentive could be seen as a contributing factor towards efficiency and creative concentration in the industrial service itself. Again, a business trend of a much larger scale is noted.

3.5 Wrap-Up Insurance: Constraints and Things Left to be Desired

The wrap-up insurance concept does suffer from some problems. Traditional industrial practices and inherent inefficiencies pose a series of tough problems for the owner and his project manager in their effort to control insurance, and for some of these, there will simply be no answer. Similar to section 3.2, points within this category will be listed along a checklist type of reference and a qualitative summary will be given at the end of this section.

1. Lack of incentive for contractor Following the definition of risk as the balance of contingency versus incentive, shouldering of the risk by an owner-paid insurance policy would appear to remove the incentive from the contractor. Safety and "good name" for the contractor, as well as construction practices that would minimize the risk and hence his contingency value, have no more appeal to him, since he cannot influence the cost of premiums. Additional measures must be implemented by the owner in order to restore incentive to contractors, such as monetary awards or shared deductibles policies, substantiated in the construction contract.
2. Double counting of insurance premiums Contractors who do not feel at ease with wrap-up insurance programs or do not understand them, would often go and purchase the same cover on their count and reflect

the cost in their bid. The owner thus pays twice for the same cover.

A clear statement of the owner furnished policies in the contract documents would help correct such misunderstandings. The same should be done by contractors in their agreements with subcontractors.

3. Delay in prompt payment of claims Contrary to the obvious advantage of wrap-up, the scale of the project might burden a lot the administrative complexity of clearing up a claim, since the owner's organization interferes considerably with the process.
4. Penalization of good contractors The exclusion of the lower insurance cost from the bid amount of a good contractor, with safe operations and prime treatment by insurance companies, penalizes the overall competitiveness of his bid, in favor of other, less safe contractors. Thus, the owner might not be selecting the cheapest cost for his project.
5. Excessive coverage In wrap-up schemes, the owner is more likely to be persuaded by the insurance companies into buying marginally more coverage than what he might need, for the benefit of simplicity or standardization in the policies and the insurance contracts. This again would result in unjustified additional costs for the owner.
6. Administrative complexity Setting-up a wrap-up insurance program, developing and using expert knowledge and getting properly staffed to process the related work, might prove to be quite an exercise for the owner's organization. In addition, knowledge of insurance industry legislation must be developed. Especially when the approach is attempted for the first time, this practice might prove exceptionally costly to the owner.
7. Need for sophisticated back-up The number of projects for which

wrap-up insurance can be justified from a strictly economical point of view is small. The analysis of this alternative requires the use of relatively sophisticated and often controversial analytical techniques, which are in many cases not understood by senior management who must make the final decisions for insurance coverage.

8. Insurance industry compartmentalization Long years of practice have specialized and standardized the services and policies of the insurance industry. Reflecting the more general problem of tailor-made cover, the insurance industry adapts slowly today to the needs of wrap-up cover, as a "working" system. Some types of cover are traditionally excluded, combinations of policies might present difficulties, agreement on pooling of resources to meet the large sums of liquidity required is difficult and slow etc. Of particular importance again is the unwillingness of the industry to include professional liability coverage in the wrap-up policy.
9. Screening difficulty for insurers Insurers and brokers have been traditionally used in methods to screen the insurability of contractors. With wrap-up they have to do the same for owners, often in complete absence of information on who the contractor will be or which construction methods will be used. The concept of owners' insurability is still under definition, since owners might not continue as business entities in project investments. Both the scope and documentation of such investigations are altered with wrap-up.
10. Lack of owner's knowledge The expert knowledge required is hard to find in owners' organizations and engineers have traditionally kept their distance from matters dealing with insurance. Insurance companies might not wish to supply just consulting services and the

technical, legal and commercial complexity of the large project will make the appropriate expert opinion even harder to find.

11. Upsetting of contractors practices Wrap-up plans upset the normal business arrangements that contractors have with their usual brokers and insurance companies. The contractor must deal with a different set of brokers, safety engineers, underwriters, claims people and auditors for each different project that he undertakes. Several payroll audits each year by different insurance companies can seriously disrupt a contractor's normal office routine and add to his administrative costs. In addition, his good performance on a project under wrap-up insurance will not be counted in his credit for another project where the contractor will have to insure privately. Consequently, contractors have opposed owner supplied and coordinated insurance and have proposed banning or restriction of its use, enforceable through legislation (15).
12. Confusion with partial wrap-up When an owner-purchased program exists and covers only part of the project risks, contractors will be required through their contracts to supply the remaining necessary insurance cover. The interference of the owner's insurer in the claims of contractors to their insurers has been shown through practice to create (as illustratively said by T. R. Kuesel (25)) a new risk for contractors: the one of hidden costs to the wrap-up program.
13. Misallocation of risks Enlarging the content of item 1. of this section, it must be borne in mind that with its intentional misallocation of risks in the owner-supplied insurance (since contractors do not bear the cost of insurance, they have no incentives towards risk abatement), control of risks does not remain with those

in the best position and best fit for it. A loss of "productivity" must be expected in this area.

In summarizing the difficulties of the owner-coordinated insurance, the following points can be highlighted:

1. Much of the success of such programs will depend on the owner's agent, since the industry, in general, is not yet collaborative.
2. Considerable administration work must be expected, especially if a wrap-up program is to be used for the first time.
3. Measures must be implemented to restore incentives to the project participants, taken away by risk misallocation.
4. Expert opinion must be sought, developed and used by the owner.
5. Wrap-up in general is a "take-it-or-leave-it" situation. If chosen, owners must strongly commit their operations to it and should not compromise its implementation with accommodative or conciliatory measures. As a new approach, owner-controlled insurance must be practiced for a while before its benefits can become more apparent.

3.6 Which Way to the Future

Risk management, with its most likely practical outcome for a large project, that of an increased owner's role over the supply and coordination of insurance cover, has been shown through its practice as becoming a sensible way of rationalizing the approach and control system over the important component that insurance is for the construction industry. It is a much larger in scale social and business trend that imposes central and coordinated control in construction. As well, it results in a progressive change in the legal definition of responsibility and liability of the project participants. Though it is complicated

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and difficult to justify economically such organizational changes strictly within their immediate business environment, the changes do occur and solidify themselves thanks to a non-apparent optimization on a higher level, which takes into account the aspects of business attitudes of owners and public accountability requirements with them.

Adoption of the project insurance concept will lead to more emphasis being placed on:

1. Increased use of a systems approach to risk management.
2. Reliance on human factors in order to convert analytical management tools into workable decision criteria.
3. Developments in legal definition of liability.
4. Shifting of the insurance industry towards product-oriented services.
5. Increased use of project management on more and more projects.

CHAPTER 4

THE PRACTICE OF PROJECT INSURANCE

The outcome of the project risk management exercise described in chapter 3, will be a set of decisions regarding the desired project insurance schemes to be implemented. In this chapter, the practical details in putting a project insurance scheme into effect will be examined-i.e., the construction contracts and the insurance policies where the relevant contractual texts appear. Since owner-controlled (wrap-up) insurance will not necessarily be the only result of project insurance decisions, this chapter will examine the full width of the traditional practice as well.

4.1 The Frame of Operations

The owner's choices on the desirable insurance cover for the project will be translated in appropriately worded clauses in the construction contracts with the contractors, followed by approval and endorsement of the supplied policies, or, in the case of partial or complete adoption of wrap-up programs in direct negotiation and purchasing of the insurance policies. Since a mix of the two approaches is the most likely course of action, the full range of activities that the owner must pass through in securing his desired insurance cover, can be sketched as follows:

1. Engage the services of an insurance broker or develop own professional expert opinion consulting;

2. Decide insurance purchase scheme following the risk management policy criteria;
3. Negotiate the placing and terms and purchase wrap-up portion of insurance;
4. Advise contractors on the contract documents of the wrap-up cover offered and the attached modalities;
5. Completely and exactly describe in the construction contracts the liability coverage required by them and the attached modalities; and
5. Provide for insurance administration mechanisms.

The prime role of expert professional opinion on insurance, whether integrated or not in the project management organization, must be emphasized for the rendering of a successful project. This role is mainly played by the insurance brokers, who as independent and specialized agents act as consultants to the owner (or the one to be insured, in general) in their contractual relationship with the insurance underwriters and the insurance companies. For the scale of coverage that will be required in the large project, it is certain that the policy's underwriting agent will place the coverage amounts with a group of other insurance companies gradually forming a pool. Reinsurance and excesses insurance (where the total insured amount is gradually borne by insurers) will also be a must, for international jobs in particular. The expert will help the owner through this foreign environment, from wording of the texts and placement arrangement down to handling of claims.

4.2 The Contractual Context of Insurance Coverage

In the contract documents the owner will do two things:

1. Specify the risks for which the contractor is going to be responsible upon award of his contract; and
2. Give specific request on the insurance cover that the contractor should purchase, its modalities, terms etc., in case that such specification is desirable.

The manner in which these two steps can be described in the contract documents, is of wide variety. However, long years of practice and the need for mutual comprehension and clarity among the project participants, have standardized the style of such clauses and to a certain degree their content. National and international professional bodies (ICE, FIDIC et al), have published standard conditions texts to be used as a guide when writing the conditions of a particular contract. Particularly the large project, where specific risks (usually secondary for other projects) will be sizeable, will need much more detailed texts than the standard forms. Consequently, they must be amended and modified. The usual terminology in the contracts makes the content of the clause describing the responsibilities to be imposed upon the contractor much larger than the content that would be specified for the required insurance cover, if the clause was tailor-made for the contract. This might mislead the contractor into obtaining insurance considerably in excess of the risks borne by him. Care must be exercised then, in stating these matters clearly.

The first mention of liabilities and insurance schemes to be followed in the project must be done in the document of the invitation.

to bidders, with special reference to any legal particulars that concern the project and the country. In the contract document itself, the liability and insurance clauses will usually be located in the General Conditions section, occupying an article of their own. If a wrap-up program is followed, insurance will occupy a section usually annexed to the contract document after the technical specification. Additional information given by the owner (list of prequalified insurance companies, for example) will be included in the Information to Tenderers section. Finally, if the preliminary insurance arrangements are required to be submitted with the bids, one or more specially composed forms will be included for this purpose in the Form of Tender section. Careful cross checking is needed to guarantee the conformity of the whole document with the liability conditions and to eliminate contradictions.

In covering the transfer of responsibilities, paragraphs will be devoted to each of the traditional risk and liability groupings (see chapter 2). A typical breakdown of the liabilities and insurances group of articles, frequently met in the General Conditions of large project contracts, is as follows:

1. Project property

- a. Care of works Under this general title, the extent of the contractor's responsibility for the permanent and temporary project property is defined, along with the time limits of its validity. The included risks can be enumerated, and the contractor's obligation to carry out the appropriate repairs mentioned.
- b. Excepted risks The excepted risks are enumerated for which the owner assumes responsibility. Force majeure and "Acts of God" are mentioned here. Of special importance among the excepted

risks will be (if mentioned), the occupancy of the works by the owner, after the issuance of a Certificate of Completion or Provisional Acceptance, as well as the controversial exclusion of the damages resulting from errors or omissions from the part of the Engineer.

- c. Insurance of works The requirement to purchase CAR or Builder's Risk insurance will be placed here for the joint protection of the owner and the contractor. The duration of the cover will be specified (including or not the guarantee or maintenance periods). The amount of coverage will be specified, either as the replacement value of the works progressively adjustable or on a fixed monetary value throughout the duration of the policy. In the latter case, reference must be made to the Special Conditions section, where quantification of requirements will be given. Finally, the policies will be required to conform with the owner's terms (language, legalities, currency for payments, pre-qualified insurance companies, etc.). Special cases can exist under these terms, as, for example, the requirement for inclusion in the policies of specifically worded clauses on jurisdiction, major catastrophe formalities, etc. Another special requirement could be the owner's desire to have the policies extendable over other contractors that will work on the project (a sort of contractor-organized wrap-up). All such requirements are detailed here.

2. General liability (third party and own)

- a. Damage to persons and property Detailed specification is given here of the contractor's risks resulting in such liability.

Consequential damage following responsibility of the owner's agents (Engineers) is included here.

- b. Owner's liability will cover the owner's bearing of all legal and procedural costs related to 2.a, as far as the contractor is concerned.
 - c. Third party insurance Similar modalities to 1.c are required here for third party liability insurance. Clear specification of owner's terms is of special importance here. Again, cover may be required extendable to future participants of the project. Most likely, the cover will be defined as an absolute dollar amount of compensation, per occurrence.
3. Workmen's compensation Again, through a "hold-harmless" clause, what usually is legal requirements upon accidents or injury to workmen, will be passed to the responsibility of the contractor. Insurance will be required.
 - 4.,5...Other desired cover.
 6. Remedy on contractor's failure to insure The assumption by the owner of contractor's obligations to purchase insurance will be specified here, along with the eventuality, in such case, of subtracting from the contractual payments the amounts paid by the owner to buy the cover. A usual addition also to this clause is the notice that must be given to the owner before a valid policy expires (30 to 60 days), so that action can be taken in time.

The above "standard" breakdown of the liabilities and insurances article of the General Conditions of the contract, usually gets lengthened by additional requirements of the owner, with respect to the required insurance. Standard policies required by law (motor

vehicle, etc.) will be mentioned. General reference of the need of conformity of the policies to the local laws is made. Occasionally, owners, especially public bodies, can require pre-approval of pre-qualified companies. Various formalities need also be specified like the delivery of the original policies to the owner, their endorsement by him, the contractual relationship between owner and insurer, procedures in cases of default by any party etc. A general clause finally is quite often used at the end of the article to say that no matter what the liability and insurance clause stipulates, the right of the owner to be indemnified by the contractor cannot be waived.

In more elaborate contracts, the liabilities and insurance clauses are usually preceded by a separate article in the General Conditions section, where under the general title "Contractor's responsibility" or similar, a comprehensive "hold-harmless" text will be placed, defining the general responsibility of the contractor and stating the usual owner's responsibility disclaimers. As applicable for each project, responsibility will be transferred away from the owner for damage or loss due to:

- a) contractor's fault, omissions or negligence, or of his sub-contractors,
- b) any others, relative to the performance of the works or the contractor's care,
- c) the following by the contractor of subsurface information given in the contract documents (important disclaimer), and
- d) misinterpretation by contractor of information given to him.

It can be stated that the owner does not have to prove default or negligence by the contractor on occurrence of an incident regarding his

right to be indemnified. The contractor, however, may disclaim responsibility, by establishing the default with others.

In the case of limited or complete adoption of wrap-up programs, while the general responsibility clauses will remain in the contract, part or the whole of the liability and insurance clauses will be removed as not applicable. In a new section of the contract documents, entitled "Insurances", the owner will give the full text of the purchased policies for the information of the contractor. The accompanying contractual text will present, as applicable, the following information:

1. Definitions The basic terminology of the policies will be defined, for clarity of procedures (event, contractor, agent, witness, etc.).
2. Owner's furnished cover The cover policies will be enumerated. As already mentioned, usually two policies will be provided under wrap-up: an All Risk policy for the project and a General Liability one. Policy modifications, contractor's notice and interpretation modalities should also be specified.
3. Occurrence reporting The nature of incidents to be reported, the formal content of the reports and all related procedural matters will be specified. The needs for full time responsible employees, legal requirements concerning witnesses and time limits for reporting and similar matters will have to be specified. Standard report form models may be annexed.
4. Duties of owner The full extent of owner-supplied services in enforcing the policies must be given. Investigations, evaluation of damages, general help, etc.
5. Agent's appointment An agent, acting independently between the

owner and contractor will be appointed, under common consent, to carry out the processing of any claim towards settlement after determining the applicability of the insurance policy. Appeal clauses for both parties regarding the agent's decisions in determining the damages amount and sharing by the owner and contractor will be included. The agent is usually vested with the power to suggest precautionary measures etc. All formalities regarding the agent's role and the parties' relations with him must be given.

6. Duties of contractor The usual contractor's duties, apart from conformity with the owner-established demands, will include first-aid and immediate remedial action upon an incident, collection of evidence and information on the causes, and full conformity with whatever included in the insurance policies.
7. Liability sharing For reasons of supplying an incentive towards better safety performance, the owner may pass part of the policy deductible to the contractor, promising at the same time full shouldering of the remaining part by himself.
8. Contractor's furnished insurance Without in any way limiting the types of insurance that the contractor might purchase to cover his responsibilities, the owner will include in this paragraph his requirements for additional policies, outside of the wrap-up scheme. For each additional policy, the owner may specify the cover amount, the deductibles, plus any kind of additional terms and formalities he desires. Policies required by law (Workmen's Compensation or Automobile) will be mentioned here, and the provincial law requirements repeated.

9. Subcontractors' position What is the status of subcontractors toward the owner must be defined (usually the same as contractor's).
10. Contractor furnished insurance formalities Owner endorsement, delivery and certification of copies, renewal formalities and notices, etc., will all be detailed in the text. Standard form models for endorsement should be annexed.

It should be mentioned that, for damages falling within the owner's selected deductible amount and for which no appeal can be made to insurance policy, the owner has direct interest to investigate the contractor's claim for indemnification and assume the insurer's role. Points 5., 7. and 8. should be interpreted taking this into account.

Because of the widespread use of the standardized liability and insurance clauses in contracts and the industry's familiarity with them, practice has proven (8) that extreme care must be exercised in amendments and additions to them. Attention must not only be directed towards clarity and appropriate wording but also towards making sure that the amendment or addition makes practical sense from the insurer's point of view. The owner may often find (usually when the incident happens) that his stipulations were meaningless, in terms of constituting a workable policy.

4.3 The Insurance Policies

Both the European and the North American practice in the insurance industry have produced construction insurance policies in standard form and content. While ample room is left for tailoring the provided coverage over the risks of the particular project and the

client's requirements, the basic policy will always carry a standard core of the provided coverage, its exclusions and the conditions under which the agreement for the service is made. In their basic quality as contracts, the insurance policies have standard wording, except when legislation or the weight of the particular market (international) will impose alterations on the underwriters. In view of the accumulated experience built in the texts it should be desirable by all parties to limit the alterations to the minimum essential.

4.3.1 Policies and Cover According to Risks

Construction activity is usually covered under two main types of policies:

1. An "All Risk" policy for the permanent and temporary project property; and,
2. A "General Liability" policy for damages to third parties.

As illustrated in the annexed policy texts, the two policies can be combined in one, with two sections (appendix B) or they can constitute separate, self-sufficient documents (appendices C and D). With reference made to chapter 2 of this report where the traditional approach to insurance was examined, it can be seen why such a grouping is convenient, with the risk as a criterion.

The All Risk-Builder's Risk policy will include a general description of the "property" insured and as applicable, particular risks will be additionally specified for which cover is desired and which are not in contradiction to the general exclusions. The wording of insured and excluded risks will stay general and interpretation will be required for unclear occurrences. The cover that such a policy

provides is the full replacement cost of the damaged property, up to specified maximum monetary limit per occurrence. When a deductible amount is set, the insurers' liability will be the excess over the deductible amount. A useful addition in the clause defining the limits of insurance is the phrase that the total liability shall not exceed the interests of the insureds (or stated in another way, the insureds cannot claim more for a particular damage than what the evaluation of their interests to repair the loss can justify). Since the property damage policies require very large amount of cover, it can happen that two and sometimes more policies are written for the same project. In such a scheme, the first policy covers a first fixed amount of the indemnification cost, the second a next amount and so on. We talk then about "Primary Insurer", "First Excess Insurer" and so on. The cover of an All Risk policy will usually extend over the maintenance period, but will stop with the passage of the project to the use of the owner.

The General Liability policy will offer cover against third party bodily injury or property damage, owners' personnel bodily injury, contingent liability of the owner, as well as consequential damages (care and loss of services, litigation defense, administrative legal and medical expenses, earnings lost, etc.). With the possibility of using again primary and excess indemnification schemes, the cover that such a policy provides will be the full cost of each occurrence, up to a certain limit per occurrence. In addition, the aggregate amounts paid for third party property damages have a limit per a predefined period (12 or 24 months). Accounting for the many particulars that can be present in such a policy due to laws and public requirements (environmental, traffic, city regulations, etc.),

the content of general liability policies tends to be tailor-made in large part, for each project.

4.3.2 Structure and Content of Texts

An insurance policy will invariably have the following structure:

1. Legal, contractual-service statement (standard risks, exclusions, conditions);
2. Detailed specification of cover (risks, exclusions);
3. Terms schedule and validation;
4. The conditions of applicability; and
5. Supporting additional documents.

The contents of each of the above sections are outlined below, with the owner's information point of view in mind, as a criterion. For further reference, appendices B, C and D should be consulted.

1. The insurance-service statement The insurers will indemnify the insured severally and not jointly, in relation to the drafting of the list of the subscribing companies where each insurer is liable for a certain proportion of any loss or damage of the property insured, and in no case more. The standard exclusions include war or other similar civil commotion and contamination by radioactive materials. The standard conditions of the policy contain further elaborations of the contractual relationship between insurer and insured, further define characteristic exclusions from the offered cover and specify the likelihood of coexistence of the said policy with other policies in force. Proof of loss is required by the claimant as well as full conformity to the formalities of reporting,

in order to ensure a claim settlement (formalities given).

Arbitration and legal procedures for disputes are defined. Identification payment formalities and existing choices are set (insurer directly making the repairs instead of paying cash).

Finally, validation of changes of the policy is specified.

2. Detailed specification of cover. Especially when additional insurance agreements are arranged under the same basic policy, specification of the extended cover will be included in the policy document. The basic cover will be detailed as pertaining to the particularities of the project. Special risks (earthquake, flood, etc.) will be mentioned separately if their insurance treatment is different. It is mainly in this section that the effort to tailor-make the project insurance is concentrated. Each insuring agreement will make reference to the conditions of applicability for the limits of liability, the deductibles and its terms.
3. Terms schedule and validation The schedule, including the signed document of the insurance policy, will define the involved parties, the period of insurance, the property and the works to be insured and the distinction of the works into construction proper and maintenance. The insured amount will be posted (per occurrence or aggregate) as well as the deductibles as applicable. The liability limits will be defined. Finally, the premium will be mentioned, subject to alterations as included in the policy conditions.
4. The policy conditions The policy's general conditions will comprise an assortment of articles, regulating the application and the procedures of the policy. The most significant among those

articles will deal with:

- a) a repetition of the insurance-service statement of the standard text;
- b) putting down of the insurance term and the premiums;
- c) further repeating and extending the offered coverage;
- d) defining the deductible and its applicability when confusion of sections exists;
- e) setting the limits of insurance, usually at the full replacement value;
- f) giving a list of definitions of the terms to be met in the text;
- g) repeating and complementing the list of excluded risks;
- h) defining the steps to be taken by the insured in case of a loss (reporting);
- i) establishing procedures for damage appraisal and basis for settlement;
- j) predefining that indemnification payments will be made even if the insurers have not agreed among themselves on the sharing of liability;
- k) waiving for the insurers (or asserting) any right of subrogation against the insureds, severally treated;
- l) asserting the necessity for the insureds to sue and pursue recovery of the damages from whoever may be responsible;
- m) stating that no loss can reduce the initial limits of insurance;
- n) asserting the right of the insurers to inspect the damages;
- o) defining the terms of other policies or excess insurance policies;

- p) predefining breach of conditions and cancellation;
- q) defining legal and monetary references; and
- r) recognizing an agent for all physical persons and legal entities to whom indemnity will be payable.

5. Supporting documents A policy will contain any or all of the following:

- a) a list of subscribing companies per insurance agreement, their authorized agent and the percentage contribution of each on the overall liability;
- b) standard variations in the policy conditions, as referred to in the standard initial statement;
- c) endorsements of subsequent alterations to the policy, including alterations in the list of the subscribing insurance companies; and
- d) statutory conditions imposed by local legislation;

When an owner-coordinated insurance program is followed, an endorsement of the insurance policy by the insurer must be signed and attached to the policy at the moment of the contract award to the contractor. In it, the additional clause for minimum notice time to the owner before cancellation of the policy is inserted.

4.4 Claims and Procedures

Contractually in the policy, indemnity for claims is usually defined as the full (or a percentage) replacement cost of the damaged works. The complexity of settling a claim arises from the difficulty of defining the exact cost of the damage. The insured often will attempt to include every item of cost within his reach even if this

has only the slightest connection with the incident in question (8). Though the insured is not entitled to make a profit on the expense of the insurer, he has in favor of him the argument that the inconvenience and disruption caused will exceed the value of the item lost. And the narrowly defined "replacement cost" will, most often, prove to be quite an inadequate compensation for the damage suffered. Though sometimes policy conditions allow the opposite, in all claims it is most unwise for the insured to make repairs (except the most nominal third party damage), as this could prejudice the insurer for the real value of the damage. Evaluation should be done jointly with the insurer's assessor.

As a minimum safeguard against unclarity and disorder in settling a claim, the policy conditions always provide articles dealing with reporting, evaluating and settling a claim. The insured, through his responsible appointed agent, will notify the insurer promptly, submit a full report with the facts of the incident, invite inspection of the damage by the insurer and furnish all documents necessary for evaluation and appraisal. Reporting to the authorities (in standard forms) will be required as stated by laws for certain kinds of incidents. Full conflict resolution procedures will be set-up beforehand providing for arbitration and appeal possibilities of any disagreement in evaluation. Finally, the basis for settlement will be clearly described, setting the quantitative obligations of the insurers, the deductibles and the time limits that indemnification payments must be made to the insureds, even if the claim has not been fully settled.

In the case of owner-paid insurance in a wrap-up scheme, the

owner himself will administer all claims before they get to the insurer. If the policy deductibles are partly passed to the contractors, then the owner will act as the contractor's insurer for the untransferred difference. An orderly control and accounting system must be set-up by the owner for adequate handling of such procedures. One efficient way of handling claims, practiced by the James Bay Energy Corporation, is to treat indemnification payments to the contractors (within the deductibles difference as stated above) as change orders in their corresponding contracts. In a process looked after by the contract administrator, the initial standard-form reporting for each incident is followed by a joint investigation and information collecting. The contractor submits his claim, the damages are defined and the approved payment as applicable takes the form of a change order to the contract, separately approved by the hierarchy and codified by cost control as a contractual expense. The approved amounts will then be claimed from the insurance company (as applicable) through different channels.

Speed of settlement is as important as the fairness of the evaluated amount in a claim. The apparent procedural and usual legal obstacles during settlement will seriously impair the overall efficiency of the insurance coverage at the expense of all participants. And as repeatedly underlined in chapter 3, simplicity of the operational frames and sound and knowledgeable expert advice, will prove of much value to the owner.

4.5 Insurance Policies Costs

In average normal conditions, the gross premiums that will

purchase the basic All Risk and General Liability policies for the large project, will represent a cost of about a fifth of the combined engineering and administration costs, or something between 1.5 and 3.5% of the overall project expenditure (30). The cost effectiveness of such a percentage of the project cost seems secondary) if compared with the financial risks in inaccuracies of cost estimates, unforeseen additional work, inflation, delays in commissioning etc. As a dollar amount however, insurance costs can represent a major expenditure,

Costs, as represented by the gross premiums, include:

1. The net risk premium to cover the assessed probable damage, which reflects the insurance class of the considered liability;
2. Insurer's overheads, claims handling costs and operating margins, amounting in all to about 20 percent of the gross premium, under average market conditions; and
3. Commission paid to insurance brokers, normally from 10 to 20 percent of the gross premium and occasionally as high as 35 percent for international jobs, requiring complex pre-arrangement of cover. Brokers face increased uncompensated costs in arranging unsuccessful insurance schemes in the pre-award contract phase.

Though insurance premiums have been depressed in recent years through keen competition in an expanding market, further reduction seems unlikely (3).

The computation of the net risk premium is, of course, where most of the effort of the underwriter will go. Insurance companies have specialists who study the technical and financial aspects of the project and through past loss experience define the transforma-

tion of risks into fixed costs. Accuracy and soundness of information from the owner and his agents is most important.

The policy premiums are payable and definable in two ways. Either computed on the periodically assessed completed value of the project, in which case their amount increases as the project nears its end; or based on the estimated total value of the project and computed in constant periodic payments throughout the construction period. The comparison of the owner's discounted cashflows for premiums payment must give the same result in both cases, with the latter slightly higher in cost due to the additional uncertainty introduced:

4.6 Underwriting Information

The optimization of premiums in strictly monetary terms is not so important as the adequacy and certainty of cover. And the overall cost of insurance is mostly influenced by the marginal losses during claims settlement and cover inadequacies, than by the direct premiums cost. Competition in the insurance industry has compressed premiums a lot and has so driven insurers to adopt very defensive positions in meeting the calls to policies when losses occur. Coverage ambiguities in the texts and vague risks specifications are traditionally prime potential areas where the insurance company will defend the inappropriateness of the policy. In addition, the specific lack of technical knowledge by underwriters results in inaccurate appreciation of the cover and estimation of the premiums. The usual weaknesses of insurers in appreciating the risk environment of a large project are:

1. Limited knowledge of underground conditions;
2. Failure to distinguish categories of risks consistent with the project content. References are then made to other, usually much riskier past jobs;
3. Insufficient break-down of project costs and mixing of low with high risk elements; and
4. Negligence of risk-interaction. (3)

The fundamental principle of insurance is that the insured bears the obligation to furnish all the facts connected with a risk. Where substantial information is not supplied, the insured may be penalized in the measure of recovery, or can at the extreme be denied recovery and indemnification.

So, the supply of information, in a form usable by the underwriter, is a prime task for the owner's agent. Insurance companies have developed standard questionnaires and checklists, for the collection of pertinent project data (see appendices E and F). The information will be aimed at the technical description of the project, its construction schedule, the analytical breakdown of value of permanent and temporary works and all other data influencing the construction risks. As seen in chapter 3, the consistent pursuing of a risk management policy by the owner can be readily transformed into important input for quantifying the cover policies. Constant communication and team approach with the insurer at all levels, becomes in fact imperative.

CHAPTER 5

FUNCTIONAL REQUIREMENTS WITH THE PM GROUP

Risk analysis can be significantly helped by available theoretical quantification tools and mathematical methods. This chapter, after briefly recapitulating the full span of management functions for the conception and implementation of project insurance, focuses mainly on an introduction to the concept of the above mentioned risk analysis methods and the attributes of their application in the contracts and the insurance policies. Communication needs with the insurance industry, relevant to the subject of risk analysis, are outlined at the end.

5.1 Area of Responsibility

For a large project, the Project Management group, with appropriate back-up from the project's engineering and other special consultants will be called upon to implement all the steps of the project's risk and insurance management program, as described in chapters 3 and 4. For large PM groups and especially when the wrap-up insurance approach is followed, the discipline may justify a separate functional department at the same level with Engineering, Construction etc. Among the whole range of risk and insurance control activities, the PM group specialists are required to provide the following functions:

1. Provide the quantitative analysis of project risks and their

- treatment;
2. Provide input to the general and special conditions of the outgoing contracts;
 3. Assess and coordinate with the engineer related aspects of the project's design, as well as construction methods and site organization;
 4. Manage the purchase and handling of insurance cover. Sub-duties will include the gathering of insurance related information, contacts with brokers and insurance companies, the retention of expert opinion etc.;
 5. Provide for construction follow-up routines, reporting to mana-

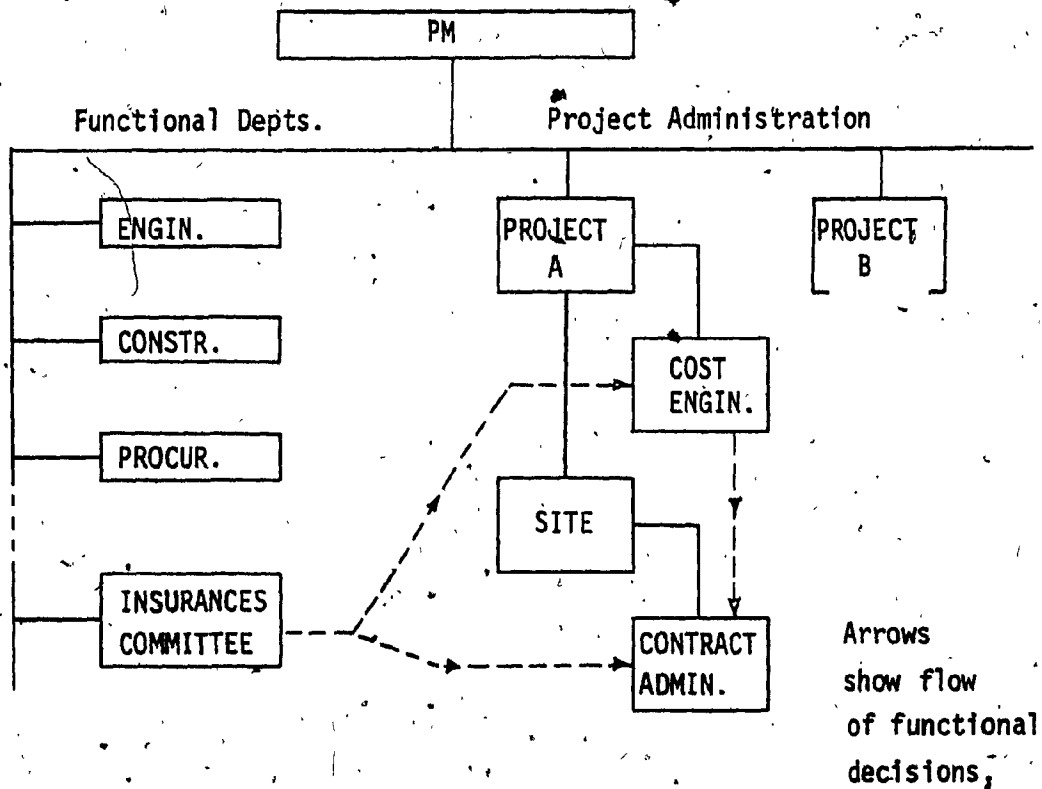


Fig. 5-1 Management organization for insurance (JBEC)

gement, disputes and claims settlement, contract administration input and other procedural matters; and

6. Normalize and standardize procedures and functional input requirements from other departments of the PM group (Cost Engineering etc.).

As an example in management organization for risks and insurance, the structure of the related functions in the James Bay Energy Corporation can be briefly sketched. JBEC currently provides project management services and has arranged for wrap-up insurance for the construction of three hydroelectric projects.

Expert opinion on insurances, arrangement of policies etc., stays with the "Insurances Committee" at the Functional Department level. Within the policy deductibles borne by the Corporation, risk optimization and contract conditions before awards are looked after by the Cost Engineering group of each project's administration team. Implementation of the policies is carried out by the Contract Administration group at the site. (See figure 5-1)

5.2 Designing for Tailor-Made Cover

5.2.1 Risk Analysis and Treatment

Extensive quantitative analysis has been directed in recent years, towards the problems of a) measuring likelihood of risks, b) identifying them, c) measuring their cost and d) deciding their treatment. Handling of a large project makes it imperative to establish and use objective and quantifiable criteria and methods for decisions which reflect the owner's desire to expect a completed project at a fair cost.

Ideally, the risk analysis and treatment process needs a single source of decisions and control for understanding and enforcement of the selection criteria and proper accounting of all treatment measures. Assuming such a role, the project management group of a large project's organization will be responsible for the whole range of the related analytical exercises, which may be described as follows (9)(10)(18)(19)(32):

1. Determine the project risks, their categories and their relations. The major part of the project risks should be defined and described with their quantitative insurability criteria as a guide (see requirements for underwriting information in chapter 4 and risk grouping descriptions following standard practice for insurance policies in chapter 3);
2. Develop estimated cost data for risk treatment measures. Information on repairs estimates, safety programs, insurance premiums, dispute settlement costs, protection measures, project design modifications etc. should be collected;
3. Determine how each of the project participants and particularly the owner perceives his commercial benefit and how each measures his performance during the operation of his industrial function. Express these measuring criteria in usable form. Account for the different perceptions of the project's participants about the significance of the risks to be assumed by each and risk preferences;
4. Perform the risk-treatment analysis (minimization, allocation, treatment), with special emphasis on the following points:
 - a. Quantification of the incentive value of bearing of each

risk by a project participant;

- b. Clear picturing of the alternatives available for treating each risk; and
- c. Provision for testing of the sensitivity of the analysis output;

- 5. Provide for disaggregation of components of costs, if required by the results of the sensitivity analysis. (With "disaggregation", the breakdown of a cost into cost components, differently affected by the project risk under consideration, is meant. For example, if we work with the total cost of a cofferdam as a protection against a flood, we would not examine the separate costs of its impervious core and its rockfill protection. Working on both costs separately might give different results through the sensitivity analysis for the same risk effects (32). A compromise must be made in disaggregating, between clarity of judgement and reasonable length of calculations.); and
- 6. Provide in the treatment analysis for trade-offs between contract price and risk shares. The analysis can be stopped at an intermediate level and the alternatives can be set as allowances for negotiation between the owner and the project participants, aiming to contract price reductions against adoption of contractor's suggestions, arriving at a specific input to the project when award of a contract is anticipated. This process, if feasible, could counteract the information value disadvantage mentioned in chapter 3, that is, of having to decide project risks treatment without the final contractors being known. For further discussion, see ref. 19.

Except for the checklist method of identifying risks, presented in chapter 3, ref. 18 compiles two other methodical rather than quantitative approaches to the same purpose. In the "Financial Statement Method", the systematic follow-through of the account titles of the interested entity's financial statements, reminds and reveals logically the exposures to economic loss. Full knowledge of the involved operations is, of course, needed by the risk manager. In the "Flow Chart Approach", the use of a complete flow chart of the entity's operations is suggested for identifying risks. Operations are followed from raw materials handling through to the finished product. The limited potential for use of both methods in construction is recognized, especially for the owner.

Specific theoretical approaches are applicable to the quantification of each of the remaining steps of the overall exercise of risk analysis. Probability theory and statistics are classically used to assess a risk quantitatively, connecting the chance of occurrence with measurable consequences on the project quantities and parameters. Thus, we speak about a specified percentage of a chance that a flood overtops a cofferdam (or the same percentage chance of facing the resulting damages), or that we expect so many serious accidents in a certain volume of work performed and so on. The result of such an approach is not a single value of the variable under examination, but a judgement on the possible range of the values and the likelihood of each value within this range. Through the use of simulation theory and correlation techniques, the aggregate probability of composite and interdependent risks can be studied and used (32).

Though inaccuracies can be introduced in the above steps due

to data interpretation differences and mathematical techniques involved, the probabilistic assessment of risks is thought-of as providing rather "objective" first raw material to be further assessed "subjectively" by the project participants following their particular measuring criteria. The same event does not signify the same thing for two different business entities, two different environments of operations or two different moments in the same time of the same operation. So, the values that a risk can take must be transformed to depict the measurement criteria of the entity that handles the risk. Utility theory, combined with engineering economy techniques and principles, is widely used for this purpose, i.e. of providing a measuring scale for the risk taker, which transforms absolute dollar values to subjective performance units, towards the desired result.

With the measuring scales established through utility theory (utility functions of the risk taker), the risk treatment phase constitutes basically a decision process, going through various alternatives for action. Essentially, the risk taker will have to decide under which conditions and for which part of the value it is feasible to replace uncertainty by a fixed cost, to be incurred in advance. This fixed cost will take the form of an additional contractual provision for work, risk minimization measures or premiums for insurance coverage. Answers will have to be given to questions like: a) what is the optimum expense for geological investigations or b) what is the optimum extent of an industrial safety program on site. Either through mathematical formulations in linear or dynamic programming and network analysis, or through the analytical description of complex problems using systems analysis techniques, an optimization exercise will be

performed for the above stated decision problem.

The elements of the basic optimization problem to be solved through mathematical programming in the most straightforward but nonetheless complex case of risk analysis, will be:

R : the measured project associated risk

R_0 : the acceptable level of risk

C : the cost of lowering the risk's value, expressed as an objective function of the alternatives, available for this purpose.

The optimization, then, will seek to minimize C subject to the inequality $R \leq R_0$.

Decision analysis, as a combination of systems analysis and statistical decision theory, is increasingly used as a conceptually clear, logical and direct method readily useable even on an incomplete and sketchy state of knowledge for the decision maker. Finally, comprehensive simulation techniques, greatly advanced thanks to the use of computers, can be used in modelling problems too large or intricate to handle with the mathematical programming optimization techniques.

R. E. Levitt et al. (19), presented a comprehensive conceptual model of risk measurement and allocation, based upon decision analysis techniques. The model, for each alternative decision, contains decision analysis submodels for the owner and the contractor separately, allows for the parallel development of owner and contractor decisions, and compares in the end, the net value to the owner for each alternative, reflected through the sum of the risk cost retained by him and the contract price given by the contractor. Repeated application of the model would yield the best decision for the owner. In appendix G, both

the executive summary of ref. 19 and two schematic diagrams of the developed models are reproduced for reference.

G. E. Mason (18), presents a very comprehensive qualitative discussion of construction risks and their treatment methods, and in reviewing the quantitative methods of decisions, reaffirms the merits of decision analysis techniques combined with utility theory. He develops and presents a computer program to be used for decision analysis.

R. I. Carr (9), examines the owner-contractor comparative evaluation of construction risk, based on different utility criteria for each, and on various assumptions about the risk attitude of each. Comparing the price that the owner would be willing to pay for risk coverage with the price increase by the contractor to cover risk, under various scenarios, he defines the owner's excess price for each allocation scheme. Without accounting for the incentive value of risk, he presents conservative results for the owner's side (little or no risk transfer). In a second paper (29), a model for uncertainty determination of construction schedules is developed (mean value and standard deviation of the duration of each activity), in combination with CPM application. The same subject of construction schedule uncertainty determination is also investigated by D. W. Campbell (33) in a similar manner.

M. Gates (10), based on probability theory and break-even analysis, investigates the calculation of contingencies to cover bidding uncertainties from the contractor's point of view. The uncertainties include "classical" risks as materials costs, design changes, mistakes, natural occurrences and labor productivity. His results

can be readily adopted by the owner's point of view.

L. Y. Pouliquen (32) investigates risk from the project investor's point of view by way of the probabilistic definition of risk and its attributes. In an effort to develop a single risk profile for the whole investment, the difficulties of correlating elemental risks and aggregating them are recognized, along with the inadequacy of theoretical back-up methods for this purpose.

As claimed by R. E. Levitt (19), risk treatment analysis can be modelled in such a way so as to yield as output, specific decisions on the purchase of insurance, its type, the policies' cover and the premiums, the deductible amounts, as well as providing a forecast of the owner's final cost after implementing and administering the proposed policy, all as dictated by the owner's best perceived interest. Even if the model is not structured towards providing such extensive results, the consistent and comprehensive evaluation of risks that such an analysis can yield will undoubtedly contribute to a better drafting of the policies to be purchased, and better communication between the project management staff and the insurer.

In closing this section, the introductory remark of this report on the inadaptability of construction industry practices to theoretically assessed methods should be again underlined. Though the above described quantitative tools have been tested and verified in models reflecting "real" industry situations, their actual application requires time, cost, sophisticated effort, more information than usually available and willingness of management to examine their credibility, ingredients which, most of the time, are simply not available in sufficient quantity. Large projects however, as recent

experience demonstrates, increase the feasibility of professionally conducted risk-analysis, within the frame of the overall project investment and multi-disciplined management effort required.

5.2.2 Implementing the Results

The document where the results of risk and risk treatment analysis will be implemented is the contract with each project participant, which will incorporate the related provisions. Table 1 gives a very comprehensive picture of the manner in which risks may be treated either through contract clauses, insurance or other measures such a safety program. Table 1 is reproduced from ref. 18, and for the method of treatment, the categories presented in section 3.1.3 are followed.

All the parameters of the contract provisions should be considered for applicability and quantification beforehand, and properly entered in the optimization method. The provisions for holdback, payment modalities and bonuses and liquidated damages will require coordination with the contract administration end of things, where their cost implications are going to be sized. The same need for post-analysis coordination exists with all the other functional departments of the PM group and the other project consultants, so that accurate information for costs to be incurred is obtained for the various examined alternatives.

The industrial safety program on site will have to be designed in accordance with applicable legislation and insurance company requirements. Full normative procedures must be drafted for the responsible personnel, and collection of statistical data for future reference must be guaranteed. Industrial safety contains a very large

TABLE 1
METHODS OF RISK TREATMENT (Ref. 18)

IDENTIFIED RISK	METHOD OF TREATMENT			RISK TRANSFER
	RISK AVOIDANCE	RISK ALLEVIATION	RISK RETENTION	
1. NON-PERFORMANCE				
A. Failure to enter into contract		1. Private Bid Openings		1. Surety Bid Bond. 2. Monetary Deposit
B. Non-payment of creditors arising out of contract	1. Separate Contract 2. Lien-Right Waiver 3. Prior Waiver 4. Joint Check 5. Deferred Payment	1. Payments Withheld Prior to Final Acceptance of Work (Sec. 29)* 2. Deferred Waiver 3. Retainage Percentage 4. Contractor Prequalification		1. Surety Payment Bond (Sec. 31)*
C. Failure to complete Contract According to the Plans and Specifications		1. Contractor Pre-qualification 2. Inspection of Work (Sec. 13)* 3. Q. C. - Contractor Quality Control 4. Deductions for Uncorrected Work (Sec. 21)* 5. Correction of Work Before Final Payment (Sec. 22) 6. Payments Withheld Prior to Final Acceptance (Sec. 29)* 7. Retainage Percentage		1. Surety Performance Bond (Sec. 31)* 2. Warranty Clause
D. Timely Completion		1. Alternates Completion 2. Bonus Clause Only	1. Extension of Time (Sec. 19)* 2. Force Majeure (Acte of God) Clause	1. Liquidated Damage Clause 2. No Damage Clause 3. Penalty Clause

* From General and Special Conditions of Contract, A.C.C. Form 3, ASCE Form JCC-1
Identified Risks and Methods of Treatment

TABLE 1 (cont'd)

IDENTIFIED RISK	METHOD OF TREATMENT			RISK TRANSFER
	RISK AVOIDANCE	RISK ABATEMENT	RISK RETENTION	
II. SITUATION CHANGES				
A. Differing Site Conditions		<ol style="list-style-type: none"> More Thorough Site Investigation by Owner 	<ol style="list-style-type: none"> Changed Conditions Clause (Sec. 8) * Unit Price Contract 	<ol style="list-style-type: none"> Familiarity with Work (Sec. 7) * Information Disclaimer Differing Site Condition Disclaimer Lump Sum Contract
B. Changes During Construction		<ol style="list-style-type: none"> Changes in Work (Sec. 18) * Claims (Sec. 20) * Suspension of Work (Sec. 23) * Owner's Right to Terminate Contract (Sec. 24) * 	<ol style="list-style-type: none"> Contractor's Right to Stop Work or Terminate Contract (Sec. 25) * Claims (Sec. 20) * Changes in Work (Sec. 18) * 	
III. COST OF DISPUTE SETTLEMENT		<ol style="list-style-type: none"> Engineer's Decision (Sec. 38) * Requirement for Arbitration (Sec. 39) * 		

TABLE 1 (cont'd)

IDENTIFIED RISK	METHOD OF TREATMENT			
	RISK AVOIDANCE	RISK ABATEMENT	RISK RETENTION	RISK TRANSFER
IV. LIABILITY LOSSES				
A. Bodily Injury		1. Safety Program	1. Deductible Insurance	1. Owner's Insurance (Sec. 32) ^a 2. Contractor's Insurance (Sec. 30) ^a 3. Indemnification (Sec. 4.18) 4. Protection of the Public and of Work and Property (Sec. 14) ^a
B. Property Damage		1. Safety Program	1. Deductible Insurance	1. Owner's Insurance (Sec. 32) ^a 2. Contractor's Insurance (Sec. 30) ^a 3. Indemnification (Sec. 4.18) 4. Protection of the Public and of Work and Property (Sec. 14) ^a
V. DAMAGE TO PROJECT DURING CONSTRUCTION		1. Safety Program	1. Deductible Insurance 2. Partial Completion and Acceptance (Sec. 28)	1. Owner's Insurance (Sec. 32) ^a 2. Indemnification (Sec. 30) ^a 3. Protection of the Public and of Work and Property (Sec. 14) ^a 4. Responsibility for Work (Sec. 23) ^a 5. Contractor's Insurance (Sec. 30) ^a

area of specialized activities and must be treated as a full professional service.

5.3 Insurance Management Support

Over and above the optimization analysis which should back every particular coverage decision, a permanent and long term requirement for the PM group will be to build-up insurance industry oriented information. Such information will be very effective in the long run in redefining the whole attitude of the insurance industry towards construction, for the ultimate attainment of premiums' value. As mentioned in chapter 3, the reluctance of engineers to be involved in insurance matters, combined with the usually hasty arrangement of policies, has produced a chronic lack of communication between the two industries which has resulted in deforming the costs of the service almost invariably towards the more expensive side. As suggested by J. P. Germond, a more exact and knowledgeable approach towards coverage cost accurately reflecting the risks and their environment would need concentration of effort in the following areas:

1. Compilation of relevant statistics of individual and aggregate losses, based on surveys by responsible bodies as well as insurance claims records;
2. Classification of construction risks in technical terms to provide a rational basis for risk assessment and to assist in the setting of premiums;
3. Standardization of procedures for the presentation of risk information and assessment; and
4. Review of the protection provided by insurance against each of

the categories of construction risks.

Some work in this area has been performed by The International Commission on Large Dams (13) which has pioneered in the publication of information reports in which dam incidents are analyzed, and conclusions and recommendations are developed.

The ultimate goal of collaboration between the industries of construction and insurance constitutes the possibility and the challenge that project management, by position and function, has as the communication agent for the project. And this objective can be reached through the development of a common language for the two industries, where technical data methodically influence insurance decisions and the economics of insurance shape technical solutions.

CHAPTER 6

REPORT SUMMARY

Project insurance, as a product-oriented functional process, has been seen through the report as the totality of activities that define, quantify, treat and insure project risks. The process uses the owner's point of view and the multi-disciplined inputs required imply that its execution is most effectively done by the Project Management group. Especially for the large project, the multi-contract breakdown of the construction phase and the interaction of risks make the pursuit of coordinated risk management a necessity.

The owner's control over his choices for insurance and risk treatment will be expressed in the drafting of related provisions in the construction contracts, and in a risk-minded reviewing of the project's design and procurement practices. On the purchase of insurance, the examination of advantages and disadvantages of owner-paid and controlled insurance (wrap-up), demonstrates that the practice may be worthwhile, especially for large projects. One of the main points in favor of wrap-up insurance, against the traditional approach, is located in its influence in reducing administrative and conflict settlement costs.

Knowledge of contractual modalities and standard traditional practices of the insurance industry becomes important for the project manager. The report summarizes the types and content of the main insurance policies and outlines information on premium costs, claims

settlement and various contractual and administrative procedures, as well as the role of expert opinion.

Various optimization techniques can be used for quantification of risk management and development of decision criteria. Principally, risks will be presented in probabilistic terms and then through systems analysis techniques, optimization will be performed using the utility criteria of the owner.

In overall conclusion, a comprehensive risk and insurance management approach is seen as supplying a rationalized optimization and control system over the expenses that uncertainty represents in construction.

The trends observed in the field of project insurance will likely orient work yet to be done in the field, mainly towards:

1. Enhancement of the applicability of theoretical risk analysis techniques in project management;
2. Promotion of the use of technical information by the insurance industry functions in a systematic and accurate manner;
3. Shifting of the focus of construction insurance on the project instead of the business entities involved; and
4. Subjection of construction insurance to cost-spreading patterns characteristic of large managed systems.

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APPENDIX A

EXTRACT OF F.I.D.I.C. - CONDITIONS OF CONTRACT (INTERNATIONAL)

Care of Works.

20. (1) From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works pursuant to Clause 48 hereof the Contractor shall take full responsibility for the care thereof. Provided that if the Engineer shall issue a Certificate of Completion in respect of any part of the Permanent Works the Contractor shall cease to be liable for the care of that part and the responsibility for the care of that part shall pass to the Employer. Provided further that the Contractor shall take full responsibility for the care of any outstanding work which he shall have undertaken to finish during the Period of Maintenance until such outstanding work is completed. In case any damage, loss or injury shall happen to the Works, or to any part thereof, from any cause whatsoever, save and except the excepted risks as defined in sub-clause (2) of this Clause, while the Contractor shall be responsible for the care thereof the Contractor shall, at his own cost, repair and make good the same, so that at completion the Permanent Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the Engineer's instructions. In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the Engineer and subject always to the provisions of Clause 65 hereof, repair and make good the same as aforesaid at the cost of the Employer. The Contractor shall also be liable for any damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of completing any outstanding work or complying with his obligations under Clauses 49 or 50 hereof.

Excepted Risks.

(2) The "excepted risks" are war, hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, or unless solely restricted to employees of the Contractor or of his sub-contractors and arising from the conduct of the Works, riot, commotion or disorder, or use or occupation by the Employer of any part of the Permanent Works, or a cause solely due to the Engineer's design of the Works, or ionising radiations or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive, nuclear assembly or nuclear component thereof, pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds, or any such operation of the forces of nature as an experienced contractor could not foresee, or reasonably make provision for or insure against all of which are herein collectively referred to as "the excepted risks".

Insurance of Works, etc.

21. Without limiting his obligations and responsibilities under Clause 20 hereof, the Contractor shall insure in the joint names of the Employer and the Contractor against all loss or damage from whatever cause arising, other than the excepted risks, for which he is responsible under the terms of the Contract and in such manner that the Employer and Contractor are covered for the period stipulated in Clause 20(1) hereof and are also covered during the Period of Maintenance for loss or damage arising from a cause, occurring prior to the commencement of the Period of Maintenance, and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50 hereof:—

- (a) The Works for the time being executed to the estimated current contract value thereof, or such additional sum as may be specified in Part II in the Clause numbered 21, together with the materials for incorporation in the Works at their replacement value.
- (b) The Constructional Plant and other things brought on to the Site by the Contractor to the replacement value of such Constructional Plant and other things.

Such insurance shall be effected with an insurer and in terms approved by the Employer, which approval shall not be unreasonably withheld, and the Contractor shall, whenever required, produce to the Engineer or the Engineer's Representative the policy or policies of insurance and the receipts for payment of the current premiums.

Damage to Persons and Property.

22. (1) The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of injuries or damage to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of the Works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to:—

- (a) The permanent use or occupation of land by the Works or any part thereof.
- (b) The right of the Employer to execute the Works or any part thereof on, over, under, in or through any land.
- (c) Injuries or damage to persons or property which are the unavoidable result of the execution or maintenance of the Works in accordance with the Contract.

(d) Injuries or damage to persons or property resulting from any act or neglect of the Employer, his agents, servants or other contractors, not being employed by the Contractor, or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the damage or injury.

(2) The Employer shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the proviso to sub-clause (1) of this Clause.

Indemnity
by Employer.

23. (1) Before commencing the execution of the Works the Contractor, but without limiting his obligations and responsibilities under Clause 22 hereof, shall insure against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the Employer, or to any person, including any employee of the Employer, by or arising out of the execution of the Works or in the carrying out of the Contract, otherwise than due to the matters referred to in the proviso to Clause 22 (1) hereof.

Third Party
Insurance.

(2) Such insurance shall be effected with an insurer and in terms approved by the Employer, which approval shall not be unreasonably withheld, and for at least the amount stated in the Appendix to the Tender. The Contractor shall, whenever required, produce to the Engineer or the Engineer's Representative the policy or policies of insurance and the receipts for payment of the current premiums.

Minimum
Amount of
Third Party
Insurance.

(3) The terms shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive indemnity under the policy being brought or made against the Employer, the insurer will indemnify the Employer against such claims and any costs, charges and expenses in respect thereof.

Provision to
Indemnify
Employer.

24. (1) The Employer shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the Employer, his agents, or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

Accident or
Injury to
Workmen.

(2) The Contractor shall insure against such liability with an insurer approved by the Employer, which approval shall not be unreasonably withheld, and shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall, when required, produce to the Engineer or the Engineer's Representative such policy of insurance and the receipt for payment of the current premium. Provided always that, in respect of any persons employed by any sub-contractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such sub-contractor to produce to the Engineer or the Engineer's Representative, when required, such policy of insurance and the receipt for the payment of the current premium.

Insurance against
Accident, etc.,
to Workmen.

25. If the Contractor shall fail to effect and keep in force the insurances referred to in Clauses 21, 23 and 24 hereof, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the Employer as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debt due from the Contractor.

Remedy on
Contractor's
Failure to Insure.

26. (1) The Contractor shall give all notices and pay all fees required to be given or paid by any National or State Statute, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution of the Works and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works.

Giving of
Notices and
Payment of Fees.

(2) The Contractor shall conform in all respects with the provisions of any such Statute, Ordinance or Law as aforesaid and the regulations or bye-laws of any local or other duly constituted authority which may be applicable to the Works and with such rules and regulations of public bodies and companies as aforesaid and shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such Statute, Ordinance or Law, regulation or bye-law.

Compliance
with Statutes,
Regulations, etc.

(3) The Employer will repay or allow to the Contractor all such sums as the Engineer shall certify to have been properly payable and paid by the Contractor in respect of such fees.

27. All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site of the Works shall as between the Employer and the Contractor be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall immediately upon discovery thereof and, before removal, acquaint the Engineer's Representative of such discovery and carry out, at the expense of the Employer, the Engineer's Representative's orders as to the disposal of the same.

Fossils, etc.

APPENDIX B

STANDARD CONTRACT WORKS INSURANCE POLICY (EUROPE)

CONTRACT WORKS POLICY

WHEREAS the Insured by a Proposal and Declaration which shall be the basis of this Policy and be deemed to be incorporated herein has applied to the Insurers for the insurance hereinafter contained

NOW THIS POLICY WITNESSETH that in consideration of the Insured having paid to the Insurers the Premium stated in the Schedule

THE INSURERS HEREBY AGREE subject to the terms, exceptions, limits and conditions contained herein or endorsed hereon that if during the Period of Insurance or during any further period in respect of which the Insured shall have paid and the Insurers shall have accepted the premium required any part of the Property Insured shall be lost, destroyed or damaged as referred to in Section I hereof or the Insured shall incur legal liability as referred to in Section II hereof the Insurers will indemnify the Insured as provided hereinafter.

GENERAL EXCEPTIONS

1. This insurance does not cover any loss, destruction, damage or liability directly or indirectly occasioned by or through or in consequence of:—

- (a) war, invasion, act of foreign enemy, hostilities or warlike operations (whether war be declared or not), civil war
- (b) mutiny, civil commotion assuming the proportions of or amounting to a popular rising, military rising, insurrection, rebellion, revolution, military or usurped power
- (c) the act of any person acting on behalf of or in connection with any organisation with activities directed towards the overthrow by force of the Government *de jure* or *de facto* or to the influencing of it by terrorism or violence
- (d) (i) permanent or temporary dispossession resulting from confiscation, nationalisation, commandeering or requisition by any lawfully constituted authority
- (ii) permanent or temporary dispossession of any building resulting from the unlawful occupation of such building by any person

provided that the Insurers are not relieved of any liability to the Insured in respect of physical damage to the Property Insured occurring before dispossession or during temporary dispossession which is otherwise covered by this Policy.

In any action, suit or other proceeding where the Insurers allege that by reason of the provisions of Exceptions (a), (b) and (c) above any loss, destruction, damage or liability is not covered by this insurance the burden of proving that such loss, destruction, damage or liability is covered shall be upon the Insured.

2. This insurance does not cover

- (a) any accident or any loss or destruction of or damage to any property whatsoever or any loss or expense whatsoever resulting or arising therefrom or any consequential loss
- (b) any legal liability of whatsoever nature

directly or indirectly caused by or contributed to by or arising from ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel. Solely for the purpose of this exception combustion shall include any self-sustaining process of nuclear fission.

3. The indemnity provided by this Policy shall not apply to or include any accident, loss, destruction, damage or legal liability directly or indirectly caused by or contributed to by or arising from nuclear weapons material.

SECTION I—INSURANCE OF CONTRACT WORKS

The Insurers will by payment or, at their option, by repair or reinstatement indemnify the Insured in respect of loss or destruction of or damage to the Property Insured arising from any cause (other than as provided in the General Exceptions or in the Exceptions to this Section contained hereinafter) whilst at the Situation of the Contract.

In addition the Insurers will indemnify the Insured against costs and expenses incurred under Item 1 of the Schedule. The liability of the Insurers under this Section of the Policy shall not exceed during the currency of the Policy in respect of each item of the Schedule the Sum Insured thereon or in all the Total Sum Insured except to the extent that such Sum Insured may be reinstated as provided hereinafter.

Upon the occurrence of any loss or destruction of or damage to the Property Insured the Sum Insured in respect of the item or items concerned shall immediately stand reduced by the amount paid or payable under the Policy in respect of such loss, destruction or damage unless such Sum Insured be reinstated by the payment to the Insurers of an additional premium calculated on a pro rata basis from the date of the occurrence to the expiry of the current period of assurance, it being understood that the said additional premium shall be disregarded for the purpose of any adjustment of premium under Condition 10.

The Insurers' liability shall cease:

- in respect of any part of the Contract works taken over or taken into use by the Principal prior to the end of the Construction Period, at the date of being so taken over or into use and
- in respect of any remaining part of the Contract works, at the end of the Construction Period except that for any Contract works taken over or taken into use by the Principal the indemnity provided by this Section shall apply during the Maintenance Period in respect of any loss, destruction or damage:
 - arising from a cause occurring during the Construction Period but prior to the commencement of the Maintenance Period
 - occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under the Conditions of the Contract

EXCEPTIONS TO SECTION I

The indemnity expressed in this Section shall not apply to or include—

- loss or destruction of or damage to any locomotive, waterborne vessel or craft, aircraft or any mechanically propelled vehicle other than vehicles used at the Situation of the Contract and forming part of the Property Insured under Item 2 of the Schedule
- loss or destruction of or damage to cash, bank notes, treasury notes, cheques, postal orders, money orders, stamps, securities, debentures, bonds, bills of exchange or promissory notes
- loss or destruction of or damage to any plant, machinery or equipment due to its own explosion, mechanical or electrical breakdown, failure, breakage or derangement, but this exception shall not be deemed to exclude loss or destruction of or damage to (a) other property insured under this Policy or other separate parts of the plant, machinery or equipment arising as a consequence of such explosion, breakdown, failure, breakage or derangement or (b) a boiler used for domestic purposes only
- loss, destruction or damage (other than by fire or explosion) due to:—
 - wear and tear, rust, rustle or deterioration
 - insects, larvae or vermin of any kind
 - defective design
 - acts of the Insured (not of his employees) which are contrary to the recognized rules of engineering or to any legislation or regulations issued by an authority
- costs of work whether total or partial
 - replacement or rectification rendered necessary by defective material or workmanship, but this exception shall not apply to loss or destruction of or damage to any other Property Insured by an accident resulting from such defect
 - normal upkeep or normal working good
- damage to tyres unless the vehicle or plant is damaged at the same time
- loss of any property by disappearance or by shortage where such loss is revealed only by the making of an inventory or a periodic stocktaking
- loss occasioned by or through or in consequence of the destruction of or damage to the Property Insured by order of any lawfully constituted authority
- consequential loss of any kind or description whatsoever, including penalties, fines, loss of contracts and loss arising from delay in completing or negotiating contracts.

SECTION II—LIABILITY TO THIRD PARTIES

The Insurers will indemnify the Insured against:

- all claims which the Insured shall become legally liable to pay for compensation in respect of:
 - bodily injury to or illness of any person
 - loss of or damage to property
 occurring as a result of an accident at the Situation of the Contract and arising out of the performance of the Contract
- all reasonable expenses of litigation:
 - incurred by any claimant against the Insured
 - incurred with the written consent of the Insurers in respect of a claim against the Insured for compensation to which the indemnity expressed in this Policy applies.

INDEMNITY TO PRINCIPAL

In the event of a claim being made on the Principal and arising out of the performance of the Contract by the Insured the Insurers will indemnify the Principal as though he were the Insured provided that the Principal shall be subject to all the terms, conditions and exceptions of this Policy.

LIMIT OF INDEMNITY

The total liability of the Insurers under this Section of the Policy for all compensation payable to any claimant or any number of claimants in respect of or arising out of any one occurrence or in respect of or arising out of all occurrences of a series consequent on or attributable to one source or original cause shall not exceed the Limit of Indemnity for any one accident.

EXCEPTIONS TO SECTION II

The indemnity expressed in this Section shall not apply to or include:

- liability assumed by the Insured by agreement and which would not have attached in the absence of such agreement
- liability in respect of:
 - injury to or illness of any person under a contract of service or apprenticeship with the Insured if such liability is in respect of injury or illness arising out of and in the course of the employment of such person by the Insured
 - any sums payable by the Insured under legislation relating to occupational injury or illness
- liability in respect of loss of or damage to property belonging to or in the charge or under the control of the Insured or of any servant or agent of the Insured
- liability in respect of damage to any property or land or building caused by vibration or by the removal or unloading of support or injury or damage to any person or property occasioned by or resulting from any such damage
- liability in respect of injury, illness, loss or damage caused by or in connection with or arising from:
 - the use of any mechanically propelled vehicle which when the accident giving rise to the liability occurred was required to be insured by any provisions of any legislation relating to the compulsory insurance of motor vehicles or the use thereof
 - the ownership or possession or use by or on behalf of the Insured of any locomotive, aircraft or waterborne vessel or craft
- liability in respect of loss of or damage to property caused by or in connection with or arising from the bursting of any pressure part of:
 - any steam boiler or any economiser
 - any vessel or apparatus intended to operate under steam pressure.

THE SCHEDULE

Policy No. _____

The Insurers: _____	
The Insured: _____	
The Principal: _____	
The Contract: _____	
Situation of the Contract: _____	
Total Contract Price: _____	
Period of Contract:	Construction Period: _____ Maintenance Period: _____
INSURED UNDER SECTION I	
Property Insured	Sum Insured
Item 1.	The permanent and temporary works and the materials and all other things (except as insured under Item 2) belonging to the Insured or for which he is responsible brought on to the Situation of the Contract for the purposes of the Contract
Item 2.	Contractors' plant, machinery and equipment whilst at the Situation of the Contract the property of the Insured or for which he is responsible
Item 3.	Costs and expenses necessarily incurred by the Insured with the consent of the Insurers in demolishing or removing debris of the portion or portions of the property insured by Items 1 & 2 above destroyed or damaged by any peril hereby insured against
TOTAL SUM INSURED	
<p>The sum insured by Item 1 includes an amount in respect of Architects', Surveyors' and Consulting Engineers' Fees necessarily incurred in the reinstatement of the Property Insured consequent upon its loss, destruction or damage but not for preparing any claim, it being understood that the amount payable for such fees, shall not exceed those authorised under the scale of the Royal Institute of British Architects or the Association of Consulting Engineers or the equivalent local body.</p>	
Excess Clause	
It is agreed that for each and every occurrence giving rise to a claim under Section I the Insured shall be responsible for:	
(a) the first _____ in respect of loss, destruction or damage arising from storm, flood, earthquake, subsidence, landslip or collapse.	
(b) the first _____ in respect of loss, destruction or damage from any other cause except fire, lightning or explosion.	
Limit of indemnity under Section II for any one accident: _____	
Premium (subject to adjustment in accordance with Condition 10) _____	
Period of Insurance	
From _____	} both dates inclusive
To _____	
(including _____ months Maintenance Period)	
Date of signature of Proposal and Declaration _____	

For and on behalf of the Insurers

Date _____

THE CONDITIONS

1. This Policy and the Schedule shall be read together as one contract and any word or expression to which a specific meaning has been attached in any part of this Policy or of the Schedule shall bear such meaning wherever it may appear. The expression Conditions of the Contract shall mean the Conditions stipulated by the Principal and agreed by the Insured in connection with the Contract.

2. The Insured shall take all reasonable precautions in the selection of labour and for the safety of the Property Insured and shall at all times maintain in efficient condition all plant, machinery and equipment used in connection with the Contract. The Insured shall also take and cause to be taken all reasonable precautions to prevent accidents and shall ensure that all plant, machinery and equipment requiring inspection under any statute or order shall be so inspected.

The Insured's representatives shall have access to the Situation of the Contract at all reasonable times and have the right to examine any plant, machinery and equipment used in connection with the Contract.

3. The Insured shall

- (a) immediately upon having knowledge of any event giving rise or likely to give rise to a claim under the Policy, give notice in writing thereof to the Insurers and at his own expense as soon as practicable supply such particulars as may reasonably be required by the Insurers
- (b) send to the Insurers immediately on receipt any writ, summons or other proceedings which may be commenced against the Insured
- (c) give to the Insurers all information and assistance to enable them to settle or resist any claim or institute proceedings.

In no case shall the Insurers be liable for any loss, destruction or damage not notified to them within three calendar months after the event giving rise to a claim.

In the case of property lost, stolen or wilfully damaged the Insured shall immediately notify the police and render all reasonable assistance in causing the discovery and punishment of any guilty person and in tracing and recovering lost or stolen property.

The Insured shall not repudiate liability, negotiate or make any admission, offer, promise or payment in connection with any accident or claim without the written consent of the Insurers.

4. The Insurers shall be entitled if they so desire to take over and conduct in the name of the Insured the defence of any claim by a third party or to prosecute in the name of the Insured at their own expense and for their own benefit any claim for indemnity or damages or otherwise and shall have full discretion in the conduct of any proceedings and in the settlement of any claim and the Insured shall give all such information and assistance as the Insurers may require.

5. In the case of liability to third parties the Insurers may so far as any accident is concerned pay to the Insured the Limit of Indemnity for any one accident (but deducting therefrom in such case any sum or sums already paid as compensation in respect thereof) by any lesser sum for which the claim or claims arising from such accident can be settled and the Insurers shall thereafter be under no further liability in respect of such accident except for the payment of costs and expenses of litigation under Section II of this Policy incurred prior to the date of the payment of such Limit of Indemnity or such lesser sum.

6. On the happening of any damage to the Property Insured the Insurers may take or keep possession of such property and examine, sort, arrange, remove or otherwise deal with it or they may sell or dispose of the property for the account of whom it may concern.

The powers conferred by this Condition shall be exercisable by the Insurers at any time until notice in writing is given by the Insured that he makes no claim under the Policy or, if any claim is made, until such claim is finally determined or withdrawn and the Insurers shall not, by any act done in the exercise or purported exercise of their powers hereunder, incur any liability to the Insured or diminish their right to rely upon any of the conditions of this Policy in answer to any claim.

If the Insured or any person on his behalf shall not comply with the requirements of the Insurers or shall hinder or obstruct the Insurers in the exercise of their powers hereunder, all benefit under this Policy shall be forfeited.

The Insured shall not in any case be entitled to abandon any property to the Insurers whether taken possession of by the Insurers or not.

7. The Insured shall at the expense of the Insurers do and concur in doing and permit to be done all such acts and things as may be necessary or reasonably required by the Insurers for the purpose of enforcing rights and remedies or for obtaining relief or indemnity from other parties to which the Insurers shall be or would become entitled or subrogated upon their paying for or making good any loss or damage or claim under this Policy, whether such acts and things shall be or become necessary or required before or after indemnification by the Insurers.

8. This insurance does not cover any fire, destruction, damage or liability which is insured by or would, but for the existence of this Policy, be insured by any other policy or policies, except in respect of any claims beyond the amount which would have been payable under such other policy or policies had this insurance not been effected.

9. If a claim is made by or on behalf of the Insured which shall be in any respect unfounded or fraudulent or intentionally exaggerated or if any false declaration or statement be made in support thereof the claim shall not be recoverable hereunder.

10. The Insured shall within one month of the expiration of the period of insurance furnish to the Insurers a declaration of the actual Total Contract Price and if such price shall differ from the original Total Contract Price the premium shall be suitably adjusted.

11. All differences arising out of this Policy shall be referred to the decision of an Arbitrator to be appointed in writing by the parties in difference or if they cannot agree upon a single Arbitrator to the decision of two Arbitrators one to be appointed in writing by each of the parties within one calendar month after having been required in writing so to do by either of the parties or, in case the Arbitrators do not agree, of an Umpire appointed in writing by the Arbitrators before entering upon the reference. The Umpire shall sit with the Arbitrators and preside at their meetings and the making of an award shall be a condition precedent to any right of action against the Insurers. If the Insurers shall disclaim liability to the Insured for any claim hereunder and such claim shall not within twelve months from the date of such disclaimer have been referred to arbitration under the provisions herein contained then the claim shall for all purposes be deemed to have been abandoned and shall not thereafter be recoverable hereunder.

12. The due observance and fulfilment of the terms, conditions and endorsements of this Policy by the Insured is so far as they relate to anything to be done or complied with by him and the truth of the statements and answers in the Proposal shall be conditions precedent to any liability of the Insurers to make any payment under this Policy.

APPENDIX C

BUILDER'S RISK SAMPLE POLICY (NORTH AMERICA)

MULTI-PERIL
Subscription
Policy
No.

Replacing Policy No. Expired
Cancelled

Sum Insured by this policy	Rate	Premium Payable under this policy	Term	Period of Insurance	
\$ being percent of the total of the sums respectively set against each item of The Schedule attached hereto.			Months	From	to XXXXXXXXXXXX

Name of
THE INSURED

Loss payable to Insured

IN CONSIDERATION OF THE INSURED having paid or agreed to pay to each of the INSURERS named in the List of Subscribing Companies forming part hereof, or to INSURERS whose names are substituted therefor or added thereto by endorsement, hereinafter called "THE INSURERS", the premium set against its name in the List of Subscribing Companies,

THE INSURERS SEVERALLY AND NOT JOINTLY AGREE, each for the Sum Insured set against its name in the List of Subscribing Companies, (subject to the terms and conditions contained herein or endorsed hereon, and which are to be taken as part of this Policy), that in the event that any of the property insured described in The Schedule attached hereto be lost, destroyed or damaged by a peril for which insurance is provided by the terms of The Schedule and endorsements attached hereto, at any time while this Policy is in force, THE INSURERS will indemnify THE INSURED against the direct loss so caused, the liability of THE INSURERS individually being limited to that proportion of the limit of insurance provided by each item of The Schedule in respect of the property lost, destroyed or damaged which the sum set against the name of the individual Insurer in the List of Subscribing Companies, or such other sum as may be substituted therefor by endorsement, bears to the total of the sums respectively set against each item of The Schedule attached hereto.

EXCLUSIONS

This Policy does not cover:

- (a) loss or damage caused by war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military power;
- (b) loss or damage caused by contamination by radioactive material.

If this Policy contains a Co-Insurance Clause or a Guaranteed Amount (Stated Amount) Clause, and subject always to the limit of liability of each Insurer as set forth in the List of Subscribing Companies, no Insurer shall be liable for a greater proportion of any loss or damage to the property described in The Schedule attached hereto, than the sum insured by such Insurer bears to:—

- (a) that percentage, stated in the Co-Insurance Clause, of the actual cash value of the said property at the time of loss, or
- (b) the Guaranteed Amount (Stated Amount) of total insurance stated in the Guaranteed Amount (Stated Amount) Clause, as the case may be.

If the insurance under this policy is divided into two or more items, the foregoing shall apply to each item separately.

Wherever in this Policy or in any endorsement attached hereto reference is made to "The Company", "The Insurer", or "This Company" reference shall be deemed to be made to each of the Insurers severally.

This Policy is subject to the terms and conditions set forth herein together with such other terms and conditions as may be endorsed hereon or added hereto. No term or condition of this Policy shall be deemed to be waived in whole or in part by THE INSURERS unless the waiver is clearly expressed in writing, signed by the person(s) authorized for that purpose by THE INSURERS.

In Witness Whereof THE INSURERS through their representative(s) duly authorized by them for this purpose have executed and signed this Policy

Dated at 19.....

CONDITIONS

All of the Conditions set forth under the titles Conditions of the Policy, Variations in Conditions and Additional Conditions apply with respect to all of the perils insured by this Policy except as these Conditions may be modified or supplemented by the Forms or Endorsements attached.

CONDITIONS OF THE POLICY

1. If any person insures his buildings or goods and causes the same to be described otherwise than as they really are, to the prejudice of the company, or misrepresents or omits to communicate any circumstance which is material to be made known to the company, in order to enable it to judge of the risk it undertakes, such insurance shall be no longer with respect to the property insured to which the misrepresentation or omission is made, but when the application is made out by the company's agent, such application shall be deemed to be the act of the company.
2. After application for insurance, it shall be presumed that any Policy sent to the insured is intended to be in accordance with the terms of the application, unless the company points out, in writing, the particulars wherein the Policy differs from a application.
3. Any change in the use or condition of the property insured as defined by the Policy, made without the consent of the insurer, and within the control or knowledge of the insured, and which increases the risk, shall void the Policy, unless the change is promptly notified in writing to the company or its local agent, and the company, when notified, may return the premium for the unexpired period and cancel the Policy, or may demand in writing an additional premium, which the insured shall, if he desires a continuance of the Policy, forthwith pay to the company, and if he neglects to make such payment forthwith after receiving such demand, the Policy shall be no longer in force.
4. The insurance is rendered void by the transfer of the interest in the object of the insured to a third person, unless such transfer is with the consent or privity of the insurer.
The foregoing rule does not apply in the case of risks assumed by successive owners as specified in clause b of this paragraph.
- a. The insured has a right to assign the Policy with the thing insured, subject to the conditions therein contained.
- b. A transfer of interest by one to another of several partners or owners of unadvised property who are jointly insured does not avoid the Policy.
5. Where property insured is only partially damaged, an abandonment of the same will be allowed except with the consent of the company or its agent; and, in case of removal of property to escape confiscation, the company will contribute to the cost and expense attending such act of salvage proportionately to the respective interests the company or companies and the insured.
6. Money, books, of account, securities for money, and evidences of debt or title are not insured.
7. Plate, plate-glass, plated ware, jewellery, paintings, sculptures, curiosities, scientific and musical instruments, pictures, engravings, gold and silver, watches, art, articles of vertu, bric-a-brac, clocks, watches, trunks and mirrors are not insured unless mentioned in the Policy.
8. The company is not liable for loss if there is any prior insurance in any other company, unless the company's agent therein appears in the Policy or is endorsed thereon, nor if any subsequent insurance is effected by any other company, unless and until the company consents therein, or unless the company does not dissent in writing (file two weeks after receiving written notice of the intention or demand to effect the subsequent insurance, or does not dissent in writing after that time and before the subsequent or further insurance is effected).
9. In the event of any other insurance on the property herein described having been effected as aforesaid, then the company shall, if such other insurance remains in force, on the happening of any loss or damage, be liable only for the payment of a rateable proportion of such loss or damage, without reference to the dates of the different policies.
10. The company is not liable for the losses following, that is to say:
a. For the loss of property owned by any other person than the insured, unless the interest of the insured is stated in or upon the Policy.
b. For loss by fire caused by invasion, insurrection, riot, civil commotion, military or usurped power, earthquake or volcanic eruption.
c. Where the insurance is upon buildings or their contents, for loss caused through want of good and substantial brick or stone chimneys, or by ashes or embers being deposited, with the knowledge and consent of the insured, in wooden vessels; or by leaks or stove-pipes being, to the knowledge of the insured, in an unsafe condition or improperly secured.
d. For loss or damage to goods destroyed or damaged while undergoing any process in or by which the application of fire heat is necessary.
e. For loss or damage occurring to buildings or to their contents, while the buildings are being repaired by carpenters, joiners, plasterers or other workmen, and when loss or damage to such buildings or their contents is due to such carpenters, joiners, plasterers or other workmen, unless permission to execute such repairs has been previously granted in writing, signed by a duly authorized agent of the company. But, in dwelling houses fifteen days are allowed in each year for incidental repairs without such permission.
f. For loss or damage occurring when petroleum, or rock, earth or coal-oil, camdome, gasoline, burning fluid, benzine, naphtha or any liquid products thereof, or any of their constituent parts (refined coal oil for lighting purposes only, not exceeding five gallons in quantity, or lubrication oil not being crude petroleum or oil of less specific gravity than that required by law for illuminating purposes, not exceeding five gallons in quantity, excepted), or more than twenty-five pounds of gunpowder, or are stored or kept in the building insured or containing the property insured, unless permission is given in writing by the company.
11. The company shall make good: loss caused by the explosion of natural or coal gas, in a building not forming part of gas-works, and all other loss caused by fire resulting from an explosion, and all loss caused by lightning, even if it does not set fire.
12. Proof of loss must be made by the insured, although the loss be payable in a third person.
13. Every person entitled to make a claim under this Policy shall observe the following directions:
a. He shall forthwith after loss give notice in writing to the company.
b. He shall deliver, as soon after as practicable, as particular an account of the loss as the nature of the case permits.
c. He shall also furnish therewith a sworn declaration establishing:
1. That the said account is just and true;
2. When and how the fire originated so far as declarant knows or believes;
3. That the fire was not caused through his wilful act or neglect, procurement, means or connivance;
4. The amount of other insurances;
5. All liens and incumbrances on the property insured;
6. The place where the property insured, if movable, was deposited at the time of the fire.
d. He shall, in support of his claim, if required and if practicable, produce books of account, warehouse receipts and stock lists and furnish invoices and other vouchers, and also copies of all his policies, and shall separate, as far as reasonably may be, the damaged from the undamaged goods, and exhibit for examination all that remains of the property which was covered by the Policy.
e. He shall produce, if required, a certificate under the hand of a magistrate, notary, commissioner for taking affidavits, or municipal clerk, residing in the vicinity in which the fire happened, and not concerned in the loss or related to the insured or insurers, stating that he has examined the circumstances and, if he, the fire, loss or damage alleged, that he is acquainted with the character and circumstances of the insured or claimant, and that he verily believes that the insured has, by misfortune and without fraud or evil practice, sustained loss and damage in respect of the property insured to the amount certified.
14. The above proofs of loss may be made by the agent of the insured, in case of the absence or inability of the insured himself to make the same, such absence or inability being satisfactorily accounted for.
15. Any fraud or false representation in relation to any of the above particulars shall vitiate the claim.
16. If any difference arises as to the value of the property insured, or of the property saved or the amount of the loss, such value and amount and the proportion thereof (if any) to be paid by the company, shall, whether the right to recover on the Policy is disputed or not and independently of all other questions, be submitted to the arbitration of some person to be chosen by both parties, or if they cannot agree on one person, then to three persons, one to be chosen by the party insured and the other by the company, and the third to be appointed by the two persons first chosen, or, in their failing to agree, then by a judge of the Superior Court sitting in the district wherein the loss has happened, and such reference shall be subject to the provisions of articles 1431 and following of the Code of Civil Procedure. The award shall, if the company is in other respects liable, be conclusive as to the amount of the loss and proportion to be paid by the company. Where the full amount of the claim is awarded, the costs shall follow the event, and, in other cases, all questions of costs shall be in the discretion of the arbitrators.
17. The loss shall not be payable until thirty days after completion of the proofs of loss, unless otherwise provided for by the contract of insurance.
18. The company, instead of making payment, may repair, rebuild or replace, within a reasonable time, the property damaged or lost, giving notice of their intention within fifteen days after the receipt of the proofs herein required.
19. The insurance may be terminated by the company, by giving notice to that effect, and, if as the cash plan, by tendering therewith a rateable proportion of the premium for the unexpired term, calculated from the termination of the notice, in the case of personal service of the notice, five days' notice, excluding Sunday, shall be sufficient. Notice may be given by any company having an agency in the Province of Quebec, by registered letter addressed to the insured at his last post-office address notified to the company, and where no address has been notified, then to the post office of the agency from which the application was received, and, where such notice is by letter, then seven days from the arrival at any post office in the Province shall be deemed good notice. The Policy shall cease after such tender and notice aforesaid, and at the expiration of the five or seven days as the case may be.
The insurance, if for cash, may also be terminated by the insured, by giving written notice to that effect to the company or its authorized agent, in which case the company may retain the customary short rate for the time the insurance has been in force, and shall pay to the insured the balance of the premium paid.
- * 20. No condition of the Policy shall be deemed to have been waived by the company, either wholly or in part, unless the waiver is clearly expressed in writing, signed by an agent of the company.
21. An agent or agent of the company, who assumes on behalf of the company to enter into any written agreement relating in any matter connected with the insurance, shall be deemed PRIMA FACIE to be the agent of the company for such purpose.
22. Every action or proceeding against the company for the recovery of any claim under or by virtue of this Policy shall be absolutely barred, unless commenced within one year next after the loss or damage occurred.
23. Any written notice to the company for any purpose of the conditions of the Policy, where the mode thereof is not expressly provided by law, may be by letter delivered at the head office of the company in the Province of Quebec, or by registered letter addressed to the company, its manager or agent, at such head office or by such written notice given in any other manner to an authorized agent of the company.

See VARIATIONS IN CONDITIONS below THE SCHEDULE

SCHEDULE

INSURED:

and/or all Contractors
and Subcontractors including Suppliers who
enter into contracts to carry out work on
the site and/or all Engineers, Architects
and Consultants as their interests may appear.

MAILING ADDRESS
FOR PURPOSES OF
THIS POLICY:-

POLICY PERIOD:-

PREMIUM:-

payable in instalments of,

LIMIT OF LIABILITY:-

any one occurrence.

GENERAL

1. This Policy insures against "ALL Risks" of Physical Loss or Damage howsoever and wheresoever occurring from any cause whatsoever, except as hereinafter excluded.
2. This Policy covers on materials, supplies and property of every description, in any way involved in the Construction of a and all supporting or related facilities near and known as.
3. Coverage shall apply whilst the insured property is in storage in buildings or in the open awaiting or during erection or installation awaiting tests and during tests anywhere in until finally accepted by the Owner, or until the responsibility of the Insured for arranging insurance ceases or until such time as this Policy expires or has been terminated whichever first occurs.
4. The Limit of Liability hereunder shall not exceed \$ any one occurrence (inclusive of general average, salvage, debris removal and fire fighting charges).
5. Deductible Clause:-
 - a) Earthquake:- Each loss caused by Earthquake shall constitute a single claim hereunder, provided that more than one Earthquake shock occurring within any seventy-two hours during the term of this policy shall be deemed a single Earthquake within the meaning hereof. Notwithstanding the foregoing, the Insurers shall not be liable for any loss or damage caused by any Earthquake shock occurring before the date of inception of this policy, nor for any loss or damage caused by an Earthquake shock occurring after the expiration of this Policy. In no event, however, shall the Insurers be liable hereunder for an amount greater than that amount by which the loss or damage exceeds the sum of
 - b) All Other Perils:- Each claim for loss or damage shall be adjusted separately and from the amount of each such adjusted claim an amount of shall be deducted.
6. In respect of contractors and/or subcontractors insured hereunder, coverage is effective only when such property is at their risk.
7. Time Clause:-
The condition as to insurance becoming effective at 12:01 A.M. Standard Time in shall not apply hereto (except in the case

7. Time Clause:- (continued)

(of renewal of insurance under this Policy), but all insurance shall become effective and binding from the time same is actually placed, anything else herein to the contrary notwithstanding, the hour of expiration remaining as expressed in this Policy.

8. The term "Insured" shall mean any one or more person, firm or organization insured hereunder, and the term "Insurers" shall mean the Underwriters.

EXCLUSIONS

This Policy does not insure:-

- a) Against claims arising from delay or loss of market, or delay in completion of contract, nor does this Policy cover any stipulated penalties for non-compliance with contract conditions.
- b) At any permanent location of a contractor or subcontractor but this exclusion shall not apply to described property temporarily stored at such locations prior to moving to site;
At Suppliers' Premises.
- c) Contractors tools and equipment (except contractors temporary buildings, structures, formwork, fuel in storage, trailers, scaffolding or tarpaulins) and licensed motor vehicles (except while said vehicles are on the worksite).
- d) Fidelity of Insured's employees.
- e) Loss or damage caused directly or indirectly by:
 - 1) Hostile or warlike action in time of peace or war, including action in hindering, combating, defending against an actual, impending or expected attack, (a) by any government or sovereign power (de jure or de facto), or by any authority maintaining or using military, naval or air forces; or (b) by military, naval or air forces; or (c) by any agent of any government, power, authority or forces;
 - 2) Any weapon of war employing atomic fission or radioactive force whether in time of peace or war.
 - 3) Insurrection, rebellion, revolution, civil war, usurped power or action taken by government authority in hindering, combating or defending against such an occurrence; seizure or destruction under quarantine, or customs regulations, confiscation by order of any government or public authority, or risks of contraband or illegal transportation or trade.

Exclusions:- (continued)

- f) Wear and tear, or defective workmanship, material or design but this exclusion shall be limited to the piece of machine, structure or work immediately affected and shall not extend to other work or property lost or damage in consequence of such defective workmanship, material, design or wear and tear; provided; however, that where any named or unnamed insured effects other valid and collectible insurance against loss or damage in consequence of defective design, such insurance shall be primary and this policy shall apply only as excess in respect of claims for loss or damage in consequence of defective design.
- g) Losses due to inventory shortage alone, or mysterious disappearance.
- h) Loss, destruction, or damage to accounts, bills, currency, stamps, deeds, evidence of debt, money, notes or securities.
- i) Loss or damage caused by or resulting from wet or dry rot, mould, rust or corrosion; dampness or dryness of atmosphere; freezing, moths, rodents, or vermin, termites or insects; inherent vice, misappropriation, secretion, conversion, infidelity or any dishonest act on the part of person(s), to whom the property may be entrusted (carriers for hire excepted);
- but this Exclusion (i) shall not apply to loss or damage (not otherwise excluded in this Policy) caused by or ensuing from Fire, Lightning, Explosion, Windstorm, Impact by Aircraft or Vehicles, Smoke or Sprinkler Leakage.
- j) Windstorm damage to Polythene hoardings.
- k) Loss or damage to the extent that such loss or damage is recoverable under manufacturers, installers or suppliers Warranty or Supply Agreement.

C O N D I T I O N S1. Sue and Labour Clause:-

In case of loss or damage it shall be lawful and necessary for the Insured, their factors servants or assigns, to sue, labour and travel for, in and about the defence, safeguard and recovery of the property insured hereunder, or any part thereof, without prejudice to this insurance; nor shall the acts of the Insured or Insurers in recovering, saving and preserving the property insured in case of loss or damage, be considered a waiver or acceptance of abandonment. In the event of expenditure for salvage, salvage charges, or sue and labour expenses, the liability under this Policy shall be limited to such proportion of such amounts as the amount of this insurance bears to the total value of the merchandise involved.

Conditions:- (continued)2. Subrogation Release Clause:-

Any release from liability entered into by the Insured prior to any loss or damage shall not affect the validity of this Policy or the right of the Insured to recover hereunder and it is further agreed that if the Insured, prior to any loss or damage, has executed any agreement whereby a third party shall be held harmless for loss or damage to the property covered under this Policy, the Insurers shall have no right of recovery against such third party; and it is also agreed that in no event shall the Insurers have any right of recovery against any other Insured under any Part of this insurance contract nor against any subsidiary or affiliated company of the Insured.

3. Benefit to Carrier or Bailee Clause:-

It is warranted by the Insured that this insurance shall in no way inure directly or indirectly to the benefit of any carrier or other bailee.

4. Reinstatement Clause:-

This Policy shall not be reduced by the sum paid in any claim. The Policy cover shall be automatically reinstated without charge, but in the event of a claim where the replacement cost exceeds the declared value the Insurer shall receive an additional premium calculated on the difference in value but subject in all to the Limit of Liability set out elsewhere herein.

5. Suit or Action Clause:-

No suit or action on this Policy for the recovery of any claim shall be sustainable in any court of law or equity unless the Insured shall have fully complied with all the requirements of this Policy nor unless commenced within twelve (12) months next after the happening of the loss.

6. Arbitration Clause:-

In case the Insured and the Insurers shall fail to agree as to the amount of loss or damage, the same shall be ascertained by two competent and disinterested appraisers, the Insured and the Insurers each selecting one, and the two so chosen shall first select a competent and disinterested umpire; the appraisers together shall then estimate and appraise the loss, stating separately the sound value and damage and failing to agree, shall submit their differences to the umpire; and the award in writing of any two shall determine the amount of such loss; the parties thereto shall pay the appraisers respectively selected by them, and shall bear equally the expenses of the appraisal and umpire.

Conditions:- (continued)7. Valuation Clause:-

Claims shall be settled under this Policy on the basis of cost of replacement and shall include but not be limited to the cost of materials, plus labour, insurance and all other charges, plus overhead, plus taxes, plus profit and that the amount of insurance so determined, and loss, if any, whether partial or total shall be adjusted accordingly on 100% of the value.

8. It is agreed that any notice required by any terms or conditions of this Policy to be given to the Insurers may be given by the Insured, through

9. Claims Procedure Clause:-

1. Every claim for loss or damage under this Policy shall be promptly reported to the Insurers
2. A detailed proof of loss shall be filed with the Insurers as soon as practicable.
3. All adjusted claims shall be paid to the Insured (Owner) within Thirty (30) days after filing such proof of loss.
4. The Insurers will instruct their appointed adjuster, at the request and expense of the Insured, to ask the Owners' Engineers to arrange that all property damaged will be classified into codes to deal with various contracts. When payments are made by the Insurers such payments shall be accompanied by a statement of the amount due to each Insured in accordance with the proof of loss submitted by each Insured.
5. The Insurers grant permission to the Insured to carry out any immediately necessary repairs in respect of any partial damage to the property insured hereby which conveniently and advantageously can be undertaken by them. The Insurers shall reimburse the Insured (Owner) for the actual cost of such repairs subject always to the terms, conditions and the "deductible" and Limit of Liability Clauses stated elsewhere herein.

10. Loss Payable Clause:-

Claims shall be paid to

11. Debris Removal Clause:-

This Policy covers expenses incurred in the removal of all debris of the property covered hereunder which may be occasioned by loss caused by any of the perils insured against in this Policy. However, the total liability under this Policy for both loss to property and

Conditions:- (continued)11. Debris Removal Clause:- (continued)

removal of debris shall not exceed the limit of liability stated in the Schedule. The Insurers shall not be liable for more than the proportion of such debris removal expense as the amount of insurance under this policy bears to the total amount of insurance on the property covered hereunder whether or not all such insurance includes this clause.

The Insurers shall not be liable for debris removal expense occasioned by the enforcement of any state or municipal law or ordinance which necessitates the demolition of any portion of a building covered hereunder which has or has not suffered damage by any of the perils insured against.

12. Margin of Profit Clause:-

Any contractor included as an Insured shall be entitled to receive his Margin of Profit on repairs or replacement, done by him, of any work which has been damaged or destroyed. This Margin of Profit shall not apply to materials and supplies which have not entered into construction at the time of loss.

13. Premium Computation Clause:-

It is understood that the Full Contract Value, being the value of all insured property (including construction, assembly and installation costs), is estimated at inception of this insurance at \$. The final premium hereon shall, after completion of the project, be adjusted on the final Full Contract Value at a rate of \$. per month, per one hundred dollars (\$100.00) of such full Contract Value, for the period of this insurance; it is further agreed however that if the Insured confirms that the final Full Contract Value was within Five Percent (5%) of the above mentioned amount, such premium adjustment will be waived.

14. Extension Clause:-

It is agreed that in the event that extension of the term of coverage is required such extension shall be made at \$. per one hundred dollars (\$100.00) of the estimated Contract Value, for each month.

15. Permission Clause:-

Permission is hereby granted the Insured to occupy the "Project" or any part thereof for the purpose for which it was constructed or otherwise.

16. Cancellation Clause:-

This Policy may be cancelled at any time upon request of the Insured subject to no claim(s) being advised, the Insurers retaining or collecting the customary short rates for the period it has been in force; or, it may be cancelled by the Insurers by delivering or mailing to the Insured Sixty (60) days written notice of such cancellation.

Conditions:- (continued)17. Errors and Omissions Clause:-

It is agreed that this insurance shall not be prejudiced by any unintentional error in description or amount hereto, provided notice be given to the Insurers as soon as said facts become known to the Insured and an additional premium charged if required.

18. No Control Clause:-

This insurance shall not be invalidated by any act or neglect which is not within the control and knowledge of the Insured.

19. Other Insurance Clause:-

It is the intent of this Policy to cover the interest of the "Insured" as defined herein and whether specifically named or not, in the property insured and against loss or damage arising from the perils insured under the Policy until such time as the Policy expires or has been terminated, whichever first occurs.

The Insurers hereby agree, therefore, that if at the time of accident or occurrence covered by this Policy there is any other valid and collectible insurance which would attach if this insurance had not been effected, this insurance shall be primary and any insurance effected by any one of the named or unnamed Insureds covering their own interests in all work performed by them anywhere and in which they may be involved during the term of such insurance, including the work performed in connection with the subject matter of this insurance, shall be excess insurance; provided, however, that where any such named or unnamed Insured effects other valid and collectible insurance related only to their own interests in their work performed in connection with the subject matter of this insurance, such insurance shall be primary and, if there is more than one such insurance, they shall be contributory and this Policy shall apply only as excess.

20. Expendable Costs Clause:-

It is understood and agreed that this insurance extends to and includes labour and other costs incurred in re-erecting, re-installing and replacing temporary work and/or equipment used in connection with and included in the cost of the "Project", but always excluding the equipment itself.

21. Breach of Conditions Clause:-

Where a loss occurs and there has been a breach of a condition relating to a matter before the happening of the loss, which breach would otherwise disentitle the Insured to recover under this Policy, the breach shall not disentitle the Insured to recover if the Insured establishes that the loss was not caused or contributed to by the breach of condition. Any act, or breach of a condition of the Policy, by any of the parties insured hereby shall not prevent recovery by any other party hereby insured who is innocent of such act or breach.

Attached to and forming part of Subscription Policy.



FORM 101-Q
(EDITION 9-71)

Attached to and forming part of Policy No.

TO THE EXTENT THAT THE QUEBEC INSURANCE ACT IS NOT APPLICABLE TO THIS CONTRACT, THE CONDITIONS HEREINAFTER SET FORTH UNDER THE HEADING "STATUTORY CONDITIONS" APPLY TO THIS CONTRACT.

STATUTORY CONDITIONS

Misrepresentation 1. If a person applying for insurance falsely describes the property to the prejudice of the Insurer, or misrepresents or fraudulently omits to communicate any circumstance that is material to be made known to the Insurer in order to enable it to judge of the risk to be undertaken, the contract is void as to any property in relation to which the misrepresentation or omission is material.

Property of 2. Unless otherwise specifically stated in the contract, the Insurer is not liable for loss or damage to property owned by any person other than the Insured, unless the interest of the Insured therein is stated in the contract.

Change of 3. The Insurer is liable for loss or damage occurring insured after an authorized assignment under the *Bankruptcy Act* or change of title by succession, by operation of law, or by death.

Material 4. Any change material to the risk and within the Change control and knowledge of the Insured avoids the contract as to the part affected thereby, unless the change is promptly notified in writing to the Insurer or its local agent; and the Insurer when so notified may return the unearned portion, if any, of the premium paid and cancel the contract, or may notify the Insured in writing that, if he desires the contract to continue in force, he must, within fifteen days of the receipt of the notice, pay to the Insurer an additional premium; and in default of such payment the contract is no longer in force and the Insurer shall return the unearned portion, if any, of the premium paid.

Termination 5. (1) This contract may be terminated.

(a) by the Insurer giving to the Insured fifteen days' notice of termination by registered mail or five days' written notice of termination personally delivered;

(b) by the Insured at any time on request.

(2) Where this contract is terminated by the Insurer.

(a) the Insurer shall refund the excess of premium actually paid by the Insured over the pro rata premium for the expired time, but, in no event, shall the pro rata premium for the expired time be deemed to be less than any minimum retained premium specified; and

(b) the refund shall accompany the notice unless the premium is subject to adjustment or determination as to amount, in which case the refund shall be made as soon as practicable.

(3) Where this contract is terminated by the Insured, the Insurer shall refund as soon as practicable the excess of the premium actually paid by the Insured over the short rate premium for the expired time, but in no event shall the short rate premium for the expired time be deemed to be less than any minimum retained premium specified.

(4) The refund may be made by money, postal or express company money order or cheque payable at par.

(5) The fifteen days mentioned in clause (a) of subcondition (1) of this condition commences to run on the day following the receipt of the registered letter at the post office to which it is addressed.

Requirements 6. (1) Upon the occurrence of any loss or damage to the insured property, the Insured shall, if the loss or damage is covered by the contract, in addition to observing the requirements of conditions 9, 10 and 11.

(a) forthwith give notice thereof in writing to the Insurer;

(b) deliver as soon as practicable to the Insurer a proof of loss verified by a statutory declaration,

(i) giving a complete inventory of the destroyed and damaged property and showing in detail quantities, costs, actual cash value and particulars of amount of loss claimed;

(ii) stating when and how the loss occurred, and if caused by fire or explosion due to ignition, how the fire or explosion originated, so far as the Insured knows or believes;

(iii) stating that the loss did not occur through any willful act or neglect or the procurement, means or connivance of the Insured;

(iv) showing the amount of other insurances and the names of other Insurers;

(v) showing the interest of the Insured and of all others in the property with particulars of all liens, encumbrances and other charges upon the property;

(vi) showing any changes in title, use, occupation, location, possession or exposures of the property since the issue of the contract;

(vii) showing the place where the property insured was at the time of loss;

(c) if required give a complete inventory of undamaged property and showing in detail quantities, cost, actual cash value;

(d) if required and if practicable, produce books of account, warehouse receipts and stock lists, and furnish invoices and other vouchers verified by statutory declaration, and furnish a copy of the written portion of any other contract.

(2) The evidence furnished under clauses (c) and (d) of sub-paragraph (1) of this condition shall not be considered proof of loss within the meaning of conditions 12 and 13.

Fraud 7. Any fraud or willfully false statement in a statutory declaration in relation to any of the above particulars, vitiates the claim of the person making the declaration.

Who may 8. Notice of loss may be given, and proof of loss may give notice be made, by the agent of the Insured named in the contract in case of absence or inability of the Insured to give the notice or make the proof, and absence or inability being satisfactorily accounted for, or in the like case, or if the Insured refuses to do so, by a person to whom any part of the insurance money is payable.

Salvage 9. (1) The Insured in the event of any loss or damage to any property insured under the contract, shall take all reasonable steps to prevent further damage to any such property so damaged and to prevent damage to other property insured hereunder including, if necessary, its removal to prevent damage or further damage thereto.

(2) The Insurer shall contribute pro rata towards any reasonable and proper expenses in connection with steps taken by the Insured and required under sub-paragraph 1 of this condition according to the respective interests of the parties.

Entry, Control, Abandonment 10. After loss or damage to insured property, the Insurer has an immediate right of access and entry by accredited agents sufficient to enable them to survey and examine the property, and to make an estimate of the loss or damage, and, after the Insured has secured the property, a further right of access and entry sufficient to enable them to make appraisement or particular estimate of the loss or damage, but the Insurer is not entitled to the control or possession of the insured property, and without the consent of the Insurer there can be no abandonment to it of insured property.

Appraisal 11. In the event of disagreement as to the value of the property insured, the property saved or the amount of the loss, those questions shall be determined by appraisal as provided under The Insurance Act before there can be any recovery under this contract whether the right to recover on the contract is disputed or not, and independently of all other questions. There shall be no right to an appraisal until a specific demand therefor is made in writing and until after proof of loss has been delivered.

When loss 12. The loss is payable within sixty days after completion of the proof of loss, unless the contract provides for a shorter period.

Repair or replacement 13. (1) The Insurer, instead of making payment, may repair, rebuild, or replace the property damaged or lost, giving written notice of its intention to do so within thirty days after receipt of the proofs of loss.

(2) In that event the Insurer shall commence to so repair, rebuild, or replace the property within forty-five days after receipt of the proofs of loss, and shall thereafter proceed with all due diligence to the completion thereof.

Action 14. Every action or proceeding against the Insurer for the recovery of any claim under or by virtue of this contract is absolutely barred unless commenced within one year next after the loss or damage occurs.

Notice 15. Any written notice to the Insurer may be delivered at, or sent by registered mail to, the chief agency or head office of the Insurer in the Province. Written notice may be given to the Insured named in this contract by letter personally delivered to him or by registered mail addressed to him at his latest post office address as notified to the Insurer. In this condition, the expression "registered" means registered in or outside Canada.

THE SCHEDULE

VARIATIONS IN CONDITIONS

THIS POLICY IS ISSUED ON THE ABOVE CONDITIONS WITH THE FOLLOWING VARIATIONS AND ADDITIONS:

- A. 1. If this Policy covers, specifically or otherwise, any of the property mentioned in Conditions 6 and 7, then such Conditions 6 and 7 are hereby modified to the extent that coverage is so provided.
- 2. Conditions 8 and 10c are deleted.
- 3. Condition 9 is replaced by any other provision(s) in this Policy concerning other insurance but in the absence of other provision(s) and in the event of there being any other insurance, then the Insurer shall on the happening of any loss or damage be liable only for the payment of a rateable proportion of such loss or damage without reference to the dates of the different policies.
- 4. Condition 10b is replaced by the following:
10. The Insurer is not liable for the losses following, that is to say:
b. loss or damage caused by:
i. war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military power;
ii. riot, civil commotion, earthquakes or volcanic eruption except to the extent otherwise provided in this Policy.
- 5. Condition 10d, e, f and 11 are replaced by any other provision(s) in this Policy concerning—goods undergoing process; repairs; storage or keeping of materials, explosion or lightning; but in the absence of other provision(s) these Conditions are deleted.
- 6. Condition 20 is replaced by the following:
20. No term or condition of this Policy shall be deemed to be waived in whole or in part by the Insurer unless the waiver is clearly expressed in writing, signed by a person authorized for that purpose by the Insurer.

B. The following Conditions are added:

- 1. This Policy does not cover loss or damage caused by contamination by radio-active material.
- 2. (a) If this Policy contains a Co Insurance Clause or a Guaranteed Amount (Stated Amount) Clause, and subject always to the limit of liability of each Insurer as set forth in the List of Subscribing Companies, no Insurer shall be liable for a greater proportion of any loss or damage to the property described in the Schedule attached hereto, than the sum insured by such Insurer bears to:—
(i) that percentage, stated in the Co-Insurance Clause, of the actual cash value of the said property at the time of loss, or
(ii) the Guaranteed Amount (Stated Amount) of total insurance stated in the Guaranteed Amount (Stated Amount) Clause, as the case may be.
If the insurance under this Policy is divided into two or more items, the foregoing shall apply to each item separately.
- (b) If there is comprised in this Policy a Declaration or Reporting Form providing:
(i) that every other insurance on property described in this Policy shall be written upon the same Declaration or Reporting Form;
(ii) that values be reported and the premium adjusted; and
(iii) that the amount of insurance may vary in accordance with the values reported;
and subject always to the limit of liability of each Insurer as set forth in the List of Subscribing Companies, this Policy shall be subject to all terms and conditions set forth in such Declaration or Reporting Form and the amount of insurance at any location at any given time shall be determined as set forth in such Declaration or Reporting Form.

Additional Conditions

- Notice to Authorities 1. Where the loss is due to malicious mischief, burglary, robbery, theft, or attempt thereof, or is suspected to be so due, the Insured shall give immediate notice thereof to the police or other authorities having jurisdiction.
- No Benefit to Bailee 2. It is warranted by the Insured that this insurance shall in no wise ensure directly or indirectly to the benefit of any carrier or other bailee.
- Part and Set 3. In the case of loss of or damage to any article or articles, whether scheduled or unscheduled, which are a part of a set, the measure of loss of or damage to such article or articles shall be a reasonable and fair proportion of the total value of the set, but in no event shall such loss or damage be construed to mean total loss of set.
- Parts 4. In the case of loss of or damage to any part of the insured property whether scheduled or unscheduled, consisting when complete for use, of several parts, the Insurer is not liable for more than the insured value of the part lost or damaged, including the cost of installation.
- Sue and Labour 5. It is the duty of the Insured (a) in the event of any loss or damage to any property insured under the contract to take all reasonable steps to prevent further damage to any such property so damaged and to prevent damage to other property insured hereunder including, if necessary, its removal

- to prevent damage or further damage thereto; and
(b) in the event that any property insured hereunder is lost to take all reasonable steps in and about the recovery of such property. The Insurer shall contribute pro rata towards any reasonable and proper expenses in connection with the foregoing according to the respective interests of the parties.
- Basis of Settlement 6. Unless otherwise provided, the Insurer is not liable beyond the actual cash value of the property at the time any loss or damage occurs and the loss or damage shall be ascertained or estimated according to such actual cash value with proper deduction for depreciation, however caused, and shall in no event exceed what it would then cost to repair or replace the same with material of like kind and quality.
- Subrogation 7. The Insurer, upon making any payment or assuming liability therefor under this Policy, shall be entitled to a transfer of all rights of recovery of the Insured against any person and may bring action in the name of the Insured to enforce such rights. Where the net amount recovered after deducting the costs of recovery is not sufficient to provide a complete indemnity for the loss or damage suffered, that amount shall be divided between the Insurer and the Insured in the proportions in which the loss or damage has been borne by them respectively.

THESE VARIATIONS AND ADDITIONS ARE MADE BY VIRTUE OF THE QUEBEC INSURANCE ACT, AND SHALL HAVE EFFECT INsofar AS, BY THE COURT OR JUDGE BEFORE WHOM A QUESTION IS TRIED RELATING THERETO THEY SHALL BE HELD TO BE JUST AND REASONABLE REQUIREMENTS ON THE PART OF THE COMPANY.

RECEIPT FOR CANCELLATION

\$..... 19

In consideration of..... Dollars.

Return Premium, the Receipt of which is hereby acknowledged, this Policy is cancelled and surrendered to THE INSURERS.

..... Insured.

..... Foyce.

APPENDIX D

COMPREHENSIVE GENERAL LIABILITY INSURANCE

ISSUED BY: -

(hereinafter called the insurer)

POLICY NUMBER

The Insurer hereby agrees with the Insured named or described in the "Declarations" which are made a part hereof, in consideration of an agreed premium and of the statements contained in the "Declarations" and subject to the Insuring Agreements, Limits of Liability, Exclusions and other terms of the Policy as follows:-

DECLARATIONS

1. NAME OF INSURED(S):-

and/or all Contractors and Subcontractors including Suppliers who enter into contracts to carry out work at the site and/or all Engineers, Architects and Consultants as their interests may appear.

2. MAILING ADDRESS, FOR PURPOSE OF THIS POLICY:-

3. POLICY PERIOD:-

plus, (full coverage)
("Completed")
Operations" only coverage)

4. DEFINITION OF OPERATIONS:-

All operations related to and/or arising out of the undertakings of the Insured with respect to the ownership, engineering, construction and completion of the "Project" referred to as the construction of a and all supporting or related facilities near : and known as

5. TERRITORY CLAUSE:-

This Policy applies to claims anywhere in the "World".

6. PREMIUM COMPUTATION:-

Hereon, payable in three instalments,
1)\$
2)
3)

INSURING AGREEMENTS1. COVERAGE "A" - Bodily Injury Liability

To pay on behalf of the Insured all sums which the Insured shall become obligated to pay by reason of liability for damage, including damages for care and loss of services, because of bodily injury, sickness, disease or mental suffering or shock, including death at any time resulting therefrom, sustained or alleged to have been sustained by any person or persons during the policy period.

COVERAGE "B" - Property Damage Liability

To pay on behalf of the Insured all sums which the Insured shall become obligated to pay by reason of liability for damages, because of damage to or destruction of property, including the loss of use thereof, caused by an occurrence as defined during the policy period.

COVERAGE "C" - Personal Injury Liability

To pay on behalf of the Insured all sums which the Insured shall become obligated to pay by reason of liability for damages, including damages, for care and loss of services, because of personal injury including death at any time resulting therefrom arising during the policy period out of:

- a) False arrest, detention or imprisonment, malicious prosecution;
- b) Libel, slander or defamation of character;
- c) Invasion of privacy, wrongful eviction or wrongful entry;
- d) Discrimination, except in such jurisdiction where by legislation, court decision or administrative ruling such insurance is prohibited or held to violate the law or public policy of any such jurisdiction.

COVERAGE "D" - Contingent Employer's Liability

To pay on behalf of the Insured all sums which the Insured shall become obligated to pay by reason of the liability imposed upon the Insured by law for damages because of bodily injury, including death resulting therefrom, accidentally suffered or alleged to have been suffered, while this policy, is in force, by any person and arising out of and in the course of his employment by the Insured named or described in the "Declarations", and attributed to the operations insured hereunder.

No payment shall be made under this Insuring Agreement until all means of recovery under the Workmen's Compensation Act of the Province or State in which the claimant is employed shall have been exhausted. Such insurance as is provided under this Insuring Agreement shall be excess of any valid and collectible insurance available to the Insured.

2. Definition of Insured:-

The unqualified word "Insured" shall include the Insured and also any partner, executive officer, director or shareholder and any employee of the Insured, while acting within the scope of his duties as such. It shall also mean any one or more person, firm or organization insured hereunder, but the inclusion herein of more than one Insured shall not operate to increase the limits of the Insurer's liability.

3. Defence, Settlement, Supplementary Payments:-

With respect to such insurance as is afforded by this Policy, the Insurer shall:-

- a) Defend any suit against the Insured alleging such injury, sickness, disease or destruction and seeking damages on account thereof, even if such suit is groundless, false or fraudulent; but the Insurer may make such investigation, negotiation and settlement of any claim or suit as it deems expedient;
- b) 1 - Pay all premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, all premiums on appeal bonds required in any such defended suit, but without any obligation to apply for or furnish any such bonds;
- 2 - Pay all expense incurred by the Insurer, all costs taxed against the Insured in any such suit and all interest accruing after entry of judgment until the Insurer has paid or tendered or deposited in court such part of such judgment as does not exceed the limit of the Insurer's liability thereon;
- 3 - Pay expense incurred by the Insured for such immediate medical and surgical relief to others as shall be imperative at the time of the occurrence;
- 4 - Reimburse the Insured for all reasonable expenses other than loss of earnings, incurred at the Insurer's request.

The amounts so incurred, except settlements of claims and suits, are payable by the Insurer in addition to the applicable limits of liability of this Policy.

4. Cross Liability:-

It is understood and agreed between the Insured and the Insurer that the inclusion of more than one corporation, person, organization, firm or entity as an Insured in this policy shall not in any way affect the rights of such corporation, person, organization, firm or entity, either as respects to any claim, demand, suit or judgment made, brought or recovered, or in favour of any other Insured, or by or in favour of any employee of such Insured.

4. Cross Liability:- (continued)

This policy shall protect each corporation, person, organization, firm or entity in the same manner as though a separate policy were issued to each, but nothing herein shall operate to increase the Insurer's liability as set forth elsewhere in this policy beyond the amount or amounts for which the Insurer would have been liable if only one person or interest had been named as Insured. It is agreed that any act or omission on the part of any one Insured under this policy shall not prejudice the interest of any other Insured under this policy.

EXCLUSIONSThis Policy does not apply:

- a) To any liability imposed upon or assumed by the Insured under any Workman's Compensation Statute, Law or Plan;
- b) Except as respects Coverage "D", to the ownership, use or operation, by or on behalf of the Insured of any self-propelled land motor vehicle, trailer or semi-trailer while attached thereto or unattached (including accessories and equipment while attached thereto or mounted thereon) other than any of the following or their trailers, accessories and equipment;
 - 1) Vehicles of the crawler type (other than snowmobiles licensed for use on public roads);
 - 2) Tractors (other than road transport tractors designed to haul semi-trailers or trailers), road rollers, graders, scrapers, bulldozers, paving machines and concrete mixers (other than concrete mixers of the mix-in-transit type);
 - 3) Other construction machinery or equipment mounted on wheels but not self-propelled while not attached to any self-propelled land motor vehicles;
 - 4) Self-propelled land motor vehicles intended for use solely on the premises of the Insured or at the construction site but which may use a public highway;
 - 5) Any vehicles or equipment (whether motorized, self-propelled or otherwise) of the Insured for which a special license or permit may be issued to enable it to travel or be towed upon a highway or roadway for use at or near a location upon which the Insured is to carry on or is carrying on operations, and the removal of such vehicles or equipment when it is no longer required or useful at or near such location;
- c) To damage to or destruction of,
 - 1) property owned by, rented or leased to the Insured, or

Exclusions:- (continued)

- a) 2) except with respect to the use of elevators or escalators or liability assumed under any sidetrack agreement, property in charge of the Insured, or
- 3) any goods or products or containers thereof manufactured, sold, handled, or distributed or premises alienated by the Insured, or work completed by or for the Insured, out of which the occurrence arises; except that for the purpose of this Exclusion (c), the property known as _____ and _____ shall be deemed not to be property owned by or in the charge of the Insured.
- c) To assault committed at the specific instance or direction of the Insured;
- e) As respects Coverage "C", to
 - 1) liability assumed by the Insured under any contract or agreement;
 - 2) injury caused by the wilful violation of a penal statute or ordinance committed by or with the knowledge or consent of any Insured, or
 - 3) acts committed in connection with advertising, broadcasting or telecasting by or in the interest of the Insured.
- f) Under Coverage "A", for any claim or loss for which coverage is or can be afforded under Coverage "C";
- g) To the ownership, maintenance, use or operation, including loading and unloading, of aircraft owned by or registered in the name of the Insured;
- h) To the ownership, maintenance, use or operation, loading or unloading of any registered watercraft or barge having a net tonnage in excess of ten tons;
- i) To the ownership, operation, maintenance or use of any airfield or aircraft landing strip;
- j) As respects any Engineers, Architects, or other Professional Consultants insured by this policy, to any liability arising out of error, neglect or omission committed by any such Insured, or by an employee thereof, in the preparation or approval, of designs, maps, plans and specifications; except that this exclusion shall not apply to Bodily Injury resulting from such error, neglect or omission.

Exclusions:- (continued)

k) To Bodily Injury or Property Damage.

- 1) With respect to which an Insured under this policy is also insured under a contract of nuclear energy liability insurance (whether the Insured is unnamed in such contract and whether or not it is legally enforceable by the Insured) issued by the Nuclear Insurance Association of Canada or any other group or pool of Insurers or would be an Insured under any such policy but for its termination upon exhaustion of its limit of liability; or
- 2) Resulting directly or indirectly from the nuclear energy hazard arising from:
 - a) the ownership, maintenance, operation or use of a nuclear facility by or on behalf of an Insured;
 - b) the furnishing by an Insured of services, materials, parts or equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility; and
 - c) the transportation, consumption, possession, handling, disposal or use of radioactive material sold, handled, used or distributed by an Insured.

As used in this Exclusion (k)

- 1) The term "nuclear energy hazard" means the radioactive, toxic, explosive, or other hazardous properties of radioactive material;
- 2) The term "radioactive material" means uranium, thorium, plutonium, neptunium, their respective derivative and compounds, radioactive isotopes of other elements and any other substances that the Atomic Energy Control Board may, by regulation, designate as being prescribed substance capable of releasing atomic energy, or as being requisite for the production, use, or application of atomic energy;
- 3) The term "nuclear facility" means:
 - i) any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of plutonium, thorium and uranium or any one or more of them;
 - ii) any equipment or device designed or used for
 - a) separating the isotopes of plutonium, thorium and uranium or any one or more of them.

Exclusions:- (continued)

- k) 3) ii) b) processing or utilizing spent fuel, or
c) handling, processing or packaging waste;
- iii) any equipment or device used for the processing, fabricating or alloying of plutonium, thorium and uranium or any one of more of them if at any time the total amount of such material in the custody of the Insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235;
- iv) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste radioactive material; and includes the site on which any of the foregoing is located, together with all operations conducted thereon and all premises used for such operations.
- 4) With respect to property, loss of use of such property shall be deemed to be damage to or destruction of property.
- 1) Only as respects Coverage "B", Property Damage Liability - except in respect of occurrences taking place in the United States of America, its Territories or Possessions, or Canada, to any liability of the Insured directly or indirectly occasioned by, happening through or in consequence of war, invasion, acts of foreign enemies, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation or nationalization or requisition or destruction of or damage to property by or under the order of any government or public or local authority.

C O N D I T I O N S1. Limits of Liability:-

In respect of Coverage "A", or Coverage "B", or Coverage "C", or Coverage "D", or any combination of such coverage, the liability of the Insurer for all damages, including damages for care and loss of services, arising out of Bodily Injury or Death and for all damage because of injury to or destruction of property including the loss of use thereof, shall be limited to the sum of \$ as the result of any one occurrence or accident. There is no limit to the number of occurrences or accidents for which claims may be made hereunder, provided they occur during the currency of this policy, except as hereinafter provided.

In respect of occurrences or accidents arising out of the products hazard, as defined in Condition "B", the liability of the Insurer, subject to the above limit applicable to any one occurrence or accident, shall be limited in the aggregate to \$ for Bodily Injury or Death or Property Damage in respect of all occurrences or accidents taking place in any one policy period.

Conditions:- (continued)

All bodily injuries, or deaths or property damage arising out of one prepared or acquired lot of merchandise or products shall be considered arising out of one occurrence or accident.

2. Definitions:-

- a) "OCCURRENCE", as respects Coverage "B", Property Damage Liability, means either an accident happening during the policy period or a continuous or repeated exposure to conditions resulting during the policy period in injury to or destruction of property which is accidentally caused.

All damage arising out of such exposure to substantially the same general conditions shall be considered as arising out of one occurrence.

- b) the words "PRODUCTS HAZARD", as used in this policy, shall mean:

- 1) the handling or use of or the existence of any condition in goods or products manufactured, sold, handled or distributed by the Insured or by others trading under his name, if the occurrence or accident takes place after possession of such goods or products has been relinquished to others by the Insured or by others trading under his name and if such occurrence or accident takes place away from the premises owned by, rented to or controlled by the Insured, provided, such goods or products shall be deemed to include any container thereof, other than a vehicle, but shall not include any vending machine or any property, other than such contained, rented to or located for the use of others but not sold, and
- 2) operations, if the occurrence or accident takes place after such operations have been completed or abandoned and occurs away from the premises owned by, rented to or controlled by the Insured; provided, operations shall not be deemed incomplete because improperly or defectively performed or because further operations may be required pursuant to an agreement, provided further, the following shall not be deemed to be "operations" within the meaning of this paragraph:
 - i) pick-up or delivery, except from or into a railroad car,
 - ii) the maintenance of vehicles owned or used by or on behalf of the Insured,
 - iii) the existence of tools, uninstalled equipment and abandoned or unused materials.

3. Extension:-

It is agreed that in the event that extension of the term of coverage beyond . . . is required such extension shall be made at "pro-rata" and the twelve (12) months of "Completed Operations" coverage shall then commence from the termination of such extended period.

4. Notice of Occurrence or Accident:-

Written notice of each occurrence or accident shall be given by or on behalf of the Insured to the Insurer or to us soon as practicable after notice thereof has been received by an executive officer of any named Insured. Such notice shall contain particulars sufficient to identify the Insured and also reasonably obtainable information respecting the time, place and circumstances of the occurrence or accident, the name and address of the injured, and of any available witnesses. If claim is made or suit is brought against the Insured, the Insured shall immediately forward to the Insurer every demand, notice, summons or other process received by him or his representatives.

5. Assistance and Co-Operation of the Insured:-

The Insured shall co-operate with the Insurer and, upon the Insurer's request, shall attend hearings and trials and shall assist in effecting settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits, and the Insurer shall reimburse the Insured for any expense, other than loss of earnings, incurred at the Insurer's request. The Insured shall not, except at his own cost, voluntarily make any payment, assume any obligation, or incur any expense other than for such immediate and surgical relief to others as shall be imperative at the time of the injury. Upon the Insurer's request, the Insured shall give to the Insurer a signed statement of facts containing all available information deemed necessary by the Insurer to determine and define its liability and rights under this policy.

6. Action Against Insurer:-

No action shall lie against the Insurer unless, as a condition precedent thereto, the Insured shall have fully complied with all the conditions hereof, nor until the amount of the Insured's obligation to pay shall have been finally determined either by judgment against the Insured, after actual trial or by written agreement of the Insured, the claimant, and the Insurer. Any person or his legal representative who has secured such judgment or written agreement shall thereafter be entitled to recover under the terms of this policy to the extent of the insurance afforded by the policy.

Nothing contained in this policy shall give any person or organization any right to join the Insurer as co-defendant in any action against the Insured to determine the Insured's liability. Bankruptcy or insolvency of the Insured shall not relieve the Insurer of any of its obligations hereunder.

7. Other Insurance:-

It is the intent of this insurance to apply to all claims against any or all of the Insureds as defined in the "Declarations", whether specifically named or not, related to and/or arising out of their operations with respect to the ownership, engineering, construction, completion and occupancy of the project referred to in the said

7. Other Insurance:- (continued)

"Declarations", until such time as this policy expires or has been terminated, whichever first occurs.

The Insurers hereby agree, therefore, that if at the time of accident or occurrence covered by this policy, there is any other valid insurance or indemnity which would attach if this insurance had not been effected, this insurance shall be primary and any such other insurance effected by any one of the named or unnamed insureds covering or applying to claims arising out of all work performed by them anywhere and in which they may be involved during the term of such insurance, including the work performed in connection with the subject matter of this insurance, shall be excess insurance; provided, however, that where any such named or unnamed insured effects valid insurance or indemnity related only to claims arising out of the work performed by them in connection with the subject matter of this insurance, such insurance shall be primary and, if there is more than one such insurance, they shall be contributory and this policy shall apply only as excess.

8. Conflicting Statutes:-

If any condition in this policy conflicts with any specific statutory provision in the Province in which it is claimed that the Insured is liable for any such injuries or loss as are covered by this policy, such specific statutory provision shall be substituted for such condition.

9. Subrogation:-

In the event of any payment under this policy, and to the extent of such payment, the Insurer shall be subrogated to all the Insured's rights of recovery therefor, and the Insured shall execute all papers required and shall do everything that may be necessary to secure such rights, but the Insurer shall have no right of subrogation against any other Insured under any part of this insurance contract, nor against any person, firm, corporation, or other party in respect of whom or which the Insured has assumed liability under any contract or agreement relating to the operations insured hereunder.

10. Changes:-

No notice to any agent or knowledge possessed by any agent or by any other person shall be held to effect a waiver or change in any part of this policy nor stop the Insurer from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part hereof, signed by an authorized representative of the Insurer.

11. Assignment:-

No assignment of interest under this policy shall bind the Insurer until his consent is endorsed hereon. If the Insured shall be adjudged bankrupt or insolvent within the policy period, this policy, unless cancelled, shall cover the Insured's legal representative for the unexpired portion of such period.

12. Cancellation:

This policy can be cancelled at any time by either the Insurer or (subject to no claim(s) being advised) Insured by written notice to the other stating when thereafter cancellation shall be effective. Such notice by the Insurer to the Insured

at
or to any other Insured whose name has been provided to the Insurer, given not less than Sixty (60) days prior to the effective date of cancellation, shall be a sufficient notice. If the Insurer cancels, the earned premium shall be computed "pro-rata" of any flat premium charged hereunder. If the Insured cancels, the earned premium shall be computed in accordance with the customary "short-rate" table and procedure subject to the minimum premium provided herein. The mailing of notice as aforesaid shall be sufficient proof of notice and the insurance under this policy shall end on the effective date and hour of cancellation stated in the notice. Delivery of such written notice, either by the Insured or the Insurer, shall be equivalent to mailing. The Insurer's cheque or the cheque of its representative similarly mailed or delivered shall be a sufficient tender of any refund of premium due to the Insured but no unearned premium shall be payable until the insured has filed with the Insurer a true statement of the total contract costs, as defined hereunder, during the time this policy has been in force, for the adjustable portion of the policy.

13. Declarations:

By the acceptance of this policy the Insured agrees that the statements in the "Declarations" are its agreements and representations, that this policy is issued in reliance upon the truth of such representations, and that this policy embodies all agreements existing between itself and the Insurer or any of its agents relating to this insurance.

14. Premium Computation Clause:

It is understood that the "Full Contract Value", being the value of all insured property (including transportation cost to sites, construction, assembly and installation costs), is estimated at inception of this insurance at \$. The final premium hereon shall, after completion of the project, be adjusted on the final "Full Contract Value" at a rate of \$ cents, per One Hundred Dollars (\$100.00) of such "Full Contract Value", for the period of this insurance; it is further agreed however, that if the Insured confirms that the final "Full Contract Value" was within Five Percent (5%) of the above mentioned amount, such premium adjustment will be waived.

It is also understood and agreed that:

- a) Should the incurred losses, after completion of the project, not exceed Twenty-Five Percent (25%) of the paid premium, the Insured will be allowed a rebate of Ten Percent (10%) of the paid premium;

or,

14. Premium Computation Clause:... (continued)

- b) Should the incurred losses, after completion of the project, be in excess of Twenty-five Percent (25%) but not more than Forty Percent (40%) of the paid premium, then the Insured will be allowed a rebate of Five Percent (5%) of the paid premium.

For the purposes of the above Condition, the term "PAID PREMIUM" shall mean the premium derived from the application of a rate of \$ cents per One Hundred Dollars (\$100.00) to the final "Full Contract Value" of this Project.

15. Deductible: -

Only as respects Coverage "B" (Property Damage Liability) it is hereby agreed that the sum of \$ shall be deducted from the total liability arising from each disaster (meaning one accident or series of accidents arising out of one occurrence) and the Insurer shall be liable for loss or damage only in excess of that amount, subject to the limits of liability stated herein.

IN WITNESS WHEREOF, . . . has caused this policy to be signed by its Manager for Canada, but it shall not be binding upon the Insurer until countersigned by a duly authorized representative of the Insurer.

Countersigned at Montreal.

APPENDIX E

UNDERWRITING INFORMATION REQUIRED IN CONNECTION WITH MACHINERY ERECTION OR CONTRACT WORKS (MACHINERY) INSURANCE.

When dealing with enquiries for this form of cover the following will be a guide to the minimum essential information, according to the nature, size and location of risk, necessary for an accurate appreciation and assessment of the terms and conditions applicable.

A. BASIC COVER

- 1) General description of the installation or machinery to be insured - precise details to be obtained of all major items. Any plans which might be helpful to be provided (these will usually be necessary for assessment of the M.P.L. and an indication of acceptance levels).
- 2) Is the installation or machinery new or secondhand? If secondhand, what is its age and has it been re-conditioned since last in use and, if so, by whom? If partly new and partly secondhand, distinguish briefly between each and indicate what proportion of the total value does the new or secondhand part represent.
- 3) What is the estimated contract price - this is usually the sum insured.

N.B. When the contract price is taken as the sum insured it is usually assumed to cover the value of all machinery and materials used in the construction or work of installation, wages and services etc. all freight to site and the cost of erection and testing - if this is not the case, then the position is to be made clear and an estimate of the additional amounts involved and not included in the contract price must be obtained.

- 4) Whose interest is to be insured, the contractor(s), manufacturer(n), the purchaser or eventual owner, or the consulting engineer? Names of all "Insured" are to be given and the precise interest specified in each case.
- 5) The experience of the contractor(s) and manufacturer(s) with contracts of the nature and magnitude of the contract to be insured.
- 6) Who will actually carry out the construction, installation or erection and who will be supervising the work?
- 7) What sub-contractor(s) interests are to be insured? Names and nature of work to be carried out by main sub-contractors to be provided.
- 8) Location at which the work is to be carried out (ensure that the location can be fixed with reasonable accuracy in relation to well-known geographical features). Will the work be carried out on a virgin site, in new unoccupied premises or in premises already occupied and in which business is being carried out.
- 9) What is the nature of the terrain of the site itself and the nature of the surrounding terrain (nature of sub-soil, what is the altitude above sea-level, is the site or the surroundings flat, mountainous, swampy, rocky, sandy, in a valley, on a high plateau, easy or difficult of access etc.) Investigate exposure of site to storms, flooding, subsidence, avalanche, earthquake etc. and, if exposure exists, ascertain what measures are being taken to reduce such risks to a minimum.

N.B. Higher excesses are usually applied for damage due to storm, flood, subsidence, avalanche, earthquake, strike, riot and civil commotion (which is only covered within the limitations of the new F.O.C. wordings) and weakening or removal of supports (in the range of £250. to £1,000 or more).

- 10) Will the work involve any blasting, piling, thrust-boring, tunnelling, shaft-sinking or similar operations - if so, give the reasons and indicate the extent of these operations.
- 11) Will the work necessitate any large-scale manufacture or fabrication on site - if so, ascertain details.
- 12) What is the estimated period from the arrival of the first materials on site to the completion of handing over. Will the installation be taken over in parts - if so, give details and how this will affect the maintenance period.
- 13) What are the provisions of the contract, and the Insured's requirements, relative to testing and commissioning - nature and duration etc.
- 14) Who will test and commission and who will supervise?
- 15) What are the provisions of the contract, and the Insured's requirements, relative to "maintenance" after handover - quote text of relevant clauses of contract, indicating extent of obligation and duration.
- N.B. 1) The actual text is essential if the widest coverage available and necessary is to be given.
- N.B. 2) Normal maintenance cover does not provide indemnity to the purchaser and the like during the maintenance period.
- 16) What guarantees are given by manufacturers (not being "Insured") of machinery etc. as to their products' design, workmanship and the materials used - extent, duration and when do such guarantees commence.
- 17) A "progress plan" must be supplied, giving the anticipated build-up of values on site, the phasing of the work (erection, testing, commissioning and hand-over).
- N.B. Assumptions of an even build-up are often grossly inaccurate and can result in too high or low a rate being put forward.
- 18) A completed site layout plan should also be provided to enable a reasonably accurate assessment of the maximum probable loss to be made.

B. EXTENSIONS OF COVER.

I. Constructional Plant and Equipment:

NOTE: Under Contract Works Insurances, "plant and equipment" used for the construction, installation and/or erection is not covered against its own mechanical or electrical breakdown or explosion. If such cover is required, then full details of each item are to be supplied (to include a full description, maker's name and country of origin, age and new replacement value) and a separate policy will be necessary.

- 19) The maximum total value of such plant and equipment on site at any one time, the average value on site throughout the duration of the construction period and the values of the larger or most expensive items of plant.
- 20) If the plant and equipment to be used includes any waterborne items, or any items not usually associated with contracts of this nature, obtain details.

II. Temporary Hutments and Caravans used as offices, living or sleeping quarters and the like.

- 21) Indicate total value and if caravans, the total number, value of largest and obtain confirmation that during the period of contract they will be used only on the contract site - otherwise they must be insured under a motor policy.

III. Employees' Personal Effects:

- 22) Number of employees involved.

- 23) Indemnity limit required per employee.

N.B. This section incorporates a small excess (minimum £5.) per employee and per loss.

IV. Transit (by road, rail or inland waterway only)

- 24) What is the total value and give a brief description of the materials to be insured in transit.

- 25) From where are the materials to be transported and by what route?

- 26) If the materials are coming from abroad and are being taken from a ship or another carrier at a frontier for example, what check is made of quantity and condition before onward transmission under the protection of this insurance.

- 27) By what means is the material to be transported.

- 28) Are any special measures or precautions necessary or envisaged during such transport whether by reason of the weight, dimensions and/or nature of the loads, or the condition of the conveyances, roads, bridges, etc. or otherwise. If so, give full details.

- 29) Are any trans-shipments or changes of method of conveyance envisaged en route or any temporary storage before arrival at site? If so, give details.

V. Third Party Liability:

- 30) Limit of liability required for any one accident.

- 31) Estimated total cost of salaries and wages for the contract.

- 32) Are cross liabilities between "Insured" to be covered?

- 33) Who will be working on the site other than employees of the Insured?

- 34) What access, if any, will the general public have to the site, whether by "right of way" or otherwise?

- 35) What is the nature of the public or private property immediately adjacent to the site - and referring back to Question 10) if any of these operations are carried on, how far from such operations will the nearest or most vulnerable of any buildings on adjacent property be?

- 36) Do any public services, or roads, railways or canals cross the site or does the "line of construction" (as in the case of pipelines, electrification systems etc.) cross, whether through, under or over, any public services, roads, railways etc. or other third party property? If so, give details and indicate whether the Insured is, under the contract, indemnified against liability for damage thereto.

- 37) Where the work is to be carried out in existing premises or as an extension to existing premises, if the other property or persons employed therein are, for the purposes of the insurance, to be considered as third parties and third party property - full details and an appreciation of the risk, supplemented with drawings or plans, must be submitted.
- 38) Obtain details of any contractual liability to be accepted by the Insured, for injury to persons or damage to property, which would not devolve on the Insured but for these contractual obligations.
- 39) Where new installations are being connected to existing plant or utilities, what liability devolves on the "Insured" arising from any damage they may cause to such existing installations or utilities systems.

APPENDIX F

UNDERWRITING INFORMATION SAMPLE QUESTIONNAIRE

Additional Questionnaire for the
Construction of Dams No.

1. Title of contract

2. Site

exposure to landslide rock fall subsidence
 avalanche earthquake

distance to nearest downstream settlement

type of settlement (farm, village, etc.)

to what extent might this settlement be destroyed in case of a dam failure?

3. Breakdown of values

Item	Value (currency)
diversion works (cofferdam, tunnels, etc.)	
dam	
spillway	
stilling basin	
discharge tunnel	
intake tower	
power house	
substation	
Total value	

4. Type of dam

earth dam with a core of impervious earth concrete
 rock-filled dam with watertight skin of bitumen concrete
 other (if so, specify)

 gravity dam slab-and-butress dam multi-arch-butress dam
 solid-head-butress dam cellular and hollow gravity dam
 arch dam dam of combined design (if so, specify)

Technical data	length	m	height	m	base width	m
	top width	m	upstream slope 1:		downstream slope 1:	
spillway	<input type="checkbox"/> in the middle of an earth dam		<input type="checkbox"/> cut in rock adjacent to dam		<input type="checkbox"/> a shaft spillway	
power plant	<input type="checkbox"/> underground		<input type="checkbox"/> adjacent to dam		<input type="checkbox"/> distant from dam	
	if so, distance		km			
Foundation	<input type="checkbox"/> on loose material lying on top of solid rock		<input type="checkbox"/> with grout curtain (if so, specify)			
	<input type="checkbox"/> on solid rock; type of rock					
	depth of rock below surface		m			
	<input type="checkbox"/> blasting work necessary (if so, specify where)					
subsoil	please furnish diagram of strata indicating					
ground layers	type					
	thickness					
ground water	inclinations relative to		a) horizon	b) dam		
	level below grade		m	<input type="checkbox"/> dewatering required		
water	quantities of water to be removed		m ³ /s			
	number of pumps to be used		number of stand-by pumps			
	total capacity of pumps		m ³ /h			
	pumps are driven		<input type="checkbox"/> electrically		<input type="checkbox"/> by combustion engines	
	electric power supply		<input type="checkbox"/> off the main		<input type="checkbox"/> by own generator(s)	
	water course	name				
<input type="checkbox"/> spring		<input type="checkbox"/> river		<input type="checkbox"/> seasonal flow		
water level	observation period		years	months		
	normal in dry season		m	normal flood		m
	highest ever recorded		m	date		
water rates	observation period		years	months		
	normal in dry season		m ³ /s			
	normal flood		m ³ /s			
	highest ever recorded		m ³ /s	date		
protection from flood damage	<input type="checkbox"/> coffer dam		height above normal flood level		m	
	<input type="checkbox"/> diversion channel capacity		m ³ /s			

	<input type="checkbox"/> sheet piles	<input type="checkbox"/> timber piles	to protect excavation
	lateral support of piles	<input type="checkbox"/> yes	<input type="checkbox"/> no
	is risk of flooding reduced by upstream dams?	<input type="checkbox"/> yes	<input type="checkbox"/> no
	details		
	is there a flood warning system?	<input type="checkbox"/> yes	<input type="checkbox"/> no
	time lapse between warning and time when flood reaches site	hours	
9. Construction schedule	component	anticipated period of work months	
	diversion works		
	dam		
	spillway		
	stilling basin		
	discharge tunnel		
	intake tower		
	power house		
	substation		
10. To what extent might the contract works be destroyed in one loss event?	_____		

11. What work will be executed by subcontractors?	_____		

12. Which contractors will work independently of the insured at the site or in its immediate vicinity?	_____		

<p>1) Where are the barracks, construction plant and equipment, stores, work-shops, etc. located? Give details</p>	
<p>2) To what extent will these facilities be protected against flood? Give details.</p>	

APPENDIX G

EXTRACTS FROM REFERENCE 19

EXECUTIVE SUMMARY

A QUANTITATIVE METHOD FOR ANALYZING THE ALLOCATION OF RISK IN TRANSPORTATION CONSTRUCTION

In September 1977, M.I.T.'s Department of Civil Engineering was awarded a contract by the U.S. Department of Transportation, Transportation Systems Center, to develop a conceptual model of risks in transportation construction. This conceptual model should incorporate the interaction of risks with one another, and should be capable of quantifying the impact on owner's total cost of allocating these risks in different ways among a project's participants. In addition, the contract called for a pilot test of the model with a sample category of risk on an actual transportation project.

A conceptual model of risk allocation was successfully developed by the research team, and was verified by the technical advisory board for the project in early December 1977. The model was subsequently field tested using the owner and a contractor on the new Baltimore mass transit project as subjects, and analyzing the owner's decision of how to purchase insurance for the construction of the system. The technique and the results of the pilot test will be briefly described in the following paragraphs.

The conceptual model is based upon Decision Analysis techniques, with a significant extension of the standard Decision Analysis procedure used by many analysts. The standard Decision Analysis model creates a decision tree with "chance nodes" and "decision nodes" to disaggregate the variables that impact a single decision-maker in a decision situation. The tree is then used to determine the decision (or sequence of decisions) that maximizes the expected value of the decision maker. In the case of a risk-averse decision-maker, the analyst measures his risk preference ("utility") and maximizes expected utility rather than expected value. The model used in this study adopts the basic tenets of Decision Analysis—subjective probability, value of information, risk-aversion, and the same set of axioms—but develops the model as a two-party, interactive decision process, where risk share is traded for contract price. In addition, considerable use is made of graphic presentations of each risk submodel in the form of "Interaction Diagrams" (circles and arrows) to illustrate the relationships between risks and to verify the submodel with each decision maker.

These changes permit the model to capture two important aspects of the problem not considered in a standard Decision Analysis approach:

- Differences between the contractor's and owner's perception of a given category of risk could be identified and exploited to the owner's advantage in the allocation of risk.

- The value of risk as an incentive for performance could be explicitly considered.

To recapitulate, the conceptual model contains decision analysis submodels for each party. These submodels incorporate the notion of risk as an incentive for performance, and are illustrated and verified through Interaction Diagrams. The submodels interact as follows: (1) An owner determines a particular allocation of risk through contract clauses and other decisions. (2) A contractor responds to the risk share he must accept by pricing the risk into his bid. (3) The sensitivity of the contractor's bid price to different risk allocations can be tested by the model. (4) An owner can then decide how much risk he (the owner) will accept in exchange for a lower bid price.

- The model was tested on the owner decision (actually a sequence of decisions) relating to the purchase of insurance for the construction of a hypothetical urban mass transit project. The owner of Baltimore's MTA project and a contractor currently working on that project were the subjects for our test. All of the mass transit systems recently built in the U.S. have been insured under owner coordinated or "wrap-up" programs. Three major categories of insurance are involved: Workers' Compensation, General Liability and Builder's Risk. To date these have all been included in the owners' wrap-up coverage. After disaggregating these risks, our analysis indicated an alternative arrangement; by excluding builder's risk from the wrap-up package, and by accepting more risk (in the form of higher deductibles) the owner could lower his expected cost—including the expected payout of deductibles—by some 20% of total insurance cost, or 1% of total project cost!

It should be noted that whereas our example risk category involved insurance, the technique is broadly applicable to all categories of construction risk. We intend, in the future, to use this model to analyze the allocation of such risks as site geological uncertainty, where the model's "value of information" capability can be used. In the case of site geological risks, the model will yield the amount of site investigation that should be conducted by an owner before soliciting bids, to minimize his total cost.

In addition, future research should look at incorporating the designer as a third party to the process, and at formalizing the models that are developed into a large matrix model which can be computerized. Repetitive use of such a model may make it possible to apply classical statistical analysis methods and human behavior models to identify "typical" decision-makers whose perceptions could be substituted for subjective assessments. Thereby the amount of input information required could be limited to assessments of only those variables to which the final output of the model was extremely sensitive. Such a "standardized" model would not require a detailed analysis for each problem investigated, and would thus save substantial time and money.

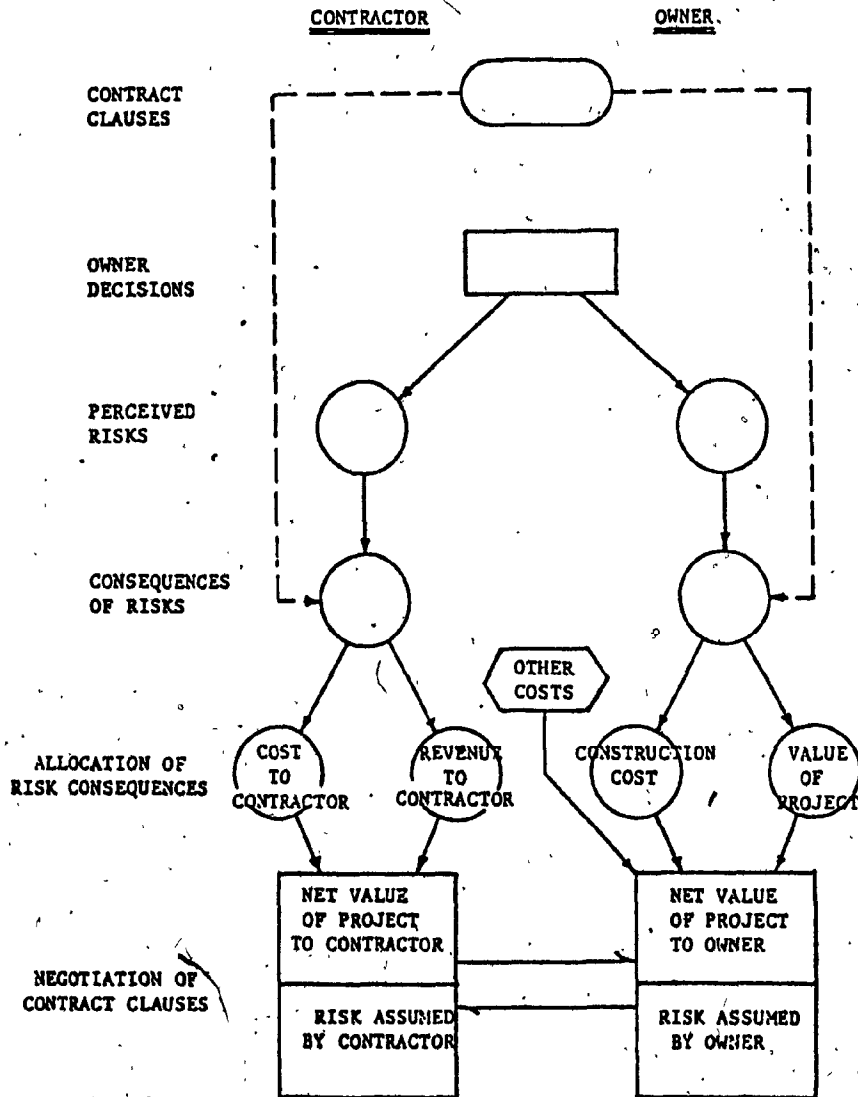


FIGURE 3-2 CONCEPTUAL MODEL OF RISK

