



# NEBOSH International Diploma in Occupational Health & Safety

## UNIT IA

### INTERNATIONAL MANAGEMENT OF HEALTH AND SAFETY

#### ELEMENT IA5: RISK CONTROL

#### SAMPLE MATERIAL

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## Common Risk Management Strategies

### Key Information

The key risk management strategies are:

- Avoidance or elimination.
- Reduction.
- Transfer.
- Retention with/without knowledge.

### Concepts Within a Health and Safety Management Programme

**Risk management** may be defined as:

*The identification, measurement and economic control of the risks which threaten the assets or earnings of a company or enterprise.*

**Risk control** can be split into **loss control** and **risk financing**.

- Loss control:
  - Risk avoidance.
  - Risk reduction.
- Risk financing:
  - Risk retention.
  - Risk transfer.

A strategy may consist of one or a combination of these methods.

#### Avoidance or Elimination

- **Risk avoidance** is avoiding completely all activities giving rise to risk. For example, never travel by air to avoid the risk of being involved in a mid-air collision.
- **Risk elimination** usually has a wider meaning; it implies removal of a risk **without necessarily ceasing** an activity completely, e.g. redesign of a process to remove a particular risk without stopping the activity.

Risk avoidance or risk elimination is the best solution to the problem of risk. In some cases we will have estimated the risk of some particular operation to involve the possibility of a fatality or serious personal injury. This suggests that avoidance or elimination is an essential requirement. In eliminating one risk you could inadvertently introduce other risks. For example, in automating a process by introducing robots to eliminate the risk of manual handling, you will introduce some of the risks associated with robots. Some hazards can be avoided by completing a task in a slightly different

way. For example, providing a chair for a supermarket checkout person (rather than expecting them to stand) can reduce hazards associated with physical fatigue.



#### Reduction

Often avoidance or elimination may not be possible or reasonably practicable or even desirable (if, for example, it would involve closing a factory with the loss of all jobs and the high associated cost of redundancy). Risk reduction, while not as effective, might be a more economically viable solution.



## Risk Retention



### Jargon Buster

#### Risk reduction

This is where risk is not avoided or eliminated entirely, but attempts are made to reduce the frequency and/or severity of a potential loss by use of typical safety control techniques such as engineering solutions to control risk at source, procedures and behavioural measures (training, etc.).

Here the loss is to be financed from funds within the organisation, so we have to consider where the funds are to come from.

#### Sources of Funds

Possible sources are:

- Pay losses from current operating funds. Payments should be restricted to a maximum of about 5% of the operating costs. Losses must be predictable.
- Use an unfunded reserve, such as depreciation. This is where some large item of capital expenditure is written off over a number of years. The problem is that the fund does not actually exist except as an accounting convenience. There is no tax advantage and no actual ready cash.
- Use a funded reserve, e.g. a fund of cash or easily obtained cash. It could be a group fund. There is no tax advantage. It takes time to build up such a reserve, so care is required in the early years. There is low interest on capital. If you wish to obtain a good rate of interest, you will have to give notice before you can withdraw funds. The fund needs to gain interest, but should be readily available when required.
- Insuring through a captive insurer (see later).
- Borrowing to restore losses, which is not easy after a loss occurs. For example, if you had just had a large fire at the factory, the bank would be reluctant to lend and would make a lot of expensive conditions.
- Divert funds from planned capital investment; the company then uses funds set aside to buy an important capital item because there is a loss which has to be paid for.

If you consider each of these options you will realise that there is no readily available, inexpensive source of finance to pay for any loss. On the other hand, there are some good reasons for considering risk retention.

#### Advantages of Risk Retention

- The full sum of insurance premiums is never paid out, so risk retention can be cheaper than insurance. The insurance company has to make a profit both for future finance and for its shareholders. A millionaire does not take out maximum insurance for his car; if it is damaged, he just buys another one. The good car driver or employer pays through his premiums, for the poor driver or employer. Insurance is profitable for poor risk managers but not for good risk managers.
- Retention reduces the cost both of processing claims and the detailed accounting required. The loss occurs and you just pay out.
- If costs are allocated to departments, management becomes more risk conscious. This is a vital feature in risk management; it is pointless for a departmental manager to go all out for production profit and then have to use his or her profits to pay for accidents and losses.
- Losses are dealt with quickly.

You should think about each advantage and see whether it applies to your organisation.

#### Risk Retention - With or Without Knowledge

**With knowledge** means you have made a conscious decision to bear the burden of losses; **without knowledge** means it is done without any consideration whether or not to insure.

Every risk which is not transferred (to insurance) is a retained risk. Examples are:

- **Events which are insurable.** You cannot get insurance for everything. The insurance company has to be able to assess risk since they are in the business of risk management. They may quote a premium which is above the value you wish to insure. If you can buy a new item for the price of the premium, it is pointless to insure. Take the risk instead.
- **Losses not considered when setting up insurance** - if you do not take into account a particular possibility, you are retaining the loss. It is a case of accidental risk retention, or risk retention by default.
- **Hazards deliberately not insured** - risk management is all about taking a risk, where you have been able to reduce either the probability or the severity of a loss-making event.
- **Losses outside the scope of the insurance** - there are always exclusion clauses, and you do not realise their significance until you need to make a claim. The good risk manager does not find himself or herself in such a situation.



- **The part of the loss paid by the company (the excess)** - you can get cheaper insurance if you agree to pay the first £x of any claim.
- **The part of the loss which is above the limits of the contract** - there is often an upper limit to an insurance claim. The claimant pays if the loss exceeds that figure.
- **The person or company is unable to pay full compensation** - obtaining the cheapest insurance cover may not be sound economy if your losses put them into bankruptcy.

### Risk Transfer

Transfer involves transferring the risk to another party such as by insurance - the loss is financed from funds which originate outside the organisation. The second main way is to engage a contractor who will take on the risks.

### Insurance

How can you reduce insurance premiums? One way is to retain losses; another way is to accept a voluntary excess on insurance premiums and control losses.

Advantages of insurance are that:

- The loss will be dealt with smoothly. There will be a few forms to fill in and enquiries, but the procedures are well known.
- The cash is available. The insurer can get hold of the funds quickly, though will perhaps not release them as quickly as you would like.
- The insurer can provide advice. He is dealing with this type of problem all the time and can help you to decide what is best.

### Use of Specialist Contractors

Sometimes the best way of avoiding a hazard is to make use of specialist contractors, e.g. for the removal of asbestos. In this way the hazard is avoided by workers and the task is carried out professionally and in compliance with current legislation. A reputable company with suitably trained personnel and a good safety record should be used.

### Risk Sharing

Risk management is really a type of risk sharing and involves financing risks which are manageable and transferring those which are not.

Methods include:

- Reductible portion of excess - you pay the first part of each claim.
- Re-insurance.
- Co-insurance - the insurer pays a percentage of the claim. This is another way of reducing a premium.

You share the risk with the insurer by paying not only an excess but a percentage of the losses which fall within a certain price range; paying another percentage of those in another range; and the insurer paying all losses above a set figure.

### An Important Point

A good risk manager will make his greatest savings in the area of insurance by:

- Not insuring where the risk has been eliminated.
- Considering very carefully those areas where the risk has significantly been reduced.
- Paying for the retained risk where it is cheaper than insuring.

### Selection of Optimum Solution Based on Relevant Risk Data

The selection of the optimum solution must take into account the type of organisation and the relevant risk data. The risk assessment will be a vital part of the exercise. If the probability is high and the severity is also high, then it will be important to do a great deal and spend a lot of finance to achieve a valid solution. If the probability or the severity is low, then it will not warrant too great an expenditure.



## Element IA5: Risk Control

Study the following table carefully:

Probability	Severity	Action
Definite	High	Eliminate
	Medium	Fund (cheaper than insurance)
	Low	No action - operating expense
High	High	Eliminate or reduce probability or severity
	Medium	Reduce severity
	Low	Retain as an operating expense
Medium	High	Reduce severity
	Medium	Reduce severity or transfer
	Low	Retain as an operating expense
Low	High	Fund or insure
	Medium	Fund
	Low	Retain as an operating expense
Remote	Catastrophic	Insure, or fold company
	High	Retain, insure or fold company
	Medium	Fund or retain as an expense
	Low	No action

*Relationship Between Probability and Severity*

Other important factors include:

- **Present State of Technology**

With technology improving all the time new solutions become available; as computers have improved, the price of this technology has reduced. The safety practitioner must keep up to date with technology and consider how it could help the safety solutions.

- **Public Expectancy**

After a disaster a journalist often asks: "Can you guarantee that nothing like this will ever happen again?" Remember that human beings make mistakes, and no machine is infallible. Earthquakes occur without warning, and we can do little to control the effects of freak weather.

A major problem is that the general public is never realistic in assessing relative risk. Car accidents cause more deaths than public transport, but seldom hit the national headlines. Atomic energy is probably one of the safest power sources. Most deaths are from cancer, heart disease and stroke, and very few are from industrial causes. Most people would make a poor job of rating industries by their accident potential.

- **Legal Requirements**

'Legal' is a way of describing how safety legislation has developed over the years. Industrial accidents and disasters were the basic reason for the introduction of much of the existing

safety legislation. Mines and factories were the cause of many fatalities while industry was developing, so legislation was enacted to control them. Now legislation tends to be more proactive, setting broad standards that have to be adhered to in order to control risk, rather than reactively responding to specific incidents.

- **Economic State of the Company**

The economic state of the company is no excuse for not meeting legal standards - it can be used as a reason for not going for a higher standard. It is not good economic sense to skimp on safety, since all accidents produce a loss. However, a company with vast profits can afford to spend more than one with financial restraints. Companies' economic goals will influence the approach to risk control. These may range from simple cost covering to survive, to profit maximisation. Risk management must balance the cost of controls against the estimated reduction in potential loss from risks.

- **Levels of Insurance Premiums**

Premiums are set by the level of claims. The insurance company is in business to make a profit. Good companies pay their premiums and do not make claims; it is the bad companies who benefit from insurance. If the premiums are reasonable then it is better to take the precaution of insurance. However, if premiums become excessive then it will be better to retain the risk.



- **Confidence of the Company in the Benefits of Risk Management and in the Competence of the Risk Manager**

A good company, with good control of risk, will opt to retain risk rather than insure or transfer the risk. As the situation and the confidence improve, there will be increased movement towards this method of solution. If the company is able to use a captive insurance company, there will be less reliance on outside risk transfer.

- **Human Factors**

Accidents and incidents have an associated direct cost but can also influence the culture of the organisation. Frequent loss-making events can have a bad effect on morale, which can lead to a reduction in efficiency and higher overall costs. Consequently, a wish to improve industrial relationships can influence the approach to risk control measures.



### Revision Questions

1. What are the main risk management strategies?

(Suggested Answers are at the end of Unit IA.)



### Factors to be Taken Into Account When Selecting Risk Controls

#### Key Information

- The following are well recognised general principles of risk prevention:
  - Avoid risks.
  - Evaluate.
  - Combat at source.
  - Adapt work to the individual - ergonomics.
  - Adapt to technical progress.
- Control measures may be classified as being technical, procedural or behavioural.
- The choice of control measures adopted should take account of:
  - Use in the long or short term.
  - Applicability.
  - Practicability.
  - Cost.
  - Effectiveness.
  - Legal requirements.
  - Competence/training needs.
- Cost-benefit analysis is a useful tool to aid the decision-making process.

#### General Principles of Prevention

Having identified the risks, measured their effect upon the company and developed some kind of priority, we then have to do something about them. In practice, we are probably doing each of these stages at the same time:

- Recognise.
- Measure.
- Evaluate.
- Control.
- Monitor.
- Review.





## Topic Focus

### Preventive and Protective Measures

There are some well recognised general principles of prevention:

- **Avoiding risks.**  
Not using the material (e.g. toxic chemicals) or carrying out the activity (e.g. excavations) eliminates the need for control.
- **Evaluating the risks which cannot be avoided.**  
Risk evaluation is an essential part of the risk assessment process. It is where the level of risk is compared against agreed risk criteria. This helps you decide on the most appropriate risk control options.
- **Combating the risks at source.**  
Control the risk as close to the point of generation as possible to prevent its escape into the workplace (e.g. extract dust directly from a circular saw blade using LEV).
- **Adapting the work to the individual,** especially as regards the design of workplaces, the choice of work equipment and the choice of working and production methods, with a view to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health. (Terri – I'm hopeless and can't work out how to change this font!!)  
  
The traditional approach has always been for the person to adapt to the machine or process. This measure requires the employer to carefully consider ergonomic principles and design the work to suit the person.
- **Adapting to technical progress.**  
Many risks disappear from the workplace as better processes and methods are introduced. For example, the replacement of traditional machine tools by CNC (Computer Numerical Control) machines, primarily for production efficiency, also removes the need for manually adjusted guards on lathes and milling machines.
- **Replacing the dangerous with the non-dangerous or the less dangerous.**  
This is always a key aim, and an example of this is the replacement of the metal-cased, hand-held mains electric drill by rechargeable, battery-operated, plastic-cased drills.
- **Developing a coherent overall preventive policy** which covers technology, organisation of work, working conditions, social relationships and the influence of factors relating to the working environment.  
  
This embodies the principles of risk management and requires the employer to look at all aspects of the health and safety management system rather than simply concentrating on basic workplace precautions.
- **Giving collective protective measures priority over individual protective measures.**  
A safe place of work should be the main priority rather than a safe person, so control of noise at source should be the aim rather than the use of hearing protection.
- **Giving appropriate instructions to workers.**





## Element IA5: Risk Control

### Categories of Control Measures

Control measures are often categorised into one of three different types.

- **Technical** - the hazard is controlled or eliminated by designing a new machine or process, or by producing some guarding measure.
- **Procedural** - such as a safe method of work, e.g. introducing permit-to-work systems as part of a safe system of work.
- **Behavioural** - will involve education and training of operatives, putting up notices and signs, using protective equipment and generally making workers aware of the risks - changing the 'safety culture' of the organisation.

### General Hierarchy of Control Measures

In dealing with risks, we must establish an order of treatment. A quick Internet search will make you realise that there are a number of different hierarchies, many of which are very similar; some are specific to control of chemicals or machinery guarding. One such order of treatment is:



### Topic Focus

#### Hierarchy of Control Measures

One hierarchy of control measures (different from that in *Management of Occupational Health Risks in the Offshore Oil and Gas Industry*) is:

- **Elimination**  
Stop using the process, substance or equipment, or use it in a different form.
- **Substitution**  
Replace a toxic chemical with one that is not dangerous or less dangerous. Use less noisy pumps.
- **Engineering Controls**  
Redesign of the process or equipment to eliminate the release of the hazard so that exposure is protected; enclosure or isolation of the process or use of equipment to capture the hazard at source and release it to a safe place, or dilution to minimise concentration of the hazard, e.g. acoustic enclosures, use of LEV.
- **Administrative Controls**  
Design work procedures and work systems to limit exposure, e.g. limit work periods in hot environments, develop good housekeeping procedures. Controls may also include: use of signs, training in specific work methods, and supervision.
- **PPE (as a last resort)**  
Respiratory protective equipment, gloves, etc. - only protects the individual.





The items at the beginning of the list are often long-term objectives and are the responsibility of management. They are the most effective, but more costly to implement. The items towards the bottom of the list can be short term and quickly put into place, but are the least effective. It may be impossible or prohibitively expensive to eliminate a hazard in a practical situation. On the other hand, you will get very few marks in the examination if your solution to a practical situation is to issue a pair of gloves, or just suggest that a worker takes more care.

Another example of a hierarchy that is sometimes quoted is:

- Total elimination or avoidance of the risk at its source.
- Reduction of the risk at its source.
- Contain the risk by enclosure of some kind.
- Remove the worker from the risk.
- Reduce the worker's exposure to the risk.
- Use personal protective equipment.
- Train the worker in safe techniques.
- Make safety rules, or issue instructions.
- Tell the worker to be careful.

## Factors Affecting Choice of Control Measures

### Long Term/Short Term, Applicability and Costs

Those points which appear earlier in the list of control measures will be the most effective in reducing the risk, but are usually the more expensive and take much longer to put in place, so can be viewed as **long-term objectives**. Although, in practice, it might be technically possible to achieve total elimination of a hazard, the **costs involved** and the benefits achieved may mean that it does not pass the test of "**reasonably practicable**".

Many of the improvements in safety standards have been due to the reduction in manpower and increasing mechanisation. Computers can be used to control many operations and eliminate the use of people in risky situations. However, they cannot think, and sometimes the choice is not between right and wrong (1 and 0 to a computer) but between the lesser of two wrongs.

The methods shown lower in the list of control measures are usually the cheaper options. They can be put into operation quickly, and give some measure of risk reduction, but **their effect is of short duration**. PPE, although near the bottom of the hierarchy, may be appropriate for non-frequent exposure such as in maintenance tasks.

### Effectiveness of Controls

No one control measure can be 100% effective so when evaluating which measure to adopt you have to take into account its effectiveness. PPE is a limited benefit because it only protects the person wearing it and not necessarily all those at risk. It may be uncomfortable or inconvenient to wear. The more effective the control, the greater consideration should be given to its use.

### Legal Requirements and Standards

In some circumstances legislation specifies the controls needed for a particular hazard. In these situations any selected control measure will have to meet these standards as a minimum.

### Competence of Personnel and Training Needs

Clearly the control measures adopted for a specific situation must be such that the user is competent to use them without them creating a risk to the worker concerned or others. This may mean additional training or supervision which are an added cost.



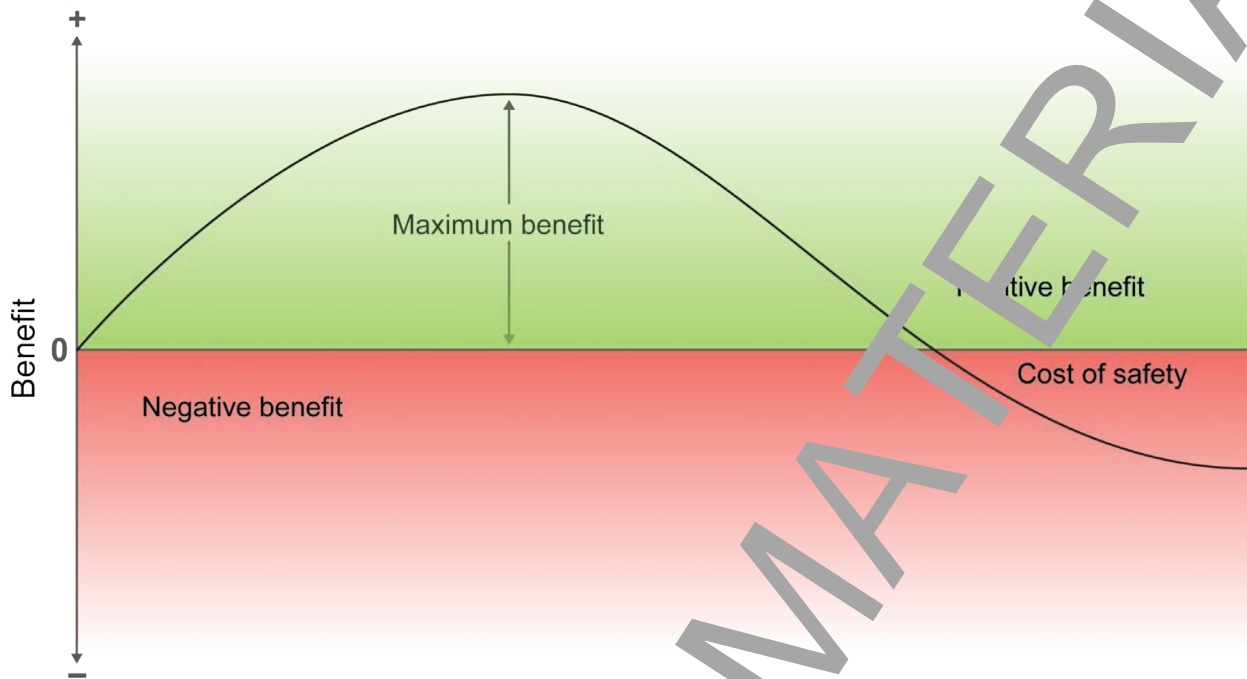
### Cost-Benefit Analysis

There are costs involved with all accidents and losses. There will also be costs involved with accident prevention and risk reduction, in addition to the obvious benefits of such measures. It is possible to spend more on risk treatment than we save by the reduction of the losses. This is why part of risk management is the idea of risk retention.



## Element IA5: Risk Control

The cost-benefit graph is illustrated below.



Cost-Benefit Graph

This graph shows the position where there is maximum benefit.

Cost-benefit analysis is a conceptually simple tool for helping you make a decision as to whether a particular course of action or project is in fact viable or cost effective. So, if you are thinking about upgrading risk control measures, you will probably need to justify the request for funding with the aid of a cost-benefit analysis. In its simplest form, it is an entirely economic argument (rather than a moral or legal one). It is an essential, persuasive tool for the safety practitioner because not only is it systematic and simple, but it is also commonly used and understood by business people. For this reason, using the UK as an example, many proposed new regulations are almost always accompanied by a regulatory impact assessment, which contains a cost-benefit analysis to assess the financial impact of the proposals on UK businesses. In the case of regulatory impact assessments, costs may outweigh the benefits for certain industries but, if the proposals become law, the requirements will still have to be implemented.

In principle, you simply add up all the benefits associated with a programme and then subtract all the costs. In practice, there are a number of complications:

- **Not all costs and benefits can be assigned a reasonably accurate financial value.**

Though we know that intangible concepts such as 'reputation', 'public/shareholder perception', 'worker morale', and 'worker co-operation and involvement' may have an impact on efficiency, productivity, shareholder investment and sales, their

value cannot be fully quantified financially - though it may be possible to suggest an estimate.

- **Benefits may not be seen immediately.**

It may take several years to achieve sufficient benefits to 'break even'. This is known as a payback period. This includes the benefits of reduction in civil liability claims and reductions (or no trend of further rises) in employers' liability insurance premiums.

- **Some costs and benefits are one-off, others are recurring.**

For example, if your project required the purchase of a new piece of machinery, there is the initial one-off cost of the machine itself, installation, commissioning and any specific training. There are also the annual on-going running costs such as energy, maintenance, testing, etc. For 'software' projects, such as implementing a safety management system or a behavioural safety programme, you may need to hire extra staff to manage and administer the system, as well as incur costs associated with annual external audits/recertifications.

We have already looked at some typical sources of costs in relation to health and safety accidents. Benefits can be along similar lines (removing a current source of cost is, of course, a future saving, i.e. a benefit of implementing a risk control measure).



There is obviously a cost implication from controlling any kind of risk. **Costs from implementing safety improvement measures** (some of which may have on-going as well as one-off costs) can arise from the following areas:

- **Organisational**  
These are the costs of any new personnel (salary and training) or perhaps making greater use of an existing resource required to implement and maintain risk control measures. There will also be costs associated with disruption to normal working (temporary staff to cover workers being trained or overtime).
- **Design**  
Reduction of accidents will involve engineering aspects, such as the purchase, fabrication and installation of safety devices, other equipment and any associated software. Safety systems need to be designed and programmes for recording and costing losses will have to be tried out. Costs may also arise from lost production and sales, perhaps due to plant shut-down while equipment is being installed.
- **Planning**  
New safe methods of work, post-to-work schemes and factory layouts could be considered here.
- **Operational**  
Consideration must be given to the costs of running and maintaining safety systems (maintaining guards, interlocks and software (support licence renewals), providing PPE as well as carrying out sampling and testing.

**Benefits** may arise from issues such as:

- Projected reduction in accidents, with associated savings from less time off and fewer investigations, etc.
- Projected reduction in civil claims.
- Projected reduction in insurance premiums (or bucking the trend of increases due to repeated claims).
- Increased productivity (i.e. reduce cost per unit). This may seem difficult to quantify. However, think about how much time might be saved and translate this to man-hours. This will give an indication of how much time, and therefore money, may be saved.

You must be prepared to provide and justify estimates of the benefits that you perceive. You will need to analyse your annual accident statistics and consult with your human resources, legal and finance departments to arrive at estimates for some of these benefits.

Generally, you should try to stick to costs and benefits for which you can provide plausible estimates. The more intangible elements for which no financial estimate can be agreed are of more persuasive value. Once you have estimated costs and benefits, you can calculate a projected payback or break-even point. The shorter this is the better, of course, but some projects are more long term. Even so, do not expect to be greeted with enthusiasm if your projected payback period is much over three years; short payback periods are much more attractive to senior management.



### Revision Questions

1. List the factors that should be considered when choosing control measures.
2. Give three reasons why cost-benefit analysis is not as simple as adding up all the benefits of a health and safety programme and subtracting the costs.

(Suggested Answers are at the end of Unit IA.)