PRACTICAL EMERGENCY MANAGEMENT

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The paper examines the realities imposed by crisis and emergency management. Its focus is upon major hazard plant. It is rooted in current practical experience, and draws in particular upon the offshore oil and gas industry. It will identify, with practical examples, key factors in successful emergency management. These will include their application to the selection and development of persons in charge and their teams. Relevance extends to emergency preparedness.

KEY WORDS

Crisis Management; Emergency Management; Emergency Preparedness; Emergency Command; Command Teams; Command Training; Leadership; Leadership Training; Control of Risk in Major Hazard Plant; Command Appraisal and Assessment; Offshore Installation Managers (OIMs); Platform Managers; Major Hazard Plant Managers.

INTRODUCTION

"Crisis" - derived from ancient Greek word for *"Decision"*

The Oxford Dictionary defines an emergency as *"A sudden juncture needing prompt action"*.

"We know from experience that the circumstances of any major accident never repeat themselves". Brian Appleton, ICI and Assessor on the Piper Alpha Public Enquiry.

Despite efforts to the contrary, emergencies continue to outflank attempts at prediction, anticipation and prevention. Accidents, emergencies, and crises present by their nature an apparently endless ability to surprise. Examples include the Argentine invasion of the Falklands, the collapse of the Soviet Union, the re-election of the Conservative Party at the last General Election, the recent Kobe earthquake, the Piper Alpha disaster, the Kings Cross and the Bradford stadium fires and the loss of *Herald of Free Enterprise* and *Estonia* - the latter two, you will recall, being repetitions of type. In the current offshore context, reported gas releases number around 100 a year, of which some 10% are of a size equivalent to the initiating event of Piper Alpha.

This talk deals with the topic of emergency management, command and control. It will draw upon four years of training managers of major hazard facilities in the onshore and offshore oil and gas industries and the nuclear industry. Additionally it is underpinned by 33 years of service in the Royal Navy, of which 15 years carried direct involvement in surface and submarine command - eg a key ship and task-group command role in the Falklands campaign and four years developing command training including supervision of all submarine advanced training and the 'Perisher' course.

I offer my view here as a practitioner, not a psychologist nor a human factors specialist, although I will draw from time to time upon some of the leading academic work in the field of emergency command.

The major hazard manager's role in emergency involves "command".

None have put this better than Lord Cullen in his report on the Piper Alpha disaster. Referring to the plant manager (known as the Offshore Installation Manager, or OIM), Lord Cullen said (Cullen Report para 20.59) that this post "calls for decisions which may make the difference between the life and death of personnel" and that "it demands a level of command ability which is not a feature of normal management posts". These responsibilities are increasingly vested in law upon line management for major hazard plant. So far as the offshore oil and gas industry is concerned, the relevant legislation is to be found in the new Prevention of Fire and Explosions, and Emergency Response (PFEER) Regulations, which have reached the Statute Books. Explicit, as in the nuclear licensing regime, is the need for sound emergency management. Links need also to be forged with over-arching industry and national emergency management organisations, such as Sector Clubs and the recently revised Home Office "Dealing with Disaster" arrangements.

MANAGING AN EMERGENCY

Offshore Installation Manager (OIM) in action provides an example.

As a mechanism for describing what I want to share with you about emergency response in major hazard plant, I am going to invite you to consider a structured example of an offshore emergency. We have a large, fixed platform typical of those found in the northern North Sea. It comprises (see Fig 1):

- an accommodation module, set above some services plant and topped by the heli-deck;
- a drilling and well-head module, with drilling derrick; and
- a series of oil and gas processing modules of compact layout, designed to resist fire rather than explosion, with associated gas and oil pipelines to and from the sea bed.

Our emergency scenario arises in the middle of a dark and, fortunately, calm night. It starts with a small gas escape in the production module which, shortly after detection, ignites and gives a modest explosion. The explosion ruptures the water deluge pipework and the crude oil pipeline between the 2nd stage separator and main oil line pumps. It causes some other collateral damage to fire walls. A large pool fire begins. Three men were working in the module.

The first need is for the whole organisation to respond: change gear, find out what is going on whilst taking initial actions, and to look ahead; the OIM must strive to stand above the detail.

The OIM is summoned from his bed by the gas alarm to the emergency command centre, there to assume command of the emergency support team. He arrives, very much wide awake, within two minutes of the alarm. His task is to change an unexpected, adverse, unstable and fast-moving situation into one that is at least contained, stable and controlled. The OIM must create and sustain coherence out of threatening chaos. This requires actions. Actions demand decisions. Let us take the OIM's perspective.

There is instantly a flurry of information and a mass of issues to consider and arrange into a mental picture of the emergency (for a schematic of developments and likely immediate issues (see Fig 2). From this mental picture, the OIM needs to take decisions to initiate actions. A side-effect of these will be more information (probably of improving quality), and requirements for ensuing decisions.

It can be seen already that during these first few minutes the picture is growing complicated. There is a great deal of communication, and from it much information to be processed. This of itself brings pressure. Add to this the pressure of uncertainty and concern for the outcome. Time constraints will aggravate sensations of stress impinging upon one and all. What about stress? Stress is for many a stimulus, at least for a while; some however it will hobble from the start. For everyone it will disturb (and differently for each) the natural sensation of the passage of time.

In this situation, the OIM must maintain control of him/herself and the team sufficiently to fulfil effectively the command role. Take a few of the OIM's essential competence credentials:

- to ***stand above*** the detailed tactical decisions (eg: fire-fighting; the personnel muster) and ***develop*** a strategic over-view;
- to ***make an early appraisal*** (outputs to include: worst credible course of incident; most likely courses; major measures to be set in hand and external resources activated);
- to ***create initial direction***, by making objectives clear; and to have ***set in hand*** the provision of on-platform and external resources;
- to ***monitor*** key details to ensure consistency with strategy (eg: plant shut-down and de-pressurisation; security of people; fire teams (effect v risk); effective information management and presentation; logistic management; practicable evacuation);

- to ***project ahead*** in the most systematic manner practicable, ***refine and continue to articulate objectives*** (life first, then plant) (to be repeatedly re-visited) and ***make good decisions***.

- to ***draw advice*** from the emergency command team and wherever appropriate;

The nature of this major hazard plant emergency is that all these facets are relevant. They are subjects of interest in their own right, but for this paper I shall concentrate upon command. Certain core issues of command prove to be the most elusive, but I will offer you the analysis of a practitioner.

During the early stages, the OIM's actions will probably lie within the envelope of prescribed procedures. Operators respond in the main on the basis of procedural reflex. Much of the shutdown is automated. Personnel will follow muster procedures. Fire teams will assemble and make preliminary assessments. The process team will verify the shutdown and blowdown functions.

The emergency begins to move outside pre-planned responses and the operational envelope.

Very soon however, this emergency (as so many) begins to move outside the operational envelope. Any who doubt this expectation should consult the well-analysed records of civil aviation incidents. There may be errors. Muster areas may become smoke logged. The helideck may also be unusable on account of smoke. Weather may limit lifeboat availability, or in extreme cases make lifeboats virtually unusable. I myself have spent two hours in the middle of the night in a life-boat on the upwind side of platform, supposedly ready to go in a Force 9 under the command of an unbriefed and terrified coxswain. In one recent instance of gas release, within the first moments the Control Room Operator had inadvertently overridden the emergency shut-down system and isolated the fire water pumps - whereafter the gas cloud quickly entered the gas turbine intakes, but without an explosion. Yes, when things happen suddenly and stress impinges, even experienced people can act in illogical ways. When, as so often, we get outside the operational envelope, the OIM needs more than ever to diagnose correctly, project ahead, act decisively and improvise. As I have said elsewhere and in another context, he will in large degree then be operating "in unknown territory without maps". This demands the utmost resources of courage, coolness, skill, and background knowledge.

We should therefore examine the core command activities which take place as we move outside the procedural envelope. These are: correct diagnosis; clear objectives and creation of direction; future projection; time management; team management; and overall control; all with monitoring feed-back loops. Let us consider some elements of these.

Objectives and direction are essential but elusive.

Following a correct, perhaps multi-faceted, diagnosis, creating direction is an elusive concept; yet it is essential to understanding the role of the emergency command function. It involves the skills of ***strategy formation*** and ***decision making***, both of which must take place under ***conditions of time pressure and limited information*** in a situation which may be moving ever further ***outside***

the operational envelope. It involves, first and foremost, the establishment of objectives, which must be clearly articulated to the team.

> In this case, the OIM after some minute or so feels sufficiently clear about the situation that he calls firmly for attention (with the secondary purpose of ensuring everyone has noted his arrival) and makes a brief statement of the situation as he sees it. No-one disagrees. He states his objectives, turns to the Public Address (PA) system and makes a firm and factual, yet warm, broadcast to all platform personnel. At the forefront of his mind also are the pressing support and public presentational requirements of the "the Beach" - a subject in itself not covered in detail in this paper.

To develop the concept further, we must deal with the factors highlighted above, starting with decision-making.

Decision making - there is no quick fix nor easy answers.

Decisions operate, self-evidently, at both strategic and tactical levels. Derived from the experience of practitioners, there are two principal genres of decision-making model available from psychological research. Both, if they are to make sense, need to carry clear objectives, themselves subject of decisions. The first approach can be termed naturalistic (intuitive); the second classical or analytical (thorough and long-winded). For the detail, please see references (JSP 101 (8), Klein and Orasanau (4)).

Naturalistic decision-making theories have been developed from observation of, for example, expert fire team commanders with long experience of practical command skills. It involves recognition of the nature of the situation and determining actions from intuitive mental modelling - with minor modifications - to achieve a sufficient and satisfactory outcome. The key point here is that this work has been done observing practitioners of long-proven ability in an area which, whilst demanding in terms of functioning under pressure, lies within their operational envelope.

This approach may give you difficulty in the industry context. Here we shut down plant and make safe when real trouble threatens. Plant managers do not spend their lives preparing, primarily, to fight serious emergencies. They do so at a major level (e.g., outside the operational envelope) possibly once or twice in their careers - perhaps never. For the industry emergency manager therefore, naturalistic decision making, where the first apparently workable option is adopted, offers much scope for false judgements, and for rapid disappearance down metaphorical rabbit-holes.

Therefore, in the complex emergency situation on a major hazard site, the emergency commander needs to strike a delicate balance between the temptation to adopt intuitively the 'obvious' solution and an analytical approach which questions and tests whether or not the solution is right - and to be prepared to change direction if necessary.

Relate this to our incident. Naturalistic decision-making has carried us safely through niceties of shut-down and blow-down; the conduct of the muster proceeds; shore authorities are alerted and over the next hour the shore support facility should become fully effective.

Around the emergency control centre the OIM is pleased to see assessed information beginning to take shape. Unfortunately one of the key presentation aids is being set up by a man he knows has not done it before. He resists the temptation to give this man some help, and mentions the matter to his Maintenance Supervisor - who responds as if he has not quite woken up fully. The assessment of fire and explosion risks looks as if it will involve some careful consideration of possibly quite complex safety-case factors. The OIM looks round for the Construction Supervisor and draws him into a quick discussion with the Maintenance Supervisor. What seems to be the damage from the explosion?

The Maintenance Supervisor is talking to the On-scene Commander - a good man; Questions race through the OIM's mind. Is the fire containable?; what inventory of flammables and toxic substances is involved, and what does this imply?; what options have we to help the men who may be trapped (the main muster is still incomplete)?; what is the hazard to the Temporary Refuge (TR)?; what is the hazard to the platform structure?. The OIM invites the Maintenance Supervisor to look into the integrity of escape means and routes to lifeboats and, of course, the helideck. Then he has a very quick few words with the Production Superintendent.

You will reflect that there is time, apparently, to hold this sort of brisk succinct consultation. Emergencies generally permit this, in that even the worst of them (including Piper Alpha, for instance) comprise peaks and troughs of activity. It is essential that the command team can identify the troughs as vital opportunities in the process of regaining the initiative. Needless to say this is easier said than done, especially when fear and stress stalk the mind.

The OIM calls once again for attention, reviews the position (already covered with his principals), puts a couple of suggestion to the Maintenance Supervisor, and once again makes a PA announcement and speaks quickly to "the Beach". It is seven minutes since the explosion - to the OIM it seems far longer, but he fears it may seem but moments to the Maintenance Supervisor - who, he is concerned to see, still looks a bit off colour.

Strategy formation: it is vital to survival.

A strategy is a key step to the longer-term objectives and direction. Consider how this emergency might progress in terms of the questions we have asked ourselves. The explosion *may* have damaged the fire wall between the main production module (where the explosion occurred) and the adjacent gas separation module, but we have not yet gained sufficiently close access to be sure one way or the other. The fire should be containable provided the inventory is properly isolated; but there are unexpected indications of residual pressure - have all valves closed correctly? We are shifting clear methanol drums stored above the fire, but temperatures are rising and there is concern for those involved - can we complete this task? There is no immediate threat to the Temporary Refuge. We are concerned as to whether we can gain sufficient control of the fire (deluges, and a foam blanket under the separator bottom run-offs) before risk of separator rupture becomes unacceptable and the fire teams must withdraw. But there is increasing evidence that

there are three casualties in the production module - none of these were present at muster. The helideck is usable, the quantities of thick black smoke blowing clear. We hear that one Coastguard helicopter will be in the field in just over an hour, but it seems then we must expect another forty minutes before anything else arrives, including specialist medical assistance. Launching lifeboats is possible, but it is overcast and apparently very dark. Our excellent Standby Vessel, which is about to engage in some carefully-directed support fire-fighting, will be joined in 35 minutes by a less-capable sister from an adjacent platform. There is a supply vessel also with us.

The OIM must force himself away from the detail. Everyone proclaims this mantra. It is however not at all easy for a person dedicated to production efficiency most days of working life to detach from the beloved plant and become a high-level strategist addressing wider and generally more demanding problems. Time after time, in training, we watch OIMs under pressure become drawn inexorably back into the tactical fray of damage control and the intricacies of personnel accounting. However well-intended, this sadly is too nearly the equivalent of fiddling while Rome burns.

Our OIM, happily, has no such leanings. Whilst keeping intuitive ears and senses tuned to what is going on around him, and keeping an eye on the Maintenance Supervisor (who at least seems to be getting into his stride), he turns his mind firmly to the future.

Naturalistic decision-making can obviously help here, but the factors are many and their manifestations complex. This is no time to jump to conclusions. To achieve balanced objectives some measured development of options and their analysis is essential. The OIM may be beginning to consider whether the fire escalation is on a scale that makes it important only to the extent that it influences the overall strategy for the saving of life in what are becoming life-threatening circumstances for everyone on the platform. What attention can he afford to spare for the trapped men? Can he place further men at risk, now, on their account? Is there some imaginative option that could help them?

With intermissions, the OIM devotes some three minutes to developing two prime options. Sensing a slight lull, he detaches the Maintenance Supervisor and takes him into an adjacent office with the Services Supervisor. The Services Supervisor (a steady man) endorses his thinking; the Maintenance Supervisor just nods. The OIM sends the latter back and invites the Services Supervisor to work up the plans. Returning then to the emergency command centre the OIM senses a deterioration. Information is not coming along well; he has to chase for a clear picture, losing a minute. Another review of immediate options, objectives stated and a PA broadcast to keep spirits up whilst warning for possibilities of evacuation, it is time to speak to the asset manager - who has now arrived at "the Beach" support centre.

And so on. As you can see the incident may pass through several key changes of direction. These may include: escalation; effective control; buying time before escalation proceeds.

The emergency commander must be able to identify swiftly such swerves in direction and adjust strategy accordingly. At each stage, there are decisions to be made and we know already that the commander under time pressure is likely to pick the first workable option that occurs. There is a need to bear in mind always the worst credible scenario, whilst not "taking counsel of one's worst fears", and to test and question the current actions and decisions points to search for any anomalies

which might indicate that a key decision needs to be revised. This of course introduces another level of analytical thinking.

As always with emergency management, it is easy to say "how obvious". But it is when the factors of time pressure and incomplete information are coupled with activities beyond the operational envelope that the true complexity and risk of disorientation emerges. I hope I have helped to bring alive aspects of this process. Good emergency simulation exercises do help enormously. But there is no substitute for reality in terms of actual experience. Continuing still on the theme of creating direction, I would now like to touch on these two factors.

Time pressure and incomplete information are an uncomfortable but often unavoidable fellow travellers; they heat decision making, and are stressors.

Time pressure and incomplete information are both stressors. Under stress, as we have seen from our Maintenance Supervisor, an individual's behaviour patterns may alter. To begin with the outer physical signs are small and difficult to identify but, as levels of stress increase, obvious physical manifestations take place and the capability of an individual to function effectively is impaired. The symptoms of stress vary with each individual - each has strengths and weaknesses. The experience of the submarine command 'Perisher' course provides rich prime evidence here. From observation of industry managers both onshore and offshore we have identified similar behaviour traits during emergency training programmes and simulation exercises. Let us place these illustratively in the first person.

- We may see reality skewed, as through a prism - deny the problems we face, and see instead reflections that we find more malleable, and therefore preferable.
- We may see a confused mass of data, deducing nothing of value. We settle for the answer we last used or the one we are offered, or we just guess.
- We deny there is a problem, and we deal with trivia. We act with no clear objective, no focus, no priority.
- We do not understand the information presented. We misinterpret, draw wrong conclusions, followed by wrong judgements.
- We panic. In clear sight of reality and its awful implications, we freeze, do nothing or become emotional.
- We interpret the information correctly and make good decisions, but organise resources ineffectively and fail to control the situation.

In the Royal Navy's case, candidate submarine commanders, already well trained and experienced in emergency command, are subjected systematically to extremes of pressure. Some 25% fail to qualify as competent. We do not advise that this level of pressure is useful, let alone necessary, for industry management training. We would however I think agree that industry emergency commanders may, in reality, be subjected to pressures under which their performance deteriorates. Ultimately this will be true of any individual, since everyone has a limit of resistance and

endurance. We shall return to this point later, and consider to what extent it should be a concern for industry managers and what they can do about it.

Let us now leave our example in the midst of the fight for a satisfactory outcome, and look at one or two of the key mechanisms in more detail.

There is a crucial relationship between strategy, decision-making, time pressure and the operational envelope.

We return to the research on fire team leaders (Klein(4)). Interestingly, it was found that the fire team leaders coped well under the normal levels of pressure encountered in their work. This in part could be due to the fact that, when studied, they were largely within their operational envelope. It could also reflect that the structured and natural selection processes which have taken place over a period of time have worked well. Certainly, being within one's operational envelope enhances the ability to cope under the pressure of time constraints and information shortage. Outside the operational envelope, people must - as we have seen - work things out for themselves, although we must hope they will not be called upon to do so entirely from first principles. If the speed of their analytical processes, under pressure, is insufficient for the circumstances, the performance of an individual will be affected.

Observation of industry major hazard managers shows that the ability to function outside the operational envelope is developed through a process of natural selection until, at senior management level, one of the key functions is an ability to develop an accurate strategic overview and 'ask the right questions'. Therefore our chances of finding such people in positions of responsibility for emergency command prove, in practice, to be understandably high. This is indeed demonstrated by the majority of managers whom we have trained and assessed.

Take a closer look at time management.

As an emergency progresses, more information becomes available and decisions become easier to make. In parallel, however, options are closing. It is therefore extremely important to manage the time-base of an emergency - i.e. to have a clear picture of the timescales within which actions may necessarily have to take place and to provide the basis for a forward plan. Various techniques of action plotting are available. Recalling our scenario, the OIM must develop an appreciation of the critical time windows available. For example (Fig 3), a reverse critical path analysis can be done quite quickly.

Vitally, if self-evidently, time is liable to be at a premium and the emergency commander must make best use of it. We have seen that there will be opportunities during the emergency for thought and consideration of options and these must not be squandered. An example of less than ideal behaviour was an emergency commander who effectively turned into the telephone operator, dutifully obeying the orders of his command team. Yet we have had it suggested seriously that a prime function for the OIM is to keep his asset manager ashore constantly informed personally.

Team management and leadership are potentially winning commodities.

The qualities of a leader are a subject in themselves and go beyond the confines of this paper. I will restrict myself to presenting a few basic concepts in support of the general theme of emergency management. One of the pre-requisites of effective emergency management is the structuring and training of an effective supporting team. For any emergency configuration it is useful to perform an elementary task analysis. Returning to our case study, one suitable emergency team configuration might look like this:

- OIM - overall command
- Production liaison - control of production and processing plant, technical advice and diagnosis, deployment of process team. May be deputy and key advisor to the OIM.
- On-scene and Maintenance/Engineering - link to and direction of incident; also takes non-processing issues. May be deputy and key advisor to the OIM.
- Logistics - Control of helicopter and vessel movements, liaison with external agencies.
- Personnel mustering - muster co-ordination, personnel movement, abandonment planning.
- Log-keeper.

The number of people involved could of course be more or less than this depending on the characteristics of the installation.

Consider the key points in constructing an emergency team:

- There must be a balance between totally overloading a single individual with information- handling duties and creating, at the other extreme, too complex a matrix of interfaces.
- Information handling and presentation systems must reflect the specific needs of the team and the demands placed by the nature of the installation.
- Team members should be trained to observe and support each other, including support of the emergency commander at difficult moments.

Project into the future.

A self-evident truth, one of the many with which emergency management abounds, is that one can do nothing about the past, one can act in the present, but one can influence the future. The emergency manager's role is to ensure a successful outcome in the future. In major hazard industry this usually equates to the saving of life as a first priority and saving of plant the second.

Observation of the attention focus of emergency commanders under training has shown a pronounced tendency to the past (unalterable) and the present (functioning by reflex) at the expense of the future (where lies salvation) (see Fig 4).

With training, successful emergency managers develop a more useful focus of attention as they become more effective. They begin to consider and balance their present decisions against future possibilities. Both logic and practical observation support the conclusion that this skill is one of the last to be learned by an emergency commander. While an individual is seeking to grasp the basics, the finer points are elusive. In due course, when the basic skills are assimilated thoroughly, an individual can move on to complete the range of core skills.

TRAINING OF EMERGENCY MANAGERS

As we have shown, emergency managers require a broad base of skills. These include:

- Capability to manage under pressure;
- Capability to operate outside the operational envelope. The broader the range of operational experience, the less likely is the emergency commander to find himself having to operate outside the personal operational envelope.
- Ability in emergency team command; leadership;
- Skills in the basics of emergency management - logistics; personnel accounting and movement; evacuation plans; communication and information processing;
- Skills in major hazard management - process plant; drilling; technical diagnosis.
- Knowledge of major hazards: fire and explosion; chemical; radiation;
- Knowledge of the facility itself.

In training personnel across such a broad front, it is important to take a broad view. There are some key features of emergency command training which I would like to cover below:

Emergency management training is an intellectual not a physical exercise

To illustrate this point, it is perhaps helpful to consider the levels of emergency command: These line up broadly with conventional management terminology in the following way:

On-scene commander; fire team leader	First line management
Production superintendent; shift charge engineer; shift manager	Second line management
OIM (large platforms); Station Manager	Senior management

From first line management through to senior management levels, there is an increase in the strategic intellectual activities at the expense of the tactical and practical, although contact with the practical level should always be maintained.

Concerning stress, we have seen that it is not necessary to subject people to extremes of pressure and fear in order to produce an adequate vehicle for training "outside the operational envelope". Indeed it is generally inadvisable. Training can however usefully take place in a physical environment, offering a gentle degree of stimulation and excitement, but offering predominantly the opportunity to develop techniques for the management of critical fast-moving situations. Let it be understood that this is primarily an intellectual, not a physical activity.

Depth of training required

On the personal competence ladder, we start at a level of unconscious incompetence: we don't know what we don't know. We develop an awareness which takes us to conscious incompetence: we know what we don't know. We develop a conscious competence: so long as we think about what we are doing, we can do it. Ultimately we may arrive at a stage of unconscious competence: here we act correctly almost without thinking. One of the objectives of OCTO's emergency management training is for people to attain a state of unconscious competence in most of the basis skills, so that they can begin to focus on the strategic, time-based and decision-making skills and achieve at least a stage of conscious competence in these areas. There is a real danger, too frequently demonstrated, that people stop at the level of conscious competence in the basics and fail to address the core issues. As a result, when the pressure is on, the emergency command structure breaks down, with potentially disastrous consequences. Note that a high level conscious competence may be all we should expect reasonably to achieve overall as managers of a complex plant. Unconscious competence can smack of over-confidence and, ultimately, superficiality.

Extensive experience of training in command competence shows that for many people the goal is intangible. A successful technique has been to show individuals by experience what they can achieve, whereby they can create their own personal image and understanding of command through practical experience under expert guidance. The key is to relate theoretical, intellectual training to practical contexts of emergency exercises, emergency simulations and practical command training. Basically this means:

Don't:

- Teach dry management, command and decision-making models in isolation.
- Train individuals in the basic elements of emergency management without also giving them training in putting all the elements together into a coherent and effective whole.
- Re-inforce bad-practice by giving either no feedback in simulation exercises or only generic feedback.

Do:

- Use trainers who are expert in the field and able to follow the cognitive processes of the emergency manager who can therefore help to diagnose individual difficulties and coach individuals towards a solution.
- Perform on-line coaching through simulation exercises - whether on or off-site, incorporating immediate feedback based on specific observed behaviour.

Interestingly the recent research by Klein *et al* (2) in the United States into command team decision making is reinforcing this experience.

Finally, in case anyone still harbours doubts as to the realism or attainability of high standards, I would like to conclude with some myths of emergency management training (Fig. 5).

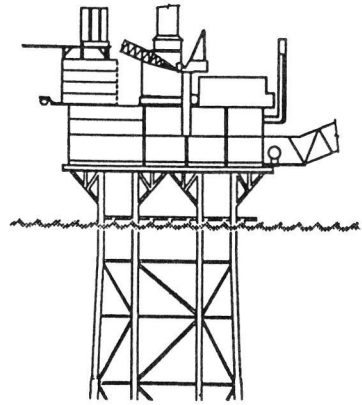
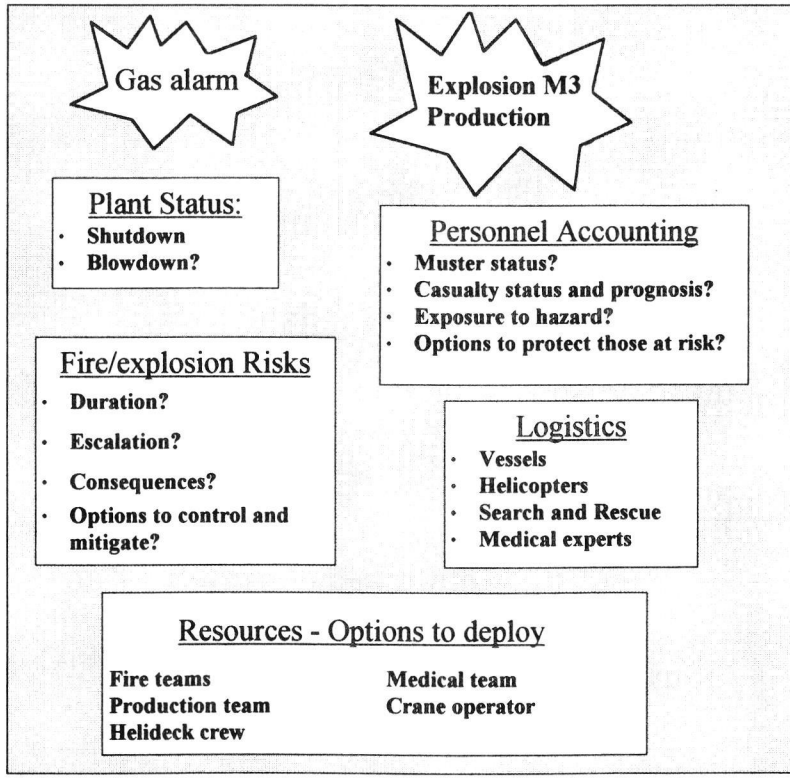


Figure 1



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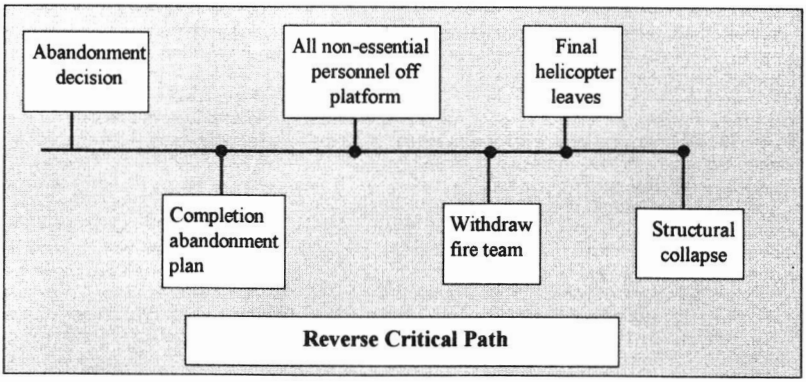

Figure 3.

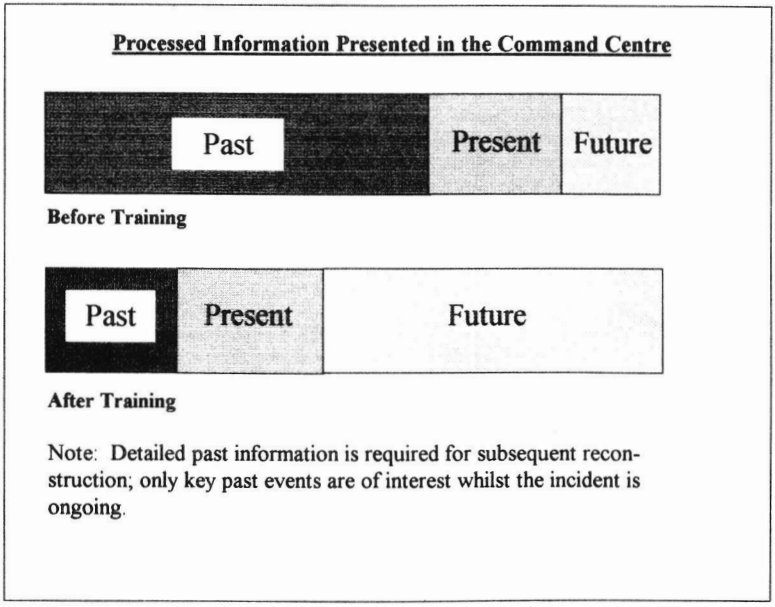

Figure 4

MYTHS OF EMERGENCY MANAGEMENT TRAINING

Emergency management training is expensive.

The key to cost-effective training is to include high quality training in routine emergency exercises and simulations and always to aim as close as possible to reality. Emergency training is much cheaper than dealing with the aftermath of ineffective emergency management.

Experienced industry managers don't need training.

Ask the managers. From my experience, people who know they will be in the hot seat welcome all the good advice they can get.

It is possible to write procedures to deal with any emergency - so why train people to work without them?

Extensive experience in the military and in industry situations shows that emergencies very quickly move beyond the limits of prescribed procedures. Any assumption that they will not is foolhardy. It also collapses under the evidence of accident analysis.

Industry needs managers in place to prevent emergencies; the skills of emergency management are not compatible.

Of course the primary role of a major hazard manager is to prevent an emergency. Experience shows however that the ability to command in an emergency almost always coexists with abilities in general and safety management and indeed enhances the ability to operate in fast-moving, high pressure circumstances.

It is impossible to assess the ability of people to perform under pressure

It is difficult, and it needs a high standard of expert and specialist observation and experience in emergency management. It is however eminently possible and normally extremely useful for individuals to learn constructively about their own strengths and weaknesses under pressure.

There is no point in training an industry manager to manage a difficult emergency because, unlike the military who do it all the time, industry managers do it so rarely that they are bound to fail in practice.

One view on this is the general public - who expect major hazard industries to be able to deal with the consequences of their mistakes without major repercussions on the workforce or the general public. Lord Cullen makes this point in his report into the Piper Alpha disaster. Another point is that industry managers start off with some excellent characteristics and can indeed be trained to a very good standard. Also a reasonable amount of practice and some carefully targeted refresher training will keep them there. Good standards can be maintained with a well-considered emergency exercise programme which is probably no more onerous than that currently in place.

Figure 5

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