

Category	Item	Notes
Safety Management	Protective Equipment Compliance	
	Unsafe Acts/Conditions	
	Safety Attitudes	
	Procedures	
	Communication	
	Training	
	Supervision	
	Design	
	Maintenance	
	Emergency Procedures	
Alarm Systems		
Operational	Operating Procedures	
	Control Room	
	Instrumentation	
	Process Control	
	Disturbances	
	Human Factors	
	Design	
	Maintenance	
	Emergency Procedures	
	Alarm Systems	
General	Organizational Structure	
	Communication	
	Training	
	Supervision	
	Design	
	Maintenance	
	Emergency Procedures	
	Alarm Systems	
	Operating Procedures	
	Control Room	

PIPER ALPHA - A CASE STUDY IN DISTORTED COMMUNICATION

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This paper seeks to understand the fire and explosion on Piper Alpha as partly a consequence of various manifestations of 'distorted communication'. This concept is discussed, before its relevance in understanding particular circumstances and events surrounding the disaster is explored. On the basis of this, two principles of reform in safety management are considered, it being claimed that it may be rational for owners and controllers of rigs to adopt such 'radical' measures.

INTRODUCTION

At an IchemE symposium in 1984, in the course of developing what she called an 'informational processing model' of industrial accident causation, Bellamy noted the significance of 'information handling problems'. She stated of 'complex organisations' that informed outsiders can be considered to be uninformed alarmists, a clear example of organisational exclusivity (1).

Bellamy failed, however, to examine the systematic nature of hierarchical communication both within corporations, as well as between corporations and 'outside' groups and interests. In this paper, we are particularly concerned with the implicit definition of workers and their organisations as 'outside groups' - in other words, with systematically distorted communication within which those who lack formal managerial executive authority are deemed as not having a legitimate voice in the organisation and maintenance of safe systems of work.

DISTORTED COMMUNICATION AND THE CAUSES OF INDUSTRIAL ACCIDENTS

Let me explore this concept of systematically distorted (hierarchical) communication before addressing the particular case of the fire and explosion on Piper Alpha.

In his seminal work on the causes of disasters, Barry Turner (2) has argued that energy + misinformation = disaster. While the concern here is not simply with disasters, but with the prevention both of disasters and the much more frequent and "mundane" incidences of injury and death arising out of work,

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Turner's analysis remains of more general use. According to Turner, disasters and accidents arise from situations in which "the relevant information is not available to [those with the ability or power to act upon it] at the appropriate time in a form which it is possible for them to use" (3). This point needs to be placed in the context of the broader claim that accidents and disasters are often the result of "complex and systemic, human and organisational factors, rather than inherent technological weaknesses ... in order to obtain an adequate understanding of such phenomena, and hence ultimately the better management of safety, a socio-technical perspective must be developed" (4).

Turner argues that the relevant information that individuals or groups need to know in order to prevent the emergence of disasters can be divided into four categories: (i) that which is completely unknown; (ii) that which is known but not fully appreciated; (iii) that which is known by someone, but is not brought together with other information at an appropriate time when its significance can be realised; (iv) that which was available to be known, but which could not be appreciated because there was no place for it in existing/prevaling modes of understanding.

It should be immediately clear that categories of misinformation covered by (i) and (iv) are, in any short term sense, ineradicable; yet 'misinformation' of types (ii) and (iii) ought to be much more amenable to redress.

Further, Pearce (5) has noted the significance of two subcategories that Turner notes but fails to explore in detail, namely in (iii), where it is stated that information which might have prevented a disaster was "wilfully withheld". Thus Pearce develops an argument which links errors of communication to the ability of employers to define what is legitimate knowledge, what knowledge may or may not be acted upon, who do/do not constitute sources of serious statements, and so on. In these ways, Turner's detailed analysis of various forms of misinformation can largely be subsumed under Habermas's more general concept of 'distorted communication' (6).

Let me expand, albeit briefly, upon this concept. In an essay seeking to set out the nature and bases of 'normal' communication, Habermas writes that, 'In normal communication an intersubjectivity .. develops and is maintained in the relation between individuals, who acknowledge one another' (7).

While Habermas is concerned to understand speech acts and their context between individuals, his analysis is translatable to contexts in which groups communicate, or attempt to communicate, with each other.

The reference to 'acknowledgement' is important - that is, for speech to be a possibility, potential participants in dialogue must acknowledge each other. To put this more explicitly, they must recognise each other as legitimate potential participants in any dialogue that may occur, and thus be prepared to act upon this recognition. Of equal importance is

the context that Habermas considers a precondition for 'genuine' dialogue, namely ideal speech. While ideal speech can never be fully attained in any real situation, the degree to which it can be approximated is related to the 'structures of the social system to which we belong' (8).

Thus it is necessary to recognise obstacles to ideal speech, factors which prevent genuine dialogue, which are present within any particular 'social system'; and 'social system' is used in its broadest sense here, so that it may refer to a system of production, an industrial context, or a particular workplace. In other words, a precondition of approaching ideal speech is a recognition of the socially constructed obstacles to that ideal speech situation. The degree of distortion in communication is related to the degree of repression within a given social system.

These insights can be related back to some of the details of Turner's analysis of the causes or sources of misinformation.

'Information known but not fully appreciated' can clearly encompass information known and appreciated by one set of actors, but not deemed as legitimate, and thus in a sense not 'appreciated', by a different set of actors; crucially, by the latter group, we are referring to those with the power to act upon such information. The subcategory highlighted by Pearce (above) is important, since it is precisely workers and their trades unions which may constitute mistrusted sources of information. Repression exists where the voices of workers are not granted an a priori legitimacy; thus we have a situation of distorted communication.

Similarly, information may be known but 'not brought together with other information at an appropriate time when its significance can be realised', precisely because those in positions of power vis-a-vis the running of chemical plants refuse to do so. Such information may be 'wilfully withheld', as has been data on the health and environmental effects of many chemical substances from asbestos to pesticides in contemporary widespread use, or it may be deliberately repressed, for reasons of economy or hubris.

In these ways, then, the potential for workers and their representative organisations to participate in decision-making processes which bear crucially upon the possible prevention of industrial accidents is limited.

Elsewhere I have examined the causes of accidents in the British chemical industry, using data from a variety of sources (9). It is clear on the basis of this work that while some accidents can be attributed to 'economies' on the part of managements, a significant number are more directly manifestations of corporate/managerial incompetence or ignorance. Many of these accidents can be related to various forms of communications errors/malfunctions. Thus, for example, insufficient knowledge of processes or substances, inadequate safety or emergency policies, and failures to communicate vital safety information or adequately train personnel are all very frequent underlying causes of, or contributory factors to, accidents in the chemical industry, and to some extent it is in the interests of

managements to eradicate such errors. Moreover, to do so need not, and often would not, entail any encroachment upon profits; in fact, in terms of more efficient operation of plant, less downtime, and reductions in accidents and ill-health, measures to eradicate such problems might be favourable to profitability. Thus these immediate causes may be understood in relation to the fundamental cause of 'distorted communication', and are not simple effects of attempts to maximise profitability. The eradication of such errors, then, being rooted within distorted communication, is partly dependent upon adequately using, and allowing the development of, the knowledges possessed by workers vis-a-vis the realities of normal production, as opposed to simply relying upon the (formally acknowledged) knowledges of designers, engineers and managers.

Let me draw some of these theoretical points together. If the causes of accidents can be at least partially located within communication systems, or, rather, in their failings - that is, if they can be attributed to various forms of distorted communication - then this allows for a serious consideration of how the incidence of such occurrences can be limited.

How, then, can this be this general theoretical schema be related to an understanding of the events leading up to the tragedy on the Piper Alpha oil platform?

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Bearing in mind our point about the immediate ineradicability of Turner's categories (i) and (iv), I shall here focus upon (ii) and (iii), and shall subsume these forms of misinformation under Habermas's more general concept of distorted communication. Since the public inquiry under Lord Cullen has still to report, the analysis here uses evidence from newspaper and more general articles on the course of that inquiry, as well as the Technical Investigation Interim and Further Reports produced under the authorship of J.R. Petrie. Moreover, while this is a case study of the fire and explosion at Piper Alpha, it seems sensible to refer not only to those elements of distorted communication that can be related specifically to Piper Alpha, but also to those of more general relevance in the context of North Sea oil installations and operations.

Using the categories discussed in the previous section, it is clear that in the case of Piper Alpha there were certain pieces of information which were not acted upon by those with power to do so despite the fact that such actions may have prevented the disaster.

It had been known, for example, though perhaps not 'fully appreciated', that the rig had been operating at a level in excess of normal capacity during the year prior to the disaster. Thus, 'the platform was pushed to the limit in production terms. Built 12 years ago, with an estimated lifetime of 20 years, it was designed to produce 150,000 barrels of oil a day. In fact, during 1987, it produced on average 167,000 and would run at full production for many weeks. Many witnesses now claim that there was insufficient maintenance and inoperative fire and safety procedures and equipment' (10).

It is not known whether periods of 'overproduction' are common on other installations in the North Sea.

Similarly, it had been known, though not fully appreciated, that Piper Alpha's water system 'was frequently inoperative', a fact the company had been warned about. While this point has the status of a claim made by Jack Donaldson, who had worked for Occidental Petroleum as loss prevention manager for seven years, it was not contested by Occidental when made publicly (11). A similar point could be made about the claim that the Piper Alpha rig's fire defence was said to be 'useless', and had been reported as such in a memo from Mr. Konrad Wottge, Occidental's facilities engineering manager, to Occidental four months before the explosion (12). Indeed, the Department of Energy's Technical Investigation Interim Report made special reference to the problem of fire pumps (13), this being taken upon in the Further Report (14).

In the specific case of Piper Alpha, examples of warning information known but not fully appreciated, coming from a 'mistrusted source', are numerous. Yet these examples highlight a set of issues of more general relevance for North Sea oil installations.

The mistrusted source of warnings were trades unions and individual workers. It should be noted that the objective possibilities for such a 'mistrust' and consequent dismissal of such warnings are greater, for both historical and legal reasons, in the offshore oil-industry than is the case in many land-based industrial contexts; thus not only are trades unions less effectively organised offshore than they are in many land-based industries (15), but their rights to representation in the management of safety, minimally guaranteed for large numbers of workers under the principle of self-regulation as enshrined in the 1974 HASAWACT, are not granted in law. Moreover, there seems to be evidence that individual workers in the offshore oil industry both were, and are, unwilling to raise safety issues for fear of future employment prospects in the industry (16). Claims that trade-union representation is unnecessary for workers to possess an effective voice in safety matters, as well as statements to the effect that individuals need have no fear of coming forward with information relating to mismanagement and poor safety standards and practices offshore (see, for example, the then energy secretary Cecil Parkinson, (17), not only lack any understanding of the general nature of power and of the specific economic realities which encourage men to work in the North Sea, but they also ignore the empirical and historical realities of safety as an issue and the role of trades unions in improvements in that sphere in British industry. Thus regulations providing for safety representatives and safety committees in the North Sea which fail to guarantee union representation may in fact be counter-productive.

The North Sea offshore oil industry is a context in which it has been claimed there exists a general 'anti-union stance' (18). Thus, 'Mobil, Amoco, Conoco, BP and Britoil refuse to permit union representation on their platforms in the North Sea. Shell does recognise trade unions, but not for safety purposes. Ironically, Piper Alpha was one of the few platforms with a

union recognition agreement. But even so the safety committee on the platform was so ineffective that the two union safety reps on the committee resigned in disgust in 1983' (19).

Indeed, to the shame of an advanced industrialised economy, Britain is one of only three major oil producing countries without legal requirements for trade union safety reps and safety committees, the other two being Libya and Saudi Arabia.

Of course, within this general context, it should not be assumed that workers can exercise no power. If they do not have formal rights to 'stop the job' as exist, for example, in the Norwegian offshore oil industry, then individuals can on occasion take such initiatives. Thus Jack Donaldson claimed that two men had spoken of smelling gas on the rig the day before the disaster. 'One .., a welder, was said to have refused to ignite his torch. A safety officer eventually gave him permission not to carry on with the job' (20).

Yet relying upon the persistence and boldness of individuals is clearly precarious and unsatisfactory. And because no formalised system exists for 'stopping the job', the benefits of the actions of individuals are not translated into the fundamental inquiring of a kind that may prevent accidents and disasters. Thus Occidental Petroleum's press office stated of the reports of gas leaks on the rig that while such reports had been made to a foreman on board, they had not been received onshore (21).

In this instance, effects of distorted communication can be seen which were in turn exacerbated by the peculiar conditions of offshore work, namely its physical separation from onshore executive decision-makers.

Let me simply note further 'warnings', based upon previous incidents or accidents, that had apparently not been acted upon by Occidental, and where acting upon such information may have proved crucial in either preventing or mitigating the disaster of July 1988. Again, while these are of specific relevance to Piper Alpha, the issue of unheeded warnings is, of course, of more general applicability.

1. It had been reported that gas had leaked on the rig just over a month before the disaster (22).
2. Konrad Wottge, the engineering facilities manager for Occidental, stated that there had been 8 gas leaks on the rig between 1979 and 1988. 75 of these had occurred in the four years before the disaster (23).
3. In particular, in 1984, there was a gas explosion on the platform, which resulted in four injuries and the evacuation of the 175 people from the platform. The explosion was investigated by the Department of Energy but the report remained secret, even in the face of pleas from thirteen trades unions following the Piper Alpha disaster (24).
4. Similarly, it was reported early in 1989 that, 'Measures which could have prevented the Piper Alpha tragedy were

recommended in an unpublished safety report written a year before last year's accident'. However, the Department of Energy denied any knowledge of the 1986 report, which the trades union spokesman Roger Lyons described as a 'secret external safety audit with specific recommendations for action which could possibly have prevented the tragic second explosion' (25).

Now, of course, it is easy to be wise after an event, to uncover information and warnings that, if acted upon, would have prevented a disaster. But I do not intend to base an analysis upon the wisdom of hindsight. For it is also equally easy to be unwise after an event, and to claim that the information or warnings concerned were hardly extraordinary, and that it is illegitimate to expect all such information to be treated seriously. What has been pointed to above is a systematic failure to heed or act upon crucial information - and this can to a large extent be related: (i) to the sources from which such information derived; (ii) to a general technocratic hubris; (iii) to a general set of power relationships characteristic of, but not unique to, the offshore oil industry. Clearly there is a need to develop systems whereby potentially crucial information and warnings are encouraged, are made public, and are at least treated seriously, if not always acted upon.

These exigencies are all the more important in the North Sea, where communications are by definition difficult. This is related to:

- (a) the physical separation of rigs from land-based operating headquarters;
- (b) the system of shift changes;
- (c) the widespread use of sub-contract labour.

Regarding (a), it is important to note that after the first explosion the installation-to-shore telephone system appears to have failed immediately (26). This clearly indicates the need for each installation to have developed independent means of mitigating and coping with any disaster situation. It is not clear that emergency procedures were adequately developed, understood, or followed on the rig. Evacuation has been highlighted as an issue for further investigation (27). Again communication is a key here - one immediate improvement might be gained from ensuring that operators are involved in performing and revising regular drill exercises in simulated disaster conditions, this supplementing (not replacing) existing land-based training courses.

(b) The Technical Investigation Interim Report noted that a crucial omission was the fact that operators did not know that relief valve PSV 504 on the A pump system had been removed. This information should have been communicated at the shift handover at 18.00 on 6th July. Problems of shift change are ubiquitous in continuous process industries, yet it appears that there were particular problems associated with the Work Permit system on Piper Alpha (28); these general and ongoing problems might have been communicated to management had there been an effective safety culture in evidence on the rig (see below).

(c) Further, Work Permit problems may be exacerbated by the use of contract labour, since sub-contractors may be unaware of, or be more likely to ignore, permit systems. It is worth noting that at the time of the Piper Alpha disaster only 37 of the 223 crew were Occidental employees; the rest worked for contractors. Indeed, the production operator working on Phase 1 gas on Wednesday 6th July was a contractor who was working on his own and had only arrived on the installation that day (29).

The peculiar problems posed by sub-contract labour have been recognised by Keith Taylor, the president of the UK Offshore Operators Association (30) and more recently by Shell UK's Managing Director for Exploration and Production (31). In the context of this paper, the issue of contractors raises two important points:

(i) the use of contractors on such a scale as was common Piper Alpha (and indeed other rigs) creates problems in terms of the development of a coherent safety culture, continuity in experience and training, and possession of the kinds of knowledges that workers often bring to bear in the course of 'normal production' (see following section);

(ii) as a group of workers contractors tend to be poorly organised (that is, in terms of unionisation) and thus structurally weaker vis-a-vis their respective 'managements'. This latter point is further reason why rights for workers to participate reactively and proactively in the securing and maintenance of safe working needs to be formalised in law. It is also one justification for the tightening up of the current law on corporate responsibility in relation to safety at work.

TOWARDS IDEAL SPEECH ?

We would argue that the above analysis demonstrates that one precondition of improved safety management in the petrochemical industries is for workers to become subjects in, rather than objects of, health and safety efforts; in this way, their role could be a substantial one. As is clear from even the cursory overview engaged in above at some of the events and factors surrounding the Piper Alpha tragedy, and as has been highlighted in numerous post-accident enquiries, crucial errors in the design, maintenance or operation of particular plants have often been brought to the attention of managements by workers or their representatives prior to the incident in question, only for such warnings to be ignored.

Despite the fact that we have argued that two types of Turner's misinformation, those which we have subsumed under a 'distorted communication', are in principle eradicable, there is a need to consider the extent to which this might be seen to be rational from the point of view of those who own, control and manage offshore oil rigs. Let us be clear, however, that only through understanding certain accidents as the result of negligence, carelessness or general miscalculation on the part of managements - that is, rather than as decisions by managements - does the possibility that it may be in the economic interests of corporate managements that such accidents be prevented emerge. We shall consider this issue below. But let us first say something of how such an eradication may be achieved in practice.

If we posit the concepts of 'distorted communication' and 'ideal speech' as resting at two extremes of one continuum, then changes in the employer-employee relationship which entail any shift towards the 'ideal' end of the continuum will facilitate the prevention of certain forms of industrial accidents. That is, to the extent that workers are granted a voice in safety management, then some of those accidents which might be recognised as consequences of distorted communication may be prevented. We would argue that such a shift - such a granting of a voice - can be achieved through the reactive and proactive involvement of workers in managing plant safety.

A reactive role for workers would entail the fostering of a corporate culture in which workers are encouraged - indeed, required - to use their unique on-the-job positioning to bring what they perceive to be problems with plant, processes or practices to the attention of those with the power to act upon them. Workers would need to have demonstrated to them that managements are prepared to treat such information seriously. That is, they would need to be convinced of the development of, and managerial commitment to, one element of a more general 'safety culture' (32). More tangibly, companies should develop mechanisms whereby workers can get vital safety information 'straight to the top', such communication channels circumventing, where necessary, the usual channels of supervisors, line, and even plant managers. Such systems are a reality in some of the largest American corporations. Indeed, as Ballard has argued, effective mechanisms for communication are particularly crucial in the context of the offshore oil industry (33).

We would argue, then, that workers should be granted formal legal rights to communicate such information - at the very least, the HSE could legislate for the rights of safety reps to have formal safety and health complaints recorded by the company concerned and for a copy of such a record to be held by the HSE itself. Such material, which all too often only comes to light subsequent to any incident, would also provide possible evidence in the wake of any incident that a particular management had not done 'all that is reasonably practicable to ensure the health, safety and welfare of employees'. The recording of such information and knowledge of this possible subsequent use should more positively act as an incentive for an employer to improve standards of safety provision. Coupled with this right to have possibly crucial safety information stored might be a legal responsibility to ensure that safety and health hazards, if known to workers or their representatives, be made known to management; the HASAWACT does, after all, place legal responsibilities on employees also. Such legislative changes presuppose that the Safety Committee and Safety Representatives Regulations (1977) be extended to cover the offshore oil industry.

More important even than such reactive roles, workers need to assume proactive roles in the management of safety. That is, there should be developed mechanisms whereby workers are in a position to use their unique and intimate knowledge of the workplace to contribute to the devising of working practices, to assess the effects of the introduction of new substances or plant into the workplace, and to have a serious voice in staffing policies. Perhaps most importantly, workers need to be given

ongoing, holistic forms of safety training, rather than the limited and piecemeal forms to which they are currently exposed in the petrochemicals industries. Their knowledge of the 'workplace' should then be used to revise and develop such forms of training - and this, presumably, would be perfectly consistent with 'total quality' management approaches. Indeed, poor training in emergency procedures, for example, has been highlighted in the wake of the Piper Alpha disaster as possibly exacerbating the numbers of dead and injured (34), and the area of training has been recognised as one worthy of particular attention (35).

The Health and Safety Executive (HSE) itself has at times at least glimpsed the potentially huge benefits of real workforce involvement in safety matters: 'the best people to ensure that dangers are anticipated and contained are those intimately concerned with work - managers, supervisors, and workers. Accordingly, safety committees should not be devoted entirely to putting over management policy but should allow for contributions via the safety reps to the decision-making process' (36).

It is this lived, on-the-job relation which operators have to the plant that can be so crucial in providing insights into the most effective organisation of safety. This does not necessarily mean that plant managers are "out-of-touch" with the practical realities of the operating of their plant, although this may of course be the case. Rather, it is simply to recognise that such individuals cannot, by definition, possess the same degree of detailed and intimate knowledge of particular processes or plant that an operator acquires as a matter of course. And it must be emphasised that there is a real sense in which workers utilise this knowledge at present - studies of the labour and production processes in the chemical industry have consistently highlighted the necessity of workers utilising (formally unrecognised) skills and knowledges in an ad hoc way to maintain 'normal' production. But the crucial point here is precisely that such 'everyday' interventions are neither recognised nor formally utilised - for it is at this point that a necessary role performed by workers is problematic for employers to recognise.

For clearly, such a role infringes upon managements' rights to manage. Here, then, we encounter a problem for employers in general, and for those who own and control petrochemical plants in particular. While it may in fact be in the interests of profitability to have many accidents prevented, using the resource that workers represent may call into question managerial control over the labour process. That such contradictions should exist for capitalist enterprises is unsurprising; and it is likely that these will only be resolved empirically, in different workplaces and companies, rather than on any a priori theoretical basis.

CONCLUSIONS

Morally, of course, the occurrence of events such as the fire and explosion on Piper Alpha must be prevented. Yet as 'reasonable practicability', risk assessment, cost-benefit analysis, and so on demonstrate clearly, safety cannot be bought at any price. The question 'How safe is safe enough?' is both an economic and political one. Thus while we have argued that reforms towards ideal speech are one precondition of safety improvements, and are practicable in a certain sense, there is a need to consider whether managements would accede to the introduction of such reforms. Here we argue that, in both economic and political terms, the introduction of radical measures to prevent a similar disaster occurring again in the North Sea is perfectly consistent with a long-term capitalist rationality.

One immediate consequence of the Piper Alpha disaster was to further fuel a 'mini-crisis' in the insurance industry. This does, of course, need to be placed in the context of a series of major disasters in the UK during the eighties, but the effects of such a series of shocks will doubtlessly be felt by the offshore oil industry, among others, in the form of increased premiums (37). Indeed, as the post-Bhopal UK chemical industry has discovered, and as has become the case for the asbestos industry, the emergence of a crisis of confidence in a particular industry can lead to fundamental problems of insurance. In this sense, it can only be economically rational for managements to seek to tighten up safety procedure and ensure safer systems of working - the kinds of measures proposed here are radical, but would be a significant step in this direction.

Secondly, and equally likely to concentrate the minds of corporate accounting departments, losses of production associated with a disaster such as Piper Alpha are so enormous as to make their prevention crucial. As Union Carbide discovered, disasters of sufficient scale can threaten the very existence of a corporation; and even in the wake of Piper Alpha, the oil industry suffered financial losses through severe cutbacks in production and therefore revenue.

Thirdly, and related to the latter point, there are political consequences of such disasters. One of these has been an increased level of trade union activity offshore around the issue of safety. The wave of strikes that such activity prompted has caused, and continues to cause, severe disruption to production.

For these reasons, then, it may be rational for those who own and control offshore oil installations to begin to introduce some of the reforms considered here. And this may be rational in a fourth and final sense - it may preempt harsher legal and regulatory reforms in an era in which, as Wells has argued, 'the notion of corporate manslaughter is .. entering popular vocabulary' (38).

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