“Major Even Analysis in the United States Chemical Industry: Organizational Learning vs. Liability”

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AFTER THE EVENT
From Accident to Organisational Learning

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CHAPTER C.2

MAJOR EVENT ANALYSIS IN THE UNITED STATES CHEMICAL INDUSTRY:
ORGANISATIONAL LEARNING VS. LIABILITY

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1. INTRODUCTION

In chapter A.1 two conflicting goals for event analysis were contrasted:

- "that companies, industries and regulatory authorities use event analysis to identify signals for initiating or guiding change in their safety management and regulatory systems".
- "A second, often conflicting goal of event analysis, particularly of single accidents, has been to fix liability, so that punishment can be meted out, or compensation claimed."

Conflict between these goals of event analysis quite logically gives rise to the following question:

Is the goal of using accident event analysis to gather information aimed at improving process safety regulatory and safety management systems compatible with the legal system's goal of establishing possible corporate responsibility as a basis for corporate punishment and victim compensation?

This chapter addresses the question of the compatibility of these two goals of event analysis with a narrow focus on business organisational failures leading to low probability - high consequence (major) accidents in United States chemical manufacturing organisations.
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It concludes that most firms in the United States (U.S.) act as though there is very little compatibility between the learning and punishment goals. Firms appear to believe that the accident investigation methodology most likely to yield information on the prevention of future accidents, is also more likely to yield information that will lead to punishment of the firm and that the resultant punishment exceeds the gains from added learning.

While no numerical data exist to prove this assertion, the literature on accident investigation provides a convincing case that a large majority of firms practice event analysis techniques which they know to be less than optimum for gathering learning on how to improve their management systems because of their concern about punishment. However, there are considerations which make some firms willing to pursue maximisation of the learning goal in spite of the fact that the type of event analysis required to do this is more resource intensive and may also increase the probable magnitude of punishment penalties, all other factors being equal.

The arguments put forth to support this position require perspective on the following:
- Current U.S. public and industry concerns about the consequences of major accidental releases.
- Present industry process safety and risk communication initiatives.
- The positions on process safety of organisations such as the Centre for Chemical Process Safety (CCPS) and the Chemical Manufacturers association (CMA) and the standing of such organisations in US society.
- Existing and proposed Federal and State process safety regulations.

These perspectives are best achieved by reviewing the relevant changes in the US social scene after Bhopal.

2. BACKGROUND

2.1 Setting the scene

Prior to the tragedy at Bhopal in December 1984, major chemical accident occurrences in the United States (U.S.) were followed very closely by professional risk managers. However, most of the attention and energy of chemical executives, US regulatory agencies and the general public were focused on chronic human health and ecological effects.
These public were reflected in the stream of regulations aimed at the chemical industry’s products and operations flowing out of the Occupational Safety and Health Agency (OSHA) and the Environmental Protection Agency (EPA). OSHA’s efforts in the safety area were largely devoted to the prevention of injuries of the more conventional type, i.e., slips, falls and struck-by categories, areas in which the Chemical industry had an exemplary record.

The 1979 accident in the Three Mile Island nuclear power plant profoundly shook the US public’s confidence about the safety of nuclear power plants; they were thereafter viewed by most of society as a significant, dread, disaster threat to the public, and a stream of Federal and state regulations was issued in response to this perceived risk. By and large however, this lack of public confidence and regulations was not extended to the chemical industry in regard to major accident disasters. Flixborough (1974), Seveso (1976) and even the two major disasters in South and Central America (Cubato, February 1984; Mexico City, November 1984) also did not translate into widespread public concerns about major accidents in US chemical plant that might disastrously affect the public. This situation changed completely after the December 1984 disaster at the Union Carbide plant in Bhopal.

Not only was the public’s confidence in the chemical industry shaken; the chemical industry itself questioned whether its provisions for protection against major accidental releases were adequate. After all, the company involved was Union Carbide which had an excellent engineering and safety reputation in the industry. Even the best U.S. companies identified themselves with Union Carbide and if it could happen to Union Carbide, it could happen to them. Further, the belief that major accidents were not likely to have major impacts outside the facility was shattered by the graphic news coverage given Bhopal.

One major US based multinational company’s concerns about the safety of their plants is described by Bowman and Kunreuther (1988). Their paper notes that,

"Within a day of the disaster, it was apparent to Chemco that this was a crisis of major importance which would affect the entire chemical industry. The company viewed the accident as a signal to the public about the potential for future accidents of this type within the United States and Elsewhere. A questionnaire was prepared two days after Bhopal and telexed to all plant managers around the world requesting the following information:

(1) What is the nature of the volatile and flammable chemicals in the plant that might cause catastrophes?

(2) What are the potential population exposures within various distances if an event occurs?

(3) Are there any specific evacuation plans that have been prepared for the community and for the plant dealing with Bhopal-type vapour cloud events?"
Based on my personal experience (as Corporate Director of Safety, Health, and Environmental Affairs of a major chemical company and member of the US Chemical Manufacturers Association’s Safety and Health Committee, before and after Bhopal), I believe that Chemco’s initial responses to Bhopal was fairly representative of the actions and reactions in larger US chemical companies. What the Chemco paper may not convey is the emotional impact that Bhopal had on the industry’s technical self assurance. After Bhopal, and the symbolically linked event at the same parent company’s Institute West Virginia plant, the significance of each new chemical accident and "near miss" was interpreted in a new light by industry, government and the public. Intense public pressure to do something about controlling these imposed, "dread" risks was placed on the relevant institutions (chemical firms, local and federal government, public interest groups, professional and trade associations)

This chapter will try to show that while institutional responses engendered by Bhopal led to radical changes in the process safety risk management paradigms and practice of both industry and regulatory agencies, the shift of accident investigation practice towards this new paradigm has lagged because of industry concerns about liability.

### 2.2 Initial institutional responses to Bhopal

#### 2.2.1 Right-to-Know and emergency response.

The first series of responses occurred in the 1985-1986 period and dealt with citizens "Right-to-Know" and emergency response measures (Hadden, 1989, esp. chapter 2). In 1985, the CMA established the Community Awareness and Emergency Response (CAER) program and the National Chemical Response and Information Centre (NCRIC). This same year saw the beginning of fact finding initiatives by OSHA (special Emphasis Program) and EPA (Chemical Preparedness Program). In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA) (US Government 1986). EPCRA established Local Emergency Planning Committees (LEPC), required many responses from private facilities that handled or stored more than a specified amount of a listed chemical. Among other things, regulated facilities had to give notification of releases that might affect the community, provide an inventory of regulated substances, designate a local emergency coordinator and furnish LEPCs with the information required by them to develop and implement a community emergency response plan (see O’Leary 1993 for details). LEPC’s were obliged to develop and update periodically their own emergency response plans and also to make information on potential risks available to the community upon request.

As Makris (1990) notes, EPCRA addressed the reduction of the consequences from major plant releases in the community (mitigation); it did not address reduction of either the frequency or magnitude of such releases.
2.2.2 Accident prevention. The second, somewhat lagging, series of institutional responses to public concern about major chemical accidents, did address accident prevention. In 1985, very shortly after Bhopal, the CMA published its guidelines on Process Safety Management and the American Institute of Chemical Engineers (AIChE) created the Centre for Chemical Process Safety (CCPS). CCPS is recognised by industry, government and the related risk management/engineering professionals as the premier U.S. technical body in the field of chemical safety. It has produced over 20 monographs in the last 10 years. Each of these monographs has either been written or closely overseen and edited by the leading experts from chemical industry firms, government and academia. While receiving substantial support by industry, it is clear that CCSP's publications reflect a technical consensus that is often at variance with positions put forward by chemical industry associations.

EPA and OSHA also started several initiatives aimed at gathering information about major accident risks. Between 1987 and 1991 OSHA investigated 467 chemically related accidents that resulted in 453 worker fatalities (EPA, 1993).

At about the same time, state governments, starting with California in 1985, passed laws aimed at preventing chemical accidental releases. The "Toxic Catastrophe Prevention Act," probably the most demanding of such state laws, was adopted by New Jersey in 1986. In 1988 CMA started their Responsible Care program, an effort to reduce the "cradle to grave" risks associated with chemicals.

2.3 Further institutional responses to Bhopal

The several "Public Interest" organisations, that had pressed for Federal regulation aimed at preventing major accidental releases since Bhopal, did not believe that the totality of the various institutional accident prevention efforts were adequate. Moreover, several major chemical accidents post-Bhopal, in particular the disastrous accident at the Phillips facility in Texas in 1989, rekindled public concerns (see Mahoney, 1993). The Phillips accident resulted in the death of 28 workers, injury to 125 others and the evacuation of thousands in the community. While insured losses were estimated at about $750,000,000, total losses were estimated to be twice this figure.

In 1990, the CMA promulgated a mandatory Process Safety code which was developed under the aegis of their Responsible Care program. The American Petroleum Institute (API) took similar action. That same year, Congress passed amendments to the Clean Air Act (CAA) mandating extensive regulation of chemical accident risk prevention and mitigation by both OSHA and EPA, as well as the creation of an independent Chemical Safety and Hazard Investigation Board.
On February 24, 1992, OSHA issued its Process Safety Management Standard (PSM) (Federal Register 1992) as required under the CAA. The PSM, by law, was focused on process incidents with the potential for injuring employees. It covered only a relatively small number of facilities and did not address off-site accident consequences or community evacuations, emergency response or Right-to-Know issues. This standard is performance oriented and since it closely tracked recommendations developed by industry (ORC 1985), it met little opposition during OSHA hearings on the standard.

On October 20, 1993, EPA undertook to meet its commitments under the CAA by publishing a proposed Rule entitled, "Risk Management Programs for Chemical Accidental Release Prevention" (Federal Register 1993). The EPA rule addresses process incidents which have the potential to injure ecosystems or people outside the plant gates (see chapters A.4 & C.1 for more details).

Among the requirements in the rule are accident consequence assessment, identification of "root" causes in accident investigations and the production of a risk management plan (RMP) which summarises the key elements of the firm’s risk management program and accident history. Furthermore, the RMP must be sent to federal, state and local authorities who in turn must make it publicly available.

3. DISCUSSION.

There is no single simple answer to the question:

Is the goal of using accident event analysis to gather information aimed at improving process safety regulatory and safety management systems compatible with the legal system’s goal of establishing possible corporate responsibility as a basis for corporate punishment and victim compensation?

Judgement of compatibility depends on both the respondent’s time frame (short or long term) and his perspective (common law, regulatory law, business, ethics, etc.) and the chapter will touch on some of these complexities at the end of this discussion.

The discussion will be developed initially in an intuitive fashion that speculates on how firms might be expected to act given the conventional wisdom available to them. Then we will examine whether actual industry practice follows such intuitive speculation and finally touch on some of the legal/economic analytical work on the compatibility issue.
3.1 Postulates

At the simplest level, where there are possible tort and civil, but not regulatory, actions at issue, the answer to this question is that the two goals are not compatible, if the firm's focus is primarily on minimizing both short term financial impacts to the firm and possible criminal actions against its managers.

This conclusion appears to follow directly if one accepts postulates 1 & 2 (below) and agrees that root cause accident investigation techniques do not yield greater immediate cost/benefit advantages to the firm than "traditional" accident investigation methods which by and large have limited themselves to searching for the cause of an accident in an unsafe act or unsafe condition resulting from employee action or inaction.

By contrast, "root" causes are defined (CCPS 1992) as,

"Prime reasons, such as failures of some management systems, (emphasis added) that allow faulty design, inadequate training or improper changes, which lead to an unsafe act or unsafe condition and result in an incident. Root causes are also known as underlying causes. If root causes were removed, the particular incident would not have occurred."

**Postulate 1** Management failures will predominate in the findings of accident analysis techniques aimed at uncovering root causes for low probability-high consequence process accidents.

Note the following observations in CCPS/AIChe publications:

"An axiom of incident investigation is that process safety incidents are the result of management system failure. Invariably, some aspect of a process safety management system can be found that, had it functioned properly, could have prevented an incident."

"Of course, many causes of incidents can be attributed not to management system failures, but to specific technical or human failures, such as equipment breakdown or operator error. However, experienced incident investigators know that such specific failures are but the immediate cause of an incident, and that underlying each such immediate cause is a management system failure, such as a faulty design or inadequate training". (CCPS 1989)

"That human error is a primary contributor to the failure of systems in the process industry is readily acknowledged. What is not generally recognised is that human error is often a failure of the management system occurring at the manager, designer or technical expert levels of a company." (CCPS 1994)
This view of management failure as the predominant "root" cause of major accidents is not restricted to the US and the CCPS. Hurst et al (1993) maintain that the data from their analysis of 500 reported incidents involving failures of fixed pipe-work on chemical and major hazard plant show that:

"it is potentially within the control of management to prevent 90% of the incidents analysed."

Perhaps somewhat surprisingly, some experienced industry leaders make similar, and somewhat stronger, statements:

"Industrial accidents do not just happen. All accidents are preventable. Management has the responsibility and the ability to control industrial accidents" (Thibaut Brian 1988).

**Postulate 2** Establishing management failure as a "root cause" of an injury is almost certain to increase the likelihood of escalated legal penalties.

This is hardly disputable but in any case the CMA has gone on record to this effect and has stated for the record that, "Findings of accident investigations that are characterised as "root causes" could have a very prejudicial effect in legal proceedings" (CMA 1994)

The depth and breadth of industry concerns about potential legal liabilities and regulatory penalties attendant on an incident investigation finding of "management" failure is evidenced in the almost universal practice of having legal oversight of process safety incident investigation (PSII) teams.

"Legal concerns are now an integral part of every major incident or whenever a non-employee is involved in an incident. In many states it is becoming easier and more common for employees to be litigants. Legal access to documentation of the PSII team deliberations and findings is becoming an increasingly complex issue. Traditional client-lawyer confidentiality is being continuously tested and explored in new ways.

"Often the PSII team is placed in a position between two conflicting forces.

The company's legal department may endorse a position of minimising the retention of documents that have the potential to cause financial damage. Incident prevention specialists and process safety managers may, on the other hand, endorse a policy of through documentation and proactive sharing of lessons learned (including disclosure of actual specific causes of an incident)." (CCPS1994b)

"Since most incidents have legal implications and some have regulatory reporting requirements, the PSII system should include a legal department review of reports required by regulatory groups and of other reports for format and content" (CCPS 1992, emphasis added).
3.2 Worker Injuries

If there are only regulatory violations at issue, i.e., only workers were injured and their recourse is primarily to worker's compensation, then the answer to the compatibility question is also no; the two goals are not compatible, if the firm's focus is primarily on minimising both short term financial impacts to the firm and possible criminal actions against its managers.

This conclusion is again intuitive and it follows after examining the apparent goals of regulatory agency accident investigations and analysing pertinent findings from an accident investigation by OSHA.

Accident investigations by regulatory agencies appear to seek answers to four questions.

- What violation of the regulations led to the accident?
- Who was responsible for the violation?
- Did factors not covered by regulations contribute to the accident?
- Would additional regulation prevent similar accidents in the future?

Findings and corrective recommendations tend to be framed in the context of these questions. Agency investigation teams, like almost all investigation and audit teams, feel that they must justify their activity. This often leads to a bias for making "significant" findings and identifying persons "responsible" for the accident or violation being examined. Of course, after an incident has occurred, one can almost always find the "cause" and someone "responsible" for the "cause" who can be punished.

Thus, Gomber & Yohay (1995) note, "it is well-known that OSHA proposes its highest penalties, driven by allegations of wilful violations, following catastrophic accidents in petrochemical plants" and then goes on to observe "OSHA citations asserting wilful misconduct and "mega-fines" are often a driving force in collateral civil and criminal litigation following an industrial accident".

We turn now to accident investigations by US regulatory agencies.

The conflicting accounts of accident causation put forth by OSHA (1990) and the Phillips Petroleum Company (1990) in regard to the October 23 1989 accident at Phillips's Houston Chemical complex, illustrate several points of interest. This accident involved a massive release of ethylene and subsequent explosions and fires which resulted in multiple deaths and over $1x10^9$ dollar loss.
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1) Neither the OSHA or the Phillips's investigations appear to have pursued the underlying cause of the accident to any significant degree.

2) Many of the conclusions drawn were diametrically opposite.
   - OSHA found that Phillips was responsible for "intentional disregard of, or indifference to, the requirements of the OSH Act and the regulations issued under that Act".
   - Phillips found that "The accident was caused by a violation of well established and understood procedures, and that other possible causes such as design, construction, quality of materials and established procedures were not implicated" and that "the design of the Plant V, reactor 6, and the associated product recovery system and the procedures for following them are safe".

3) OSHA based some of its findings and citations on the allegation that "Phillips had not acted upon reports issued previously by the company’s own safety personnel and outside consultants who pointed out unsafe conditions".

4) Phillips countered that "All recommendations-- both from the outside consultant and from our own safety personnel-- were carefully reviewed and considered and actions taken where appropriate." (emphasis added).

5) In its general findings, OSHA concluded that it needed new regulations covering process safety management, should examine the use of contractors by the chemical industry and would give higher priority to "catastrophic events in the chemical industry".

The use by OSHA of internal audits and documents, as noted in the Phillips's citations, has an obvious effect on the type of accident investigation that a firm chooses to use (see below). It is easy to see why punishment might dominate other considerations in choosing accident investigation approaches.

It also affects other aspects of a firm's safety program: firms often discourage technical people from generating written audit reports about unsafe items or a near-miss, until the firm decides whether it will remedy the item noted, or if not, whether it can generate a credible written report as to why the firm chose not to take any action.

These considerations are pertinent to our subsequent discussions on designing regulations aimed at achieving an optimum balance between prevention and punishment.
3.3 Evidence on Goal Compatibility: The Nature of Actual Accident Analysis Techniques used by US Chemical Firms

The conclusions drawn in the last two sections are somewhat simplistic and intuitive; however there is evidence to support the thrust of these conclusions. This evidence is based on industry practice in regard to the choice of accident analysis methodology.

Firms are legally required to do some type of accident investigation after most significant accidental releases and certainly after any accident that causes significant human injury. The choice that a firm faces is not whether it should do an accident investigation but what kind of investigation to do. In making this choice, the firm might be expected to choose the accident analysis method that maximises its net benefits. The accident analysis methodology available to the firm ranges from the traditional approach (i.e., finding the individual who made an error leading to an "unsafe act" and/or "unsafe condition", determining the error s/he committed and using this information to modify the responsible individual's behaviour) to one of the several methodologies aimed at identifying root causes and then using this information to modify the system(s) that failed.

Which approach to accident analysis approach does US industry favour?

Accident investigation in the United States chemical industry can be characterised by the following observation made in the 1994 CCPS publication "Guidelines for Preventing Human Error in Process Safety" (CCPS, 1994b).

"the data collection approaches adopted in most (emphasis added) Chemical Process Industry incident reporting systems (...) provide little support for systematically gathering data on underlying causes"

While there are no statistical data cited as a basis for this observation, there is every reason to grant it high credibility. As noted in the preface to this CCPS book, it

"is the result of a project in which a group of volunteer professionals from CCPS sponsor companies prepared a project proposal and then worked with the successful contractor, Dr. David Embrey of Human Reliability Associates to produce this book".

Perusal of the "acknowledgement" to this book shows 30 individual contributors, 16 of which came from leading US chemical and the other 14 from a variety of academic, research and consulting institutions. If the opinion of this group is biased, it is probably in the direction of reflecting accident investigation practice in the "best" companies, all of whom can be expected to be aware of the latest accident analysis approaches available.
This finding on the actual accident analysis methods predominately used by chemical firms leads to an apparent contradiction. On the one hand, if one assumes that the market is reasonably efficient and therefore chooses the accident analysis approach that yields the greatest net benefit package for firms, then one concludes that traditional systems offer greater net benefits to firms than root cause system analysis approaches. On the other hand the technical community almost universally believes that root cause analysis systems as a class offer greater net prevention benefits to firms than do traditional approaches, all things being equal.

The contradiction arises because all other things are not equal. More specifically, firms believe that the management failures identified by root cause system analysis lead to punishment penalties that significantly exceed the costs of lower prevention effectiveness experienced with traditional accident analysis.

It would be interesting to collect and research alternative explanations for this observation on actual industry practice. One alternative explanation for the predominant use of traditional systems might be that the newer analysis systems are not widely available to firms. This does not seem likely since they are well described in the literature, strongly advocated by industry technical employees and are widely available through consulting firms. Another more likely explanation is that even if finding and correcting root failures is cost effective over the longer term, they are not so over the short term and the responsible managers are focused on short term financial returns which determine their compensation.

3.4 Minority Practice

Why do a significant minority of firms pursue accident event analysis to gather information aimed at improving their safety management systems despite what appear to be significant punishment deterrents?

Some companies (Dowell, 1990) appear to have elected nevertheless to do some form of root cause incident investigations. The potential inducement for such companies may be the expectation that the number of future incidents experienced will be reduced as a result of more open and complete incident investigations and the belief that the reduction in the number of losses will be relatively greater than the increase in punishment costs resulting from the inclusion of management failures in accident reports.
In assessing the importance of punishment penalties, one must also take into account factors other than cash fines. For firms that have only a single facility producing a critically important material, a major accident can threaten the firm’s very existence. There are a host of other intangibles, such as the loss of credibility and legitimacy (Rosenthal, 1993), damage to the firm’s social franchise to operate, and damage to relations with regulatory agencies.

Some examples are:

- Chemical Worker’s Unions and Community Advisory Panels, organised by chemical companies under the aegis of CMA’s Responsible Care program, expect open and full reports on the lessons from an incident investigation and follow-up on corrective actions.

- Accident investigation reports such as that from Phillips which maintain that "the accident was caused by a violation of well established and understood procedures" make communities subject to such imposed risks question whether they wish to have their safety depend only on what the company can do in correcting worker errors.

- In order to reassure communities that a recent accident will not reoccur, some companies have even gone to the length of allowing local community groups to hire an independent firm, at the companies expense, to audit the companies accident investigation (Community Liaison Committee, 1994). Such companies are at risk if their accident investigation is subject to an independent audit’s finding that the firm dealt only with the immediate accident cause and left the underlying system faults in place.

These intangible losses can be much more "costly" than actual cash punishment penalties. Where the cost of these "other than punishment penalties" is large enough, firms will have an incentive to reduce both the number of accidents and any appearance of "cover-up".

3.5 Reducing the Incompatibility

Calabresi (1970) stated that the principle goals of any system of accident law are that, "first it must be just or fair and second it must reduce the (social) cost of accidents". In his further discussion of these objectives Calabresi accords primacy to the cost goal, views justice more as a constraint than a goal and regards compensation as another facet of social cost reduction/internalisation.

More than twenty years later, Priest’s discussion (1990) of the principles that govern modern accident law in the United follows Calabresi in regard to focusing major attention on the internalisation of social costs but separates out compensation issues in a second principle of accident law.
"The first principle of modern law creates incentives for parties to invest to reduce the accident rate by defining a legal standard that threatens to charge parties with the cost of injuries if they fail to make risk reduction measures. The underlying idea is to reduce the accident rate by making it cheaper for a party to invest in risk reduction than to pay damages for the unprevented injuries".

There appears to be a consensus among economists that government should approach the deterrence of corporate failures and "crime", e.g., failures to take optimal care, etc., by imposing fines equal to the net social cost of the crime to others divided by the probability of detection (Becker, 1989)

Priest goes on to note that this "first principle" has been widely accepted in the courts and the Academy and that "Indeed it is impossible to find even the speculation that the society would not benefit from its careful implementation". However he notes that this wide acceptance of the first principle does not hold for the second (compensation) principle, "injuries that cannot be practicably prevented, liability will be assigned to the party that was in the relatively better position to spread the risk of the injury".

In practice, the application of the second principle is a relatively minor consideration in regard to our present focus which is the corporation and major accidents. The reason for this is that since processes capable of giving rise to major accidents are almost always intrinsically hazardous, there is little question about corporate responsibility for "victim" compensation: the corporation will be held responsible, though it may in turn seek to recover damages from its contractors and suppliers.

Our question then narrows down to, can the conflict between the goals of increased corporate learning from event analysis and punishment be resolved in the case of major accidents? There is reason to believe that this conflict can be substantially reduced if not completely eliminated by shifting away from a strict liability rule. Arlen (1994) outlines and discusses three such alternative approaches in her general discussion on the perverse effects of corporate criminal liability.

These three approaches are,

- A negligence based liability rule under which the firm bears no liability if it engages in efficient enforcement (due care).
- Mitigation provisions, under which incurring efficient expenditures reduces the corporate fine but does not absolve the firm from criminal liability.
- A modified "evidentiary privilege" under which any information disclosed by the corporation can be used to prosecute wrongful agents but cannot be used against the corporation in criminal or civil litigation.
Arlen believes that the straight negligence rule is superior to the other two alternatives.

Clearly adoption of any of these three alternative approaches would supply an incentive for "root" cause accident investigations which are likely to uncover failures in management systems. However the negligence rule would provide the strongest incentive for modifying process safety systems in accord with such "root" cause and other lessons.

There has been some movement to modify strict corporate vicarious liability through use of a modified "evidentiary privilege" at both the federal and state levels. This is also reflected in the 1991 US Sentencing Commission's Guidelines and more recent initiatives by EPA on environmental self audits (EPA, 1995). While these changes somewhat reduce the conflict between the learning and punishment goals in regard to criminal and regulatory penalties, they do little to protect the firm, in civil suits under the common law. After an accident occurs, plaintiffs can use the firm's findings of management system failures in an attempt to prove gross negligence leading to large punitive awards which may dwarf avoided regulatory and even criminal penalties (Gomber, 1995; Ainsworth, 1995).

4. CONCLUSIONS

At present, it appears as though most firms in the United States find little compatibility between the social goals of learning and punishment in regard to the investigation of major chemical accidents. On balance, the author believes that with notable exceptions, most firms carry out their accident investigations with a stronger emphasis on avoiding punishment than on learning. Given the magnitude of the punitive civil penalties exacted even in the absence of what juries judge to be serious human injury, this is not surprising.

A number of legal approaches for re-balancing the punishment - learning goals have been proposed in an effort to promote learning and thereby accident prevention. However as of the present none of these has made significant political progress.

REFERENCES

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In the next two chapters the focus moves to Europe. Becker's analysis of the German nuclear industry reveals that there are many other pressures apart from concerns with legal liability which can throw up barriers to organisational learning.

He introduces the dynamics of reward and punishment within companies which set in motion self-protective mechanisms which mitigate against accepting evidence that the organisation has failed. The problems are likely to be particularly great in persuading higher management levels to accept the need to learn. He makes suggestions for designing an organisational learning system to counter at least some of these problems.