

**ASBESTOS AND POLLUTION RESERVING
WORKING PARTY**

1997 GENERAL INSURANCE CONVENTION

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ASBESTOS AND POLLUTION RESERVING WORKING PARTY

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1 INTRODUCTION

There has been a large increase in interest in latent claims over the last decade as many London Market insurers and reinsurers have suffered large volumes of asbestos and pollution claims from the United States. The aim of this paper is to bring together the publicly available information on each claim type and describe some of the methods which are used for reserving purposes. In each section we have considered the following areas:

- the background to the losses including key legislation and the type of insurance policies which have been affected or may be affected in the future
- the size of the problem including the effect on insurers to date and available estimates of insurers' ultimate claims
- key outstanding legislative and legal issues
- reserving techniques used including the recently developed "exposure based" methodologies.

The sources of information we have used for this paper include academic papers, press articles, court documents, actuarial papers and publications produced by insurers and other organisations with an interest in latent claims. The most important sources are listed in the references section at the back of the paper. This paper is largely a summary of available information and techniques.

We have only considered asbestos and environmental claims which may have a material effect on London Market insurers and reinsurers. Our attention has therefore been focused on asbestos and pollution claims from the United States. We have also briefly considered the potential for European pollution claims as many commentators believe that such claims could have a material effect on liability insurers and reinsurers. We have not looked at European asbestos claims as the effect on the London Market is likely to be relatively small. Claims for asbestos related diseases in the United Kingdom are usually made on employers' liability policies and rarely reach the reinsurance retention. We have not considered asbestos or pollution claims from outside the United States or Europe.

Section 2 considers US pollution claims, section 3 looks at US asbestos claims and section 4 discusses the possibility of pollution claims emerging in the future on UK risks.

2 US POLLUTION

2.1 Background

2.1.1 Brief history of how the problem has developed

US pollution, in the context of the problem faced by the London Market, refers to claims arising from damage caused by the gradual seepage of hazardous waste into the environment and impacting general liability policies. Claims impacting policies specifically written to cover environmental releases and claims arising from accidents at a specific point in time, such as an oil tanker disaster, are not considered in this section.

Environmental damage by hazardous waste has been occurring for decades but, until the late 1970s, there was little pressure for anyone to do anything about it. However, Love Canal (a highly publicised, heavily polluted site) caused public outrage and the US politicians had to be seen to do something in response. As a result, the Comprehensive Environmental Restoration Compensation and Liability Act (CERCLA) was passed in 1980.

CERCLA has the aim of 'polluter pays', regardless of whether the alleged polluter was acting within the law at the time of polluting. CERCLA imposed strict and retroactive liability on potentially responsible parties (PRPs). CERCLA has been treated as joint and several by the courts so, in theory, any party with any involvement whatever on a site can be made to pay for all the costs associated with cleaning up that site. CERCLA was reauthorised in 1986 as the Superfund Amendment and Reauthorisation Act (SARA) and again in 1990. This made CERCLA even more punitive.

The name Superfund refers to a fund that was set up by taxing chemical goods in order to pay for cleanup of sites which have no PRP, or to fund the quick cleanup of 'emergency' sites, the costs of which could then be reclaimed from the PRPs.

Superfund legislation has been heavily criticised by many parties. Besides allegations of unfairness and unreasonably high standards of cleanup (from PRPs and insurers), there is much criticism that Superfund legislation simply is not working as had been initially intended. Vast sums of money are being

spent on litigation rather than cleaning sites and, once started, the process of cleaning up a site often takes many years.

Polluted sites vary widely in size and the most common contaminants are solvents and other organic compounds. The worst polluted sites are placed on the National Priorities List (NPL) which is maintained by the Environmental Protection Agency (EPA).

There are many sites which have not, and are unlikely to ever be, placed on the NPL. These non-NPL sites are outside of federal law and it is the responsibility of individual states to decide on the level of cleanup required and to enforce the cleanup. Other cleanups happen privately and voluntarily. As well as maintaining the NPL, the EPA also maintains the CERCLA Information System (CERCLIS), which, until recently, listed all known contaminated sites in the US, regardless of whether cleanup will be required, although a large proportion were removed in 1995.

2.1.2 Source of claims and policies affected

Most industrial companies in the US have a pollution problem to some extent and are likely to have bought comprehensive general liability (CGL) insurance policies throughout the years of their existence. Pollution claims tend to arise from the premises/operations coverage afforded by these policies.

The costs associated with cleaning up a site tend to be spread over the years where the pollution allegedly occurred and are allocated to policies over these years. Each site is allocated separately. The combination of allocating costs over years and not aggregating sites together leads to a large number of small claims. This approach is not universally accepted (see section 2.3.1).

The years of insurance involvement frequently begin in the 1950s, 1960s or 1970s and end in the 1980s.

The London Market tended to write excess layers, as opposed to the primary layers, so insurers may only be impacted by the largest sites. However, in the early years of involvement, many excess policies had low attachment points, so London insurers

may pick up significant claims from attritional losses (sheer volume of small losses from lots of small sites). There is rarely a (horizontal) limit to the coverage available.

This contrasts to asbestos losses which are usually covered under the products section of general liability policies and are limited by a products aggregate limit. There are also fewer companies involved in the asbestos problem - a high proportion of the liability is concentrated in less than 100 companies. Excess policies of an asbestos producer are highly likely to be impacted (and may be exhausted) as all injury caused by an asbestos product is aggregated together as one claim.

As well as the exposure to direct pollution losses from the general liability policies, the London Market also has suffered pollution claims on reinsurance and retrocessional policies (both treaty and facultative) written to protect US insurance companies and other London Market insurers.

Elements of the total direct pollution claims an insurer may have are:

1 *Costs associated with the actual cleanup of the site.* This will usually include initial costs such as carrying out a remedial investigation and feasibility study (RI/FS) to decide on what needs to be done and any emergency work that may be required prior to the general cleanup. Then there will be the cost of cleanup itself, often referred to as remedial action. Once the site has been cleaned up, further costs may be incurred on an ongoing basis, for example groundwater pumping and treatment. These are referred to as operations and maintenance (O&M) costs and may last for thirty years for any given site.

2 *Third party bodily injury or (non-remediation) property damage claims.* The release of hazardous waste may also give rise to bodily injury liability as a result of, for example, causing cancer or birth defects and any subsequent medical monitoring expenses. It may also give rise to property damages such as loss of property values as a result of being next to a polluted site. Such suits are not included within CERCLA and hence anyone filing a suit of this type must use the normal tort law system.

3 *Natural resource damages.* Such claims may arise if the remediation of a site does not restore damage done to the environment beyond the site. For example, a lake downstream from a polluted river may not be at a suitably clean level even though the site which caused the pollution has been remediated. CERCLA allows claims to be made for restoration of a natural resource as well as paying for the loss of use of the resource from the initial polluting date up to the date of restoration.

4 *Defence costs.* Before a PRP goes into battle with its insurers about whether any cleanup costs are covered under its policies, it will usually defend itself against the accusation that it was involved in polluting the site, or against its share, or the remediation deemed necessary. The primary insurer often has a duty to defend the PRP. Primary policies tend to be 'costs in addition', which means that they have to pay for the cost of defending the PRP, without limit, until all the policy limit has been used up for indemnity payments. Excess policies tend to be 'costs inclusive', which means that the limit to the policy is the maximum that will be paid out for any one site, regardless of whether it is expenses or indemnity. Some policies are indemnity only. London Market companies, being mainly excess writers, can be expected to have a significantly smaller proportion of total claims arising from defence expenses than a US primary writer.

5 *Coverage litigation / Declaratory Judgement (DJ) costs.* These are costs that an insurer can expect to incur in defending itself against PRPs who are seeking insurance coverage.

6 *Other expenses associated with pollution.* An example of these are the invoices of US attorneys representing LMCS subscribers when calculating reserve potentials often called London Representation costs.

The distinction is often made between cleanup costs and transaction costs, where items 1 and 4 make up the majority of an insurers cleanup costs and item 5 makes up the majority of the transaction costs.

2.1.3 Other issues of relevance

This section describes a few other pollution terms/issues which did not fall naturally within the first two sections.

Some sites are owned by the US federal Government and the pollution has been largely caused by a federal organisation such as the Department of Defence. The Government will pay for most of the cleanup of these sites and little liability should arise for insurers (with the exception of one very large site). Many market level estimates of the total costs associated with pollution exclude federal sites.

Sites where a PRP cannot be found are called orphan sites. For many sites less than 100% of the liability is allocated amongst PRPs. The unallocated portions are referred to as rise to orphan shares. The EPA pays for orphan sites and orphan shares from its funds. As for federal sites, no liability should arise for insurers.

Pollution damage has been alleged from underground storage tanks (USTs) which typically contain petrol and exist under petrol filling stations. There are a huge number of USTs and any claims arising from them are likely to be confined to petrochemical companies. USTs are usually excluded from ultimate site count and average site cost estimates. Average costs tend to be under \$250,000 so there is likely to be little impact on London excess policies.

The Resource Conservation and Recovery Act (RCRA) was passed in 1976. Sites may become RCRA permitted, which means that some hazardous wastes on the site will be tracked 'from cradle to grave', engineering standards will be set and monitored and 'financial responsibility amounts' are provided for any required remediation. The purpose of the Act was to control future pollution. However, there is a possibility that RCRA sites may become too expensive to remediate with the financial responsibility amounts and that they may move outside of the RCRA. As for USTs, most studies exclude RCRA sites.

When the EPA adds a site to the NPL, it assesses the type of remediation that will be required and estimates the cost of the cleanup. Such an assessment is called a Record of Decision

(RoD) and a site may have further RoDs which replace the previous one. RoDs are publicly available and are an excellent starting point when trying to generate distributions of NPL site costs. The University of Tennessee's latest study used RoDs and adjusted them as they thought appropriate (for example increasing estimates that they believed understated) when estimating the ultimate cost of NPL sites. A database is available from the University of Tennessee of the RoDs used in their study. Note that a site may have more than one 'operable unit', each of which may have its own RoD. Therefore there may be more than one current RoD at a site.

2.2 Size of the problem

2.2.1 Market level estimates

Numerous publications have attempted to assess the scale of the US pollution problem. When comparing the various studies, it is essential to ensure that differences in what is trying to be estimated are taken into account. For example:

- Is the total cost defined as the ultimate universe of the problem or that to the US insurance industry?
- Are all types of costs included?
- Are the estimates discounted or undiscounted?
- Are the estimates in respect of all sites or just NPL sites?
- Are the estimates ultimate or unpaid?
- Are insurance estimates gross or net of reinsurance?

In March 1994 BestWeek attempted to estimate total cost of pollution losses (including non-insured losses) in the United States. A wide variety of commentators had predicted the ultimate number of NPL sites between 2,000 and 10,000. The average cost of cleanup at each site had been estimated as between \$25 million and \$100 million. BestWeek presented three scenarios with the 'expected' scenario based on 4,600 sites at an average cleanup cost of \$60 million per site producing total cleanup costs of \$275 billion for NPL sites. Insurers litigation costs, third party costs and natural resource costs were estimated to add a total of \$173 billion to the total cost of NPL

sites giving a total of \$448 billion. US insurers and reinsurers were expected to pay a total \$170 billion for NPL sites with the remaining \$278 billion uninsured or paid by non-US insurers or reinsurers. BestWeek added 50% to this estimate to allow for non-NPL sites to arrive at total estimated undiscounted claims for the US insurance industry of \$255 billion.

Since this report, further studies have estimated the size of the US pollution problem to be considerably lower. The following table summarises the central estimates by various organisations of the ultimate undiscounted universe of the non-federal NPL cleanup costs:

Ultimate undiscounted universe of the non-federal NPL cleanup costs including non-insured costs Researcher	Ultimate NPL count	Average cost per site (\$millions)	Ultimate NPL cost (\$billions)
Congressional Budget Office (CBO) [Jan 1994]	4,500	37	167
BestWeek/A.M.Best [Mar 1994]	4,600*	60	275
Brookings Institute/Resources for the future [Jan 95]	4,500	29**	131
American Academy of Actuaries [Aug 95]	2,000	40	80
University of Tennessee [Sep 95]	2,100	38	80
Standard & Poors [Oct 95]	5,400	31	167
BestWeek/A.M.Best [Jan 1996]	2,100	37	78

* including federal sites

** discounted O&M costs

The final column is simply the product of the previous two.

Of the estimates above, the authors believe that most credibility should be placed on the American Academy Of Actuaries report. The members of their Environmental Liabilities Work Group have analysed results of previous studies and used their own experience and judgement to arrive at their estimate. It is possible that their estimates are not entirely independent of the University of Tennessee estimates.

The most significant reason for the large reduction in the estimated ultimate NPL costs between the BestWeek reports in 1994 and 1996 is the reduction in the estimated ultimate number of non-federal NPL sites. There are two reasons for this:

- additions to the NPL in recent years have been slow (around 50 per year) and projecting these forward using seemingly sensible estimates (American Academy of Actuaries used 50 sites per year for 1995-2000, 30 sites per year for the following ten years, 20 sites per year for the ten years after that and 10 sites per year up to 2030) arrives at a number of approximately 2,000. Arguably, given the next bullet point, the estimate of 2,000 may be too high.
- budget pressures on the EPA will constrain its ability to place large numbers of sites on the NPL.

As well as aligning their ultimate NPL estimates with the American Academy of Actuaries and University of Tennessee estimates, the latest BestWeek report also estimates the ultimate cost to the US insurance industry of the pollution problem and breaks this down into informative categories:

All costs are net of reinsurance and are undiscounted			
Component	Cost (\$bn)	Component	Cost (\$bn)
NPL cleanup costs	18	Paid losses	11
Other NPL costs	12	Carried reserves	14
Non NPL costs	36	Unfunded liabilities	41**
Total	66		66

** BestWeek estimated the discounted value of this amount to be \$18bn, based on their own cash flow patterns and a discount rate of 4.5% per annum.

The estimate of \$66 billion is fairly consistent with the findings of a survey undertaken by the American Academy of Actuaries in 1996. They asked a number of chief financial officers (CFOs) and consulting actuaries their views on a number of matters relating to asbestos and pollution claims. The table below is taken from their publication:

Magnitude of ultimate pollution losses for the US insurance industry		
Estimate (again, net and undiscounted)	CFOs	Consulting actuaries
Under \$30 billion	1	0
\$30 - 50 billion	3	3
\$50 - 70 billion	6	0
\$70 - 100 billion	5	2
Over \$100 billion	4	3
No response	3	1

As the table reproduced from BestWeek shows, the non-NPL cost to the US insurance industry is now estimated to be 55% of the total cost. However, there is little information available on these sites. At the start of 1995 CERCLIS was running at around 38,000, but 24,000 sites have been removed and handed over to the states on the basis that no further remedial action was planned.

States maintain their own lists of waste sites. The University of Tennessee in their 1991 study estimated that there would ultimately be a total of 100,000 sites (state and NPL), not all of which would require remediation. The study estimated the number of non-NPL sites requiring remediation to be 24,000, although this was highly subjective. Other estimates tend to fall somewhere between these two numbers.

Estimates of non-NPL site costs are also few and far between. Many non-NPL sites are likely to be small enough such that, after spreading the loss over a number of years, little liability if any will impact insurance policies. There will be, however, some very large non-NPL sites.

A significant difference in average cleanup costs has been identified depending on who is performing and/or paying for the cleanup process. The CBO paper referred to a study which categorised cleanups as being one of three types:

- a. directly by the EPA (i.e. paid for out of the Superfund)
- b. by private parties under the supervision of the EPA
- c. wholly private cleanups

Having attempted to standardise the sample of sites within the study (e.g. for volume of waste, pollutant type and cleanup technology) the study indicated that category 1 costs 15% more than category 2 and 32% more than category 3. These reductions, often referred to as PRP-led efficiency savings, are not likely to affect transaction costs.

2.2.2 Development of insurance claims to date

Little claim activity happened in the 1980s. The number of US pollution direct claims didn't begin to become significant until about 1990. The authors are not aware of any survey which shows when insurance organisations started to strip pollution out of their general liability triangles, but believe that on average it will have been in the early 1990s.

US reinsurance and retrocession claim and reserve development lagged the direct claims development, partly as a result of the usual insurance and reinsurance chain process, but exaggerated because of direct writers unwillingness to admit that there was a potential liability. However London Market companies have been receiving proofs of loss, from US cedants in particular, over the last few years as they attempt to reclaim some of their pollution outgo.

US insurers and reinsurers are required by the National Association of Insurance Commissioners (NAIC) to disclose a five year history of their environmental (and asbestos separately) reserves and claim payments, both on a net and gross basis. This disclosure, referred to as Footnote 24, was first required with the 1995 statutory filings. Note that Footnote 24 has been renamed Footnote 25.

Analysing Footnote 24 is the easiest way of studying claim and reserve development at the US industry level. BestWeek have analysed these filings across the whole industry and published their findings in a July 1996 report.

The key environmental statistics are shown in the table below:

	1991 \$bn	1992 \$bn	1993 \$bn	1994 \$bn	1995 \$bn
Beginning net reserves	3.8	4.7	6.2	7.7	9.7
Plus net incurred losses in year	1.6	2.3	2.7	3.3	6.8
Less net paid loss and LAE	0.8	1.0	1.2	1.4	1.8
Ending net reserves	4.6	6.2	7.7	9.7	14.7
Net/gross ratio (%)	68.2%	68.4%	67.8%	69.8%	71.8%
3-year survival ratio (years) *	5.6	6.9	7.6	8.0	9.8

* Calculated as (Current reserve) / (Average of payments in previous three years)

A key conclusion from this analysis is that there was a significant one-off reserve strengthening exercise in 1995. Another observation is that the outwards reinsurance recovery rates shown are higher than most commentators previously expected. For example, the 28% recovery rate for 1995 compares with BestWeek's original estimate of 13%. The data by insurer is readily available and can be quickly analysed with the aid of a spreadsheet.

The Department of Trade and Industry (DTI) asked UK insurers to provide further details of their US asbestos pollution and health hazard exposures in January 1997. The information requested includes details of paid, outstanding and IBNR claims, claims arising from the largest sites or pollution cedants affecting the (re)insurer and claims arising from the largest asbestos defendants or cedants affecting the (re) insurer.

2.3 Key outstanding issues

2.3.1 Trigger of coverage, occurrence/event definition and allocation

The trigger of coverage is the date the injury or damage is deemed to have taken place. In traditional claims, the date of loss is easy to determine. For example, a bodily injury claim arising from a car accident will be filed against the policy which was in force on the date of the accident. However, in the case of environmental claims, it is often difficult to determine precisely when the injury or damage has taken place as this may have occurred cumulatively over a period of years. There are however four principal trigger theories that have been adopted by the US courts:

- *exposure* - each insurance policy on the risk during the period in which waste is released into the environment is triggered.
- *manifestation* - each insurance policy on the risk on the date that policy damage is discovered is triggered.
- *injury-in-fact* - each insurance policy on the risk on the date that bodily injury or damage is established

through actual proof that the injury or damage was sustained, is triggered on a case-by case basis. Based upon the evidence submitted, injury-in-fact may be determined as occurring at any time from exposure to manifestation, inclusively.

- *continuous trigger* - all insurance policies on the risk beginning at the time of first exposure through the date of manifestation are triggered.

Considerable litigation continues to surround the issue of trigger of coverage. Different triggers are used in different states and sometimes apparently inconsistent approaches are taken in individual cases heard in the same state.

For inwards direct business an occurrence is usually defined as per site per year. However, this is not always the basis of presentation of claims for inwards reinsurance business. For example, a cedant may attempt to maximise its outwards reinsurance recovery by including all sites of an assured within the definition of an occurrence. London Market writers of inwards reinsurance and retrocession must be alert to primary writers in the US carrying out a settlement with an assured where the definition of an occurrence is deliberately defined to pass the liability on to the reinsurer, rather than basing the occurrence definition on the actual policy wordings.

In theory once the trigger of coverage has been decided, allocating liability across years and then to policies should be a fairly mechanical process. For example, if damage was deemed to have occurred from 1961 to 1975, then 1/15th of the liability will be allocated each year affected and then up the layers for each year.

In practice however, allocation may be more 'All sums'. Policy wordings usually contain the phrase '[The insurer] hereby agrees to pay on behalf of the insured all sums which the insured shall become legally obliged to pay as damages'. Some insureds have taken this to mean that once a coverage block has been triggered, any one policy is liable for all the liability up to its limits, hence allowing the

insured to cherry pick those years which best suit it (for example picking years with no/low self insured retentions, no pollution exclusions or where insurers are still solvent). It is then up to the insurers in the target year(s) to collect contributions from other insurers within the coverage block. As well as increasing the total insurance liability, there will be serious cash flow implications for the insurers in the chosen years. It is important to note that 'all sums' has not been accepted by any US Supreme court to date and is shown here for illustrative purposes.

In the authors' experience, nothing fundamental has changed or been resolved over the past couple of years. Considerable uncertainty still exists as to the final way in which many of the key states will decide to trigger coverage.

2.3.2 Insurer defences - Win factors

Insurers maintain that the policies that are being claimed against were never intended to cover gradual pollution. When a PRP files a gradual pollution claim against a general liability policy, the insurer is likely to deny coverage and the two parties end up arguing the case in a court in the US. The insurers have a number of defences:

- *As damages* - most CGL insurance policies state that an insurer will only be required to pay sums that its policyholder becomes legally obligated to pay 'as damages' arising from a covered occurrence. Insurers often argue that cleanup costs incurred by the policyholder (under threat of litigation) do not constitute sums that the policyholder is legally obligated to pay 'as damages'. The majority of courts have ruled in favour of policyholders, either as the costs are plainly damages, or because the term is ambiguous and must be construed in favour of the policyholder.

- *Expected and intended* - the standard wording of CGL policies excludes losses that are expected or intended by the insured. It is difficult to draw trends in the success of this defence as each case is litigated on the basis of the facts specific to that case.
- *Pollution exclusion - sudden and accidental exception* - most CGL policies issued between the early 1970s and the mid-1980s contained 'the Qualified [pollution] exclusion' which allows pollution claims only if the discharge, dispersal, release or escape is sudden and accidental'. Courts in most states have agreed that 'accidental' means unexpected and unintended. However, courts are divided over the proper interpretation of the term 'sudden'. Most states interpret 'sudden' to have a temporal meaning and hence conclude that the exclusion holds. However, some say 'sudden' does not have temporal meaning or is ambiguous and rule in favour of the policyholder (i.e. the exclusion does not apply).
- *Late notice* - most occurrence based insurance policies require the policyholder to give notice to the insurer within a period of time after learning of an event or development which might result in a claim under a policy. In some states, the insurer is entitled to deny coverage if the policyholder unreasonably delayed in giving notice, regardless of whether the insurer suffered any prejudice as a result. Other states have abandoned the 'traditional approach' in favour of the 'modern trend' in which the insurer is not allowed to deny coverage merely because the policyholder has delayed giving notice. Prejudice must be proved, with the degree of prejudice and who has the burden of proof varying from state to state.
- *Absolute pollution exclusion* - this was introduced almost universally in 1986. As its name suggests, any pollution related claim is excluded. This exclusion has worked in almost every case.

- *Owned property* - CGL policies usually exclude claims stemming from the cleanup of an insured's own property. The exclusion is strong as long as there is no danger of off-site contamination and/or groundwater involvement (which is often the case).
- *Duty to defend* - in most CGL policies the insurer agrees to defend any suit against the insured seeking damages under the policy. This is largely an issue for primary writers, who generally have costs in addition policies. Higher layer insurers (like the London Market) will not pay defence costs until the indemnity reaches their layer. The issue at stake is whether the insurer has to defend prior to a suit being filed; courts are divided on this issue.

The policy wording will also be critical. Different courts in the same state may come up with contradictory decisions on two similar cases. The above defences have been argued for many years now although, as indicated, many are far from a universal conclusion.

There are some other more recent issues which may have a significant effect on the London Market. One such issue is whether remedial/investigative and feasibility studies are classed as expenses or indemnity. One policyholder has argued, successfully at Supreme Court level, that they should be treated as expenses. Another policyholder of which the authors are aware has been successful at lower courts in other states. This is bad news for primary writers, whose policies are generally costs in addition, and conversely good news for excess writers such as the London Market.

American Re-Insurance Company's publication 'Environmental Coverage Case Law' lists many of the key court verdicts under a number of sections, including pollution exclusions (absolute and non-absolute) and owned property. It also has sections dealing with triggers of coverage and number of occurrences (relevant for previous section). This publication may be of use as a starting point when formulating the win factor suite of a direct pollution model.

2.3.3 Choice of law

The success or otherwise of each of the defences discussed above depends on a number of factors, one of which is the state law which will apply to the case. Before any of the issues above are litigated, the applicable state law must be decided by a court. Each state has its own choice of law rules, but one of three rules tend to be followed by most courts:

- 1** the most significant relationship test - i.e. the state which has the most significant relationship to a transaction, contract or policy will have its law applied.
- 2** the governmental interest approach - the state which has the most interest in having its own law govern will have its law applied.
- 3** the *lex loci contractus* rule - courts follow the law of the state in which a contract was entered into.

The first two rule sets are difficult to apply and will depend considerably on the specifics of a case. Trends in case law show that courts tend to either apply their own state's law, the law of the state in which the contracting events were centred, or the law of the state in which the risk is located. Therefore, for example, it is quite possible for a New York court to decide a case using Texas law. Indeed two claims within the same case may have different applicable laws.

2.3.4 Superfund reform

As discussed in the background section at the start of this report, Superfund legislation is unpopular with just about everybody (except American lawyers). At the beginning of 1994, many commentators believed that Superfund reform would take place within the following few years. However, nothing has happened.

The EPA's budgetary constraints may increase the pressure for Superfund reform to occur.

The American Academy of Actuaries paper dated August 1995 explains the various scenarios that may occur under Superfund reform and summarises various other studies' findings on the effect of the alternative reforms on the annual costs of cleanup. In summary, some possible reforms are as follows:

- remedy selection reform - the cleanup option selected would have to be based on a cost/benefit analysis, consideration of future use of the site (industrial vs residential) and different, less stringent, risk assessment criteria. The two studies reviewed estimated the cleanup cost per site (not transaction costs) to reduce by 60% and 35%.
- co-dispersal reform - landfill sites that received both municipal and industrial waste would no longer be a PRP liability, but would transfer to the Superfund. This would considerably reduce PRP cleanup costs (passing them on to the EPA) and would also reduce transaction costs.
- 1981 or 1987 retrodate multiparty reform - liability prior to this date on multiparty sites would become the responsibility of the Superfund, with the responsible party only retaining liability prior to this date on sites where it was the sole polluter. This will have the effect of a drastic reduction in the liability of PRPs, including a drastic reduction in transaction costs.
- 1981 or 1987 retrodate reform - this would eliminate all retroactive liability of private parties for all dumping that occurred before this date at all sites. This will have the effect of an even more drastic reduction in the liability of PRPs.

Offsetting the large cost reductions from (multiparty) retrodate reform will be the possibility that PRPs may try to allocate losses to later years and this limited spread across years will lead to higher limits being reached, also having reinsurance implications. However, this offset would be likely to be small.

When reserving, it would be prudent not to allow for the possibility of Superfund reform. If a best estimate is required, the amount of discount to give to reserves in respect of Superfund reform is a subjective decision. Consideration must be given to the likelihood that proposed settlements already partially allow for the possibility of Superfund reform and that outstanding claims and some IBNR claims will be based on cleanups carried out under the current law.

2.3.5 Other issues

A key determinant of the pollution reserves that an insurance company holds will be the settlement strategy of that company. Some insurers may be able to achieve settlements (for example a complete environmental release, or a full policy buy back) for a price considerably lower than the present value of the estimated costs if the case was litigated to conclusion in the courts. Alternatively, settlements may be reached at a higher level than the present value of the future cash flows if litigated perhaps because the company is keen to remove these uncertainties. As well as possibly affecting the undiscounted total of the remaining liability and the present value of these undiscounted cash flows, the future volume of settlements may have a drastic effect on the cash flow pattern itself.

A number of courts have requested that insurers file a bond with the court prior to a trial taking place, so as to ensure that the money will be there to pay the claim in the event of the insurer losing the case. These bond requests can be huge - indeed, the larger the claim, the more likely the court is going to be worried about the financial strength of the insurer. A problem is that an assured may have an outrageous claim, which the insurer is convinced does not stand a chance of being wholly accepted by the court, but the insurer still has to effectively provide a cash amount up front as if the case had been lost in entirety. Insurers may appeal against these bond motions, and the London Market has been highly successful to date in resisting bond motions.

Reinsurance and retrocessional disputes are often arbitrated. Alternative Disputation Resolution (ADR) is a method whereby the two parties (whether insurer/reinsurer or insured/insurer) in dispute come together to try and come to a definitive agreement without the cost and burden of full-scale litigation, the aim being to reach an outcome more quickly and cheaply. Both arbitrations and ADRs can be carried out on a variety of different bases.

2.4 Reserving

2.4.1 Overview of different possible reserving methods

Traditional actuarial projection techniques based on triangles of data by policy, accident or reporting year will not work when trying to estimate pollution liabilities. The reasons for this are well documented elsewhere (for example in the Bouska/McIntyre paper) and will not be repeated here.

However, there are a number of methods available that a London Market (re)insurer may use to estimate its exposure to US pollution. These are discussed in outline below:

- Build a model - see section 2.4.2.
- Use an approach based on the company's market share. Estimates are required of the total US pollution liability to the insurance industry, preferably split by year (or bands of years) that it is likely to impact insurance coverage. The company's share of the total in each time period can then be estimated by taking the company's proportion of total premium income (from policies that will be impacted by pollution liability) during the period. Adjustments can then be judgmentally made for the company's exposure characteristics compared to the industry average, such as whether it wrote high or low.
- Use a multiple of current payments. Assuming that the company knows what it has paid in pollution claims over the past few years, then benchmark survival ratios

can be used to multiply these payments to produce a reserve. Footnote 24 disclosures suggests that the average survival ratio for the US insurance industry was around 10 as at 31 December 1995. Allowances can then be made for whether the company is a relatively high or low layer writer, or has a relatively higher proportion of inwards reinsurance and retrocession business than average. Allowance may also be made for any unusual patterns of recent payments, for example if the company has been settling with many of its assureds.

- Use a multiple of case reserves (or reserve potentials¹, which are not the same). The claims department should be able to provide claims reserves and it is possible to apply an IBNR multiplier to these. Many of the assumptions required to estimate an appropriate multiplier will be similar to those used in the aggregate loss projections (see next method). Consideration should also be given to any perceived caution in the case estimates. Alternatively benchmarks or rules of thumb may be available from other companies or consultants. However, such peer group benchmarking will eventually lead to overfunding, as IBNR drops as a proportion of outstandings.
- Use projections of aggregate paid losses. One of the reasons why traditional actuarial methods fall down is that pollution claims develop on a calendar year basis. However, it may be possible to project aggregate payments by calendar year. A payment pattern needs to be derived and a possible approach is to analyse site discovery dates, combine this with a projection of future site numbers and an estimate of relative site costs by year of discovery. A further refinement would be to split out the elements of cost (e.g. cleanup costs, litigation costs) and project these separately for a site

¹ Many London Market companies subscribe to the London Market Claims Service (LMCS). This non-profit making organisation, among other things, maintains the Claims Tracking System (CTS). Lawyers representing these London Market companies attempt to estimate the sum of future payment streams to each pollution policy on the CTS and enter these as reserve potentials (updated each year). These require many variables to be estimated, including win factors.

discovered in a given year, applying weightings to each cost type by year of site discovery.

The last four methods listed above should all be achievable with considerably less effort than the first. However, they are highly subjective and people carrying out the estimation may find themselves facing questions like 'shall we use a factor of 2 or 3?' which alone may add 50% to the liability. Therefore, alone, they may not be sufficiently robust for a company with material (relative to the rest of the balance sheet) pollution liabilities, whereas they may be justifiable for a company with a small pollution problem.

Explicit modelling of the liabilities will allow the company to carry out sensitivity tests on the drivers that affect the pollution liability, such as numbers of sites, different US court verdicts or different allocation methods. A model can also be used to link to any asset liability work that the company may undertake, for example linking via inflation. Having a model may also be useful for assistance with commutation work. In these circumstances, good data may be at hand for the specific assured or cedant which will be easy to 'plug into' the reserving model.

In an ideal world, a company will model its liabilities explicitly and then use alternative methods as benchmarks against which to test the model output for reasonableness.

2.4.2 Brief summary of the components of a direct pollution model

The largest problem likely to face a company wishing to explicitly model its potential liabilities from US pollution is obtaining suitable data. Even if suitable data exists, the time required to make all the sources consistent (which is likely to require judgement) must not be underestimated. This paper does not discuss the critical issue of data collection and cleaning.

The rest of this section looks at a possible model in general terms. It assumes that everything will be modelled explicitly. In practice only certain components are likely to be, with other amounts added on as bulk loads (grossing up) at the end of the process.

The following bullet points list the main items of data which will be required for the model. Other data may also be useful, and it may be possible to proceed without all the fields mentioned below. The main sources of information is likely to be the company's claims department although other sources such as RoDs may be used to supplement this information.

- *site information* including name and code (to avoid duplications and allow further investigation), cost estimate (all on one basis, preferably undiscounted best estimate), location, site type, proximity to water sources (to aid natural resource damage estimation), proximity to population centres (to aid third party liability estimation).
- *policy information* including start and end dates, attachments and limits (preferably from the ground up and may be separate limits for bodily injury, property damage or combined single limits), exclusions, treatment of expenses and company line on the policy. Note that ideally the entire coverage chart is required for each assured (i.e. the other insurers policies as well) so that alternative allocation methods can be tested and the treatment of defence expenses modelled properly. However, this information is unlikely to be widely available.
- *assured information* in particular a definitive list of assureds to avoid duplication and also knowledge of corporate history is essential in order to allocate losses to the correct policies.
- *involvement information* including start and end dates of involvement, type of involvement (e.g. transporter of waste, generator of waste), whether the assured owns the site, the share of the costs to be borne by the

assured and the likely state law that is likely to apply (not necessarily based on location of the site).

The first stage of the model will be to fill in any blank data for the known sites, policies and involvements. If a large proportion of each field is populated, it should be possible to fill in the gaps based on distributions of the data that is available. If not, other external information (such as RoDs if site costs are missing or the views of underwriters on typical policy limits and excess points if policy information is incomplete) may be available to assist.

Judgements must be made as to whether the data that is held is itself of sufficient quality and whether this data is a suitably representative sample for filling in the blanks. Questions such as 'has the claims department only completed the site costs for the biggest sites?' must be resolved. Different distributions will be appropriate when estimating the site data which is not present for NPL and non-NPL sites.

One issue that the model builder must face is whether the model should be deterministic or stochastic. The authors believe that a deterministic model, for example filling in blank records with an average amount in all cases, will not model reality. The 'spikiness' of real claims will be lost, which may have a dramatic effect on the distribution of liability from one layer to another. A stochastic model allows this spikiness to be modelled, although each run of the model will produce different answers. Given the uncertainty in any model output though, this feature is not necessarily undesirable.

The next stage will be to generate IBNR sites and involvements. The market level analyses are a useful starting point for estimating the ultimate number of sites. Distributions of site costs, number of involvements on each site and shares of sites will also need to be estimated. This process will inevitably be highly judgmental. Many commentators believe that the big sites will have been reported first, leaving relatively smaller ones for the future (often referred to as 'barrel scraping'). Also future cleanup costs may be affected, among other things, by different

cleanup standards in the future (e.g. through Superfund reform), different technologies altering the costs or a different distribution of PRP/EPA led cleanups.

The emergence of new insureds, and hence new policies, must also be considered. However, when attempting to arrive at an aggregate amount (as opposed to best estimates at the insured level), it may be appropriate to allocate all IBNR involvements to known insureds to avoid the complications of generating phantom policies.

Allowance must then be made for the other elements of cost, as described in Section 2.1.2, which may form part of a claim. A straightforward loading the cleanup costs may be appropriate for some elements, such as natural resource damages. Other elements, such as defence expenses, which have very different effects on primary and excess policies, may need to be modelled in more detail. Other costs, such as expenses to be incurred in creating case reserves, may be projected separately outside of the model.

The model will require a trigger and allocation routine. A relatively simple routine may be built which allocates all costs on a continuous basis between the start and end dates deemed to be appropriate. A more sophisticated approach could be used.

When attempting to model pollution liabilities, it is necessary to allow for the fact that the claim against an insurer may be dismissed by a court. Hence a set of win factors will need to be developed. To be as accurate as possible, the following will need to be factored into the win factors:

- year in question
- applicable state law
- defence likely to be used
- how to allow for multiple defences

The model will also need to have the flexibility to be able to apply win factors before or after applying losses to policies, depending on the situation being modelled. This may result in a very different allocation of losses between high and low layer policies. Different applications of the win factors may reflect the allocation of losses to policies if a case is litigated to conclusion or alternatively if a case is settled prior to any court decisions.

Allowance for future settlement strategy may also be built into the model. An analysis of settlements to date may reveal whether settlements achieve a better or worse net present value than litigating to conclusion - that is to say is there any economic gain in excess of discounting for the time value of money when settling. The future volume of settlements may have a dramatic effect on the results if there is a significant economic gain or loss from settling (as opposed to litigating).

Rather than trying to model everything explicitly, it may be decided to only model a part of the liabilities and then to gross up for other elements. For example, current NPL sites may be the only element in the explicit modelling (perhaps due to data quality, alternatively due to data volumes), with IBNR NPL costs, all non-NPL costs and all non cleanup costs loaded on at the end of the process. Other variants are also possible.

Settlements which have been done prior to the reserving date must also be allowed for. If a full settlement has been agreed with an assured (for example, all the policies have been bought back), then it is probably easiest to remove that assureds policies from the exercise. Partial settlements (for example specific site releases) also need to be allowed for in an appropriate manner. If the reserves are to be used to go into a balance sheet, the exact timing of settlements needs to be taken into account to ensure that assets are consistent with liabilities.

One final point to note is that no matter how sophisticated the model and how clean the data lying behind it, the answers produced are still, at best, an educated guess. However, by altering parameters within an explicit pollution model (i.e. sensitivity testing), some view may be formed as to a reasonable range of estimates.

2.4.3 Reserving for inwards reinsurance and retrocession business

This is an area where the authors have been unable to find any literature of note. The probable reason for this is that the job is very difficult and case specific. Rather than suggesting a generic pollution reinsurance model, this section is limited to a few observations:

- if sufficient data exists, i.e. the equivalent to the direct data above for the underlying policies, plus the reinsurance policy information, then there is no reason why the pollution reinsurance claims cannot be modelled.
- There may also be a further data availability problem - information on insureds which may not necessarily be direct insureds.
- If using alternative methods to modelling, such as those in section 2.4.1, different factors will be required to those used in the direct liability estimation. For example, higher survival ratios are likely to be appropriate as the reinsurance problem is less developed. Alternatively, direct and reinsurance liabilities can be aggregated together and aggregate factors can be used.

2.4.4 Other estimates that may be required as part of the reserving process

A reserving exercise may require the following to also be estimated:

- cash flow patterns to enable discounting and also perhaps to use in an asset liability model.

- outwards reinsurance, including allowance for bad debt.

Such issues are outside the scope of this paper.

2.5 Main publications used for the pollution section

There is a list of references at the back of this paper. However, the authors believe that it may be helpful to the reader to know to what extent each publication was used and what further information may be gleaned from them.

The Bouska/McIntyre paper, to the best knowledge of the authors, was the first paper to explain in detail many of the US pollution issues and discuss modelling techniques. This excellent paper has been used principally as a check that nothing fundamental has been missed. It is easy to read and should be referred to for more detail on many of the issues mentioned within this paper

The American Re-Insurance Company publication has been used to assist with the section on coverage trigger information (in particular the definitions of the four coverage theories have been paraphrased from their summary) and the section on coverage defences. Where possible, the authors have used their own knowledge of current case law to provide an up to date view.

The various BestWeek articles have been extremely helpful when writing the section on market level estimates.

As well as quoting their best estimate of the ultimate NPL problem, The American Academy of Actuaries paper 'Costs under Superfund' was also used in the section on Superfund reform. Their March 1997 paper, which reports on the results of surveys of CFOs, consulting actuaries and state regulators concerning reserving issues, also makes interesting reading.

3 US ASBESTOS

3.1 Background

3.1.1 How the problem has developed

Asbestos is a naturally occurring mineral which was mined in a number of countries including Canada, Australia and South Africa. Asbestos was widely used in the United States from the start of the twentieth century until the 1970s. The volumes of asbestos used in the United States increased significantly after the Second World War. The main areas of use included building insulation, shipbuilding, brake linings and roofing products. Asbestos was widely used because it is extremely resistant to heat and wear.

Asbestos has been widely linked with a number of lung diseases. The four main asbestos related diseases are mesothelioma, asbestosis, lung cancer and pleural plaques. Mesothelioma is a cancer of the lining of the lung and is almost always fatal within 18 months of diagnosis. Asbestosis is a fibrosis of the lung tissue which in serious cases can be fatal. Large doses of asbestos are normally required to cause asbestosis. The majority of serious asbestosis cases are seen in shipbuilding and other occupations with heavy exposures to asbestos. Medical studies have suggested that the incidence of lung cancer amongst workers exposed to asbestos is higher than normal. Many lung cancers are caused by other factors, such as tobacco, and it can be difficult to prove that asbestos caused lung cancer in an individual case. Pleural plaques usually have very mild symptoms but are strongly linked to asbestos exposure.

There are a number of different types of asbestos. The most widely used type of asbestos is chrysotile (white asbestos) although the most dangerous is widely recognised to be crocidolite (blue asbestos) which has been strongly linked to a high incidence of mesothelioma. The incidence of mesothelioma amongst workers who have

used white asbestos is much lower than for those who have worked with blue asbestos.

Maximum permitted levels of asbestos in the workplace were first introduced in the early 1970s. The level of exposure permitted fell sharply during the 1970s and 1980s.

Asbestos related diseases often have an extremely long latency period. Due to the extreme durability of asbestos fibres, they can remain in the lung for many years. Few cases of mesothelioma are seen within 15 years of first exposure. The risk of mesothelioma increases rapidly after 15 years. The average latency period (the period from first exposure to asbestos to manifestation of the disease) for mesothelioma is in excess of 40 years. As a result, many workers exposed in the 1950s and 1960s when the use of asbestos was at its peak in the United States are continuing to make large numbers of claims today. These claims are expected to continue well into the next century.

3.1.2 Effect on insurance policies

Asbestos related diseases are causing two main types of claim for insurers:

- bodily injury claims from workers who have suffered lung diseases as a result of exposure to asbestos
- property damage claims arising from the need to remove asbestos from buildings.

Before the 1970s, bodily injury claims were largely made on workers' compensation policies. Claims were first brought against asbestos manufacturers in the early 1970s. Since the first major case was won against manufacturers in 1973, the number of claims filed has increased dramatically. Manufacturers of asbestos products sought coverage of these claims under their product liability policies.

A large portion of the asbestos bodily injury claims have been brought against manufacturers of asbestos products. However, over the years a number of other parties have been named in litigation. These defendants include distributors of asbestos products and owners of property where asbestos products were used. Claims have also been suffered by railroads arising from workers exposed to asbestos. The increase in the number of defendants has largely been driven by plaintiffs' attorneys seeking new sources of possible compensation, particularly following the bankruptcy of some of the major asbestos producers.

In addition to products liability cover, bodily injury claims are also being filed on premises and operations insurance. Such claims are being made both by asbestos manufacturers seeking additional insurance coverage if there is a danger of exhaustion of the products liability cover and by owners of property who have been drawn into the litigation.

Defendants often face a large number of bodily injury claims. These claims are allocated across policy years in accordance with legal decisions on the trigger of coverage. As with pollution, different states have chosen to apply different triggers of coverage. The most commonly used trigger for asbestos claims is the continuous trigger which triggers all policies from the start of the period of exposure to the date of manifestation of the disease. Some states have adopted an exposure trigger which triggers all policies during the period of exposure to asbestos.

For the purpose of insurance coverage, the portions of each claim allocated to a given policy year are normally aggregated. Products liability coverage normally has an aggregate limit. Thus there is only a finite amount of insurance coverage available to most defendants. It appears likely that a number of the major producers of asbestos related products will exhaust their product liability insurance coverage. This encourages defendants to seek coverage on premises and operations policies.

The aggregate limits on products liability policies increased substantially in the 1950s, 1960s, 1970s and 1980s. As a result, the amount of coverage available on 1970s and 1980s policies is much greater than on policies written in the 1950s and 1960s. However, asbestos exclusions were generally introduced into product liability coverage in the early 1980s. Thus the amount of cover available for asbestos related claims on 1980s policies is more limited. The bulk of the asbestos related claims have therefore fallen on 1970s insurance policies with a significant amount on 1960s and 1980s policies and a small amount on pre 1960 policies.

Physical damage claims are also made against manufacturers' product liability coverage and against premises and operations coverage. Property damage claims against manufacturers' product liability coverage compete for the available cover with bodily injury claims. Whilst a number of defendants have faced large volumes of bodily injury claims, a much smaller number of defendants have faced material amounts of property damage claims. Property damage claims are regarded by many commentators as a much smaller problem for insurers than bodily injury claims.

3.2 Size of the problem

3.2.1 Market level estimates

The effect of asbestos claims in the United States has been considerable. A number of organisations have published estimates of the ultimate cost of asbestos claims in the United States. Care is needed when considering market level estimates as different parts of the losses are sometimes considered. For example, Lehman Brothers published a paper in 1992 which estimated the total bodily injury losses (including non-insured losses) as \$55 to \$80 billion. Other estimates include physical damage claims and may be for the US insurance industry alone.

A consensus seems to be emerging amongst commentators for the total net of reinsurance losses of the US insurance industry including both bodily injury and physical damage

claims. These ultimate claims are widely expected to be between \$30 and \$50 billion with a figure of \$40 billion (undiscounted) being quoted by many commentators as a "best estimate". For example, as for pollution, A M Best published estimates of ultimate asbestos losses for the US insurance industry in both 1994 and 1996. In the case of pollution, A M Best dramatically reduced their estimates between 1994 and 1996. In contrast, the market level central asbestos estimate was given as \$40 billion in both articles. The American Academy of Actuaries undertook a survey of consulting actuaries' and chief financial officers' views of the likely ultimate cost of asbestos claims to the US insurance industry in 1997. There was a large majority (17 out of 25) who believed that the ultimate liability would be between \$30 and \$50 billion.

A M Best estimate that the total cumulative net payments by US insurers on asbestos claims were \$16 billion as at 31 December 1995. The Insurance Services Office of New York (ISO) estimated that net payments in 1996 amounted to \$2.0 billion. Thus US insurers have paid a little less than half of the estimated ultimate claims of \$40 billion. The ISO also estimates that US insurers total net reserves amounted to \$11 billion as at 31 December 1996. Thus US insurers have recognised \$29 billion of asbestos losses. This leaves a substantial shortfall of \$11 billion if the ultimate claims are in line with current estimates. However, this is on an undiscounted basis and the effect of discounting would be considerable.

3.2.2 Development of claims to date

For the first time in 1995, US insurers were required to provide details of claim and reserve developments for US asbestos claims (footnote 24). BestWeek analysed these findings across the whole industry and published their findings in a July 1996 report.

The key figures are summarised in the table below.

	1991 \$bn	1992 \$bn	1993 \$bn	1994 \$bn	1995 \$bn
Beginning net reserves	3.7	4.2	6.5	8.6	9.0
Plus net incurred losses in year	1.0	3.1	3.3	1.5	3.4
Less net paid loss and LAE	0.6	1.0	1.0	1.4	1.3
Ending net reserves	4.1	6.4	8.6	8.9	11.2
Net/gross ratio (%)	52.3%	56.6%	59.6%	59.5%	62.1%
Three year survival ratio (years) *	6.7	8.0	9.8	7.9	9.1

[The three year survival ratio is the ratio of the net reserves to the average of the net payments over the last three years.]

The ISO have published figures for 1996 showing net incurred losses of \$2.3 billion, net payments of \$2.0 billion and net reserves of \$11.0 billion. These figures are slightly inconsistent with the BestWeek figures for earlier years.

As with pollution, there was a significant strengthening of reserves in 1995 when a number of companies including Aetna, Fireman's Fund and CIGNA increased their reserves materially.

The ratio of net to gross reserves stood at 62% as at 31 December 1995. This compares with 72% of pollution claims. The higher reinsurance recovery rate for asbestos is not surprising given that asbestos claims tend to aggregate and therefore are more likely to affect reinsurance programmes than pollution claims which tend to be regarded as many events and hence stay low.

3.3 Key outstanding issues

3.3.1 Legal and legislative issues

The legal uncertainties surrounding asbestos liabilities are significantly smaller than those affecting pollution claims. Insurers' liability for bodily injury claims on product liability cover is largely well established. Litigation continues in individual cases over the trigger of coverage. However, as discussed earlier, most states have adopted a continuous trigger with the bulk of the rest choosing an exposure trigger.

The remaining litigation surrounds the following key issues:

- interpretation of asbestos exclusion wordings
- coverage on premises and operations policies both for asbestos manufacturers seeking cover on non-products insurance and for non-manufacturers who have been drawn into the litigation
- applicability of the known loss exclusion clause

The authors are not aware of any potential legislation in the United States which may have a material effect on insurers' asbestos liabilities.

3.3.2 Other issues

A large proportion of the total asbestos claims are falling on a small number of the largest manufacturers and distributors of asbestos products. The major defendants include Babcock and Wilcox, Armstrong World Industries, Celotex, Fibreboard, W R Grace, A W Chesterton, Johns-Manville and Owens-Illinois. Some of the largest defendants are suffering claims of several billion dollars. As a result, any settlements or court decisions on triggers of coverage can have a material effect on insurers. Such cases are keenly contested given the large amounts of money at stake and often take many years to be finally settled. For example, Owens-Illinois have had a long running battle with insurers over the trigger of coverage and whether insurers are jointly and severely liable for the asbestos related claims. The most recent ruling in 1995 found that a continuous trigger was appropriate but that insurers were not jointly and severely liable. Owens-Illinois had self insured its product liability cover from 1948-1963 and had bought cover in subsequent years. This litigation started in 1984 and continues today. Almost \$1 billion of insurance coverage is at stake.

Twenty of the major defendants have formed the Center for Claims Resolution ("CCR"). The aim of the CCR is to provide an alternative to traditional tort defence thereby saving costs. The CCR has resolved over 180,000 over the last nine years. In 1993 the CCR proposed an agreement to settle future bodily injury claims against CCR members on an agreed scale of compensation. This settlement, commonly known as Georgine, was sanctioned by the court in 1993 but has recently been blocked by the Supreme Court. It was found by the Supreme Court that the proposed settlement favoured the currently injured over future victims of asbestos related diseases.

A global settlement has also been proposed between Fibreboard and asbestos bodily injury plaintiffs. This settlement was approved by the US Appeals Court but the Supreme Court ordered further review of the case following the Georgine ruling.

3.4 Reserving

3.4.1 Overview

As with pollution claims, traditional actuarial techniques based on triangulations of claims data cannot be used. There are many reasons for this including:

- claims are spread over a number of policy years based on the applicable trigger theory. Thus there will be strong calendar year effects in any triangulation. Claim development is not dependent on the age of the policy
- both historical and future claim development will be distorted by the effect of the aggregate limit on products coverage
- asbestos related diseases are latent for many years.

However, there are a number of techniques which can be used to estimate future asbestos claims. The main techniques used are as follows:

- multiple of current payments
- multiple of case reserves
- projections of aggregate paid and incurred losses
- a detailed model of asbestos claims.

Each of these techniques are described below.

3.4.2 Multiple of current payments

The required reserve is estimated as a multiple of the average claims paid over the last three (say) years. Footnote 24 information published by BestWeek gives some helpful indicators on possible multiples to choose. As at 31 December 1995, the reserves of US insurers for

asbestos claims represented a survival ratio of 9.1. As discussed above, the reserves established by US insurers of \$11.2 billion represent approximately half of the undiscounted reserve requirement based on ultimate losses of \$40 billion.

The market survival ratios are for a mixture of direct and reinsurance business. The proportion of direct business is likely to be fairly high. Adjustments will need to be made to reflect the level of a company's writing and the mix of direct, reinsurance and retrocessional business written. It is likely that a reinsurer would require a higher survival ratio than a direct insurer. It may also be necessary to adjust for recent large settlements which may distort the three year average payments.

3.4.3 Multiple of case reserves

This method simply derives the IBNR reserve as a multiple of case estimates. As with the multiples of current payments described above, the multiples will need to be adjusted to reflect the level of writing and the mix of direct, reinsurance and retrocessional business. It is a little more difficult to obtain benchmark multiples of case reserves from published sources.

BestWeek reported that Footnote 24 disclosures implied that case estimates for asbestos claims represented 61% of total asbestos reserves as at 31 December 1995. This would imply case estimates of around \$7 billion. If we use an ultimate estimate of \$40 billion then the undiscounted IBNR requirement as at 31 December 1995 is around \$17 billion (40-16-7) representing around 250% of outstandings. However, this ratio would undoubtedly have fallen during 1996. Furthermore, BestWeek expressed considerable concern about the correctness of insurers' declarations of case reserves.

3.4.4 Projection of aggregate paid and incurred losses

Another relatively straightforward possibility is to project the aggregate paid or incurred development for all policy years combined. An assumed payment pattern could be

derived from the projections of individual bodily injury claims undertaken by a number of research organisations such as Stallard and Manton. Adjustments would need to be made for the delay from the date of diagnosis to the date of claim payment and the effect of the limits and excess points on the business written.

Such patterns can also help to estimate the effect of discounting on the claim reserves.

3.4.5 Using a detailed model of asbestos claims

Detailed modelling of asbestos claims is in principle fairly simple. The ground up losses of each asbestos defendant are projected. The effect of these ground up losses on the insurance or reinsurance policies written are then calculated. However, whilst in conceptual terms, this process is straightforward, in practice there are often significant difficulties due to a number of factors including:

- The level of detailed policy information required is often not fully available. This is particularly true for reinsurers who are often not aware of the policies written by their cedants. In order to calculate the effect of the ground up losses for each defendant, details are required of the cover provided by the direct insurer and of the cover granted by the reinsurer.
- The complexity of the insurance and reinsurance arrangements.
- Uncertainty surrounding the allocation of the insured's claims to policy years.
- The limited availability of information on the ground up claims development for some cedants.

If the required data can be obtained, projection of the ground up claim for each insured and calculation of the effect of these claims on business written should produce a more reliable estimate than the other methods described above. The model allows explicitly for coverage provided by the insurers or reinsurer together with the underlying claim development of the insureds.

The most detailed description of an asbestos model of the type outlined above which has been published to date was set out in the paper "Measurement of Asbestos Bodily Injury Liabilities" (Cross & Doucette 1994). Cross & Doucette describe how the difficulties caused by the absence of detailed policy information can be overcome if complete information is available for a sample of the business written. They use the results of the detailed projections for the policies for which full information is available to estimate the liabilities for the rest of the account. We have set out below the main steps in the modelling process outlined by Cross & Doucette. We have also tried to indicate possible sources of data for each step:

- a. Collect details of the policies written by the company which are potentially exposed to asbestos claims. This information should be available within the company and should include names of the defendants involved. In practice, only a sample of the policies may be considered in order to reduce the volume of work.
- b. For reinsurance business, it is necessary to seek details of the business written by the cedant. It is at this stage that it is often most difficult to obtain data as the only reliable source may be the cedant itself.
- c. Using the information on the defendants covered a selection of a group of defendants to be modelled in detail will be made. This selection will be based on the size of the company's exposure to each defendant and the availability of data for each defendant. In order to ensure that a good cross section of defendants is chosen and to assist in the extrapolation of the results to defendants outside the chosen group, Cross and Doucette classify the defendants into five tiers. The major manufacturers or suppliers of asbestos products who are expected to face claims exceeding \$1 billion are included in tier 1. The second tier is smaller producers and distributors. Tier 3 includes local and regional distributors of asbestos products whilst tier 4 defendants have rented or owned property where asbestos products are used. Tier 3 and 4 defendants have been brought into the asbestos litigation as third parties. Tier 5 is railroads who suffer claims under

FELA from workers exposed to asbestos. This analysis by tier is important because the development pattern of claims for defendants will differ between the tiers. In broad terms, the claims for tier 1 and tier 2 defendants would be expected to be more developed than those from tier 3, 4 or 5 defendants.

- d. Collect information on the claims filed with each defendant chosen for detailed modelling. The required information includes details of claims filed, claim payments, expense payments, insurance cover and coverage disputes. This information can be difficult to obtain for some defendants. However, possible sources of data include the claims department of the insurance company, annual reports of the defendants, lawyers acting for the insurance company and court documents.
- e. Project the future development of asbestos claims for each of the chosen defendants. These projections often involve the application of a latency profile to the exposure profile for the defendant. Fortunately, full details of such projections are often publicly available as they have been used as evidence in bankruptcy proceedings. A number of possible sources are included in the list of references at the end of this paper.
- f. Allocate the claims for each defendant to each policy year. In some cases the allocation basis will be known. Cross and Doucette discuss a number of possible assumptions which can be used if the allocation basis is not known.
- g. Restate the policies written by the company on a ground up basis for the original insured. This is a mechanical process if full details of the business are available. For a primary or excess insurer this is likely to be a straightforward process. The process is more complex for reinsurers as allowance will need to be made for the effect of the risks written by the direct insurer. For example, if the direct insurer wrote 50% of a layer of \$10 million xs \$10 million and the reinsurance provided the cedant with cover for 20% of

\$1 million xs \$3 million then the reinsurer's exposure ground up terms is 10% of \$2 million xs \$16 million.

- h. Calculate the effect of the projected claims from steps e. and f. on the restated policy data for step g. Care is needed to ensure that the treatment of expenses is consistent with the policy conditions.
- i. Extrapolate the results for the selected sample policies to the rest of the account. As discussed above, this extrapolation will need to be undertaken for each tier separately. Cross and Doucette examine a number of possible methods of extrapolation.
- j. Examine the sensitivity of the results to the assumptions made in the model. The key assumptions are likely to include the rate of claims cost escalation, the ratio of expenses to indemnity payments and the method of allocating a defendants' claims by policy year.

4 EUROPEAN POLLUTION

4.1 Background

The cleanup of contaminated land is at a much earlier stage in Europe than in the United States. For example, the legislation which specifies which parties are potentially liable for the cost of a cleanup has only just become law in the United Kingdom. In contrast, CERCLA became law in the United States in 1980. There is therefore far less material available on the potential cost of environmental claims to polluters, land owners and their insurers. This section is focused on setting out details of the relevant legislation and the key outstanding legal issues. Little information is available on the possible magnitude of claims at this stage.

We have focused our attention on the United Kingdom as the London Market has a much greater potential exposure to environmental claims in the United Kingdom than in other countries in Europe.

4.1.1 Source of claims

As in section 2, we are only considering the potential for claims arising from the gradual seepage of hazardous waste. Pollution claims can arise from accidents arising at a specific point in time but are not considered in this section.

4.1.2 Key legislation

UK legislation

The cleanup of contaminated land in the United Kingdom will be governed in the future by the 1995 Environment Act. The previous legislation, the 1990 Environmental Protection Act relied on the 'buyer beware' principle. It held the current owner of the land to be solely responsible for both compulsory own site cleanup orders and for pollution which had migrated from the site. The Government believed that it was fair for the owners to be strictly liable under statutory law on the grounds that the

owner could attempt to recover from the polluter under common law.

The case of Cambridge Water Company v Eastern Counties Leather plc (1992-1993) showed that this was not always the case. The House of Lords ruled that companies could not be held liable under common law if they pollute land and the groundwater prior to a time when they could reasonably have foreseen the environmental damage caused.

The 1995 Environment Act provides that the cost of the cleanup of a contaminated site should be borne by the polluter rather than the land owner. However, if the polluters cannot be found or are bankrupt, liability will pass to the land owner. The Act, together with considerable volumes of associated guidance and regulations, also creates a new framework to the identification of contaminated land and the management of the cleanup.

The key points of the Act are:

- Local authorities are required to regularly inspect their area and identify contaminated sites and land to be designated as 'special sites'.
- Land is considered to be contaminated if "significant harm is being caused or if there is a significant possibility of such harm being caused". Guidance is provided as to what constitutes 'significant harm' and 'significant possibility of significant harm' when assessing sites.
- If contaminated land displays certain criteria (eg having been used for petroleum refining) then it is declared a 'special site' and the Environment Agency or the Scottish Environment Protection Agency rather than the local authority will supervise the cleanup.
- The seriousness of harm, and the cost and practicality of any remediation works must be taken into account when assessing remediation requirements. The cleanup standard is 'suitable for use'.

- Liability will be decided by identifying an 'appropriate person'. The appropriate person will normally be a party who caused or knowingly allowed the pollution to occur. If the polluter cannot be found the owner or occupier of the site will be deemed the appropriate person.
- If more than one polluter is identified then liability is apportioned between them. Polluters are only liable for the portion of the cleanup caused by their pollutants. However, this appears to be at the expense of land owners who would suffer the cost of any proportion of the contamination for which a polluter could not be found.
- The appropriate person then has three months to start the cleanup or to propose a plan to cleanup the site. If no action is taken in this period the local authority or Agency will issue a remediation notice requiring the cleanup of the land. If the appropriate person continues to take no action the local authority or Agency may cleanup the land and recover the costs from the appropriate person. Criminal charges may also follow against an appropriate person who ignores a remediation notice.
- The liability of the appropriate person is both retroactive and strict.

The extent of the cleanup costs will depend on how local authorities choose to apply the Act. In particular, local authorities will have a degree of discretion in determining which sites constitute contaminated land. There have been some encouraging statements from the Department of Environment recently who have said that they expect very few sites to be classified as contaminated land. However, until the numbers of sites involved and the standards of cleanup required are known, it will remain very difficult to estimate the likely cleanup cost.

The Environment Act has a number of similarities with CERCLA; in particular, it imposes strict and retroactive liability on polluters. However, there are a number of differences between the two pieces of legislation which

suggest that the cleanup cost in the United Kingdom may be considerably smaller than in the United States:

- the standard of cleanup is 'suitable for use' in the United Kingdom. In the United States, sites are often cleaned to so called 'Mother Earth' standards
- there is a requirement on the local authority to undertake a cost benefit analysis of a proposed cleanup.

European legislation

European wide legislation is currently under discussion, with very slow progress being made. The main events to date are:

- a Draft Directive was published in 1989, aiming to impose strict liability on the producer for any damage
- in 1993 a Green Paper was published for the purposes of encouraging a wider debate about who should bear the remediation cost
- the debate continued at the 1993 Council of Europe convention (The Lugano Convention).

There is currently a great deal of disagreement and resistance about how and if any Europe wide legislation would work. The UK and Germany are currently opposed to any European legislation.

4.2 Size of the problem

4.2.1 Market level estimates

As far as the authors are aware, the Confederation of British Industry (CBI) is the only organisation to have published any estimates of the potential cost of cleaning up contaminated land in the United Kingdom. In their paper "Firm Foundations" published in 1993, the CBI estimated that there was up to 200,000 hectares of land which is contaminated in some way. However, the CBI believe that only 3% of this land is in need of urgent remedial action. The CBI estimated that the cost of cleaning up all affected

land would be between £20 and £60 billion but the cost of urgent remediation would be much smaller.

The indications by the Government that only a small number of sites are likely to be classified as contaminated land suggests that the costs imposed on industry may be rather lower than suggested by the CBI.

4.2.2 Effect on insurers

The insurance policies which are potentially affected by UK environmental claims are likely to be the public liability and third party liability policies of the organisations involved in causing the pollution. Claims could also fall on property or liability cover of land owners or occupiers. However, even if an insured was named as an appropriate person, public liability insurers may have a number of possible grounds for refuting any claim:

- *Pollution exclusions.* Gradual pollution exclusion clauses were introduced into most public liability policies in 1991 following advice from the ABI. However, pollution exclusion clauses were used selectively during the 1960s, 1970s and 1980s for many risks. For example, many companies involved in chemical manufacture have been largely subject to pollution exclusions since the early 1970s.
- *Owned property exclusion.* Public liability policies generally include an owned property exclusion which provides that the policy does not cover damage to property owned or occupied by the insured.
- *Not damages.* If the insured complies with a remediation order and voluntarily cleans up the site, the insurer could contend that the cleanup cost is not damages and therefore not covered. Indeed, this point appeared to be confirmed in a recent case *Yorkshire Water vs Sun Alliance* involving a case of sudden and accidental pollution. The insured could in theory refuse to effect the cleanup in order to force the local authority to clean the site and recover the costs from the insured. The cleanup costs may then be considered as damages. However, failing to comply

with a remediation order is a criminal offence and the insured would risk criminal prosecution in order to avoid the "not damages" defence.

These defences may well be tested in the courts in due course. At this stage the likely success of these defences is unclear. If insurance cover is found to exist, issues of trigger of coverage and number of occurrences would need to be addressed in order to determine which policies were affected.

4.3 Reserving

Reserving for UK pollution claims is at a very early stage of development. We are not aware of any publicly available papers which suggest a possible approach. This is not surprising given the considerable uncertainty surrounding both the size of the cleanup costs and the extent to which such costs may be covered by insurance.

One way in which the possible size of insurance claims for a given company could be considered would be to drill down from market level estimates. The steps in such a process may be as follows:

- Decide on an estimate of the total cleanup cost for the UK. This could be based on the CBI estimates suitably adjusted for the expected number of hectares to be remediated. Additional loadings may be added for defence and other legal costs associated with any cleanup.
- Choose an assumed proportion of the cleanup costs which may be potentially covered by insurance. Reduce the proportion to allow for the fact that not all potential insureds will bring claims and that insurers may be able to successfully defend some claims. Multiplying this proportion by the total cleanup costs gives the insurance industry costs.
- Estimate the company's likely share of the claims from information on its market share for public liability, the types of risks covered, use of pollution exclusions etc.

Multiply this share by the insurance industry costs to obtain the company's possible claims.

This type of "top down" methodology can also be used for other types of claims (such as some health hazards) in order to get a rough handle on the potential size of a problem.

Unfortunately, at this stage most of the parameters in such a process applied to UK pollution would be guesswork. In our view, the size of insurers' potential liabilities for UK pollution claims is not quantifiable at present.

5 SUMMARY

Over the last few years, there has been a tremendous development in the available information and reserving techniques for US asbestos and pollution claims. A variety of benchmarks are available to assist with reserving and detailed models can be used to obtain a better estimate if sufficient data is available. Nevertheless, the eventual outcome continues to be surrounded by significant uncertainty, particularly for pollution claims where Superfund reform could have a very material impact on claims.

The recent 1995 Environment Act is causing some concern in the UK due to its strict and retrospective nature. There is some encouragement for insurers in the lower standards of cleanup required by UK legislation in comparison to the United States. Whether insurers will suffer material claims is likely to be dependent on the approach taken by local authorities to their new responsibilities and the effectiveness of various exclusions in public liability policies.

Appendix A - Key references

US asbestos and pollution

Best's Review May 1994 "Environmental/Asbestos: The Industry's Black Hole"

Best's Review April 1996 "Insurers Chip Away at E&A Liabilities"

Best's Review April 1996 "P/L Industry Accelerates Recognition of E&A Liabilities"

BestWeek (July 1996) "Footnote 24 Ushers in a New Era of Asbestos, Environmental Disclosure"

[The Bests publications include market level estimates of asbestos and pollution claims, paid and incurred development at market level and details of insurers' reserving position as at 31 December 1995.]

American Academy of Actuaries Public Policy Monographs

- dated August 1995 summarising the market level estimates of environmental claims which have been published by various organisations
- dated March 1997 summarising the results of surveys of CEOs, consulting actuaries and regulators on their views of APH reserving.

American Re "A Review of Environmental Coverage Case Law" [This publication sets out the results of recent key coverage and trigger disputes on a state by state basis. Despite the title asbestos claims are also considered.]

University of Tennessee "Hazardous Waste Remediation: The Task Ahead" dated December 1991 which includes estimates of likely clean-up costs at a market level. An update was published in July 1996.

Various Casualty Actuarial Society papers, the most relevant of which are:

- Measurement of US Pollution Liabilities (Bouska and McIntyre, 1994)
- Measurement of Asbestos Bodily Injury Liabilities (Cross and Doucette, 1994)

[These two papers were the first to discuss detailed modelling techniques for asbestos and pollution claims.]

RAND "Public-sector cleanup expenditures and transaction costs at 18 Superfund sites"

Standard & Poors "Environmental Liability and the insurance industry" (November 1995)

CBO "The total costs of cleaning up non-federal Superfund sites" (January 1994)

Duke University Center for Demographic Studies - various papers on future asbestos related claims for Johns-Manville written by Stallard and Manton.

[Stallard & Manton estimate the likely emergence of asbestos bodily injury claims filed with Johns-Manville. Similar work has been undertaken by National Economic Research Associates and Legal Analysis Systems.]

EC Pollution

A number of press articles including various articles by lawyers commenting on the likely impact of the 1995 Environmental Act on insurers. Insurance Day has carried a number of useful articles over the last couple of years (examples: 13 November 1996, 9 October 1996).

CBI "Firm Foundations" published in November 1993.