THE ROAD TO LEGISLATION FOR TRANSPORTING HAZARDOUS GOODS IN THAILAND

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Abstract

In 1990, a gas explosion caused by the overturning of a trailer, created extensive loss of life and property, and damage to the natural environment. That incident was the origin of heightened awareness of the need for insurance for the legal liabilities involved. The Thai government decided that insurance cover would be the tool to cope with the problem. Therefore in 1993, compulsory third party motor insurance was legally enforced in Thailand. The intention of this insurance is to provide compensation to help injured or killed people. This development, of liability insurance compensation was focused on human life and health, but was not directed at environmental harm and property damage. Moreover the compensation amount awarded to plaintiffs is very small and the litigation process takes a long time.

In 2006, based on recommendations from the Committee for Hazardous Substances, within the Department of Industrial Works, the Ministry of Industry announced that transporters and hauliers who use tankers for carrying hazardous substances must obtain insurance for their legal liability for (1) loss or damage to third parties, plus (2) compensation for environmental harm including clean-up costs. The limits and cover are beyond those in compulsory third party motor insurance.

The 1993 Act and the 2006 announcement were sensible extensions of compulsory cover, to protect people, property, and the environment. However, since the 2006 announcement, the legislation has been suspended because of many concerns expressed by insurance practitioners and hazardous substances operators.

This article will firstly examine and discuss the facts about the 2006 initiative, and the concerns of insurers and transporters arties about what they regard as

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imperfect legislation. Secondly, the article will focus on the imperfections of the legislation regarding environmental impairment and the remedies necessary. Finally, the focus is on the possibility of redesigning the 2006 compulsory liability insurance.

Introduction

Chemicals play a major role in various types of industry, and the trend is increasing in Thailand. As a result, the road transportation of hazardous substances is increasing, and so is the recognition of the possibility of massive damage from any accident, which could happen at any time.

The risk of damage by hazardous substances arises firstly inside the manufacturing premises whilst those substances are in the production process, or kept in storage as raw material or as finished products. Subsequently, the risk is extended to potential loss or damage arising outside the premises whilst the substances are in transit. In Thailand, the beginning of awareness of the dangerous effects of hazardous goods during transit was sparked in 1990 by the overturning of a Liquid Petroleum Gas (LPG) tanker at Petchaburi Road, a major business road in Bangkok. The victims of this accident needed compensation, and so they sued Siam Gas, the responsible company. It took many years from the date of the accident until the victims were awarded compensation. The victims have still not received payment as the company became bankrupt, and the victims' right to compensation was not protected, merely being treated as though the victims were ordinary creditors (Channak, 2009).

The government's first solution to cope with the compensation problem was to turn to motor insurance. Third Party motor insurance was made compulsory from 1993 by the 'Protection for Motor Vehicle Accident Victims Act'. This insurance, although State controlled, is organized by the motor insurers of Thailand. The cover is for death or injury, but not property. It is a no-fault scheme: strict liability (Lawrence, 2004). The concept is to help victims to receive quick payment without having to prove negligence. This development of compulsory insurance coincided with the increased use and transportation of hazardous substances, and stimulated the government in 2006 to form a Committee for Hazardous Substances, in the Department of Industrial Works (DIW), within the Ministry of Industry. The terms of reference for this committee were:

> *To compel all hazardous substances transporters using tankers to obtain additional liability insurance other than compulsory motor insurance.*

The committee's recommendations were approved by the Minister of Industry and published in the Government Gazette (February 23, 2006) as 'Compulsory Insurance for Hazardous Substances Transported by Road'

The intention of this government initiative was to further develop compulsory insurance as a

tool to solve the bankruptcy problem, and to extend the insurance cover to include environmental impairment. However, the wording was not considered to be clear, and insurers made suggestion for improvement. Also, it met with some disagreement from business operators. The legislators had to postpone the enforcement date for nearly another two years because of these disagreements about insurance cover, premium calculation, and the problem of uninsurable risk.

Although four years have passed since the notification's release, it is clear that the regulations were not all-encompassing. Arguments still arise from time to time from both insurance practitioners and hazardous substance operators. The government deserves credit for then initiating discussions with insurers, hazardous substance operators, and their related associations. Even though a revised wording became law with effect from November 2007, there were still concerns expressed about this compulsory insurance legislation. The law still remains unenforced (the police having been authorised by the government not to prosecute those found to be without this insurance) (Channak, 2009).

The question, therefore, to be addressed in this paper, is whether the current regulations and insurance details are adequate and able to deal with the dangers of and loss from hazardous substances, and the potential losses. A subsidiary question is whether the insurance details should be amended to be pure environmental impairment insurance in order to match the potential loss, and whether this alternative would be agreeable to both the insurers and operators. If the answer from both parties is "No", what other alternatives are there?

This article describes the compulsory insurance product as firstly an issue for hazardous substances in transit. It will provide an update of the discussions among the parties involved with the legislative issue, including details of the limitations and problems from the viewpoints of both insurance practitioner and the hazardous substances operators. The article tries to redesign the compulsory insurance product to be pure environmental impairment. Finally, there is an exploration of other financial aspects beyond traditional insurance.

Methodology

This is an exploratory and descriptive research study. The methodology is based on a literature review, including conference papers, journal articles, and published statistics. Building on the literature base, qualitative research was undertaken using semi-structured interviews to gather facts and opinions from insurers and transporters. Interviews were held with 10 managers in the insurance industry in Thailand, including Direct Insurers, a Reinsurer (Thai Reinsurance Co.), and Insurance Brokers. Interviews were also held with 10 managers in the hazardous substance industry, including HASLA (Hazardous Substance Logistic Association), hazardous substance manufacturers, and hazardous substance transporters. The data gained from

the interviews was processed to elicit themes, which will be explained, discussed, and illustrated by the use of displays.

Compulsory Insurance for Hazardous Substances whilst in Transit

The initiative of the Committee of Hazardous Substances is an attempt to provide essential support for the logistics system for chemical or hazardous substances. Therefore the committee decided to study the possible loss from hazardous substances whilst in transport from one place to another. They considered the question 'Where a loss occurs, what tools could cope with this problem'. There has been much research into this issue, for example, a risk assessment project in a high risk Province of Thailand (Department of Pollution Control, 2004). Also, research commissioned by the Ministry of Transport (2006) stated that while chemicals or hazardous substances are in transit, the transporter should obtain insurance to ensure compensation for any loss to human life, health, personal property, public belongings, and environmental resources.

Frequency and severity statistics of road transportation accidents is the essential data on which the Committee of Hazardous Substances makes its decisions. Claim payment under compulsory motor insurance was firstly considered, but it was found that the maximum limit for life compensation is too low if the driver who was found to be guilty has no other insurance. Secondly, environmental impairment needs to be covered, as the motor policy does not. Even if a human victim receives quick treatment and proper compensation, the motor policy does not apply to environmental resources or public property.

The details of the legislation notifications in 2006 and 2007 stated that transport means only road transportation and does not include railways. Its further provisions are that:

The hazardous substances transporter who carries them in the following tanks must obtain special insurance rather than compulsory motor insurance.

1) Fixed Tanks
2) Dismountable Tanks
3) Tank Containers
4) Tank Swap Bodies with Shells made of Metallic Materials
5) Battery-Vehicles
6) Fiber-Reinforced Plastics Tanks (FRP)
7) Vacuum Operated Waste Tanks

The insurance must cover **every type of** loss or damage from **chemical** leakage, and/or explosion and/or fire of hazardous substances, whilst in transit, which results in

1. Loss of life or, bodily injury to third parties (with a limit of THB100,000 per person, and THB10,000,000 per occurrence).

2. Third party property damage
3. All expenses to remove, clean-up and clear damage, to diminish loss and restore the environmental resources to be the same as before the accident.

The total indemnity (sum insured) for the combined cover of 1, 2 and 3 purchased by an operator must not be below THB30,000,000 per occurrence.

Details of the Policy

The General Insurance Association (GIA), acting for the Office of the Insurance Commission, in cooperation with HASLA, designed the policy to include the following details of the new compulsory insurance (Government Gazette, 2006):

Cover	1. Loss of life, bodily injury, health defect 2. Property damages 3. Environmental damage by paying the cost of removal, clean-up, and restoration.
Limit of indemnity	The amount has to be chosen by the insured, but must be no less than THB100,000 per person and not below THB10,000,000 per occurrence for coverage 1; and the total limit of all coverage must not be below THB30,000,000 per occurrence.
Premium Rating	Minimum 0.05% to maximum 2% of the limit of Indemnity (Source: General Insurance Association, 2007)]

Problems and Limitations

The government realizes that an extensive loss may occur and affect people, public property, and the environment. Therefore the government should ask for cooperation from all relevant sectors, for example, Ministry of Energy, Ministry of Agriculture and Cooperatives, and Ministry of Public Health - as does the Ministry of Industry. The legislative notification of 2006 is limited to hazardous substances operators under the control of the Department of Industrial Work (DIW), Ministry of Industry. However, the statistical record for motor accidents shows that the number of accidents resulting from hazardous substances transportation is mostly for a Class 3 substance, Flammable liquid, and a Class 2 substance, Gas. The two classes are **not** under the control of DIW. That is why the law, in its present state, cannot be enforced on the operators of these two types of hazardous substance.

The following table shows data for the number of accident, by type of chemical, for each five-

year period from 1978 to 2007. It will be seen that the first row, Classes 2 and 3 substances, accounted for 71 out of a total of 185 incidents, i.e. about 40% of the total incidents.

Table 1: Accident Data for Each 5-year Period, by Type of Chemical

Chemical Type	Year/ number of accidents						
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2002	2003-2007	Total
Gas/ Flammable liquid (Class 3/2)	0	1	2	2	5	61	71
Explosive	3	2	3	1	2	2	13
Ammonia	0	0	1	3	4	23	31
Corrosive, Acid	0	0	1	1	8	10	20
Paint, Thinner	0	0	1	5	2	4	12
Hazardous waste	0	0	0	0	1	6	7
Other chemicals	0	1	4	5	13	14	37
Total	**3**	**4**	**13**	**17**	**35**	**120**	**185**

Source: data from www.chemtrack.org (2008)

Moreover, statistics from the Ministry of Transport as at December 31, 2009, show that for the number of vehicle used to carry hazardous substances, vehicles transporting diesel had the highest volume, with 1,737 units, followed by LPG with 519 units. These two substances are not under the control of DIW.

The restriction in the 2006 notification stated that the hazardous substances transporter who carries them in the listed seven tanks must obtain special insurance. However, this research discovered that the number of tankers required to buy insurance is only 2,000; and the premium charged per tanker is about THB10,000. With such a small pool of potential insured, it is not worth insurers writing this particular risk, indeed it is unwise as it contradicts one of the basic principles of insurance, that the law of large numbers produces a wide spread of risks, and that the premium must be commensurate with the risk. Let us think about the number of insurer participating in the program compared with the number of tankers insured. The proposed insurers are 20 companies. If one insurer will accept insurance of, say, 100 tankers, the premium collected will be 1 million Baht. Unfortunately, a major accident could mean that the insurer must pay the maximum limit of indemnity of 30 million Baht. The company would make

an overall financial loss that year. From the viewpoint of the insurance practitioner, problems with the 2006, 2007 legislation are found in terms of insurable risk, volume of exposure unit, insurable loss, and premium charged. Insurance is based on the law of large numbers. If the volume of exposure units is not large enough to be statistically valid, then probability predictions of the possible outcome are dubious, and thus an insurer could risk not having a sufficient fund from which to pay victims, and would have to use money from other accounts.

The next problem is non-standard risk. The government legislation requires tanker transporters, who meet the criteria, to buy insurance. But if that tanker is not certified to be a standard tanker by an authorized person, then the insurer cannot accept this particular type of risk as it is non-standard. The implication is that a non-standard tank has high potential to leak and create an extensive loss. It conflicts with the insurance concept that the insurance company accepts risk based on accidental fortuitous events.

The next problem for an insurer is uninsurable loss. As mentioned concerning the environmental liability product, many insurance companies have difficulties in providing this particular coverage for hazardous substances and environmental impairment. Many insurers have only a limited knowledge about underwriting these risks, and also little experience of underwriting environmental damage. Some companies are restricted by their underwriting rules in accepting risks in which the occupation involves hazardous substances, and cannot accept the risk of environmental impairment. For companies that can insure environmental impairment, they prefer not to follow the policy wording and rating guideline provided by the government: they want to use their own risk-identification guidelines and create their own risk assessment, and certainly want to calculate the premium based on their own criteria, data, and probability calculations.

This brings us to the problem about premium. This problem will be discussed from the insurer's viewpoint and then from that of the hazardous substances transporter. From the interviews, we found that insurers can be divided into two groups: 20% have experience of environmental liability risks; and 80% have no such experience. One-half of the 20% group have an underwriting manual which includes premiums, while the other half quote a premium by considering the whole of an Insured's portfolio. The first half inform us that their premium rating is about 50 percent higher than that indicated by the government, with high deductibles which they feel are appropriate to the risk character. The second half have no views about the current premium charge even though the company has claims experience in clean-up and restoration costs. The reason for this indifference is that, overall, the company still makes a profit from this account. However if a new client insures with that company, the premium rate will not be the same as for the existing insured: it should be higher. This company agrees with the other 80% that the premium indicated by the government is not attractive. Moreover the premium rate should apply to turnover, not to the limit of indemnity, as turnover is a much better indicator of risk exposure.

From the viewpoint of the hazardous substances operators, it is felt that the premium proposed by the insurers is not appropriate. It does not reflect the real characteristic of the risk and is too high. The operators feel that the premium payment will increase their expense costs because they have to pay for motor insurance initially. From their own experience, there have not been many accidents from hazardous substances, and these did not create much of a claim cost. The claim amount did not exceed the maximum limit for the liability section and material damage section under motor insurance, and did not exceed 5 million baht in environmental damage. The committee of HASLA (Hazardous Substances Logistic Association) provided information to be used as a basis for premium calculation, by characterizing the risk factors as below:

1. *The qualification of chemical or hazardous substances;* loss exposure based on the chemical's qualification which is defined by NFPA (National Fire Protection Association) is divided into three categories; Flammability, Affect on health and Reactivity.
2. *Tolerance of pressure of tanker, following the tanker code;* this means that the tanker code is defined to match the qualities of the chemical. Therefore the insurance company needs to check that the tanker code is correct for that chemical type. A tanker code is based on trust that the tanker is strong enough to store the particular type of chemical inside, because a tanker must be tested by a professional before a code is assigned.
3. *Quantity of chemical stored inside the tanker:* the bigger the quantity of chemical, the more potential to create loss
4. *Risk Management;* the operator who practices good risk management should be recognised by a reduced premium. HASLA also provided the suggestion that risk management will benefit both insurance companies and the hazardous substances group, because an operator who works below standard practice will be ejected from the group and should be charged a higher premium or have the insurance proposal rejected.

Additionally, the operators want to know if there is any other alternative to traditional insurance to solve the problem of insolvency. The operators feel that their traditional insurance is enough, and the new legislation seems to duplicate coverage with existing insurance. The operators agree that according to historical data on claims cost or liability compensation as requested by the government, they are able to absorb the loss by themselves in excess of the compensation paid by an insurance company. Some operators reserve money for this in the company accounts for paying losses when an accident happens.

The next section of this article, therefore, deals with a comparison between the existing insurance which has been bought by the operators and the new proposed compulsory liability insurance under the 2006 notification. Then the advantages and disadvantages of traditional

insurance will be discussed. The consideration of environmental impairment insurance alternatives will be explored, together with other financial alternatives.

Consideration of Factors for the Insurance of Hazardous Substances

This section describes the consideration of factors for insurance acceptance, from the viewpoint of insurer and of hazardous substance operators. Information from the sections above has been summarised in Table 2 below. The intent of the Table is to reveal some points for discussing the possibility of solving the problem of the suspended promulgation; points such as insurance coverage and premium rating. Insurance products which are relevant to the risk exposure caused by hazardous substances during road transportation will also be examined. The information has been gathered from the Office of the Insurance Commission, Ministry of Finance, and from conducting interviews with insurance practitioners and hazardous substances experts. The Table thus records stated opinions on the various issues.

Table 2: Consideration of Factors for Insurance of Hazardous Substances in Road Transportation

Factors	Insurance Company	Hazardous Substances Operators
1. Premium Rate	To be marked up by 20% - 50% of the current rate	To be marked down by 20% - 50% of the current rate
2. Increase exposure unit by including all chemical tankers	To exercise the concept of the law of large numbers	To include impartiality among hazardous substances industries
3. The qualification of chemical or hazardous substances	To be considered in the premium calculation	To be considered in the premium calculation
4. Quantity of chemical stored inside the tank	To be considered in the premium calculation	To be considered in the premium calculation
5. Risk Management	To be consider in the premium calculation and for insurance acceptance	To be considered as a discount in the premium calculation
6. Motor Insurance	To be considered in the premium calculation	To use its limit of indemnity for the third party section as the base, and extend the limit required by the law on motor insurance.

7. Indemnity Amount	To be considered in the premium calculation	It needs to be reconsidered to match the exposure of each operator
8. Environmental Impairment Coverage	This needs underwriting skill, premium rating guideline and claim management.	All operators need this coverage, with a reasonable premium, and reconsideration of the limit of indemnity.

From the Table and research, it was found that the liability insurance for hazardous substances during road transportation based on the new promulgation should be discussed under three major issues:

1. Insurance coverage
2. Premium rating
3. Claim Management

1. Insurance coverage - Information was gathered from the interviews, together with an exploration of insurance products which are available for and applicable to hazardous substances during road transportation in Thailand. Three policies are involved: Carrier Liability Insurance, Motor Insurance and Environmental Impairment Insurance. Details of each policy will be discussed.

Carrier Liability Policy

The main coverage for this type of policy is loss or damage or delay of cargo carried by the carrier. Information from interviews with ten transporters provided details of this type of insurance. Only 3 of the 10 companies have carrier liability insurance which is a contractual enforcement by the product owner to ensure that the transporter has an insurance to protect against delays. The other 7 companies carry their own responsibility for any claim due to an accident. The two major reasons for not buying insurance are refusals from insurance companies because hazardous substance is an excluded property in the policy wording, and the probability of an accident which damages cargo is very low.

Note: An important concern for this liability policy is that it excludes environmental damage arising out of the insured's operations.

Motor Insurance Policies

In Thailand there are two types of motor insurance: compulsory motor insurance (CMI) and voluntary motor insurance (VMI).

Compulsory Motor Insurance (CMI) provides cover for bodily injury only and not for property damage. The indemnity is based on a "First Aid" concept with the intention of assisting the injured person(s) and/or the family of the deceased without requiring any proof of negligence. The basis of liability is "No Fault" for the cover within the "First Aid" limit. This strict basis of liability facilitates the processing of claims.

The First Aid immediately paid for is;

1) Medical expenses - for the actual amount of medical expenses which the injured person has paid, but up to a limit of Bht 15,000 per person; and
2) Funeral expenses - Bht 35,000 per person.

If there is a person who was seriously injured in an automobile accident, who had been admitted to the hospital for medical treatment, and passed away later, the Compulsory Motor Insurer is responsible for up to Bht 100,000 per person.

Voluntary Motor Insurance is a type of insurance in which the insured decides to effect the cover by himself. It will provide cover against financial loss which may arise from:

(a) loss or damage to the insured automobile by some unforeseen and unexpected causes of loss; and/or
(b) legal liability in respect of property damage, and bodily injury of others.

The legal liability section of the Voluntary Motor Insurance can be classified into:

1. *Third Party Property Damage (TPPD)* which provides cover for property damage to others. Some important exclusions are that it does not cover damage to property which is under the ownership, care, control, or possession of the insured or any person who lives in the same house with the insured (e.g. while parking your car at your house, you negligently smash into the back of the car owned by your father living in the same house).

2. *Third party bodily injury (TPBI)* provides cover for accidental bodily injury or death of any third person. It too excludes bodily injury or death to the insured or any person who lives in the same house with the insured. The maximum limit of indemnity is THB100,000 per person and THB 10,000,000 in aggregate.

Note: For Motor Insurance, there is no specific exclusion for legal liability damage to the environment and natural resources.

Environmental Impairment Policy

This policy is especially designed to cover the liability of the insured for any damage to the environment or ecological system which results from the insured's occupational activities. The insurance will indemnify the cost of

2. Death, bodily injury, and defective health
3. Property damage
4. Clean-up
5. All expenses to restore all natural resources to their baseline, or for environmental impairment
6. Legal defense, as specified in the policy

From interviews with ten insurers, it was found that there are few insurance companies who

feel comfortable enough to underwrite and accept this type of risk. It was found that only one insurer has an underwriting guideline from head office to underwrite, calculate the premium, and tailor the policy. One company underwrites this only if it has the Insured's whole insurance account, which means an insured who asks for environmental coverage must be a good client, with an acceptable loss ratio, who has insured with the company for many years, and places all his insurance with that insurer. The rest of the insurers have no experience as a base for underwriting or accepting this particular type of risk, and the risk also falls under the exclusion list of their reinsurance contract.

Note: This coverage type is needed by the operators, but they disagree about limits of indemnity and premium rating. Additionally, the operators say that it should be an option to include this coverage in Motor Insurance.

2. Premium rating

From interviews with both parties, insurers and hazardous substances operators, it was found that there are some conflicts with rating factors as well as some agreement about them. It is possible, through the concept of a mathematical model and information from the interviews, to formulate rating factors, with the following details.

- Type of chemical - we can classify type of chemical into 3 classes by using the extent to which such a chemical could create loss or damage through explosion, flammability, or health defect
- Quantity of chemical stored in a tanker - we assume that the greater amount of chemical stored, the more possibility of loss payment if the total amount of chemical leaks.
- Value of Risk, based on Route - this value is included in the research study by the Office of Transport and Traffic Policy and Planning (OTP) Ministry of Transport (2006) and describes the risk value for each route. The definition of risk value is the product of probability of loss and severity, for each accident. The research assumes that risk in each route is different because of population density, type of highway, number of hazardous substances vehicles on the route, loss history, response capability, surrounding property, consequential loss and surrounding conditions.
- Risk Management - this factor is quite important to insurance acceptance and premium calculation. The researcher has developed this factor to be a discount in a logistic regression model, and it needs further study. Moreover from the interviews, all parties agree that the risk management factor is meaningful to calculate the probability of accidental loss. If risk management is good, the chance of loss should be low. Additionally, risk management can be used as the basic guarantee about the moral and morale hazards of operators.
- Limit of Indemnity - in the interviews, both parties were concerned about the limit

of indemnity. They disagree with the limit set by the government (especially the operators). The hazardous substances operators suggest that the limit of indemnity should have many levels, depending on the need of each company. It should be allowed that the sum insured be less than that regulated by law.

3. Claim Management - management of claims is another major concern for insurance companies, especially for environmental liability claims, because there is no professional company for emergency response and clean up, but only experts from government sectors in Bangkok. If loss or damage arises in the provinces, how could an incident be controlled to minimise loss and cost? The second concern is about the way to assess an environmental claim. It is quite difficult. It needs an economist who is an eco-environmental expert, but insurance companies have no such specialist. The claim management concern seems to the researcher that it is the key to calculating all expected claim costs. It means that it would then be possible to roughly estimate the premium and also the limit of indemnity for each chemical type.

Discussion of Alternatives

In the previous section we explored the insurance products which are applicable to hazardous substances transported by road in Thailand, including the new compulsory insurance announced by the government in 2006. Then, we compared the coverage of existing products with the new product in order to decide whether the viewpoint of the hazardous operators is correct or not. The following Table shows the relationship between loss exposure and the insurance product which matches that exposure.

This Table shows that the new insurance product will cover the possible exposure predicted by the DIW committee. Therefore the insurance does not duplicate existing cover, unless the insured is the wrongdoer and the loss exceeds the motor insurance cover. If the insured is not the wrongdoer, and chemical accidentally leaks from a tanker, motor insurance does not operate to cover this, and the new product extends liability coverage is beyond that in motor insurance. However if we consider the number of accidents where the hazardous load is class 3 flammable liquid, the 2006 legal requirement provides too much cover. Therefore the hazardous operators try to bargain with insurance companies to reduce the limit of indemnity for environmental impairment to THB5,000,000. Furthermore, the other liability coverage is within the scope of the motor insurance policy, which means that if the operator has motor insurance with the same limit as stated in the legislation it will automatically be legally covered. If not, the operator must buy a higher limit as requested by the 2006 law. The figure 5,000,000 baht is derived from the loss experience of the member companies in the HASLA group. In the researcher's view, further study into the cost of claims would help establish a more correct limit of indemnity.

Table 3: Various Loss Exposures for Various Insurance Policies
(✓ means covered and ✗ means not covered)

Loss exposure from transport of hazardous substances	Motor Insurance		Legal Liability Insurance	Liability Insurance for hazardous substances on Road Transportation
	Voluntary Motor Insurance	Compulsory Motor Insurance	Carrier Liability Insurance	
Damage to cargo	✗	✗	✓	✗
loss or damage to the Insured automobile including every description of attachment and packing of hazardous substances	✓	✗	✗	✗
Loss or damage to the persons in the Insured Vehicle - this includes the driver, the passengers who are in that vehicle and anybody who is getting on or getting out of that vehicle	✗	✓	✗	✗
Third party liability	✓	✓	✓	✓
Environmental Liability	✗	✗	✗	✓

Now, we will consider the possibilities of financial alternatives to traditional insurance. From the interviews it was found that insurance companies are not happy with premiums and policy coverage, and the hazardous substances operators have the same problem - but from opposite sides. Therefore the researcher would like to suggest the following alternatives.

1. Continue to use insurance as a financial tool to solve the insolvency problem, but the insurance must adjust the indemnity limit to fit the client's need. The way to know the client's need is to conduct a risk assessment at the insured's site and study claim costs.
2. Operate risk pooling among the hazardous substances group of operators under the control of DIW. All operators could make an agreement to share their risks by contributing an amount of money to the pool, and setting up a group compensation fund. They would appoint a fund manager and committee. In the case of a member faced with the problem of accidental leakage of a chemical during transporta-

tion, that member could borrow money from this fund and return it later, plus interest.

3. Each operator should purchase a bond to guarantee his payment when any accident occurs. This concept is similar to municipal bonds. The concept was described by White (1999) as a type of economic instrument.

A further study should examine these three alternatives in detail.

Conclusion

This is a story of the introduction of new, needed, legislation for compulsory insurance. The field, environmental impairment, is relatively new and complex in terms of urban effects in Thailand (as opposed to marine oil pollution, for example). It is therefore not surprising that the legislation travelled a rocky road, pleasing neither insurers nor potential insured. Government intervention into the insurance field is usually not beneficial, other than to regulate the industry so that there will always be money to pay claims (Skipper, 1998). But sometimes government intervention is for the wider public good (Lawrence, 2005). Liability insurance for hazardous substances during road transportation was initiated by the government for the public good (*pro bono publico*). The intention is to provide an adequate amount of compensation to various classes of victim, with a reduced time for processing proof. In the future this policy may become like compulsory motor insurance which provides first aid to victims. The Committee of Hazardous Substances also believes that this insurance will be able to minimize the insolvency problem of hazardous substances operators. Additionally, the Committee is concerned about damage to the environment, natural resources and the ecological system.

If we retain the concept of proper compensation of victims, this worthy legal initiative should be adjusted and reconsidered to take account of the comments and suggestions made by the parties most concerned. A deeper study is required in terms of product design, premium calculation, and evaluation of claim costs, especially for environmental damage.

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