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Series on Pollutant Release and Transfer Registers No.2

PROCEEDINGS OF THE OECD INTERNATIONAL CONFERENCE ON POLLUTANT RELEASE AND TRANSFER REGISTERS (PRTRs)

PRTRs: NATIONAL AND GLOBAL RESPONSIBILITY

Tokyo, Japan, 9-11 September, 1998

PART 2

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris 1999

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SESSION V

Evaluating the Role of PRTRs as an Environmental Policy Tool

Working Group E

Role of a PRTR Nationally and Globally: Focus on Governments

Benefits of a PRTR to Governments: the Cuban Perspective

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First steps

The Ministry of Science, Technology and Environment of Cuba (Ministerio de Ciencia, Tecnología y Medio Ambiente, CITMA) is the State central administrative institution in charge of proposing and controlling the execution of the environmental policy of the country, based on co-ordination and environmental management.

In terms of toxic chemical substances, the CITMA is in charge of establishing the rules related to identification, production, storage, conservation, control, adequate management, exportation and importation.

In 1995, Cuba expressed to UNITAR in Geneva its interest in taking part in projects related to PRTR development. In particular, it expressed the intention of assimilating the reliable progress of Mexico in this matter, a country selected together with Egypt and the Czech Republic to conduct case studies of PRTR implementation.

CITMA, by means of its working relations with UNEP Chemicals, attended the workshop on PRTRs for Latin American countries held in Querétaro, Mexico, in July 1997. Cuban participation in this meeting catalysed interest in the registration systems for emissions and contaminant transfer, bringing together identification of objectives and implementation capacities in the country.

In February 1998, under the auspices of UNEP Chemicals, a national workshop was held in Havana on assessing the feasibility and necessity of creating a Cuban PRTR. Its results led to an optimistic view of advancing quickly and effectively in search of viable alternatives in regard to the future of a Cuban PRTR.

Among its numerous recommendations is that related to the importance of starting, in the very short term, the planning and execution of several actions oriented to harmonisation of the different national register systems and inventories in a single PRTR, but without implying a substitution.

A very valuable result of the workshop, at which 28 institutions related to the matter were present, was the creation of a Co-ordination Group at least for the preliminary activities.

Till now it has been possible to identify the objectives of the Cuban PRTR and the advantages that it represents for the Government, industry and citizens.

The Cuban perspective on the potential role for government in PRTR systems

The beneficiaries of a PRTR are governments, industry and the general public. In general, PRTRs increase the capacity of the involved parties to participate in environmental decision-making.

The following are the most important benefits of a PRTR to the government that implements it.

- consistent identification of who is generating the emissions or contaminant transfers harmful to people or to the environment;
- specific knowledge of what contaminants are being emitted or transferred across time (trend analysis);
- where emissions and transfers are going, and therefore what ecosystems are being damaged (air, soil, and water).

TO WHAT ECOSYSTEM?

- what is the geographic distribution of contaminant emissions and transfers?

WHERE ARE THE SITES?

- Where are the main risks located?

WHERE ARE THE CRITICAL SITES?

The PRTR concept brings together two basic principles that have been recognised by international environmental agreements:

- Citizens should have access to environmental information
- Industries should provide information on emissions of toxic substance into the environment

As has been identified in the documents from OECD and UNITAR, PRTRs considerably improve government’s capabilities in environmental management. Among these in the Cuban case, the following issues should be pointed out:

- The development of indicators to measure and quantify the success or failure of the policies of contamination reduction.
- The simplification and integration of multiple requirements to report contaminant sources.
- The establishment of priorities to reduce or gradually eliminate some chemical substances.
- Generation of integrated efforts of contamination prevention and control by means of the identification of chemical substances among industries that could be subjected to the application of clean technologies.
- Informing the general public and answer precisely and accurately to the increasing demand for environmental information.
- Accomplishing the requirements to provide information derived from international agreements and conventions.

Following PRTR implementation, the Cuban authorities in charge will be in an advantageous position to know what pollutants are emitted and the trajectories of the emissions and transfers in function of time. - Knowledge of the substances released into the environment is necessary to identify priorities for action.

PRTRs are invaluable tools when it is necessary to establish priorities for risk mitigation, to reduce or eliminate contaminant emissions or transfers potentially harmful in a critical site, or to act at a country level.

Risk to human health and the environment from release and transfer of substances cannot be determined from PRTRs data alone. Data are useful as a starting point in identifying potential risks. In terms of risk, PRTRs offer very valuable information to public health authorities on the contamination levels that people or groups of workers are exposed in different labour environments, allowing solutions to contingencies or special situations.

Economically, the Cuban PRTR could contribute to diminishing the current high costs of environmental monitoring of chemical substances registered. PRTRs also simplify and integrate actions linked with the monitoring of the pollution sources.

The information derived from different territorial, country, regional or local levels could be used as a measure of progress in pollution prevention. That is the rational base for decision-making for the benefit of people and environment. Obviously, to monitor progress effectively governments, industry and society require a readily available inventory. The availability of data should help governments to target their programs in the most effective manner.

On the other hand, the results of national PRTRs could be compared with similar observations from other countries allowing knowledge of each country's reality. This is of increasing importance for the establishment and monitoring of national goals and the accomplishment of the international compromises of each country.

Principal constraints on implementation of PRTRs in developing countries or in countries

with economies in transition

The principal constraints on implementation of national PRTRs are the following:

- Low availability of material and human resources to develop the actions implied in a PRTR.
- Difficulties in the definition of goals and of the main users and beneficiaries.
- Absence or delay in the minimum infrastructures required by the PRTRs in legal, institutional, technical and administrative terms.
- Insufficient availability of data bases on the emissions and transfer of chemical substances, as well of environmental monitoring.
- Isolation or poor communication of the government with industry and people in subjects related with environmental management.
- Absence of leadership and strength among the institutions with responsibilities in research and environmental protection.

- Insufficient comunitary environmental education and participation in the environmental problems related with potential risks to health and negative effects of toxic chemical substances in the environment.
- Inability to identify the most important environmental problems of the nation, territories or localities.
- Presence of other environmental priorities than the PRTRs.

The first constraint is the most accounted by the international agencies with respect to the PRTR's implementation in developing countries. Certainly, the absence of financial resources is a big limiting factor but not the only one and, sometimes, neither the most important.

Supporting developing countries' PRTR activities

The overall goal of all assistance activities should be to facilitate the ability of the recipient country to develop the means to be self-sufficient over a long term. Thus, the assistance should be directed to developing national capabilities (technical, material and abilities development) on the implementation of PRTR, which can be maintained over time.

There must be a level of international financial support for national implementation of PRTRs, consistent funding are essential to developing countries. Financial assistance must be considered with amplitude that covers a feasibility study that identifies the actual situation of the country before it starts the process of implementation of a PRTR. This feasibility study must assess the national constraints and how to remedy them.

Funds are needed to include support for the necessary capacity building for this countries at the very beginning of the implementation process of a PRTR, in order to strength the linkage with the environmentally sound management of chemicals. This feasibility study must assess the national constraints and will define how the situation will be faced.

Within the phases to accomplish in the PRTR's implementation there is an absence of guidelines to the governments for the feasibility study. This capacity assessment is of first importance whilst it could allow the development of redemption plans that in a very short-term range could solve the identified problems and restart the work on the PRTR.

There is a very huge amount of information and guidelines to governments covering all stages of PRTR's national implementation. Nevertheless, there is a tremendous gap between the identification of national capabilities and the implementation plans. A readily big effort should be developed in order to provide local governments with specific guidelines for the feasibility study, taking into account that the problems then identified, could be remedied with proper assessment and financial support in a short term range.

In developing countries, the *feasibility study stage* should be developed before the goals identification phase. After the feasibility study is accomplished, two alternatives could be derived: start the PRTR system without taking into account whether the principal aspects have been covered, or not develop the system because the current situation has not been realistically assessed.

Comments on Pollutant Release and Transfer Registers (PRTRs) from the Viewpoint of Environmental Exposure Assessors

Prepared by the OECD Working Group on Environmental Exposure Assessment
April 1998

Presented by Patrick Kennedy
Office of Pollution Prevention and Toxics, USEPA

Introduction

The fourth meeting of the OECD Environmental Exposure Assessment Working Group occurred in Paris on January 22 and 23, 1998. At that meeting, the Working Group was advised of an upcoming international meeting on PRTRs to take place in Japan in the fall of 1998. The Working Group was told by the OECD Secretariat there was an opportunity to provide comments on PRTRs to a steering group that was planning the agenda for the fall PRTR meeting. The Working Group's comments are set forth in this paper.

Background

Environmental exposure assessments may describe the exposure of both human and non-human populations to chemical stressors. They also describe the concentration of chemicals in one or more environmental compartments such as air, water, soil, and biota. Environmental exposure assessments can be done to support the review of chemicals in the OECD SIDS program, to conduct exposure/risk assessments to support an individual member country's risk assessment and risk management activities, or for other purposes. It is often the case that monitoring data are not available for the chemical of interest. In these situations, environmental exposure assessors use fate and transport models to estimate chemical concentrations in environmental compartments. PRTRs can be very useful data sources for inputs to the fate and transport models.

Comments Related to Using PRTR Data in Environmental Exposure Assessment

The comments presented here are intended to provide managers of existing PRTRs and developers of new ones, information about key data elements of existing PRTRs that exposure assessors find useful as well as information about additional data elements assessors would find useful. There is also a possible overlap of current emissions reporting for high production volume chemicals in the European Union with common PRTR data requirements.

1. Key Data Elements of Existing PRTRs Useful for Environmental Exposure Assessments

Pollutant Release and Transfer Register (PRTR) emission data are very useful for environmental exposure assessments. The following data can be used directly for calculation of the Predicted Environmental Concentrations (PECs). {Please note that this is not intended to be an all-inclusive list of every data element that can be useful to an exposure assessment, but rather some key elements.}

Emission rates of chemicals from reporting facilities (or from offsite treatment facilities) into air, surface water, and soil are one of the key inputs that form the starting point for estimating PECs using fate and transport models. Historically, the absence of these emission rates has been one of the chief difficulties in performing even a screening level environmental exposure assessment. With the PRTR data, screening level assessments using fate and transport models can be done relatively easily. The reported emission rates should appropriately account for any recycling, including emissions from recycling, that takes place on the reporting facility site.

Knowledge of the geographic location (e.g., latitude/longitude co-ordinates) of releases from single facilities as well as for aggregate releases from a cluster of facilities, along with unique names or identification numbers, is quite useful. Knowing where facilities are located allows an assessor to make use of site-specific information such as river flow rates to develop PECs that would result from releases to that water body. Geographic information also allows the assessor to determine the proximity of potentially exposed populations. Maps of where releases and exposures are occurring can provide guidance for where detailed environmental exposure assessments should be conducted.

2. Additional Data Elements and Related Comments

In addition to the data collected by existing PRTRs, the following information would be beneficial in reducing uncertainties in environmental exposure assessments.

The peak daily releases to air and water, including releases from spills, would be very helpful. When conducting an environmental exposure assessment, it is common to estimate both long-term and short-term PECs. A long-term PEC may represent the average concentration over a year or more from a continuous release. A short-term PEC may represent the average concentration over a period as short as a day resulting from episodic releases. Long-term PECs are compared to Predicted No Effect Concentrations (PNECs) representing long-term toxicity while short-term PECs are compared to PNECs representing short-term toxicity. If only an annual emission rate (e.g., kg/year) is available, the assessor must make some assumption about how the chemical is released over the course of a year. The possibilities range from assuming the chemical is all released in one day to assuming the chemical is released in equal amounts over 365 days. The estimated value of a short-term PEC is very sensitive to the assumption of the daily release rate.

More complete information about off-site releases would be useful. For example, for land disposal it would be useful to know if the waste is sent to a facility designed to handle hazardous waste or to a facility that is designed to accept household waste. When releases are sent to an off-site waste treatment site prior to release to water, it would be useful to know the identity of the receiving water body.

The identities of the specific chemicals being released, when releases are reported for a chemical category, would be useful. Because the behaviour in the environment may vary from chemical to chemical, it would be helpful to have their identities when conducting environmental exposure assessments.

Accounting for emissions to the environment from small end-users, if those emissions form a large portion of a chemical's total release, may be important. Although PRTR data are very useful for environmental exposure assessments, for some chemicals emissions from small end-users contribute a large portion of the total emissions. In these cases, inclusion of total emissions can greatly improve the quality of environmental exposure assessments that are based on PRTR data. At least one PRTR incorporates estimated emissions from such diffuse sources.

In addition to the above data elements, the methodologies for estimating releases should be as accurate, consistent, and transparent as possible in order to be of maximum utility to the ultimate characterisation of uncertainty associated with an environmental exposure assessment.

Also, perhaps there is a need to appropriately benchmark the releases to something (e.g., biochemical oxygen demand) or some other measure or measures of environmental impact. This could provide additional perspective on the impact of the releases. However, since there can be many potential impacts, this would not be a trivial undertaking.

3. EU Reporting Requirements

For point sources, emission data already are submitted for high production chemicals under the EU existing chemicals legislation which is rather similar to data that would be collected in the future under the EU Integrated Pollution Prevention and Control legislation (a PRTR). These data requirements should be harmonised so that they do not overburden industry. The OECD and the EU agreed in 1996 to submit emission rates to water and air for OECD SIDS and EU priority chemicals by the EU questionnaire. See the accompanying documents, Annex 1 and Annex 2.

Also, it is important that a numbering system to uniquely identify each installation covered by the EU PRTR be introduced in order to avoid confusion on emitters.

ANNEX 1

GUIDANCE FOR COLLECTION OF EXPOSURE INFORMATION

Introduction

In the same way as information about quantities placed on the market and the fate of the substance in preparations and/or products, information about the various uses of a substance is an essential component of the knowledge base used in the estimation of the potential risk posed by the substance. The particular items of information and data which are to be submitted are laid down in Council Regulation (EEC) No 793/93 of 23 March 1993 on the evaluation and control of the risks of existing substances.

General Instructions

The enclosed form, which also requests information about exposure in accordance with Annex VIIA of Directive 67/548/EEC, is intended to assist in the collation of the documents required in accordance with Article 9(1) of the Regulation.

- Completion of this form by each company is mandatory, and should be based on readily available data and responsible estimates. However, it is expected that all reasonable efforts would be made in gathering the necessary information for on-site and off-site exposure. All of the information on initial production and further processing/use and the related exposure of man and the environment during production must be submitted. Information relating to use and to exposure during use must be provided on the basis of the company's own knowledge, questions put to users and literature searches. Not only the intended uses but also the foreseeable uses are to be considered here. An example of an agenda for gathering and documenting use-related exposure information is given in Annex 1. Co-operation and good communication between government and industry is very important when gathering exposure information. As shown in Annex 1, it is important to record the work done including negative results in order to avoid duplication of efforts.

- If any data are confidential, please use ranges or generic descriptions to provide as much non-confidential data as possible. Any confidential data could be attached as an Annex to this form.

- Each company should complete this form.

- As diskettes for example including files for WinWord 6.0 are available from the rapporteur, space in the format could be modified as appropriate.

- Where necessary, this information must be supplemented at a later date by further data required as a result of the assessment. Such information may, for example, comprise data on customers, the results of questions put to customers or the results of measurement programmes. It is to be used by industry when submitting data to the rapporteur.

Specific Instructions on Data Entry

- In order to evaluate the quality of data, it is important to distinguish “on-site“ data mainly related to production and “off-site“ data mainly related to downstream uses. In the questionnaire it is clearly marked if site-specific data mainly related to initial production and processing are gathered. Information on downstream uses is also important in order to know the complete life cycle of the chemicals; however, it should be noted that such data concerning downstream use could be derived based on estimation. Any estimation of the releases during downstream uses would be very helpful.

- With respect to occupational exposure, it is also important to distinguish exposure during manufacturing from that during occupational/professional use.

- With respect to industry categories and use categories, it is recommended to use the categories in the HEDSET (see Annex 2).

- The description of the technological process (Point 2.3 “Details of Process or Processes Involved”) involved in production or use is required for purposes of characterising the exposure situation. The description of the process should allow clear identification of the steps in the process during which inhalative and/or dermal exposure is to be expected. In particular, parameters which influence exposure (e.g. continuous/batch, open/close, automated/manual). Plant type (e.g. open plant) and increased temperatures should be listed. Possible exposure during e.g. maintenance and cleaning work, during sampling as well as during filling and transfer activities involving the connection and disconnection of feed pipes should be indicated.

- The availability of technical protective equipment and the personal protective measures (Point 3.2 “Protective measures employed”) which are taken have a considerable influence on the exposure situation and should be described with reference to the process or the activities which are performed.

- The information on workplace exposure (Point 3.4 “Exposure scenarios”) should include a brief description of all activities during which exposure of workers is to be expected. The description should also cover activities involving potential dermal and inhalative exposure for which the exposure is judged to be low because personal protective equipment is worn. The duration and frequency of the exposure during the shift should be provided for the individual activities. In addition, the number of days per year on which exposure occurs is to be approximately estimated. Information on the number of exposed workers should also be provided in order to obtain a full picture of the exposure situation. Differentiation according to continuos and occasional (less than 50% of the working time) exposure is desirable in this regard. If possible, a statement should also be made about whether - and, if so, how many - female workers are exposed.

- Measured data on emission are preferred for environmental exposure assessment and monitoring data are preferable for occupational exposure assessment; however, representativeness should be reviewed. For validation of the monitoring data, it is important to give some indication of the sampling and analytical methods. As space in the format is limited, detailed results could be attached to the format, as appropriate. Results available from workplace measurements (Point 3.5 “Summary of workplace monitoring data”) which are taken within the last five years should be considered. However in cases where the workplace conditions have not fundamentally changed, older values can also be given. The measurement method which was applied must be indicated in order to permit an estimation of the validity of the results. In the case of published methods, reference to the source is sufficient. If there are more than 20 measurements, the 95th percentile value is to be included. Both the type of measurement and the reason for conducting the measurement can have a considerable influence on the representativeness of the measurement result for exposure. In particular, appropriate explanations should be provided in the case of measurements which can be expected to produce a high or a low value.

- Please indicate in Table 4.1.1 and 4.1.2 year of reference and duration of production/processing campaign if shorter than one year. Data of Table 4.1.1 are requested for each site where compound is manufactured or processed as intermediate. Data of Table 4.1.2 are requested for each use of the compound as declared in Table 2.2. Emission data on release should be given as site-specifically as possible. In case of numerous sites representative data are acceptable. Please indicate also, whether data are measured (at emission point), monitored or estimated.

- With respect to off-site release to the environment, it should be noted that small-scale industry, consumer end-use of the chemicals or waste disposal where a chemical is likely to be available for environmental and human exposure should be considered. Examples of end-use categories are:

  cosmetics and toiletries

  soaps and detergents

  polishes and sanitation goods

  paints and coatings

  adhesives and sealants

  automotive care products

  pesticides and lawn/garden products

- Detailed instructions are also given in the format in italics.

(Annex 1)

An Example of an Agenda for Gathering and Documenting Use-Related Information

The following list should be regarded as a draft "checklist" describing individual steps in the process of gathering and documenting use-related data.

1. Searching substance identity data

- searching the CAS-Registry file (STN) (scientific substance identity)
- searching internal documentation (e.g. product codes)

2. Gathering use-related information by searching suitable sources

- searching governmental database (e.g. EXICHEM, product register, release inventory)
- searching internal documentation's (e.g. product catalogues, customer-related documentation)
- selection of suitable customer firms in order to obtain a representative cross-section of use-related information using an agreed pro forma. The use of an agreed pro forma is intended to promote comparability of the information which is obtained and may serve to avoid de-motivation in the consulted firms due to be confronted with different query models.
- searching printed literature
- searching standard reference books
- searching bibliographic references of available original publications (reviews)
- searching suitable electronic databases (e.g. on-line databases, CD-ROM publications)

3. Description of the work done

- short description of the search strategy (e.g. description of the approach used in accessing the various sources)
- description of the further development of the query formulation through the evaluation of the documents identified during the search

4. Documentation of search results

- short description of the steps performed in the search procedure
- negative results: list, including reference to the source
- positive results: present, including reference to the source, and transfer to the data transfer format
- ensure anonymity of source information where necessary (e.g. identity of customers)
- brief assessment of search results (e.g. outdated literature data)

(Annex 2)

Glossaries to be Used for Describing Use Pattern

Data on use pattern are recommended to be given by assigning the following glossaries which are also used in HEDSET. There are four main groups, according to their exposure relevance, 15 industrial categories and 55 use categories.

Type of Use - use **EACH** of following terms

A. Main Categories

B. Industrial Categories

C. Use Categories

A. Main Categories - use one of the following glossary codes

I Use in closed systems

II Use resulting in inclusion into or onto matrix

III Non-dispersive use

IV Wide dispersive use

Use in closed systems

A substance should be assigned only to this category if it remains within a reactor or is transferred from vessel to vessel through closed pipework and therefore accidental spillage is the only likely cause for human exposure or environmental contamination.

These intermediates are classified in one of the following 3 categories:

-- non-isolated intermediates (restricted to the reaction vessel and its dedicated equipment)
-- isolated intermediates (stored on-site under controlled conditions)
-- isolated intermediates with controlled transport

A typical example is phosgene which will be used only under these conditions.

Substances used in closed systems which might, nevertheless, be released under certain conditions:

a) Workplace

- during maintenance and cleaning work, during sampling as well as during filling and transfer activities involving the connection and disconnection of feed pipes.

b) Environment

- actual release into the environment, sometimes of considerable quantities, or potential significant release during production and use.

Typical examples in the latter case are CFC's used as cooling agents or hydraulic fluids.

Such substances should be assigned to the "non-dispersive use" or even the "wide dispersive use" categories.

Use resulting in inclusion into or onto matrix

Use consisting of inclusion into or onto matrices means all processes where chemicals are incorporated into products or articles from which they would not be released into the environment. Examples are the inclusion of plasticisers in plastics and additives such as pigments or dyes in plastics or fibres.

Non-dispersive use

Non-dispersive use refers to chemicals which are used in such a way that only certain groups of workers, with the knowledge of the processes, come into contact with these chemicals. Workers are normally aware of the procedures to protect themselves through the use of technical protective measures. The employer should also take the necessary steps to protect the environment against exposure. Thus, exposure to these chemicals will be limited.

These chemicals may also be discharged into the environment from point sources. Quantities discharged will be limited due to protective measures such as waste water sewage treatment plants or air filters.

Wide dispersive use

The term "wide dispersive use" should be used for a wide range of activities particularly where end users come into contact with the products.

Examples are detergents, cosmetics, disinfectants, solvents in household paints, solvents in paints, which are used in working places (e.g. by painters and lacquerers)

B. Industrial Categories - use the following glossary codes

1 Agricultural industry: e.g. pesticides, fertilisers

2 Chemical industry: basic chemicals e.g. solvents, pH-regulating agents (acids, alkalis)

3 Chemical industry: chemicals used in synthesis e.g. intermediates (including monomers), process regulators

4 Electrical/electronic engineering industry: e.g. electrolytes, semiconductors. Not: galvanics, electroplating agents

5 Personal and domestic use: e.g. consumer products such as detergents (including additives), cosmetics, non-agricultural pesticides for domestic use

6 Public domain: e.g. professional products used in public areas such as non-agricultural pesticides, cleaning agents

7 Leather processing industry: e.g. dyestuffs, tanning auxiliaries

8 Metal extraction, refining and processing industry: e.g. heat transferring agents, electroplating agents

9 Mineral oil and fuel industry: e.g. gasoline, colouring agents, fuel additives, antiknock agents

10 Photographic industry: e.g. antifogging agents, sensitisers

11 Polymers industry: e.g. stabilisers, softeners, antistatic agents, dyestuffs

12 Pulp, paper and board industry: e.g. dyestuffs, toners

13 Textile processing industry: e.g. dyestuffs, flame retardants

14 Paints, lacquers and varnishes industry: e.g. solvents, viscosity adjusters, dyestuffs

15 Other (indicate the category)

These 15 categories represent almost all industrial uses of chemicals and could serve for setting up exposure scenarios with regard to the designated use of a substance.

C. Use Categories - use the following glossary codes

1 Absorbents and adsorbents
2 Adhesive, binding agents
3 Aerosol propellants
4 Anti-condensation agents
5 Anti-freezing agents
6 Anti-set-off and anti-adhesive agents
7 Anti-static agents
8 Bleaching agents
9 Cleaning/washing agents and disinfectants
10 Colouring agents
11 Complexing agents
12 Conductive agents
13 Construction materials additives
14 Corrosion inhibitors
15 Cosmetics
16 Dustbinding agents
17 Electroplating agents
18 Explosives
19 Fertilisers
20 Fillers
21 Fixing agents
22 Flame retardants and fire preventing agents
23 Flotation agents
24 Flux agents for casting

25 Foaming agents
26 Food/foodstuff additives
27 Fuel
28 Fuel additives
29 Heat transferring agents
30 Hydraulic fluids and additives
31 Impregnation agents
32 Insulating materials
33 Intermediates (give description in the remarks field)
34 Laboratory chemicals
35 Lubricants and additives
36 Odour agents
37 Oxidising agents
38 Pesticides
39 Pesticides, non-agricultural
40 pH-regulating agents
41 Pharmaceuticals
42 Photochemicals
43 Process regulators
44 Reducing agents
45 Reprographic agents
46 Semiconductors
47 Softeners
48 Solvents
49 Stabilisers
50 Surface-active agents
51 Tanning agents
52 Viscosity adjusters
53 Vulcanising agents
54 Welding and soldering agents
55 Others (indicate the category)

ANNEX 2

CAS NO.: ___________

EXPOSURE INFORMATION

IDENTITY OF RESPONDER

Company/Organisation:
Name:
Street:
Town: **Tel:**
Country: **Fax:**

IDENTITY OF CHEMICAL

CAS No.:	
Chemical name:	

GENERAL INFORMATION CONCERNING PRODUCTION AND USE

Quantity (wt/year)

Quantity (tonnes/year)	**Production (total)**	**Production Capacity**	**Import into EU**	**Export outside EU**
year before notification*				
year of notification* **19 _ _**				
Estimation for next years				

** notification = data delivery according to Art. 9(1) for priority chemicals*

CAS NO.:___________

Use pattern and approximate percentage of total volume in each use category

*(Please use glossary codes for HEDSET, shown in the guidance, as much as possible. Please also distinguish between the on-site use and the estimated off-site use with *for the latter.)*

Main Category	Industrial Category	Use Category	Approximate % of total

Details of Process or Processes involved

(e.g. continuous/batch, open/closed, whether water is involved in the process or cleaning the system.)

OCCUPATIONAL EXPOSURE

(If different answers are expected for different processes, please show them separately. Please also distinguish exposure during production from that during occupational/professional use.)

MAK or equivalent occupational standard

(mg/m^3 with time period)

CAS NO.:___________

Protective measures employed

(Please clarify the industry category, process and/or activity)

Engineering control

Personal protection

(e.g. protective equipment)

Product information

Industrial category	form of the product/preparation	wt % of the chemical in the product/ preparation	function of the chemical in a product/ preparation	use of the product/preparation (including trade names)

Exposure scenarios

(Clarify the industrial category. Please also distinguish exposure during production from that during occupational/professional use.)

Activities of relevance to exposure and route of exposure

CAS NO.:___________

Frequency and duration of use

(days/years and hrs/day)

Number of workers per site

Characteristics of exposed population

(e.g. gender, age)

CAS NO.:___________

Summary of workplace monitoring data

(including a short characterisation of sampling and analytical procedure)

Industrial category and/or activity	**year(s) of measure-ment(s)**	**Number of measure-ments**	**TWA or short term value (STV)**	**range of measurement data (mg/m³)**	**median (mg/m³)**	**95%-percentil (mg/m³)**

CAS NO.:___________

ENVIRONMENTAL EXPOSURE

Environmental release

Release from point sources

(This table should be filled in for each site in which the chemical is manufactured and/or processed)

Location of production and/or processing site		**Year:**	
Industrial Category *(see Annex 2 Part B)*			
Describe industrial process *(information see chapter 2.3)*			
Frequency of activities			
Quantity of chemical involved [t/year]			

Release of chemical to compartment	
Emission to air [kg/year]	
Emission to air: monitoring concentration in ambient air [ng/m^3]	
Emission to waste water without treatment, including sea water [kg/year]	
Emission to surface water as WWTP effluent [kg/year]	
Emission to surface water: monitoring concentration in receiving surface water: name of receiving water and concentration [µg/l]	
WWTP effluent flow [m^3/s]	
Other WWTP information	
Flow of surface water body receiving WWTP outflow at water depth-gauge (name of receiving water and gauge) [m^3/s]	
Amount of substance in solid treatment [kg/year]	
Type of solid waste treatment	

CAS NO.:___________

Release from off-site sources related to further processing/use

Industrial Category	**Use Category**	**Year**	**Approximate No. of Sites**	**Industrial processes which are likely to generate releases to the environment**	**Release Data to Each Environmental Compartment (wt/year or qualitative distribution)**		
					Surface water	**Air**	**Soil/Waste**
Total							

CAS NO.:___________

Release from other downstream sources

(Please try to cover all the life cycle of chemicals.)

Release from:	**Industrial category or Use category or Form of waste**	**Approximate % of total release**	**Processes likely to generate releases to the environment**	**Release estimates to each compartment (wt/year or qualitative distribution)**		
				Surface water	**Air**	**Soil/Waste**
Small Scale Industry						
Release from Consumer Use						
During disposal and from waste						

CAS NO.:___________

Further information of environmental concentration

(details description including information, e.g. on compartment, location and year)

CONSUMER EXPOSURE

(Please fill in this table in conjunction with 2.2. Protected measures could also be described below the table. If no consumer use is expected, please skip this.)

Use Categories for Consumer Use *(Including Trade names)*	**Form of Product** *(e.g. aerosol, powder, liquid)*	**Wt % of the Chemical in Product**	**Function of Chemical in Product**	**Route and Extent of Exposure** *(e.g. oral, dermal, inhalation; outdoors, indoors)*	**Frequency and Duration of Use** *(days/year and hrs/day)*

OTHER INFORMATION WHICH WILL HELP TO FOCUS EXPOSURE ASSESSMENT

(Quantitative or qualitative)

CAS NO.:___________

Expected amounts of wastes and composition of wastes resulting from production, the intended use of the chemical and the preparations/products

DATA SOURCES SEARCHED (REFERENCES)

(Please enter full details including negative results - see Annex 1)

ANNEX 3

Comments about Potential Positive and Negative Characteristics of Right-to-Know Programs

In addition to comments about the utility of PRTR data for environmental exposure assessments, comments are provided on potential positive and negative characteristics of Right-to-know programs.

The potential positive characteristics of right-to-know (RTK) programs can include:

1. An RTK program can provide information to potentially affected communities, employees, distributors, and customers about the risks posed by products and operations, and the systems and controls in place to safely manage them.

2. An RTK program can be used to share scientifically sound, relevant, and meaningful factual information about the health, safety and environmental quality of products, packaging, and operations.

3. RTK initiatives by governments or the public can encourage innovation and competition and improve the lives of the world's population.

4. RTK programs can inform those who would be at substantial risk if left uninformed.

5. RTK programs can include involvement of a broad range of stakeholders in determining what information is relevant and appropriate to meet the public's needs.

6. RTK programs can provide information sharing in which costs to businesses and the public are justified by the risk communication benefits produced. Public and private expenditures should result in measurable societal benefit, should address needs not otherwise addressed, and should reduce recognised health and environmental impacts.

7. RTK programs can be useful in setting priorities in ways that allow for flexible and effective risk management without diverting resources from other, more meaningful, risk reduction programs.

The potential negative characteristics of right-to-know programs can include:

1. RTK programs should not impose regulatory burdens on businesses and consumers that do not serve the public interest or meaningfully add to existing programs that are already effectively protecting workers, families, children, communities and the environment.

2. RTK programs should not cause inadequate protection of intellectual property, trade secrets, or confidential business information which are essential to enabling national competitiveness in global markets and are fundamental to success in free markets.

3. RTK programs with objectives of chemical substitution, chemical use reduction, or chemical restriction without consideration of hazard and exposure (which are the determinants of risk) may divert resources from more effective risk reduction programs.

SESSION V

Evaluating the Role of PRTRs as an Environmental Policy Tool

WORKING GROUP F

Role of a PRTR Nationally and Globally: Focus on the General Public and NGOs

National Pollutant Inventory (NPI): A National Environment Protection Measure (NEPM)

Mariann Lloyd-Smith
National Toxics Network, Australia

This paper will provide a summary history of the development of Australia's National Pollutant Inventory (NPI) from the perspective of its environmental and community non-governmental organisations (NGOs). The National Toxics Network, with its environmental colleagues, represented the combined Australian environment organisations on the Government's NPI Advisory and Consultative Groups. By reviewing our experience, the paper will attempt to identify some of the pertinent issues for NGOs in the development of their Pollution Release Transfer Registers (PRTR). As NGOs function in many different cultures and are governed by different regulations and laws, some aspects of this paper may not be directly relevant. However, the experience of Australian groups may assist other NGOs in deciding where to place their priorities, acknowledging that most NGOs have significant limitations in resources.

The environment and community movement in Australia is far from satisfied with either the current NPI or with the proposed upgrading that may be implemented after the October 1999 review. After the five years of formal consultation, if we compare the current NPI to original community expectations, modest as they were, it appears we have achieved very little.

The main lesson we have learnt is, don't depend solely on Government consultation process to achieve your aims. NGOs need to use all their campaign skills including actions, education and lobbying to pressure industry and government into taking action on PRTRs. Positive co-operation and involvement in the development processes of PRTR does not guarantee success. While, throughout Australia's NPI development, Greenpeace and National Toxics Network lobbied government, had a dialogue with industry and developed NPI information systems, yet up against powerful forces, this was still not enough to gain an adequate and effective PRTR for Australia.

The Lead-up to the National Pollutant Inventory

For over two decades, environment, union and community groups in Australia as well as the minor political parties had campaigned for 'community right-to-know' legislation and access to information about chemical emissions, storage and pollution.

For Australia, a turning point came with the major chemical fires at the Coode Island chemical storage facility in August 1991. Coode Island was a large chemical storage site on the waterfront, surrounded by homes. Mass evacuations were carried out, leaving people stunned that this could happen in their suburb. The Coode Island Review panel approached a local community and environment organisation (Hazardous Materials Action Group) to prepare a report on community right-to-know, "Unlocking the Factory Door".[1] At the same time in rural Australia, the growing number of transport chemical spills in, and the incidences of pesticide drift and contamination of rivers and creeks, led regional communities to demand information on agricultural chemicals and off target pollution. In 1990, members of NTN were working on a research project to develop 'community right-to-know' chemical information systems, based on Geographic Information System technology.[2] Most groups were aware of the USA Toxics Release

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[1] Adams, P and Ruchel, M, *Unlocking the Factory Door! The Community Demands the Right-to-Know*. Report to the Coode Island Review Panel by the Hazardous Materials Action Group, March 1992.

[2] Development and Trialling of Pollution/Environmental Auditing GIS Methodology for Local Government Area, 1990-91, BioRegion Computer Mapping & Research, North Coast Environment Council. Prepared for Chemical Assessment Branch, Dept. of Environment (DASETT).

Inventory and its associated community right-to-know provisions.

In 1992, the then Prime Minister, Mr. Keating, announced a legislated National Pollutant Inventory with the stated following objectives:

to provide information to enhance and facilitate policy and decision-making in environmental management;

- to satisfy community right-to-know needs by providing information on pollutants and wastes released to the environment;
- to promote and facilitate waste minimisation and cleaner production;
- to assist Australia in meeting international obligation and to assist in identifying priority contaminants entering the environment.

In September 1993, with no sign of the announced pollution inventory, the minor parties, (Greens & Democrats) presented a Bill to Federal parliament called the "Toxic Chemicals (Community Right-to-know) Bill 1993." The Bill was never passed.

National Pollutant Inventory for Australia

By 1994, in a spirit of optimism, the now defunct Commonwealth Environment

Protection Agency released the Public Discussion Paper for the National Pollutant Inventory. There was considerable support for the reporting system from within in the community. Yet four years later, the community was left wondering, "What was all that about?" and for those closely associated with the NPI consultative process, a sense of disillusionment persists. The NPI was agreed to by the State and Federal Ministers at the 23rd February 1998 meeting. It was described by the combined environment groups of Australia as a voluntary, second rate, environmental measure; politically driven and resulting in the 'lowest common denominator' outcome.

Yet, when it was first announced, the NPI had been heralded as an innovative program, which would require companies to report their annual toxic pollution to a publicly accessible database. Similar schemes already implemented overseas, particularly in the United States, had been attributed with achieving over 40% reduction in pollution and waste with significant 'flow on' savings to industries through waste reduction and cleaner production initiatives.[3] NTN had been involved in the development of the NPI since its inception and was nominated as a member of the Commonwealth NPI Reference Group, a stakeholder advisory body. The group was made up of industry, community, union, government and environment organisations and was charged with establishing mutually acceptable outcomes for Australia's NPI. While the subsequent Reference Group meetings were often fiery and the negotiating of an acceptable outcome for industry, community and government far from easy, general agreement was reached for most of the essential components of the NPI. Those issues, on which the Reference Group couldn't agree were 'parked' or put aside for consideration later on.

Mutually Agreed Outcomes

The Reference Group came to a mutual agreement on an initial reporting list of around 100 chemicals. It agreed that emissions to all media would be included, though acknowledging that care needed

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[3] US EPA Headquarters Press Release, Washington, DC, 20/5/97, "EPA's 1995 Toxics Release Data Includes First-Ever Reporting On 286 New Chemicals".

to be taken not to double count, for example in the case of trade waste. All participants agreed that emissions from diffuse sources would need to be estimated by government agencies. It was also recommended that agricultural chemicals could be included at a later stage, in a different module or format, due to the basic differences between agricultural and industrial emissions. Certainly, there had been disagreement over the inclusion of chemical storage in an NPI and while community and union groups viewed this as an essential component, industry and government saw it as outside the realms of a PRTR. It is important to note that the only database on chemical storage sites is held by State Governments and access is restricted by 'commercial in confidence' status. Further, acknowledging that the NPI needed to be more than just a voluntary program, the Reference Group made recommendations in regards to a national legislation for the NPI, as well as a nationally consistent approach to issues such as third party rights, assessment of commercial in confidence claims, and transparency in the addition or deletion of chemicals on the NPI list.

In 1996, a decision was made by the Federal government to develop the NPI as a "measure" under the newly established National Environment Protection Council. This put aside the mutually agreed outcomes of the NPI Reference Group. The newly elected government, espousing a philosophy of State's rights, decided to abandon the national approach and develop the NPI as the first of the National Environment Protection Measures. This was despite legal advice to the effect that the NEPC structure could not deliver a mandatory, nationally consistent pollution inventory based on 'community right-to-know'. In a report by the Australian Centre for Environmental Law, Professor Fowler commented that while the co-operation of the States was critical, there was clear constitutional authority for Commonwealth legislation to establish a NPI. [4]

NPI Legislative Framework – A National Environment Protection Measures

The choice by the current Australian government to develop the NPI through a new body, the National Environment Protection Council, established with its own Act in 1994[5] ("NEPC Act"), meant that the NPI's success was totally reliant on the voluntary co-operation of States. There was no means of enforcement or accountability[6] and the States could withdraw at any time. This was provided for in the National Environment Protection Council Act 1994.

National Environment Protection Measures (NEPM) by their very nature have no 'legal teeth' and are, at best, a quasi legal instrument. The options for their implementation through State legislation vary widely (regulations, license requirements or as Environment Protection Policies). There is no obligation on a State to legislate to implement an NEPM with the NEPC Corporation describing the obligation to implement measures as a political imperative rather than a legal one. The Commonwealth and a number of States included in their various NEPC Acts the right to disallow NEPMs, further weakening the process. In the development of the NPI, there were attempts to address the significant failings of the NEPC approach through a Memorandum of Understanding between State and Federal government, which, if and when all States sign it, will remain until June 2000. The MOU has no legal standing and again is reliant on goodwill rather than legal obligations. The MOU only addresses a limited number of issues such as the assessment of commercial in confidence and funding arrangements.

At a Commonwealth level, the NEPC Implementation Bill provided little certainty giving the

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[4] "Giving the Community the Right-to-know, Options for Implementing a Legislated Enforceable National Pollutant Inventory" Report No. 4, Compiled by Julia Pits, Reviewed by Professor Rob Fowler, Australian Centre for Environmental Law, June 1996, Greenpeace.

[5] National Environment Protection Council Act, 1994 s 34.

[6] Office of General Counsel, Attorney-General's Department, Legal Advice to the Department of Environment, Sport and Territories (17 January 1994).

Federal Environment Minister, when determining which Part of the Bill will apply to a commonwealth place or activity, complete discretion.[7] No criteria or guidelines are provided to direct the Ministers in the exercise of this discretion, raising serious concerns regarding accountability and the risk of politically expedient and environmentally unsound decisions.

There are various other loopholes such as reasons of “administrative efficiency”, “national interest”, and “desirability”. All justify the Minister in refusing to make a declaration that the Commonwealth will be bound by an applied provision of State or Territory law. Even if such a declaration is made, the Commonwealth can make regulations to exempt itself from the application of any particular applied provisions as a matter of “national interest”.[8]

National Pollutant Inventory - National Environment Protection Measure

The new NEPC body, unfamiliar with participatory or consensual processes, attempted to finalise the development of the NPI in isolation. By late last year (October 1997), with the release of the proposed NPI, the environmental representatives supported by a coalition of leading environmental and community groups walked out of the NPI process. They condemned the proposed format of the National Pollutant Inventory as “the final betrayal of the Australian community’s ‘right-to-know’ about pollution,” and the NPI consultation under NEPC, a tokenistic charade![9]

In 1998, after five years and over $5 million spent, it came as no surprise to community and environment groups that Australia’s NPI is effectively a voluntary program to be variously implemented by eight different states and territories. In its current form, the NPI disallows the use of fines under State legislation to enforce reporting compliance due to the co-operative nature of the NPI. Instead, compliance programs (when they are finally introduced) are to depend on soft action such as ‘naming’ those industries who do not report their emissions, in State and Federal parliament. Nor does the NPI provide for national consistency in the community’s third party rights, a particularly important safeguard allowing the community to challenge jurisdictional decisions over claims of ‘commercial in confidence’. Instead, each jurisdiction will utilise their own legislation (or lack of) in respect of third party rights to appeal and ‘freedom of information’ access. A real issue of concern when some States in Australia have no legislation to ensure ‘freedom of information’.

Focusing on the substance of Australia’s NPI, it was even a greater disappointment! The final NPI excluded the reporting of all toxic chemicals released into the public sewers and all waste transferred to landfills and tailings dams. The exclusion of these emission transfers was totally unexpected and effectively meant that thousands of tons of toxic chemicals could continue to be dumped into the environment without any real public scrutiny. Similarly, all materials or waste being sent for recycling or reprocessing were excluded from reporting under the NPI.

The decision to omit transfers from the NPI flies in the face of international commitments to a ‘Pollution Release & Transfer Register’ (PRTR). Australia subscribed to the OECD Council Recommendation on Implementing Pollution Release and Transfer Register, which clearly includes transfers as an integral part of a PRTR. Both the United States and Canada require the reporting of

[7] Parliament of the Commonwealth of Australia, Senate, National Environment Protection Measures (Implementation) Bill 1997, Explanatory Memorandum (Circulated by Authority of the Minister for the Environment, Senator the Hon Robert Hill), P.4

[8] Parliament of the Commonwealth of Australia, Senate, National Environment Protection Measures (Implementation) Bill 1997, Explanatory Memorandum (Circulated by Authority of the Minister for the Environment, Senator the Hon Robert Hill), Parts 2 and 3.

[9] Greenpeace /NTN Media Release 13.10.97 “Final Betrayal – Green Anger at Toxic Pollution Proposal”

transfers. The community has a right-to-know about toxic chemicals released into sewers, landfills, tailings dams and other forms of transfers in their pollution inventory. Yet, the Australian Government took a last minute decision to exclude transfers after lobbying by the mining industry and pressure from powerful States who simple refused to include transfers in their NPI.

Despite this, the Plastics and Allied Chemical Industries Association of Australia (PACIA) have maintained that they will still define waste as including deposits to landfill, discharges to sewer, and materials sent off side for transfer to recycling, processing or treatment. They have committed including amalgamated data on transfers in their own reports. In their "Reducing Waste" Report of 1996, PACIA stated that, excluding carbon dioxide, the "wastes are dominated by waste transported off site for treatment or disposal - liquids/sludges and solids." [10] These account for about 67% of the non-carbon dioxide wastes. Waste sent off-site for recycling represent about 5% of non-carbon dioxide wastes.

The NPI failed to fulfil other community expectations. The number of chemicals to be reported within the scheme was significantly less than in comparable countries and while the US Toxics Release Inventory required the mandatory annual reporting of over 600 toxic substances, the National Pollutant Inventory requires companies to report only 38 substances in the first two years. Subject to a review due to start in October 1999, which will judge "the need, if any, for amendment of the Measure,"[11] the list may be expanded to around 90-100 substances.

This has placed the Australian Government in the position where it can not assess its emissions of persistent organic pollutants such as dioxins and HCBs, or assess environmental exposure to the suspected endocrine disrupter chemicals such as DEHP (Di-(2-Ethylhexyl) phthalate until well into the next century. Even those chemicals detected in the blood of Australian children such as acetone and ethyl acetate have not been included in the original list. Chemicals such as vinyl acetate or propylene oxide known to be emitted into the Australian environment in the thousands of kilograms and with accepted toxicity have not even been included in any proposed upgrade. Similarly, the PBBs and polybrominated diphenyl ethers (PBDEs) recently detected in the blubber of sperm whales and the chlorinated paraffins found in other cetaceans are not included for consideration in the future lists.

An agricultural chemical emission module was not included, nor were any plans to review its inclusion, despite the strong community calls for reporting of agricultural emissions. Recent studies showing significant levels of dioxins in the bodies of the marine mammals, dugongs from the Great Barrier Reef, have only heightened the need for including an agricultural chemical emission module. An examination of the ratio of PCDD/Fs congeners has indicated that the burning of sugarcane is the most likely source of the dioxin found in the bodies of these marine mammals.

The final format of the NPI had also ignored the strong case made by unions and community groups for including information on chemical storage and emergency response plans. Local Government authorities supported this call for information.

In a simple comparison between the data provided under industries' voluntary "Responsible Care Programs" and data available under the NPI, it is blatantly obvious that the five-year process that NGOs committed to, did not deliver. An illustration of this is the case of one large chemical company based in Melbourne, Victoria who provided information to a 1995 Greenpeace Survey.[12] Under their Responsible Care Program, this company voluntarily reported emissions of approximately 1,236,834 million kilograms

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[10] "Reducing Waste, Report on Waste Survey 1996", PACIA, Plastics and Allied Chemical Industries Association.

[11] National Pollutant Inventory, National Environment Protection Measure for the National Pollutant Inventory, 27 February 1998, Section 33, p17.

[12] Greenpeace Pollution Inventory and Database, May 1995, compiled from the results of the Greenpeace Survey of Chemical Companies with database development by BioRegion Computer Mapping and Research.

of chemical releases to air, water and landfill. Under the NPI, they would be required to report only 150,000 kilograms. This is because the majority of the chemicals are not included on the NPI list and a significant proportion of the company's waste is 'transferred' offsite to landfill (approx. 204,434 kg). Despite strong community opposition and the withdrawal by all Australian environmental groups from the NPI development process, the NPI NEPM was accepted in February of this year by the State and Federal ministers.

Lessons for NGOs

In the development of Pollution Release Transfer Registers, it is essential that NGOs play a powerful and influential role. Whether through formal consultation processes or by political lobbying and media campaigns, it is left to NGOs to offset the self-interest of industry organisations and the political expedience of government bodies. How this can be best achieved and in the most effective manner is the question to be addressed. As pointed out earlier in this paper, involvement in consultation processes is not always the most effective method. It may be far more appropriate for NGOs to define their goals and aims and to concentrate on an effective political and media campaign around those goals. Another option may be to focus on an area of pollution that is of greatest concern to the general community. By focusing on these concerns, NGOs may be better placed to counter the inevitable campaigns of industry sectors regarding the costs of reporting and their reluctance to acknowledge the rights of the community to information.

With hindsight, of all the options available to NGOs, we would recommend they pool their resources, carry out their own industry surveys, compile whatever information could be gained through company reports and Responsible Care programs and develop their own community-based inventory. Of all the actions Australian NGOs carried out, the most successful was co-operative development of the Greenpeace Pollution Inventory and Database. It was recognised as the most complete dataset available, providing benefits in defining the scope of the inventory and setting standards for information delivery.

Perhaps if resources and expertise are directed into developing a community version of a pollution release transfer register similar to the Australian community inventory or the UK Friends of the Earth's Website, NGOs may find themselves in a much more influential position. This strategy is particularly appropriate for multi-national companies who already report in other countries. This approach has the added benefit of portraying NGOs in a positive and assertive light, basically doing what government has yet failed to. It also establishes an expectation within the community about the type of information they should be able to access. In Australia, we are now focusing on furthering the development of our community inventory with updated survey data. Most importantly, NGOs need to acknowledge that consultative processes take up both time and valuable resources and place them in a position where co-operation is often valued to a greater degree than good outcomes.

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Challenges And Opportunities Of Meeting Public Needs Through NGO Involvement In The PRTR System In Mexico

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Mexico

Introduction

The Mexican PRTR process was initiated by a multi-stakeholder collaboration of diverse entities within the national as well as the international community. Consistent with the principles behind the development of PRTRs, whereby the public has a right-to-know and participate as a partner in environmental protection, Mexican NGOs played their part in the process.

We are grateful to the United Nations Institute for Training and Research (UNITAR), which made it possible for us to be a part of the National Coordinating Group (NCG) during the consultation process for the length of two years. We also wish to thank the Commission for Environmental Co-operation (CEC), who has supported our participation in PRTRs including bringing me here on this occasion. I also want to thank the Mexican government officials at the National Institute of Ecology for the supportive relationship they developed with us at such a long distance, and for strengthening our participation through constant communication.

The role of NGOs was to identify all possible opportunities to fulfil the public's needs. Sometimes this meant challenging positions within the GNC backed by powerful interests, or challenging the limitations of our own knowledge and experience; sometimes it meant challenging our abilities to negotiate, or simply finding ways to overcome practical obstacles such as limited possibilities to attend to all of the meetings.

Developing and implementing a PRTR system that will fulfil the public's needs toward playing a more responsible role in pollution prevention, based on better knowledge about toxics, will be an ongoing challenge with persistent obstacles to be overcome on every possible front: social, economic, political and technical, among others. In the case of Mexico, NGOs are committed to the progress of the PRTR as an ongoing process, every phase of which should be challenged beyond its limits, toward improving community involvement on behalf of environmental performance and protection.

This paper discusses some of the most significant issues identified by NGOs which still represent a challenge for meeting the public's needs through the current PRTR, and some thoughts about the NGO community's role in influencing this process.

Background

In Mexico, the concept of the public's right-to-know about pollutants has only developed over the past eight years. During 1989-1990 the demand for publicly accessible pollutant inventories was first articulated by border NGOs influenced by the international community through strong bi-national links with neighbouring environmental organisations that found themselves facing conflictive cross-border pollution issues. The growing bi-national concern amongst environmentalists regarding potential increase of environmental pollution associated with industrial growth under NAFTA, provided fertile ground for a heightened interest in community right-to-know about toxics.

By 1991 the NGOs committed to right-to-know were advocating and lobbying in favour of developing a suitable legal framework for it at the local and national levels as well as implementing their own industrial surveys and inventories in their communities. These experiences enabled NGOs to gain understanding and expertise about the key components of managing information about pollutants.

It was at the 2nd OECD Workshop on PRTRs in Ottawa, Canada in June of 1994 that the Mexican Government began to address this issue. This international directive led to the commitment of the Mexican federal government to develop a National PRTR Executive Proposal. Simultaneously the public's right-to-know made its way into the modifications to the General Law of Ecological Balance and Environmental Protection (LGEEPA) published in 1996. More recently, new reporting and licensing regulations have been dictated, some of which are still pending, such as the establishment of a legal standard for the reporting of the 178 chemical substances identified for the PRTR.

In the meantime, the government has already embarked on a national training strategy to instruct companies in reporting PRTR information as an optional component of the new reporting process.

Key PRTR Components to Meet Public Needs:

Public Participation in the Consultation Process

Ideally a PRTR provides the public with enough factual information about pollutant releases and transfers so that the public may become a partner along with industry and government regarding environmental protection. In Mexico, this partnership among the different stakeholders was encouraged from the beginning of the consultation process for the development of the PRTR. By recommendation of UNITAR, three NGOs were invited to be part of the multi-stakeholder group comprised of about 130 organisations, known later as the National Co-ordination Group (NCG), in charge of developing the framework for the PRTR system.

Notwithstanding the unbalanced presence of the NGO community within the NCG, with a representation of less than 10% in numbers, and an 80% attendance to NCG meetings, the NGO participation kept the public interested in the PRTR agenda throughout the process.

The dialogue was often a polarised debate between contrasting positions, with industry and NGOs at each extreme and the government as a mediator, regarding issues such as: *the objective of public access to information, the mandatory status of the report, the criteria to determine the size of the list of chemicals and public disclosure and access to site-specific data.* Often, the consensus turned out to be the lowest common denominator between both extreme positions. A few components were never agreed upon and have been left to be discussed later, such as: *criteria and mechanisms for modifying the list of chemicals, broadening the scope of companies required reporting,* among others.

In order to offset political and interests which have been part of the problem PRTRs are intended to address, NGO participation during consultation must be sufficient in number, in attendance and have strong footing within the community. Two elements that contribute to insuring sufficient NGO participation are support from national funding sources to guarantee full attendance implementation of advocacy, and public outreach by NGOs to gain support both inside and outside the consultation group.

Identification of Public Interest Objectives

In Mexico, PRTRs put public access to information about pollutants on the national agenda and by doing so mark a turning point in a long tradition of excluding the public from its right-to-know about issues that affect the community. However, in the future the list of objectives should go beyond merely articulating the goal of public access to information, and identify other objectives about how PRTRs should aim to:

- Strengthen public participation in setting priorities for environmental protection and pollution prevention
- Provide information to potentially affected communities, workers or other target groups about the potential risks
- Identify opportunities to reduce pollution as well as risk from chemical emergencies by recognising the precise sources
- Provide an information resource useful to emergency responders and potentially affected communities for contingency planning and emergency preparedness
- Enhance government and corporate accountability regarding environmental pollution
- Allow communities to assess risk for themselves
- Inform the public and encourage their participation in environmental decision making
- Provide researchers and other professionals with enough factual information for conducting studies of environmental issues related to exposure to toxics.

Legal framework

Aside form the national Executive Proposal developed by the NCG, the Mexican PRTR system rests on a legal framework designed to ensure three things:

- the public’s right-to-know about pollutants,
- legal authority to require the generators to report on releases and transfers (mandatory reporting)
- legal standards that require reports to address the list of identified chemical substances.

Right-to-know: The Mexican Constitution provides for a Right to Information with no regulatory footing as to what information or how it is to be provided or by whom. Up until now, information through the permitting process has been considered the sole privilege of the regulatory agency and regarded as confidential business information. Two years into developing the PRTR, social pressure form NGOs and progressive Mexican public officials from the INE, succeeded in influencing Congress to approve a chapter regarding “Right to Environmental Information” within the 1996 Modifications to the General Law of Ecological Balance and Environmental Protection. This chapter grants the public the right to obtain information, requires public officials to release it under a number of restrictions beyond which release can be refused, and then provides a legal recourse on behalf of the public in the event of refusal. In spite of its limitations, the existence of this chapter is regarded by the NGO community as a breakthrough considering Mexico's traditional standing, and as a platform for building a more forceful legal framework in the future.

Mandatory reporting: The importance of this component has been substantiated by multiple experiences of poor outcomes during voluntary reporting attempts in different countries. The Mexican corporate sector represented in the NCG argued favour of voluntary reporting for almost as long as the PRTR design period lasted. The NGO representatives contested and with the support of government representatives industry eventually recognised the difficulty of accomplishing consistent and reliable results under a voluntary program. The government encouraged industry by offering to integrate PRTR reporting with other existing requirements and simplify industrial reporting in general.

Legal standards regarding the list of substances: As important as mandatory reporting is the establishment of a legal standard that requires companies to report specifically on the chemical substances identified for inclusion under the PRTR system. Although PRTRs have begun to be required in Mexico as of 1998, the absence of this legal standard leaves it open for companies to disregard addressing all chemicals identified in the list until the standard becomes official. We are looking forward to seeing this process completed by the end of this year, so that by the next reporting cycle the public can begin to get acquainted with the results of PRTRs.

Scope of data elements

Chemical substances: The NGOs involved in PRTRs in Mexico are convinced of the need for covering a broad spectrum of substances to help minimise the information gaps regarding pollutants that otherwise might remain undetected and without public or governmental scrutiny or control. We warned the GNC about the risk of a short list which would obscure the release of significant pollutants that might be present in great quantities in a specific region or community.

Industry's arguments against a long list mainly pointed out the inconvenience of high administrative costs of reporting. However, of the companies who volunteered to fill out the report during the pilot PRTR study in Mexico, a good number of them did not qualify because they did not use any of the 132 chemicals listed. Others were only able to report one substance and in general their comments implied that it was convenient to add more substances to the list, based on criteria already developed by other countries and taking into consideration national and regional priorities of pollutants used. The current list includes 178 substances and the National Executive Proposal for PRTRs recommends periodic revisions of the list of substances to include or exclude substances according to updated criteria although it is yet necessary to establish how those revisions will take place.

Reporting facilities: This component, as well as the scope of substances, is also crucial to getting as much of the whole picture as possible. In the case of Mexico, only companies under federal jurisdiction are required to comply with PRTRs. Although the biggest companies with the greater quantities of hazardous substances fall into this jurisdiction, voices representing the public interest feel that the data base will fail to reveal significant amounts of pollutants released in small quantities by an enormous number of small facilities. However, because the concept of PRTR addresses the public right-to-know about pollutants and transfers in their community, NGOs are encouraging local governments to establish legal frameworks to undertake right-to-know programs for facilities which fall under state and municipal jurisdictions. The environmental interest groups are also interested in having PRTRs include non-point sources of pollution and agriculture, considering the well documented importance of this source as a predominant generator for all media.

Public access to information

Public access to information is an implicit component of PRTRs. However, in order for PRTRs to be useful in fulfilling the public's needs, people must be able to access information that is:

- Chemical specific: This allows communities to make their own evaluation of potential or actual risk to the community's environmental health, identifying the specific substances that might be related or involved in order to enable effective decisions.

- Facility specific: The only way that a PRTR can strengthen the public's ability to make effective decisions regarding pollutants is if the precise location and source of a release can be identified. Releasing facility specific data also enables the community to identify facilities that have reduced their releases. Aggregated data is interesting for academic research and for policy. However, from the point of view of practical community action it can hide companies who need to be held accountable for increasing pollution, as well as strong performers who otherwise get placed together. The compromise that was established within the NCG is to release only aggregated in the form of yearly reports during the first three years after which public access to facility specific information will be established. However, this aspect of access to information is yet to be regulated in order to guarantee its implementation.

Dissemination of PRTR information

Before the public can access or utilise PRTR information, it needs to be made aware of its right-to-know and also of the existence and availability of PRTR. PRTR systems should aim at addressing full coverage of the public's varying dissemination needs.

The range of needs begins with the need to be aware about the existence, nature, purposes, uses and availability of PRTRs; and at the other extreme the need to be updated about the ongoing developments and to give feedback about the PRTR process.

People must be made aware of their rights to know and the legal framework that supports them. They also need to be told what PRTRs are and what they are not. They need to know *which* industries are required to report, and *what* substances are subject to this report, and that these represent only a part of the nation's releases and transfers, addressing only certain specific pollution issues.

In order to meet the public's needs, PRTR systems require the development of dissemination strategies capable of:

- Communicating about the right-to-know
- Communicating about existence and accessibility of PRTR information
- Providing about the scope of the information in the context of the nation's releases and transfers
- Providing education and training to access and interpret PRTR data
- Providing access to PRTR data in diverse friendly electronic and hard copy formats
- Providing query and search capabilities
- Providing linkages with context information about health risks, hazards, preventive measures, etc., associated to PRTR listed chemicals
- Receiving public input about the PRTR process.

In the case of Mexico, the CEC is currently providing the resources to hire a consulting team to assist the government in the task of maintaining the flow of information to and from the scattered members of the NCG regarding PRTR ongoing developments.

Conclusions

Because PRTRs are intended to meet the public's needs regarding information about pollutants, not enough can be said about the importance of NGO participation in the PRTR development and follow-up. Balanced and broad range citizen participation in relation to the other stakeholders represented in the process helps ensure a broad range of opinions. Community "buy in" for the implementation of PRTRs also requires national sponsorship of citizen and NGO participation, in addition to available foreign sources, complemented by active public outreach and advocacy to gain support outside the consultation group.

Although it is the government's role to insure that outgoing and incoming communication with the public is appropriate and timely, NGOs can play an important role in facilitating such information transfer tasks and responsibilities, at a global and national as well as local level.

PRTR systems will perpetually be faced with the challenge of breaching data gaps in an effort to achieve the ideal of the "whole picture": a broader scope of substances, higher thresholds, materials accounting, a broader range of reporting facilities, associated geographic information, etc. Maybe this ideal will forever elude us. In the meantime, this process, around which the global community has gathered today for the first time, is already broadening community awareness and responsibility for reducing pollutant releases and transfers.

PRTRs and the Aarhus Convention

Jeremy Wates
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Introduction

The main purpose of this paper is to draw attention to the potential links between the existing international co-operation on pollutant release and transfer registers (PRTRs) and the recently adopted UN ECE Convention on access to information, public participation in decision-making and access to justice in environmental matters; and to propose strengthening those links.

Specifically, the new Convention could usefully provide a legal framework for carrying forward the detailed work on PRTRs undertaken to date. Given sufficient political will, it could eventually produce a legally binding international instrument on PRTRs. Such an instrument could give a new impetus to efforts to improve the quality and level of harmonisation of PRTRs, initially within the ECE region and ultimately on a global basis.

National and international steps towards freedom of information

The last few decades have seen the emergence of many national systems of freedom of information. Some of these, following in the footsteps of the Swedish or US approach, have covered information in general, whereas others have focused on environmental information.

Within Western Europe, the EU directive 90/313/EEC on freedom of access to information on the environment, adopted on 7th June 1990, provided an important stimulus to progress on this front. While a few EU countries already had well established traditions of transparency, most others were forced to make significant legislative changes in order to comply with the directive.

In Eastern Europe, following the collapse of Communism at the turn of the decade, many governments introduced constitutional provisions protecting rights to information (either general or environmental), and some went further by including access to information provisions in their environmental legislation or in a few cases starting to develop specific access to information legislation. Those countries with aspirations towards EU membership have naturally been influenced by the EU directive.

However, in both Western and Eastern Europe, the primary focus of freedom of information legislation has been on information held by public authorities. The question of how to establish an adequate flow of information from the private sector into the public domain - either directly or via public authorities - has tended to take second place. Perhaps this is part of a natural evolution in right-to-know legislation; after all, it was a couple of decades after the US introduced the Freedom of Information Act that it got round to bringing in the Emergency Planning and Community Right-to-know Act with its Toxics Release Inventory system.

Obviously the value to the public of having access to information held by public authorities is quite limited if the public authorities themselves do not have the information. In the context of solving environmental problems, reporting requirements on the private sector, as well as being necessary for regulatory purposes, are an essential aspect of a comprehensive freedom of information regime.

A step towards greater harmonisation of freedom of information provisions on an international level took place in October 1995 at the Third Ministerial Conference in the 'Environment for Europe' series, when Environment Ministers from throughout the UN ECE region adopted the UN ECE Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-making - known as the Sofia Guidelines. While once again the focus in the information parts of the Guidelines is mainly on public authorities (and some private bodies under the control of public authorities and having environmental responsibilities), the Guidelines implicitly give some recognition to the importance of access to information held by the private sector. For example:

para 4: *"Public authorities should regularly collect and update adequate environmental information. In addition, States should establish, where voluntary systems are inadequate, mandatory systems for ensuring that there is an adequate flow of information about activities significantly affecting the environment."*

para 14: *"States should encourage entities whose activities have a significant adverse impact on the environment to report regularly to the public on the environmental impact of their activities."*

While the tone in both paragraphs is recommendatory, reflecting the fact that they are guidelines, the reference to 'mandatory systems' in paragraph 4 is a welcome recognition of the need to ensure that, one way or another, the end result is achieved (notwithstanding the caveat 'where voluntary systems are inadequate').

The Aarhus Convention

It was also in Sofia that the Ministers paved the way for negotiations to begin on a new Convention on the same subject. The actual negotiations began in June 1996, and two years later, on 25th June 1998 in the Danish city of Aarhus, the UN ECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters was adopted at the Fourth 'Environment for Europe' Ministerial Conference.

As its title suggests, the Convention has three pillars, dealing respectively with rights of access to information, rights to participate in certain types of environmental decision-making, and rights of access to justice. The information pillar, which is most relevant to the discussion today, itself divides into two parts:

- Article 4 sets out the main essential elements of a system of responding to public requests for access to environmental information held by public authorities, namely a general presumption in favour of access; definitions of 'environmental information' and 'public authorities' delineating the scope of information covered and the range of bodies required to supply it; broadly defined terms of access (time limits, costs, form, etc.); and provision for a limited number of exemptions.

- Article 5 deals with issues relating to the collection and dissemination of environmental information. Article 5 contains a number of provisions relevant to PRTRs.

For example, paragraph 1 echoes the aforementioned provisions of the Sofia Guidelines but in more binding language:

"Each Party shall ensure that:

(a) Public authorities possess and update environmental information which is relevant to their functions;

(b) Mandatory systems are established so that there is an adequate flow of information to public authorities about proposed and existing activities which may significantly affect the environment;"

Paragraph 2 refers to the need for information to be made 'effectively accessible' through establishing and maintaining practical arrangements such as 'publicly accessible lists, registers or files' to which access is provided free of charge.

More specific reference to PRTR-type systems is made in paragraph 9, which states:

"Each Party shall take steps to establish progressively, taking into account international processes where appropriate, a coherent, nation-wide system of pollution inventories or registers on a structured, computerised and publicly accessible database compiled through standardised reporting. Such a system may include inputs, releases and transfers of a specified range of substances and products, including water, energy and resource use, from a specified range of activities to environmental media and to on-site and off-site treatment and disposal sites."

While the text stops short of establishing an immediate obligation to set up a PRTR, it nonetheless contains an obligation to move in a certain direction. The inclusion of softening language such as 'take steps', 'progressively' and (in the second sentence) 'may' was the price paid during the Convention negotiations for securing the support of countries which had initially opposed any reference to PRTRs in the text.

However, what gives Article 5.9 particular significance is a further reference in Article 10 on Meetings of the Parties, which states in paragraph 2 as follows:

"At their meetings, the Parties shall keep under continuous review the implementation of this Convention on the basis of regular reporting by the Parties, and, with this purpose in mind, shall:

(i) At their first meeting, review their experience in implementing the provisions of article 5, paragraph 9, and consider what steps are necessary to develop further the system referred to in that paragraph, taking into account international processes and developments, including the elaboration of an appropriate instrument concerning pollution release and transfer registers or inventories which could be annexed to this Convention."

Through this provision, PRTRs are singled out as one of a small number of priority issues to be given attention in the further development of the Convention. One possible outcome would be the adoption of a Protocol or other instrument giving legal force to the very detailed work which has been carried out by the OECD and others with the framework of the Inter-Organisation Programme for the Sound Management of Chemicals.

The argument for developing a separate instrument in the process of addressing this issue under the auspices of the Convention is supported by the fact that the officials involved in negotiating the Aarhus Convention were for the most part not the same officials involved in international PRTR work and probably did not have specialist knowledge on PRTRs. A subsidiary instrument could have its own implementation process, overseen by officials familiar with the appropriate specialisation.

Electronic access

The Convention could also have a bearing on other issues closely linked with PRTRs, such as electronic access to information.

Electronic information technologies, and especially the Internet, are revolutionising the way in which society handles information. Putting information on Websites or homepages is an increasingly effective way of making it available to the growing numbers of the computer-using public, who now have at their fingertips access to incomprehensible amounts of information from all over the globe. Many of the practical obstacles associated with more traditional methods of providing access (delays, high costs) can be overcome through electronic forms of access. It has given the concept of 'the public domain' a new and practical meaning, saving time and resources for both the public and public authorities.

The Aarhus Convention requires Parties to make environmental information progressively available in this form, and recommends that certain categories of information be given priority. Governments fell short of opting for more binding language - not least, one suspects, because many of the officials involved in the negotiations were themselves on a very steep learning curve with respect to matters to do with the Internet and electronic communications. The rapid pace of change in this area nonetheless makes this a particularly important provision, and one which should be expanded and strengthened at the earliest opportunity. In parallel with legislative measures, efforts should be made to provide technical and financial assistance to countries lacking the necessary technological infrastructure, to support them in achieving this objective.

Electronic information technologies not only provide an unprecedented degree of public access to databases, but also allow possibilities for hitherto unachievable linkages between databases, e.g. between the different layers of information in a GIS-based system, or between PRTRs and registers on the toxic properties of the substances referred to in the PRTRs (e.g. the International Register of Potentially Toxic Chemicals).

Conclusions

Among the key demands made by NGOs on the occasion of the adoption of the Convention in Aarhus was for the first Meeting of the Parties to adopt binding measures on PRTRs and to establish clear obligations with respect to the availability of information on the Internet - demands which were supported by the Danish Environment Minister Svend Auken in his summing up of the Ministerial debate.

In conclusion, the new Convention could provide a framework for carrying forward the considerable body of work which has been undertaken on PRTRs, and establishing it on a legally binding footing. As the Convention is open for accession by non-ECE countries (Art. 19.3), the benefits of this approach need not be limited to ECE countries.

SESSION V

Evaluating the Role of PRTRs as an Environmental Policy Tool

WORKING GROUP G

Role of a PRTR at the Community Level

Community Uses of PRTRs

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The evolution of PRTR systems - beginning in the mid-1980's onward - is predicated upon the belief that the effective workings of any democracy is based upon citizens' full knowledge of the complete range of forces - political, economic, cultural, and so on - which affect their lives. PRTR systems are tools which extend that knowledge to toxic chemicals as they flow through our increasing industrialised global community.

The workings of any democracy may be measured by the depth and range of citizen participation. Participation is important from the local to national level and, as the world evolves, at the global level. However, participation in a full democracy is not limited to the institutionalised political system, i.e. government. Participation in daily activities must take place across all institutional forms: political institutions, cultural institutions, economic institutions, religious institutions, and so on. And, institutions which process or release toxic chemicals, be they industrial, service, mining, etc. corporations, governments, agricultural systems, and so on, as recognised in the "Rio Protocol," are to be subject to such similar control. Else wise, the world goes on and life and livelihood, almost by chance, advances, stabilises, or declines. Toxic chemicals of all natures, regardless of their "point of impact," i.e. at the planet level, at the regional or national/ federal level, or at the local community level, in the interests of human well-being must come under full citizen awareness and control.

The form such community-based control will take will vary from national/cultural context to national/cultural context. Citizen "environmental committees" may arise in one nation. In another, heightened citizen awareness will guide the selection of officials to monitor/control these chemicals. Regardless of form, the effective workings of mechanisms to control toxic chemicals depend upon the knowledge afforded citizens by PRTR's. It is that knowledge which build's citizen's effectiveness in controlling these forces, forces affecting them from the local community level to the global level.

Thus, the effective control of toxic chemicals vitally depends upon citizens working at the local level community to ensure local systems - political and economic - are working to maintain - hopefully better - their own and their children's lives. PRTRs work to ensure that participation in governing is based upon timely, relevant, and accurate information about the world of chemicals about them.

With communities empowered with such knowledge, what are outcomes of citizen-based uses of PRTRs? The long-range and broad impacts are, in general, to build a healthier communities both in a social-political-economic sense and in a sustainability-ecological sense. PRTRs encourage interaction between community sectors which may have had little opportunity to engage each other before. Such interaction may be uncomfortable at first, *e.g.*, as in the case of labour groups and environmental groups or as in the case of citizen-based community groups and business corporation executives. If, however, allowed to proceed, the interaction supports an awareness a sharing of goals regarding a healthy community economy based upon an environmentally-sustainable system. Such interaction strengthens the fabric of economy, of the social and political community, and of the ecological system upon which all community life is based.

Evaluating the Role of a Pollutant Release Transfer Registry at the Community Level

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Toxic chemicals released into the air, land and water from industrial facilities can impact people living around the facilities. Reductions in toxic releases can often be achieved through public pressure. However, public pressure can only be applied, if the public is able to obtain information on the toxic releases. When an incident occurs at an industrial facility, such as an explosion, fire, or large chemical release, the community near the facility becomes concerned. The community members then begin to ask and demand information. In the United States the PRTR known as the Toxics Release Inventory (TRI) is one of the primary sources of public information on toxic chemical releases. The toxic releases are reported on the basis of toxic air emissions, discharges to surface water and land disposal. The citizens living around industrial facilities are usually concerned about the toxic air emissions. The citizens cannot buy bottled air if their air is contaminated.

When presenting data to community groups on air emissions, I do a data search of the Toxics Release Inventory for the industrial facilities in their area. For each industrial facility, I break down the toxic air release information into chemical categories to help the community get a clearer picture of the toxic releases. An example of one of the industrial facilities is presented on the overhead. After listing total air releases, the chemicals that are Class A Carcinogens - Known to cause human cancer are listed. In the case of the Star facility, benzene emissions fall in this category and are primarily emitted from fugitive sources. Fugitive sources are leaking flanges, valves, connectors, etc. and are usually closer to the ground than stacks. These sources have the potential to have the largest impact on the surrounding communities. The next category is Class B Carcinogens - Known animal and suspected human cancer causing chemicals. Following the Class A and B carcinogens the Chemicals of Special Interest - Known or suspected toxic effects on humans, aquatic life and wildlife are presented to the community. These chemicals are not shown on the overhead.

Community members have a need for information on the health effects associated with the facility emissions. One method of providing the data is to include health effects in conjunction with the chemical specific release information. The data from the Star Enterprise facility in Port Arthur, Texas was broken down by Group A Carcinogen, Chemicals - benzene, chromium, chromium compounds and health effects for each chemical.

After considering the health effects, the community will want to know “What are the dangers (risk) associated with living near these facilities.” At this point it becomes necessary to look beyond the TRI data. One source of additional data is the accidental releases, emergency occurrences and upset conditions. These situations are called in by the company to the regulatory agency and followed up by a written report. It requires physically going to the agencies files and performing a file review of documents that are sometimes less than complete. The overhead presents the data from the files for the Shell NORCO Refinery - East Facility near New Orleans, Louisiana for the first 3 1/2 months of 1997. The data consists of chemicals and quantities released. A more detailed tabulation also provides source of release and cause of release. For example on January 11, 1997 33,500 pounds of propylene was released from a steam damaged O ring that sealed the main valve.

A review of the first three months of data for 1998 demonstrates a similar pattern of incidents: The number of incidents were larger. There were frequent upsets and bypassing of pollution control equipment. Chemicals such as benzene, ethyl benzene, xylene and polynuclear aromatic hydrocarbons were discharged into the air and caused off-site impacts. A storage tank was over pressurised and the roof blew off. Parts of the tank fell on the adjacent community and playground.

TRI reportable chemicals released during accidental and upset conditions are required to be reported as part of TRI. However, these values are not broken out in detail under TRI for the citizens to evaluate the potential off-site impacts.

Reviewing the accidental release data is made more personal if community members have kept a log of impacts they have experienced. Communities that have been encouraged to keep logs of odours experienced, health effects, reports of fires and explosions, etc. are encouraged when accidental release information is compared to their personal logs. Patterns start to emerge that correlate specific doors and community health impacts with reportable release incidents from the facility. The community starts to understand the risks associated with living near these facilities.

For other communities living near a number of facilities, the cumulative effects of multiple facilities is often an issue that is difficult to evaluate. The TRI and accidental release data often allows the individuals to distinguish specific impacts with specific facilities. Delving further into regulatory agency files provides reports on Hazardous Air Pollutants, Air Toxics, and Permitted Releases which can be used to incorporate into air dispersion models not just for a single facility but for all the facilities impacting the community. This output of the air dispersion models demonstrates potentials for impacts on the communities on a cumulative basis that were not detected when the models were run on each facility individually.

Informed and educated communities are able to document and communicate their concerns to environmental regulators and the industrial facility. Through such efforts communities have been able to secure emission reductions, substitution of chemicals for less toxic materials, increased public notification when incidents occur, opportunities to provide meaningful participation into permitting processes and above all take control of the environmental issues impacting their communities in order to reduce the risk of living near facilities releasing toxic chemicals.

Star Enterprises
Port Arthur, Texas
TRI
Air Emission Releases

Chemical	Year	Air Emissions Fugitive (pounds)	Air Emissions Stack (pounds)
I. Group A Carcinogens - Known human cancer causing chemicals			
A. Benzene	1989	53,443	8,237
	1990	32,516	7,974
	1991	21,896	6,281
	1992	18,029	8,221
	1993	7,272	3,316
	1994	18,640	8,057

Benzene Health Effects
- Cancer in humans
- Birth defects and miscarriages
- Damages the reproductive ability of women and men
- Long term damage to liver, kidney and lungs

Chemical	Year	Fugitive (pounds)	Stack (pounds)
B. Chromium	1989	621	
	1990	507	39
	1991	484	1
	1992	279	1
	1993	144	
C. Chromium Compounds	1993	144	
	1994		31

Chromium Health Effects
- Causes cancer in humans
- Long term damage to liver, kidney and lungs

Shell NORCO Refining - East
Accidental Releases to the Air

April 12, 1997 0550 - 0633 Sulphur Dioxide - 677 pounds
Nitrogen Dioxide - 44 pounds

April 11, 1997 1119 - 1133 Sulphur Dioxide - 315 pounds
Nitrogen Dioxide - 20 pounds

April 11, 1997 0930 - 1530 Sulphur Dioxide - 17,700 pounds

April 7, 1997 0920 - April 8, 1997 1350

Sulphur Dioxide - 100,500 pounds
Nitrogen Dioxide - 551 pounds

March 18, 1997 1110 - 2130

Carbon Monoxide - 631,400 pounds
Sulphur Dioxide - 13,376 pounds,
Particulate Matter, 1,367 pounds
containing 13.70 pounds sodium metal

March 10, 1997 1100 - 1130

Butylene - 52 pounds

March 5, 1997 0945 - 1029 Sulphur Dioxide - 4,588 pounds

February 28, 1997 1800 - March 1, 1997 0930

Sulphur Dioxide - 1,137 pounds

February 17, 1997 0701 - 0704

Propane - 183 pounds

February 14, 1997 1335 - 1336

290 pounds of propane, butane, propylene,
and mixed butylenes

February 12, 1997 1500 - February 13, 1997 1800

Sulphur Dioxide - 591 pounds

January 21, 1997 1115 - 1200

761 pounds flammable gas
containing 685 pounds normal butane and
76 pounds propylene

Shell NORCO Refining - East
Accidental Releases to the Air

January 11, 1997	0825 - 0835	Propylene -	33,500 pounds
January 10, 1997	1300 - 1800	Nitrogen Oxide -	413 pounds
January 9, 1997	1300	Ethylene -	31,605 pounds
January 8, 1997	0730 -2100	Sulphur Dioxide -	41.6 pounds/hr
January 7, 1997	2100 - January 8, 1997 0340	Sulphur Dioxide -	53,525 pounds

The Gulf Between a PRTR and the Right-to-Know: A Detailed Look at the Chemical Release Inventory in England and Wales

Mary Taylor
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Friends of the Earth (England, Wales and Northern Ireland)

Friends of the Earth is one of the foremost environmental groups in the UK, and we have local campaigning groups in 240 communities as well as a central office in London. We are dependent on individual supporters who provide over 95% of our income, and whose generosity supports approximately 100 staff in London and the regions and, for an NGO, considerable Information Technology resources. Worldwide, over 50 groups make up the Friends of the Earth International network, including Friends of the Earth Japan.

Summary

There are several sources of pollution and environmental quality data in the UK, including a type of pollutant release and transfer register, known as the Chemical Release Inventory (CRI) (maintained by the Environment Agency in England and Wales). These data sets are available to the public, but it has become increasingly apparent that - unlike the US TRI - the CRI has not really stimulated public involvement in pollution control. Two main problems are identified - the lack of official publicity of the data; and various inconsistencies in the data which deter analysis or presentation of information which might catch the public's attention.

In 1995, Friends of the Earth decided to publish the first batch of data on the Internet, which has certainly improved access to the data. The Environment Agency has agreed that this is an "essential" form of publication and now has plans for their own web site of CRI data.

However the data itself still has several problems, illustrated by a closer look at data for one industrial site in Wales. The CRI looks set to continue to fail to become a true community right-to-know tool despite Environment Agency proposals for improvement, and despite commitments made by the Minister of the Environment to comprehensive pollution inventories.

Yet communities are still face to face with problems of industrial pollution, and we conclude that there is a continued need for data on industrial pollution. Consistency, reporting of individual substances rather than groups, extensive lists of substances, better information on disposal routes, toxicology information (including what we do not know about toxicology of most chemicals!) are necessary improvements for the release data alone. But beyond that, whole new areas of information, such as transport and storage information, chemicals in product streams, or mass balance data are also needed. We are a long way from full community "right-to-know" in the UK.

Friends of the Earth has long argued for access to information and the "right-to-know". Much of our campaign work is driven by digging out data so that we can analyse the information and let the public know what is happening. We have been enthusiastic supporters of pollutant release and transfer registers (PRTRs), as tools for public participation and pollution reduction.

Some data on releases from major industries in England and Wales is compiled into the "Chemical Release Inventory" (CRI), a type of PRTR [1]. Data began to be collected in 1992, and we have followed the establishment of the CRI in great detail.

1. Dissemination of Information

The tradition of "public registers"

In the UK, a considerable amount of environmental information and data is publicly available. Much of it is specified in considerable detail by statutory legislation which leaves no room for discretion when that information is requested. Nevertheless many data sets have only a recent history - for example, drinking water quality data has only been required to be public since 1990 - and public data tends to sit in obscure offices called public registers, with very few visitors.

Public registers are not "user-friendly", tending to be a set of shelves with files, sometimes computer files (with an operator). Indexes may be lacking, computerised data is impossible to browse and it can be hard to know what to ask for, copying facilities can be absent or expensive or cause delays, and asking for copies of computerised information can cause consternation [2]. Inefficiency of data organisation and "too busy" under-resourced officials who do not give the requests priority do not help. All in all, authorities have been slow or reluctant to plan for dissemination of data in response to requests, let alone plan for pro- active dissemination.

CRI information

CRI information and much more detailed related information about industrial pollution sits in such public registers, in the form of paper documents. The CRI data is also computerised centrally and two annual reports with summary information have been produced by the Environment Agency.

Incredulously, the first national publication *failed to name a single company* and cost £30 (about $45) [3]. Specific data from individual companies was aggregated into exceedingly boring lists (even reckoned by my tolerance for numbers) and listed by the local authority administrative district *(see figure 1)*. It is reputed to have sold less than 200 copies.

It has become increasingly apparent to us that the low profile of the public registers and CRI in the UK was not helping to involve the public in pollution control initiatives. Our work investigating an industrial complex in the south-west of England in 1997 brought us into contact with local residents. Although residents who came along to a meeting had a history of contact with companies and the Environment Agency, they were unaware of the existence of the Chemical Release Inventory or the statutory public registers (where companies' applications, authorisations and monitoring data are filed).

Yet a recent FOE public opinion survey in 1997 found that

- 87 per cent of people are concerned about pollution from industry and
- 81 per cent of people supported publication of league tables of polluters.

Clearly the mere existence of data does not fulfil the right-to-know. Yet we are convinced that delivering PRTR information to the public is crucial.

CRI — Chemical Release Inventory - Releases 1992 & 1993

RELEASES BY LOCAL AUTHORITY AREA - ENGLAND - 1993						
MERSEYSIDE - 1991 = 1, 1992 = 8, 1993 = 8						
Local Authority	Substance	Total Indicators	Media	Limit (Kgs)	Actual Release (Kgs)	Unauthorised Release (Kgs)
	VOC - VOLATILE ORGANIC COMPOUNDS (AS TOLUENE)		AIR	1,575.0000	234.0000	
		Total:VOC - VOLATILE ORGANIC COMPOUNDS (AS TOLUENE)		1,575.0000	234.0000	0.0000
		Total:KNOWSLEY		1,943,000.0000	547,900.0000	0.0000
LIVERPOOL	ACETALDEHYDE		AIR	500.0000	34.0000	
		Total:ACETALDEHYDE		500.0000	34.0000	0.0000
	ACETIC ACID		AIR	500.0000	280.0000	
		Total:ACETIC ACID		500.0000	280.0000	0.0000
	ALCOHOLS - TOTAL NOS		AIR	500.0000	0.0000	
		Total:ALCOHOLS - TOTAL NOS		500.0000	0.0000	0.0000
		Total:LIVERPOOL		1,500.0000	314.0000	0.0000
SEFTON	NITROGEN OXIDES (AS NO2)		AIR	300,000.0000	104,000.0000	
		Total:NITROGEN OXIDES (AS NO2)		300,000.0000	104,000.0000	0.0000
	NP - SOLIDS NOS - TO LAND		LAND	1,500,000.0000	55,720.0000	
		Total:NP - SOLIDS NOS - TO LAND		1,500,000.0000	55,720.0000	0.0000
	PARTICULATES		AIR	320,000.0000	31,650.0000	
		Total:PARTICULATES		320,000.0000	31,650.0000	0.0000
	SULPHUR DIOXIDE		AIR	1,700,000.0000	305,500.0000	
		Total:SULPHUR DIOXIDE		1,700,000.0000	305,500.0000	0.0000
		Total:SEFTON		3,820,000.0000	496,900.0000	0.0000
ST HELENS	AMINES - TOTAL NOS		AIR	5,000.0000	69.0000	
		Total:AMINES - TOTAL NOS		5,000.0000	69.0000	0.0000
	AMMONIA		AIR	30,000.0000	18,480.0000	
		Total:AMMONIA		30,000.0000	18,480.0000	0.0000
	CARBON MONOXIDE		AIR	3,000.0000	2,120.0000	
		Total:CARBON MONOXIDE		3,000.0000	2,120.0000	0.0000
	FORMALDEHYDE		AIR	6,010.0000	1,312.0000	
		Total:FORMALDEHYDE		6,010.0000	1,312.0000	0.0000

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Figure 1: A sample of data from the CRI annual report [3].

Using the Internet - http://www.foe.co.uk/cri

So what could improved access look like? With the advent of relatively wide-spread Internet access around 1994, an opportunity to provide data on demand 24 hours a day from Friends of the Earth's offices arose.

To stimulate interest in the issue and help expose the problems, we decided to publish the first batch of CRI data (which covered the years 1992-1994) on the Internet.

The database comes from the Environment Agency, but we have added more precise location data and mapped the sites onto an interactive map of England and Wales. A user can access a map of England and Wales on the Internet, point and click to zoom in to an area, or type in a postcode to retrieve a map of local industrial sites, dotted in red on the maps *(see figure 2)*. Clicking on individual dots brings up the name of the site and then lists the quantities of chemicals released into the environment from individual factories.

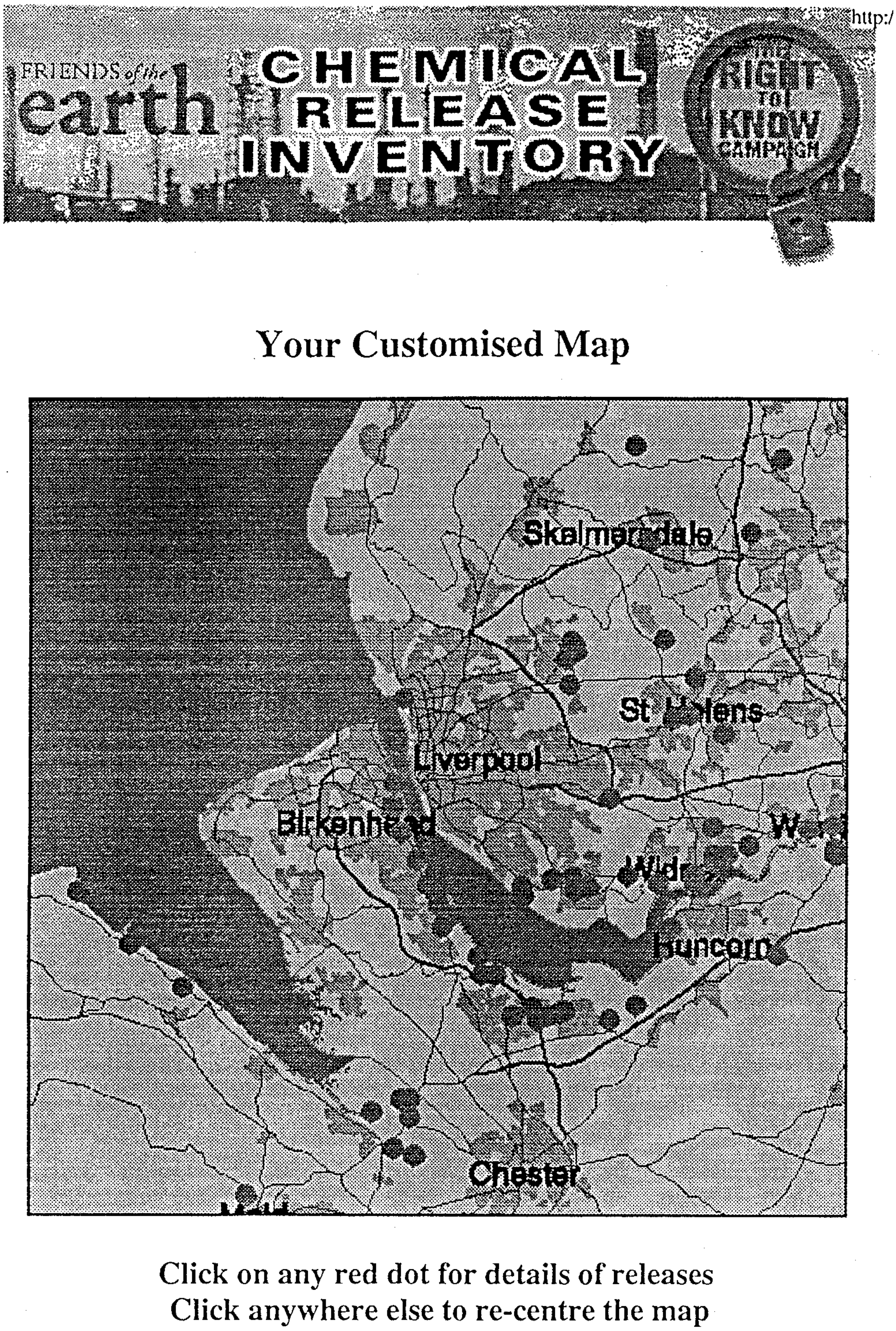

Figure 2: A local map from the Friends of the Earth web site: http:\\www.foe.co.uk\cri
Local Map: http://www.foe.co.uk/cgi-bin/cri/postcode

This allows people to scan data for everything from ammonia through dioxins and methanol to zinc [4]. Further links are provided to help explain the database, provide information on specific substances by linking to Materials Safety Data Sheets, and point out the problems of the data etc.

The maps and data are produced from a live database - which means that updates can be immediately transferred to the enquirer. If appropriate data existed it would be possible to update quite frequently, for instance to show current air quality data at a monitoring site or virtually continuous monitoring data of emissions.

Visitors to the site

The system was launched in September 1995, and was one of the first examples of Internet publication of PRTR data. (Canada also produced an internet site that year.) In one year, the Environment Agency reported around 750 enquiries about the CRI data while our CRI web site had 25,000 visitors in the first year, rising to 50,000 in 18 months. Publicity on the web and in the media at the time means that more people are now aware of the data. The Environment Agency has recognised that Internet publication is "essential", and now has its own web site, with plans for publication of the CRI data on the Internet.

The site has also stimulated other, improved, PRTR web sites - and the Environmental Defense Fund's "scorecard" site, launched this year, is a marvellous example with excellent information about league tables of polluters, good maps, and a huge database of toxicology information [5]. The site has been terrifically successful - recently recording 20 "hits" per second! It is a "must visit" site for anyone with an interest in PRTRs or public access to environmental information. It surely demonstrates conclusively that the public can be interested when the information is presented well. If you want a vigorous and interesting PRTR, then you have to put some vigour and interest into it!

Why is Internet publication important?

Given access to a computer terminal and phone line, such a database is available 24 hours a day. Maps can be produced which have features specified by the user, rather than pre- determined by the provider (in this case centred on one's own postcode). Production of one map or a million maps involves virtually no extra cost.

Data which is used also becomes more accurate - errors are spotted (not least by the companies themselves as noted above!). A centralised database which allows queries from a terminal also removes the middle "authority" which may not be totally neutral about its presentation of data or keen to permit access.

But even further than that - maps combined with data can be very powerful because they can allow us to begin to articulate a description of our neighbourhood or locality or region or country. If we can begin to compare data, then it begins to have meaning - even if we do not have science degrees.

But despite our efforts at publicising the data, other problems remain which have stifled interest in and use of the data. Although some 1500 community groups have used TRI data in the US in various ways, this level of activity has in no way been matched in England and Wales.

2. Inconsistencies and Missing Data in CRI: No League Tables Possible

The other major problem of the CRI has been the inconsistencies of the data. The CRI data was built upon the reports filed by industrial sites to show compliance with their pollution permits [6]. These permits are individually granted and, even for industries in the same sector, very different requirements to report had occurred in the permits.

To give some examples: one merchant incinerator reported three substances, another 41! Only half of the municipal waste incinerators (in 1994) had to report dioxins. Another problem relates to the definitions of substances - e.g. the metal lead may be reported in several ways, including in "metal groups", leading to uncertainty about the exact quantities released.

This inconsistency has caused a serious problem, and it completely undermines the integrity of the data set. Anyone trying to catalogue emissions or prioritise sites for whatever purpose, soon realises that missing information is noticeable [7]. Not only does this make the data unsuitable for research purposes, but it has meant that it has been impossible to produce league tables, the "top tens" of the pollution world. This might sound trivial, but rankings are important for anyone setting priorities and, most importantly I believe, are a great way to capture public attention. They also begin to help to put data into context for the public and begin to help explain the data.

Simple comparisons can be revealing! For example, if we are told that a smelter releases 20 tonnes of lead or 40 kilograms of zinc in a year and that it is within the official limit, we may have little idea what that really means. If we are told that this is the third largest release of lead in the country, or that there are more lead is released in our city than anywhere else, then these figures begin to have much more meaning and political clout - even though we still only know the original figure for our local smelter and may not even understand the units.

Yet another problem is in the definition of a CRI site - it is possible for one industrial site to have some processes that report to the CRI, whilst running other processes which may be producing releases, even of the same substances, which do NOT report to the CRI.

All of these shortcomings (and possibly even just plain errors) are shown in analysis of just one facility's releases. The company BP (British Petroleum) was chosen because it produces its own environmental report, and so it would be feasible to do a comparison.

Table 1 shows CRI data for one site of BP. It is compared with the environmental report produced by the company itself [8]. Although some data matches up, inconsistencies are numerous:

- four substance/substance groups show the same data;
- several substances are reported in much more detail by BP (VOCs are distinguished individually);
- six substances are reported by BP which do not appear in the CRI at all;
- yet other substances appear in the CRI and not in the BP report;
- many of the release quantities reported by BP are far greater (by an order of magnitude) than those recorded in the CRI.

Thus the CRI is NOT providing a clear record of pollution, and important information - such as quantities of particular carcinogens - is not appearing in the data. Although there are "legitimate" reasons for at least some of the missing information (such as releases from processes outside the legal scope of the CRI), the CRI data does an injustice to the local community. Surely a local community just wants to know what it might be exposed to, and does not worry about the niceties of pollution control legislation.

It is likely that this sort of discrepancy in CRI information compared with the “real world” of an industrial site is repeated at many sites in England and Wales, and for any pollutants which might be globally transported, the “missing” information may be an injustice world- wide.

The lesson of this must be that existing industrial regulation is not necessarily a suitable basis for production of a right-to-know inventory.

Chemical Release Inventory	**BP Co plc report**	**Comment**
aluminium **ammonia** **carbon monoxide** **phosphoric acid** **sodium hydroxide** **vanadium** not recorded in CRI	14 tonnes 25 tonnes 21 tonnes 2 tonnes 27 tonnes 3 tonnes	6 substances entirely “missing” from CRI
Cr, Cu, Pb, Ni, Zn (1.1 tonne total) **phenols** 3.3 tonnes	not in BP report	5 metals and phenols in CRI, but not in BP report
VOCs (3 classes): 395 tonnes	acetaldehyde, acetic acid, acetone, butanol ... etc... vinyl acetate (15 different “hydrocarbons”)	BP report provides much more detail; e.g. acetaldehyde is carcinogenic; acetone is not a recognised carcinogen
benzene: 13 tonnes	24 tonnes	11 tonnes “missing” from CRI; a recognised carcinogen
ethylbenzene 472 kgs	47 tonnes	46 tonnes “missing”
styrene 6.3 tonnes	90 tonnes	83.7 tonnes “missing” ; substance suspected of several health effects
toluene 437 kgs	8 tonnes	7.5 tonnes “missing”; substance a “recognised developmental toxicant”
	virtually same data	so we really are looking at the same industrial site!

Table 1: A comparison of BP’s own environment report [8] with that of the CRI, for the Baglan Bay (Wales) site, 1996.

***More consistency - but less information*?**

The Environment Agency has recognised some of the shortcomings of the CRI data, and has plans to make it a more consistent data set. However, it is proposed that increased consistency is only to be gained for a small number of substances - only 28 substances, or groups of substances, are proposed to be in the list for emissions to air for example. This is a far cry from the 600 substances of the US TRI, or even the 300 or so substances (to air) of the current CRI, and hardly fulfils any "right-to-know" aspirations. The clock is turning backwards in this respect. For example, many high volume chemicals for example which appear in the top ranks of substances in the US TRI do not appear on the proposed list.

3. Why It Matters - Community Level Concerns

So does lack of access or lack of data or confusing data really matter? Would better information be of help?

We believe that, at a community level, as a matter of principle, the public should have a right-to-know about toxics in their neighbourhood. Here are two examples of situations where information is "due" to communities, and where CRI fails to provide that information. And whilst I cannot say that CRI data would be the solution to every problem, without the data there will always be a hole in the jigsaw puzzle.

"Toxic tips" - hazardous landfill sites

The Lancet, a prestigious British medical journal, has just published a scientific paper linking increased incidences of birth defects with proximity to hazardous waste landfill sites [9]. A team of researchers studied 21 hazardous waste landfills in Europe (eight in the UK), some of which are now closed. They counted the numbers of any birth defects registered in the area around the site over a number of years. The figures show that babies of mothers who live within 3 km of these landfills were 33% more likely to have defects than babies of mothers living between 3 and 7 km away. The further away from the landfill site that the mother lived, then the less the likelihood of a child having a birth defect. The types of birth defects studied include spina bifida, and malformations of the heart, and great arteries and veins.

Whilst the paper itself has only demonstrated this observation, rather than showing any cause and effect, it would seem natural to inquire what might be in the hazardous waste landfill sites. There are thought to be around 450 hazardous waste sites in the UK, yet there is no definitive list; and the public cannot find out details of what has gone into the sites - it is regarded as "commercially confidential" information.

And what can we find out from the Chemical Release Inventory about the wastes of major industry? That 96% of solid wastes (of 2 million tonnes in 1996) are described as "non- prescribed solids not otherwise specified". This is not a very helpful description for the public (or probably even for professionals). One smelter alone produced 89,000 tonnes of slag in 1996. Power station and incinerator ashes have a variety of contaminants present, presumably including dioxins, furans and metals and there are legitimate concerns about leaching.

At one small village in Wales, Abercwmboi, where people live right next to toxic waste from a now disused factory, twenty children have deformities and skin problems. This is a particularly notorious site and, while operating, the factory itself caused gross pollution for many years. It is likely that the "invention" of PRTRs would have come too late to avoid this tragedy - if indeed the wastes and the illnesses are linked - but with such a legacy surely we cannot now avoid our responsibilities with respect to current practices and waste production?

Solid wastes should be precisely described - the TRI requires individual substances to be quantified when disposed “to land”, so this is hardly an unreasonable request - and their destination and disposal method should be required information. Data should distinguish between say landfill site or incineration or recycling - these are obviously very different environmental fates.

Excess childhood cancers and leukaemia

A further epidemiological paper published last year has shown that childhood cancers and leukaemia (in Great Britain) increase when the birthplace is near sources of petroleum derived volatiles, kiln and furnace smoke and gases, and vehicle pollution [10]. At the time the paper was published, Friends of the Earth was investigating an industrial complex near Bristol, and publication of our report on industrial pollution and the difficulties of access to data virtually coincided with publication of the epidemiology report [11]. Since industries in the area were releasing tonnes of carcinogens and other chemicals, local concern was high. One company released over seven tonnes of a carcinogen, benzene. A smelting company had releases which included 19 tonnes of lead, 1.6 tonnes of cadmium.

The local paper carried the headline “POISONED FROM BIRTH”, and the local Member of Parliament invited the Minister for the Environment at the time, John Gummer, to Bristol to meet with the Friends of the Earth local group and talk about pollution and access to information.

The Right to Understand

The previous two cases illustrate the key question that always comes up in neighbourhoods that are possibly affected by pollution - “how harmful is it?” Undoubtedly provision of background information on chemicals is an important part of the right-to-know. Yet very often the answer is that we do not know ”how harmful” a release may be - we may not know background levels, or how a pollutant is dispersed, and even experimental toxicity data is often (or even usually) missing. A European Environment Agency report this year states that

“for 75% of the 2,000 - 3,000 large volume chemicals on the market there is insufficient toxicity and eco-toxicity data publicly available for “minimal” risk assessment under OECD guidelines“ [12].

I think that the public should know about this. Chemicals are a huge part of our life: the UK chemical industry has annual sales of £39 billion annually; world-wide, the industry is $1.5 trillion - or 10% of world trade [13]. Providing citizens with good PRTRs has to be a small price to pay by industry for access to this market.

References and Notes

1. CRI data does not exist for Scotland or Northern Ireland, although this situation may be remedied in future. The Environment Agency is responsible for control of major industries in England and Wales only.

2. For example, we were originally asked to pay £10,000 for one Environment Agency public register data set (not the CRI) even though the information was already computerised and statutory public data. As a well-known pressure group we were in a good position to argue the price down and eventually got the data without charge, but an ordinary citizen would no doubt be daunted by such an initial bill.

3. Her Majesty's Inspectorate of Pollution [now amalgamated into the Environment Agency] (Chemical Release Inventory: Annual Report 1992 & 1993.

4. There are now over 400 different substances and substance groups, but the average number of substances reported per authorisation in 1994 is around 5. Industries are being phased into the system and it is estimated that eventually over 2000 sites will be listed.

5. The EDF's site is at http:\\www.scorecard.org

6. Pollution permits for major industrial processes are called "authorisations", and are granted under a regulatory regime known as "Integrated Pollution Control", IPC. The primary legislation is under the Environmental Protection Act 1990, but many details (such as definitions of the industries so controlled) are left to Regulations (i.e. secondary legislation).

7. Environment Agency (1997). Improving consistency of reporting in the CRI: a consultation document.

8. BP Co plc (1997). BP HSE Facts 1996: Health, safety and the environment.

9. Dolk, H. *et al.* (1998). Risk of congenital anomalies near hazardous waste landfill sites in Europe: the EUROHAZCON study. The Lancet 352, pp 423 - 427.

10. Knox, E.G., and E.A. Gilman (1997). Hazard proximities of childhood cancers in Great Britain from 1953-1980. Journal of Epidemiology and Community Health 51, pp151-159.

11. Friends of the Earth (1997). Toxics in your Backyard: a case study at Avonmouth, Bristol.

12. European Environment Agency (1998). Chemicals in the European Environment: Low Doses, High Stakes? Copenhagen, EEA.

13. UNECE press release. 12 August 1997; OECD (1997). Sustainable Development: OECD Policy Approaches for the 21st Century. Paris, OECD.

The Source of Environmental Policy

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A revered maxim of politics admonishes us to remember that "All politics are local".

Nonetheless, many of us too often forget that mandate, all too often at our own peril. It is easy to become swept up in glorious multi-variate economic analyses of national and international pollution prevention, attempting to derive the long-term economic benefits of chemical recycling and the attendant equations illustrating likely health and productivity gains.

I freely admit that these analytical allures are real. It's dazzling to watch the numbers cascade, line up nicely in rows, and produce a simple numerical guide to tell us which way to move. I'm also easily seduced by the conceptual plateau of international issues and the potential for developing world wide solutions, such as an integrated Worldwide toxic chemical tracking system. Why else are we here?

Now, let's pause after such a telling confession. There must be an alternative. Are we not supremely rational technocrats. And of course, I am begging the question. Why else would I consent to be part of a panel on the community uses of PRTR information?

Why indeed. Have we learned great lessons in the United States from the perfectly designed US TRI? Have we found a secret political ingredient that we need to disclose to the rest of the world. Are we solely aware of the true function of democracy so that we can guide the uniformed?

Well, yes and no. At least we should be able to give you insights from our failures. Perhaps we can shed a bit of light on where community use has played an important role and how it can affect the course of national events, despite our national disdain for the common man. However, more importantly, perhaps can we help each other in preventing the problems that are surfacing because of our imperfect decisions regarding community use of the TRI and the potential subjugation of local interests in favour of imagined international consequences.

Since I began with one confession, perhaps another is in order as we begin to thread my way around these challenges. Most of us are all too aware of the faults and excesses of the U.S. broadcast media. We pontificate upon their seedy behaviour, yet, we watch as we fill ourselves on cheap entertainment and mawkish sentimentality. We see ourselves fascinated by trivial sensationalism while we struggle to withstand it. Clearly, we try to have both ways - enjoying excess while maintaining our own personal integrity. Often, our reactions are stifled by our own improper overcompensation.

As an example my own failures, I try to keep in mind an event that occurred a few years back. While driving in my car to a similar global think-tank session on information policy, I was listening to the radio and channel-surfing between different programs. At one point I stopped at a talk show that broadcast telephone calls that were made to discuss various psychiatric problems. The last speaker had discussed something about the near-criminal incompetence and complicity of the media who pandered to our worst fears, so naturally I was delighted by the calibre of the call-in listeners.

However, I was somewhat surprised by the next caller. A lonely-sounding woman was looking for support and commiseration because her pet dog had recently died. She was excoriating the local government Department of Social Services for failing to provide her with the assistance she needed, perhaps "grief assistance", or help in finding some solace. She continued on about how saddened she was and that she could not sleep, could not eat, and felt disconnected from the rest of the world. She was afraid that she would remain alone.

Of course, in my full Washington splendour, I cynically laughed at both this woman and the talk show host who did show some empathy. I wondered why this woman didn't have more backbone, and equally, why the talk show host didn't summarily cancel her call and move on to other more important things. I felt she should just get over it and move on. How can someone permit themselves to be motivated by fear?

However, over the next several days I couldn't avoid thinking about this call. Perhaps I was goaded by the hollowness of the international experts' opinions in the conference I was attending. Perhaps I was nagged by my own sense of inadequacy by not finding a compromise on certain tough issues. I kept returning to my memory of this poor lonely soul and their plea for help. I kept squashing these feelings, putting them down to boredom or failure of will.

However, several weeks later, I was forced to conclude that this caller's plea was in fact legitimate, and perhaps, more profound than many of the other problems I was facing. What right did I have to negate her suffering? What special insight did I have to believe that she should just ignore the loss of her companion that had been with her for 15 years? What capacity did I have to know that the answers to her problem would have less effect than my global strategies? Did I have any right to ignore the potential ripples of the effect of a single person, even though her circle seemed so small.

This became even more complicated when I had a similar discussion several weeks later with a high government official, who mentioned in passing, that he was mourning the loss of his family dog. He felt sad and related how it had upset the normal workings of his family and thrown off his day. I also sensed a bit of fear for himself. It made me wonder if we sometimes give as little regard to the lives and deaths of the people in our local communities than we do to the lives and deaths of our pets.

Now, you may well ask what relevance does this parable have to community use of PRTR's? Does this mean we are to have simple faith in the righteous needs of our local citizens? Are we to permit a naive confession to serve as justification that we place the needs of grass-roots community members above the logical conclusions of our international bodies? Of course not, even I wouldn't have the temerity to suggest such a thing

However, it does lead me to question a major failure faced by many of us involved in the U.S. experience. When the U.S. Toxics Release Inventory was created, we all recognised that the collection of accurate information was critical. We also recognised that the process for fine-tuning its expansion and evolution was equally important. However, as many of us often fail to remember, a great deal of attention also was paid to the creation of a local, regional, and national network to deal with the problems that might be identified by the data we collected.

A network of local community councils was created, called Local Emergency Planning Commissions, otherwise known as "LEPC's", consisting of a mixture of community interests including industry, government, environmental advocates, general citizenry, and others who might be interested. Similarly, state-based regional groups were created, under the leadership of the governors of our 51 states, to provide another part of the network for helping to guide national choices.

Have these, worked? In a simple word, no. Was the concept flawed? Perhaps. Such a network had never been created before. Was the mechanism for their creation and management unrealistic? Again, perhaps. Equal participation was never guaranteed. Did they have a real mission? It appears that some did, although many had no relevance to their local communities. Did they have resources to support their mission? Of course not. No money was provided to help staff and operate these groups. In fact, local officials saw this as yet another national attempt to saddle them with more responsibilities without any additional resources. Here was another example of national policy being implemented on the backs of local government.

In some cases, LEPC's were active. In our experience, this occurred where two factors could be found. First, local industry became aware of the risks and opportunities these LEPC's created and they decided to become active participants to preclude or mitigate any harm. Second, there already was a balance of forces at the local level and thus this new forum could be used, or at least could not be ignored.

However, overall, the most powerful local use of TRI information did not emanate from these LEPC's. It came from local community advocacy groups, it came from local and state newspapers, it came from combinations of local, regional, and national forces that worked in parallel to amplify each other.

This brings us back to the point of my earlier confession. For many of us, the source of motivation for developing PRTR's has been more than perceived risk, or the chance that harm will occur. We must remember that for many of us, risk means fear, a natural human reaction to risk. We fear that we will encounter another "Bhopal-type" catastrophe in our communities. We fear that we are hurting our children with increased risk of cancer and other diseases. We fear that we are hurting the wildlife and countryside that sustains us. While we may think about other freedoms and rights, especially about the right-to-know, what our communities want is freedom from fear.

It seems, then, that our challenge is to use information to help reduce the fear in our communities, while recognising that many of these fears are legitimate and must be addressed. If these fears can be addressed though shared knowledge, they are more likely to be resolved.

While some may say that the publication of toxic release information will just inflame the fears of our communities, we can point to our experiences in the U.S. This information helps reduce fear by making our neighbours more informed, better able to cope with local problems, and better able to judge between unfounded claims of either safety or risk. With less fear, everyone who is interested in making our communities more free of toxic chemicals will benefit.

We have seen local groups use TRI information to highlight specific local problems that they had been addressing. For example, they identified the effects of hydrocarbon chemical releases in the air of their city and the potential effects on the health of their children. Local newspapers and television investigated their work, and since it was based on the hard, accurate numbers of the TRI, they in turn reported the story. Thus, local media and local groups worked together to highlight the scope of potential issues at local facilities.

Moreover, local stories can became illustrative of national problems and thus help identify the types of issues that might be found throughout the country. National media staff , who had not really paid attention to the national TRI data, finally discovered these issues. They talked to local community groups, local media staff, national advocacy groups, and government representatives. National media not only emphasised specific local issues, they interpreted them in light of national policy choices. They also began to highlight the behaviour of national companies who operate in many states and looked for the parallels in their behaviour. They readily adopted a simple report on who released the greatest volume of toxic chemicals.

In turn, these national and local stories amplified each other. Local community groups were then able to compare the behaviour of industrial facilities in their own home towns against other facilities and the country as a whole. A plant manager could no longer simply tell a local citizen that pollution couldn't be avoided without closing the plant. The worker or local citizen could simply point to another petrochemical plant whose pollution record was much cleaner. It is clear that local and national publicity strengthened the bargaining power of local groups.

Keeping in mind this growing effectiveness of local community groups, several of our associates have tried to keep in touch and understand the fundamental needs of local communities. With that in mind, we were quite happy when we were fortunate enough to be selected by the U.S. Environmental Protection Agency to host the national TRI and Right-to-Know Conference in the fall of 1997. One of the goals that we think we accomplished was to increase the participation of local community groups and representatives. We nearly doubled the number of local community groups who had appeared in prior conferences, and in fact, helped provide an opportunity for them to showcase their work and share it with everyone at the conference.

The range of their work was exhilarating. Their work included:

1. Assessing the effects of heavy metals releases in local communities;
2. Techniques for using reported releases in facility permitting;
3. Documenting unfair toxic burdens on minority groups;
4. Using release information in environmental education;
5. Using release information in emergency planning;
6. Assessing corporate behaviour;
7. Using release information to develop local environmental laws;

and more... Please see our Internet site http://www.rtk.net for the proceedings of this conference and an abstract of many of these works.

Overall, looking at these efforts, there are several principles we might keep in mind:

1. Local needs are real needs, influenced less by theoretical goals and more by the elements of local life. They can be relied upon in creating national policies;
2. Local needs often anticipate and predict national strategies;
3. Local community action often becomes a national story;
4. Strategies that co-ordinate and amplify local use can have significant national effects;
5. Local action can change the behaviour of national companies;
6. International efforts should be viewed as providing a level playing field and eliminating arguments against local use of information;
7. PRTR development should respect long term community needs - health, labour, etc.

Perhaps, with these principles in mind, we can address local fears, provide a way for communities to address them in a scientifically valid manner, and make some progress in reducing the risk of toxic chemicals. I for one, would appreciate it if you could help me ease my personal fear that we won't make progress in developing an international network of PRTR's. And on my part, I hope I have been able to ease some fears that the use of PRTR data by local community groups will increase national risk.

PRTR in the Press: What Journalists Are Writing About PRTR and How They Can Use PRTRs

Ralph Ahrens
EEB (European Environmental Bureau)
Brussels, Belgium

Introduction of presentation

Dear Ladies and Gentlemen, dear Chairman:

I am pleased to be here in Tokyo at this conference. At the beginning I like to tell you that I have two faces. I am here to represent the European Environmental Bureau. The EEB is an umbrella organisation of about 130 environmental NGOs mainly from the European Union. EEB is trying to influence the environmental policies of the European Commission, the European Parliament and the Council. For example, EEB is fighting for a comprehensive PRTR in the European Union. My second face, however, is that of a journalist.

Now, you may ask what a journalist can tell you about PRTR. It could be a lot, because reporters are writing about what are the effects of existing PRTRs as the American Toxics Release Inventory. And - please, do not forget this - we are also using PRTRs as an information tool. On the other side, however, I could not tell you much about PRTRs for one reason: There are just a handful of PRTRs.

Text of the paper:

No doubt environmental policies should seek to protect humans and the environment from risks and to conserve natural resources and energy. And Chapter 19 of Agenda 21 addresses the approach governments could take to collect sufficient data about various environmental media while providing public access to the information: Governments with the co-operation of industries and the public should implement and improve databases about chemicals, including inventories of emissions, called Pollutant Release and Transfer Register (PRTR).

No doubt: PRTRs should strengthen the power of the public. And journalists are acting as mediators: With support of PRTR-data they are showing citizens what companies are doing. On the other hand, they demonstrate the industrialists the concerns of the public.

- Journalists are reporting on existing PRTRs as the American Toxics Release Inventory (TRI) as well as on the principle behind these open inventories: the Community-Right-to-Know principle.
- Journalists are using PRTRs to compare environmental performances of companies and to show which company is doing good and which one is doing worse.
- A look into the future: PRTRs get more and more important as an information pool for journalists when the world is becoming a global village. PRTRs will be an ‘informative’ counterweight in the process of globalisation.

The American experience

In the USA, TRI challenges many reporters to use new data management tools. In 1992, a review of 100 stories, all from large urban dailies, found that less than 20 per cent of the reporters accessed the TRI database themselves. Often, however, citizen organisations serve as an important link to the public by interpreting the data in advocacy reports that are covered in the press.

Many papers and some broadcast media have based investigative series on TRI data. The most effective stories put the statistical data in perspective for the reader. Reporters may discuss issues such as the health effects of selected chemicals, worker health at local plants, or the degradation and displacement of poor communities by expanding chemical facilities. Other exemplary articles probe the facts behind emissions reductions, distinguishing pollution prevention and control from ‘phantom reductions (changes that occur on paper only). Reporters can also illustrate hidden hazards and vulnerable populations through techniques such as plume mappings.

Reporters claim that TRI data have increased communication with local industry officials and plant representatives. Generally available information increases plant managers’ interest in talking about toxic pollution (at least where disclosure is required by law). Journalists frequently consult industry representatives to explain production processes and interpret the chemical use.

The European experience

Up to now, the European press hasn’t discovered PRTRs as an information pool. And apart from a few exemptions journalists and editors haven’t heard about the PRTR-process - even in Great Britain where the English and Welsh governments has built up the Chemical Release Inventory (CRI). The CRI is a PRTR-like register. Only in 1995, a flurry of interest was generated: At that time, Friends of the Earth England (FoEE) has combined the CRI-emission data with a simple geographical information system on the Web.

The reason for this lack of interest are diverse. For example, the problem with the English-Welsh CRI is that the data has been so poor that no-one has been able to use it. The US-TRI is historically - and emotionally - linked with the Bhopal accident in 1984, this connection is missing in Europe. And existing chemical inventories in the Netherlands, in Norway or in Germany were built up for the needs of governments - not for the public.

Towards media-friendly PRTRs, or: What to learn from the USA

Most stories on TRI fall into one of two categories:

- in-depth analyses of specific places or companies or
- yearly overviews of TRI data.

Most articles are background stories and adhere to a common format, presenting the three ‘sides’: environmentalists, regulators and industry. Stories have to be ‘sexy’. Therefore reporters prefer to illustrate the release data with political controversy or human drama. However, the time lag before journalists can gain access to information about toxic releases prevents ‘hot’ actual stories: The EPA publicises TRI data nearly one and a half years after the reporting period.

Citizens reading or watching the news often want to know about their personal risk of chemical releases and products. Journalists are called upon to provide health data and to put the TRI numbers in context. But the limitations in TRI data and the inherent uncertainty of risk assessment make this difficult. And therefore

- reporters need more information about health and environmental effects. A good approach is the amazing webpage ‘www.scorecard.org’ published by the American non-governmental organisation Environmental Defense Fund.
- they need also easy accessible information on chemicals in products. These data are just as important for the public;
- to explain emissions in terms of efforts, of lack thereof, to prevent or control pollution reporters must take into account any changes in operations - including stoppages in the production, the construction of new installations, and the introduction of new processes.

To report about environmental performances of companies bare facts in form of emission numbers aren’t enough information. These data have to be interpreted by the journalists. Therefore, to facilitate journalistic investigations, a media-friendly PRTR should inform on

- the processes and the installations involved in the specific emissions - e.g. that vinyl chloride emits during the production of polyvinyl chloride (PVC);
- the efficiency of the processes and installations - e.g. how much vinyl chloride emits during the production of a kilogram of polyvinyl chloride.

The chemical list of PRTRs should not be limited. So, a public accessible inventory should include emissions from all chemicals which could harm humans, nature or the climate, e.g. carbon dioxide, the No. 1 heat-trapping greenhouse gas, as well as heavy metals, cancerogenic chemicals and other toxic substances. Since no one knows which are the „chemicals of tomorrow“. Therefore PRTRs should also include the emissions of e.g. chemicals which are suspicious to be endocrine disrupters.

On the other hand, it is neither practicable nor possible to include emissions from up to 100.000 chemicals in an accessible and understandable register. However, to meet the wishes of the public, industrial companies should be willing to react fast if new issues will be under discussion. For them it would be wise to build up an own comprehensive in-house emission register. This would facilitate the work of reporters and build up confidence between companies and the public.

SESSION V

Evaluating the Role of PRTRs as an Environmental Policy Tool

Working Group H

Role of a PRTR Nationally and Globally: Focus on Industry Sector/Reporters

PRTR Experience in the United States: A Perspective from the Specialty Chemicals Industry

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Jellinek, Schwartz & Connolly, Inc.
On behalf of Synthetic Organic Chemicals Manufacturers Association (SOCMA)

The Synthetic Organic Chemicals Manufacturers Association (SOCMA) is a trade association representing batch and custom chemical manufacturers, a highly innovative, entrepreneurial, and customer-driven sector of the chemical industry. More than 2,000 batch processing facilities produce 50,000 of the specialty and custom chemicals manufactured in the United States at a value of about $60 billion annually. SOCMA members are representative of these facilities, which are typically small businesses with fewer than 50 employees and less than $40 million in annual sales.

Many SOCMA members are covered by the requirements of the Pollutant Release and Transfer Register (PRTR) implemented in the United States, the Toxics Release Inventory (TRI). Under TRI requirements, qualifying facilities report annually to the U.S. Environmental Protection Agency on their total release to each environmental medium, transfer to various locations, and treatment efficiency of more than 600 chemical substances. These data are entered into a national database that is made available to the public.

The following comments reflect the experience of SOCMA members and other companies with the TRI program over a 10-year period. The TRI program has led to beneficial results, both for society as a whole and for the individual companies that participate in the program. However, SOCMA members and others continue to have legitimate concerns about some aspects of the design and implementation of the TRI program. SOCMA recognises that the United States TRI program is but one example of PRTR design. By offering these comments about the TRI, SOCMA hopes to assist other countries in designing and implementing PRTR programs that will most efficiently meet national goals.

Program Scope

In its original form, TRI applied only to facilities in the manufacturing sector, though the Environmental Protection Agency has more recently begun to expand into other sectors. Still, manufacturing enterprises dominate TRI and will continue to do so for the foreseeable future. By reporting releases only from the manufacturing industrial sector, the U.S. TRI continues to focus the public's concern on chemical releases from industry. In many watersheds and airsheds, however, significant (if not predominant) releases of problem pollutants arise from agricultural and street runoff, equipment maintenance areas (e.g., airports and trucking fleet facilities), traffic concentrations, publicly owned sewage treatment facilities (air releases as well as water releases), and other non-industrial sources. If the national objective of the PRTR is solely to encourage changes in the materials handling behaviour of manufacturing facilities, then it is appropriate to limit the PRTR to these sources. However, in most countries (or regions), other sources are likely to be important as well. A PRTR program aimed at identifying and managing the most important sources in a region should, where appropriate, include release reporting or estimations from all sources that likely are important in the region. Given that operation of the

PRTR is costly for all concerned, it makes sense to design and operate it in such a way that most information obtained is "purchased" by the public and private resources dedicated to operating the PRTR program. In many cases, more valuable information might be gained by focusing attention on these sources rather than on small industrial ones.

Effectiveness of Public Disclosure

The TRI experience in the United States has demonstrated that a PRTR reporting system, coupled with public disclosure of the reported information, can provide an incentive for companies to reduce their waste. In the United States, various parties have published "Top 10 Lists" of the largest emitters, for example, and some companies have acknowledged that concern for their corporate reputation has encouraged them to reduce their emissions. In a similar vein, some companies that have reduced emissions have been eager to communicate their success to their customers or to the general public. From the point of view of government, these emissions reductions have been made with a far lower expenditure of resources (money and personnel) than would have been required to achieve the same result through traditional regulatory means. This perceived "cost effectiveness" in achieving emissions reductions is advanced by TRI supporters as a primary benefit of the program. There is no question that, in many cases, this is a genuine overall benefit of the program.

Data for Internal Management

Another benefit of TRI reporting is that the information collected for reporting to the government also is available to support internal management decisions within the facility. Some companies have acknowledged that this information has called their attention to the amount of purchased raw materials that were being "wasted" from their facilities. This has led to concern about the dollar value of those materials, as well as the waste-handling costs of disposing of them through regulated means. As a result, companies have identified opportunities for increases in production efficiency and associated reductions in operating costs. Thus, in some cases, TRI has led to direct increases in profitability as well as reductions in the environmental burden of waste products. There is a good deal of anecdotal evidence that this has occurred, but there has been no systematic evaluation of the extent or value of this phenomenon.

Limited Utility for Risk Prioritisation

There are two ways in which TRI has limited utility for risk prioritisation. First, as noted above, because TRI is focused on the manufacturing sector, it does not provide environmental planning information that would help establish priorities across all potentially important sources of pollutant release. Thus, it is limited in its ability to help the public or government identify the highest priority environmental risks.

Second, TRI has frustrated some companies by encouraging attention to less important internal chemical management problems. In other words, while TRI has helped some companies identify opportunities for waste reduction, it has not always led to the most cost-effective response from regulated industry. This has come about in the following way: as noted above, the power of public disclosure of release information is such that some companies feel compelled to reduce the highest volume releases first, even though their resources might better be expended on lower volume, more toxic chemicals. In fact, the highest volume release may not be the most important at any given location

In any given situation, the environmental or human health risk associated with a routine release of chemicals is a function of the toxicity of the chemical involved, the location of the release relative to different types of ecosystems, the environmental medium receiving the release, the proximity and numbers of people exposed, the pattern of release during a period of time, and numerous other variables. TRI was not designed to capture most of this information. The 600-plus TRI chemical substances are not categorised or ranked according to their relative toxicity. The sensitivity of the various receiving media is not considered, and the TRI database does not contain information on proximity to population centres, sensitive populations, pattern of release during the year, etc. Informed judgements about which releases are more harmful than others (i.e., risk prioritisation decisions) are left to subsequent analyses that use TRI data as an input. Some companies express concern that the general public does not understand this distinction and equates the “largest emitter” with the “greatest risk.” This they say, distorts priorities for emission reduction; and, in fact, some companies have reported that they have reduced “big number” releases that are relatively less harmful (e.g., a less toxic chemical injected into a deep well) instead of “smaller number” releases that are likely to be of greater environmental concern (e.g., an air release of a relatively more toxic chemical near a population centre).

To the extent that a government wishes to use a PRTR to encourage industry (or other sources) to reduce releases of chemicals to the environment, it should design the program carefully to focus on the chemicals, sources, and release routes that are likely to have the greatest impact. This is especially important when the PRTR information is subject to release to the public, because of the possibility that PRTR data alone will lead to misleading conclusions and deflect the public and environmental managers from the most important problems. At the least, the government instituting the PRTR should make a clear statement to users about the limitations of the data and provide guidance on what analyses can and cannot validly be performed using the data.

Data Quality

Another lesson learned from the TRI experience is that data quality is very important. TRI reporting requirements reach far too many facilities for EPA to exercise close review of the quality of reported data from each of them, In addition, data entry errors are bound to occur. (These will be reduced with electronic reporting.) The expected result is errors in the database that can confound analyses. For example, one Non-governmental organisation (NGO) recently published a report, based on TRI data, that identified schools located within one mile of facilities that release TRI chemicals to the air. Due to problems with the TRI database, the report contained numerous errors about facility location that subsequently were brought to the attention of the authors. EPA is undertaking a program to correct the location errors. Problems of this type, some of which must be expected, may undermine confidence in the PRTR itself.

To reduce confusion, a PRTR should be based, if possible, on a system of unique identifiers that unambiguously identify each facility, and there should be a quality control procedure to reduce errors in reporting and data entry.

Confidential Business Information

PRTRs should be designed to be sensitive to industry concerns about revealing proprietary information. This is especially important in the specialty chemicals industry, where the competitive advantage enjoyed by a company may be reduced or eliminated by release of information about chemicals in use at the site.

Confidential information can be revealed both directly and indirectly. A direct breach of confidentiality occurs when the specific information revealed is itself a trade secret. This problem can be overcome by providing a means for the submitter to identify and protect specific information that is proprietary, based on some agreed criteria for making that determination.

It is possible that confidentiality can be breached as well by release of an element of information which, while not itself confidential, can be placed alongside other information to yield insights into confidential information—such as process efficiency, pricing margins, and so forth. This has been called the "mosaic effect" because, like a mosaic, the "picture" is built up by the juxtaposition of numerous elements, each unremarkable in its own right. This is a much more difficult PRTR design problem.

The concern for release of confidential information generally is less acute with PRTR reporting of releases and off-site transfers than it is with reporting about internal processes, but it is nonetheless an area that deserves special attention and consultation with industry during PRTR design.

Burden

The benefits of PRTR reporting come at a price, and care should be given to assure that the information to be reported from each sector is sufficiently valuable to justify the cost of obtaining it.

Reporting from the specialty chemical industry involves consideration of both the cost of obtaining the information for reporting and the value of the reported information, compared to information from other sources.

First, with respect to burden, it is important to recognise the special reporting burdens on small, specialty chemical manufacturers. Specialty chemicals are manufactured using "batch" processing, whereas commodity chemicals are generally produced using "continuous" processes. Continuous processes involve relatively constant raw material input and product withdrawal. Specialty (and custom) chemicals are generally manufactured by batch processing, as it provides an efficient (and often the only) method of making small quantities of chemicals to meet specific needs and consumer demand. A batch process involves frequently changing raw materials, varying process conditions, and different removal methods.

The range of annual emissions from a batch processing operation is substantially different from that of a continuous operation because product lines change from year to year and there are constant changes in the raw materials and waste streams. Among SOCMA member companies, for example, product lines may include from 200 to 1,500 different items, with a significant portion of the product line deleted or added each year. This results in a highly variable waste stream and a correspondingly difficult challenge to do the "bookkeeping" required to measure or estimate releases and transfers of hundreds of chemicals.

This variability in raw materials and waste streams also diminishes the value of the reported data, because observed variations in releases and transfers year to year do not necessarily yield information about the existence or success of pollution prevention programs, production efficiency, or other variables that a PRTR program may be designed to encourage.

Considering as well the fact that most specialty chemical producers are small companies with few resources, countries developing PRTR programs should consider carefully whether the usefulness of the data warrant the burden of obtaining it from this particular industrial sector.

Conclusion

SOCMA and its member companies support the implementation of TRI in the United States and the development of PRTR programs in other countries. As these national programs develop, it is very important to be sensitive to the need for a "level playing field" with respect to international competitiveness. While every country that finds merit in developing a PRTR should do so in a way that is responsive to its unique needs, every reasonable effort should be made to harmonise these programs as much as possible to avoid competitive disadvantages that might otherwise result..

SOCMA is pleased to have the opportunity of providing these comments and stands ready to work with any interested party to develop PRTR programs that will provide accurate, meaningful, and useful information.

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Utilisation of PRTR Data in Industries: Voluntary PRTR Programs of Japan Industries

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Introduction

There are two ways of thinking about PRTR. One is the American way of thinking based on "right-to-know" and another is the European way of thinking, that is, to use data for "total risk management of chemical substances".

The Japan Chemical Industry Association (JCIA) and Keidanren (Japan Federation of Economic Organisations) have adopted the latter way of thinking and have been collecting PRTR data from industrial circles voluntarily.

Generally speaking, the production and/or use of toxic substances is traditionally prohibited by law or restricted by emission standards. But it is not clear how we should manage the substances which are suspected of being toxic, so-called "gray" substances, in the future.

Therefore, the main use of PRTR data for industries is to evaluate grey substances on the point of "total risk management of chemical substances" and to determine the order of priority in which to take emission reduction measures.

Here, let me give you examples of the use of PRTR data by JCIA and by Keidanren.

OHP-1 Utilisation of PRTR

Hazardous substance:
- Legal restrictions
- Environmental standards, emission standards

Grey substances:
- Voluntary emission reductions
- Decide the priority of emission reduction measures.
  ↑
  Hazardous property, PRTR data

PRTR Development in Japan's Industries

The Japan Chemical Industry Association (JCIA) launched a PRTR pilot voluntarily in 1992 for the first time in Japan, it surveyed 12 substances and was supported by the Ministry of International Trade and Industry. In 1993, JCIA continued the voluntary PRTR pilot with 28 substances to find out the problems of implementing PRTR smoothly and effectively. In 1994, to prepare for a regular PRTR survey, JCIA specified 259 substances as total target substances and created an "Investigation Manual for Chemical Substance Emissions", the name of which we changed to the "PRTR Manual" in 1997.

In 1995, JCIA started a regular PRTR program with 55 substances and, in 1996, surveyed 151 substances. In 1997, the number of total target substances was increased to 454 and JCIA surveyed 286 of them.

On the other hand, in 1996 the Air Pollution Control Law (APCL) was revised and voluntary activity by industrial circles was adopted in the law to reduce emission amounts of grey substances.

In this situation, Keidanren consisting of all industrial circles in Japan, launched PRTR in 1997 as a voluntary activity of all industries.

OHP-2 The PRTR history of industrial circles in Japan

1992	JCIA first pilot (12)	
1993	JCIA second pilot (28)	
1994	JCIA preparation of regular survey (target substances, manual)	Start the study to revise APCL.
1995	JCIA first regular survey (55)	
1996	APCL was revised.	
		Each industrial circle made voluntary emission reduction plans.
	Voluntary activities of industrial circles were adopted into law.	
	JCIA second regular survey (151)	
1997	JCIA third regular survey (286)	
	Keidanren first survey (174)	

PRTR Experiences of JCIA

Collecting data and threshold

As the PRTR of Keidanren was explained by Keiichi Higuchi in Session A this morning, I would like to explain the PRTR of JCIA briefly.

As of 1997, 454 substances are specified as total target substances of the JCIA PRTR, considering hazardous properties, identification as a carcinogen and so on. In 1997, 286 out of a total of 454 target substances were surveyed.

The thresholds of target facilities are specified based on the hazardous levels of substances and the amounts treated.

OHP-3.1 Target substances and thresholds in 1997 survey

Total target substances: 454 substances
(Specified based on legal restriction, carcinogen, etc.)
Surveyed substances: 286 substances
(Selected based on production and imported amount)
Threshold of target facilities:

≥ 1 T/Y/Facility: Toxic level A, B

Legally restricted substances

Voluntary control substances specified by the Air

Pollution Control Law

≥ 10 T/Y/Facility: Others

As to data, JCIA is collecting the following items with the co-operation of member companies.

OHP-3.2 Collecting data in 1997 survey

Collecting Data

Handling amounts:	Production, consumption/use
Emissions:	Air (from vents , from storage tanks and fugitive releases)
	Water (to public water, to sewage)
	Soil (landfill, other)
Consumption:	
	Treatments: Burning at site, decomposition, others
	Transfers: Treatments to reduce weight/volume, Final landfill, Others
Others:	Recycle. Landfill at off-site

That is, amounts handled are divided into production and consumption. The emissions to air are divided into the amounts from vents, storage tanks and fugitive releases. The emissions to water are divided into public water and sewage. The emissions to soil are divided into landfill and others. The treatment amounts are divided into burning, decomposition and others. The transfer amounts are divided into intermediate treatment, final landfill and other. Recycle amounts and landfill off-site are collected, too.

Result of survey

The 1997 survey data on 286 substances are being aggregated now. So it is not available to show you now, but the summary of the 1996 survey written in English is provided at this conference. If you need more detailed information about the 1995 and 1996 surveys, which are published, please request them to JCIA.

Uses of PRTR data

Voluntary emission reduction by industrial circles

(Example of voluntary plan by revised APCL)

This example isn't considered to be PRTR, but it is a good example of industrial circles being surveyed regarding heir missions to air and the data resulting in measures for emission reductions. So I would like to show you the voluntary plan for benzene by JCIA as an example of this scheme. Benzene is one of the voluntary control substances specified by revised APCL. The emission reduction plan has been approved by the Japanese government and is now proceeding.

First, we investigated all emission sources of benzene within the facilities and measured the concentration of benzene and the gas volume from each source, then calculated each emission amount of benzene according to emission sources. And we studied the applicable measures to reduce the emission of benzene from each emission source. Then, considering cost-effectiveness, we created the emission reduction plan for benzene. Each member company of JCIA did this.

JCIA collected these emission data and emission reduction plans. After the discussion and the negotiation among member companies, JCIA decided the benzene emission reduction plan of JCIA and reported it to the government. Now the plan has been implemented. Each industrial circle did so. OHP-4.1 shows the aggregated emission data for benzene and the JCIA reduction plan.

OHP-4.1 Voluntary emission reduction by revised APCL scheme
(Example of voluntary plan for benzene by JCIA)

The emissions of benzene and reduction plans.

ProcessEmission amount (T/Y) Reduction measures
Production Consumption Solvent in 3 years
Reaction 30 320 9 Improve operation
Burning
Separation 159 97
Recovery 97 254 Adsorption by active
carbon Burning
Distillation 13 85 456
Drying 919 Burning, Solvent change
Adsorption by active
carbon
Others 121240
Sub-total 2800 1700 (in 3 years)
Storage1000 900 (in 3 years)
Total 3800 2600 (in 3 years, 30%)

Sources: Central Environment Council, Sub-Committee on Air Pollution Control, 7/23/1996.

Evaluation of the priority of measures using the JICA's PRTR data

The mechanism in 4.1 is the most effective way to reduce emissions of toxic substances. But it is physically and economically difficult to expand this scheme to the substances which are only suspected of being toxic. And from the point of view manpower to collect data, it is also considered very difficult. On the other hand, the following way is a possible and effective means of total management of chemical substances.

In the JICA's PRTR survey, the emission amount lists, by substances and by facilities, are provided to member companies. Of course company names and facility names aren't disclosed, but each company can find their facilities' positions on the lists from their emission data. Using these lists, we can determine the emission ranking of all facilities by substances. The above OHP uses the example of benzene (not available in this paper). By ranking figures like these, member companies can understand their facilities' positions. We can then evaluate the risks caused by our emissions, the necessity of measures to reduce emissions and the priorities of measures. Moreover, these evaluation results are very effective in persuading top management to invest money in measures for emission reduction plans.

We discuss emission reduction plans for all substances and negotiate each company's emission reduction amount for each substance from the point of view of total emission reduction. Therefore, we can take cost effective emission reduction measures.

OHP-4.2 The use of PRTR data by JCIA

Preparation of emission lists:
- By substances
- By facilities

Use of emission lists:
- Member company ;
  - Emission levels within an industry.
  - Priority of emission reduction measures.
- JCIA:
  - Negotiation among member companies.
  - Accomplish emission reduction in all.

↓

Cost-effective emission reduction measures

The effect of the Keidanren PRTR

Emission reductions should not be requested only from the chemical industry. The Keidanren PRTR is the expansion of the JCIA emission reduction scheme to whole industries, to reduce emissions of whole chemical substances effectively in Japan.

Last years' survey is the first Keidanren PRTR, but the survey had many effects. Unfortunately, because the data collection areas and the validation of emission values aren't sufficient enough, I couldn't show them to you clearly. But from my preliminary study, the emission reduction measures on 12 substances specified by revised APCL are proceeding well in industry as a whole, though the progress is different in individual sectors.(See OHP , but not available in this paper.)

By the next Keidanren PRTR, the total flow of chemical substances in Japan and their emission condition will be clarified. This will help each industrial circle, as well as each compa, to reduce emissions of chemical substances.

OHP-4.3 The effect of the Keidanren PRTR

We can find;
- Total flow of chemical substances.
- Emission condition on each substance.
- Emission amounts by industrial circles.
- Emission reduction efforts by industrial circles.

We will undertake
- Technical co-operation with each other to reduce emissions.
- Cost-effective emission reduction measures.

Summary

The effective use of PRTR as in above three examples, which I explained today, requires voluntary PRTR system by industrial circles. Because the collection of detailed data, including trade secrets, is indispensable for these purposes. And when we decide emission reduction measures from the point of cost-effectiveness, we need to co-operate together in industrial circles.

On the other hand, to consider the reduction of emissions of chemical substances in the world, it is unfair to force only industrial circles to do so. The collection of emission data from non-point sources and the implementation of emission reduction measures for them are the role of government.

Consequently, it is important to make the framework, including the voluntary program by industrial circles, to succeed in emission reductions. And a good relationship and co-operation between government and industrial circles are much expected.

OHP-5 Summary

Data collection and emission reduction measures:
- Point source: voluntary program by industrial circles
- Non-point source: role of government

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Voluntary programme by industrial circles has an important role in PRTR framework.

SESSION VI - IDENTIFYING FUTURE DIRECTIONS AND CHALLENGES

SESSION VI

Identifying Future Directions and Challenges

Working Group I

New and Evolving Uses of PRTR Data

Potential Use of PRTR Data for a GIS-based Simulation/Presentation System on Risk Assessment, Management and Communication

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1. Introduction

A PRTR can provide many different benefits through different way of applications; to set priorities for reducing or eliminating the most potentially damaging pollutant releases; to promote pollution prevention by indicating to reporters the amounts of valuable material resources being released as pollutants and thus simply wasted; to pin-point priority emission sources for the introduction of technologies for cleaner production; to serve as a major driving force for pollution reduction throughout many sectors of the economy; thus to achieve pollution prevention with minimum burden of control regulations; and to assess the status of local environment by using PRTR results as one input for model/simulation system.

Amongst all of these promising applications, this paper is focusing on the use of PRTR data as input for assessing the status of local environment and risks to human health.

2. PRTR pilot survey in Japan

PRTR first pilot survey was conducted in 1997FY in three test regions; Kawasaki city, Shonan-area of Kanagawa prefecture, and Nishi-Mikawa area of Aichi prefecture, under the auspices of the Environment Agency. The pilot survey includes a questionnaire survey for large industrial facilities, which was mainly undertaken by local governments, and estimates for non-point sources including vehicles, households, agriculture, etc., which was mainly undertaken by the Environment Agency. Other efforts for collecting emission and transfer information on a specific industrial sector and/or limited huge point sources throughout Japan have been made by industrial associations on voluntary basis.

Technical working groups have been established in the Environment Agency, to design a framework of the pilot survey, to compile technical guidance to reporters, to design way of communication/dissemination of results, and to review the first results of the survey. There are lot of lessons learned from preparation, implementation and review of the first pilot survey. Most of the time had to be devoted to make it feasible to implement the pilot survey, though more ambitious discussions were also made concerning the use of results, in particular, at the working group on communication. Many people pointed out the importance of additional information to avoid misinterpretation of results from PRTR, in order to distinguish quantities of release/transfer and potential/real risks to human health. This requires information on hazard assessment of chemicals and fate prediction of substances after release to the environment.

3. Needs from risk management in local authorities and from impact assessment studies for LCA

Besides the discussions on PRTR, there emerged needs to develop inventories of chemical releases and integrated model for quantitative risk assessment of environmental chemicals from two contexts.

Firstly, some of local governments started their own programs for risk management of environmental chemicals, because there locate industries involving intensive use of hazardous chemicals and densely inhabited population within their administrative boundaries. In order to improve management of chemicals by industries, the local governments provide them with technical assistance such as information on hazard and in reduction technology on priority chemicals. They encourage industries to report chemical management plan, which may include inventories of procurement, production, use, shipment, and emission of chemicals, as a basis for responsible/better management of chemicals. However, effectiveness of such efforts has not yet been verified by environmental data, e.g. regular monitoring of ambient pollution level. Therefore, next steps of their efforts may include analysis of relationship between geographical distribution of sources and patterns of ambient concentration measured by local environmental monitoring. Since a nation-wide periodic monitoring program of hazardous air pollutants has just launched in FY 1997, it is a good occasion to undertake such ambitious analysis.

Another need derives from impact assessment studies for Life Cycle Assessment (LCA). As known, LCA is a tool to quantify overall environmental impacts of products, technologies, infrastructures, and so on, throughout their life cycle. Although considerable studies have been carried out to compile inventories of life-cycle emissions of Green house gases and conventional pollutants (e.g. NOx, SOx), more comprehensive LCA studies including broader scope of emissions such as carcinogens are much behind. Impact assessment studies of such "new" pollutants are expected to reflect specificity of natural and social geography. In case of existing LCA studies, locality of impacts is not reflected because of difficulties in estimation, but "potential" impacts are estimated. Although this is practical approach, we should also consider the fact that distributions of industries and populations, especially in Japan, are very heterogeneous so that exposure to different pollutants may be largely dependent on such geographical circumstances.

4. Outline of the information system

4.1 Overall structure

In order to respond to requirements stated above, a research project has started in 1996FY to develop an integrated information system for area-based quantitative risk assessment of pollutants, which includes databases and models throughout a causal chain from sources to receptors of environmental risks. The system is designed so as to identify priority substances, their sources and population at high risk, as well as to make an assessment of feedback from policy measures for risk reduction. The inter-disciplinary project team consists of members within the NIES, visiting researchers and contract technicians, whose background include systems analysis, environmental engineering, computational modelling, geographic information system, statistics, epidemiology, experimental risk assessment, analytical chemistry, and so on.

The overall framework of the system is shown in Figure 1. The system consists of many modules, including four stages of data files, three types of sub-models for linking these stages, parameter files for the models, and common basic geographic databases. In addition to sub-models for describing the causal chain from sources to receptors, a feedback loop for estimating effects of policy measure alternatives, which will be taken as reactions to assessment results, is considered.

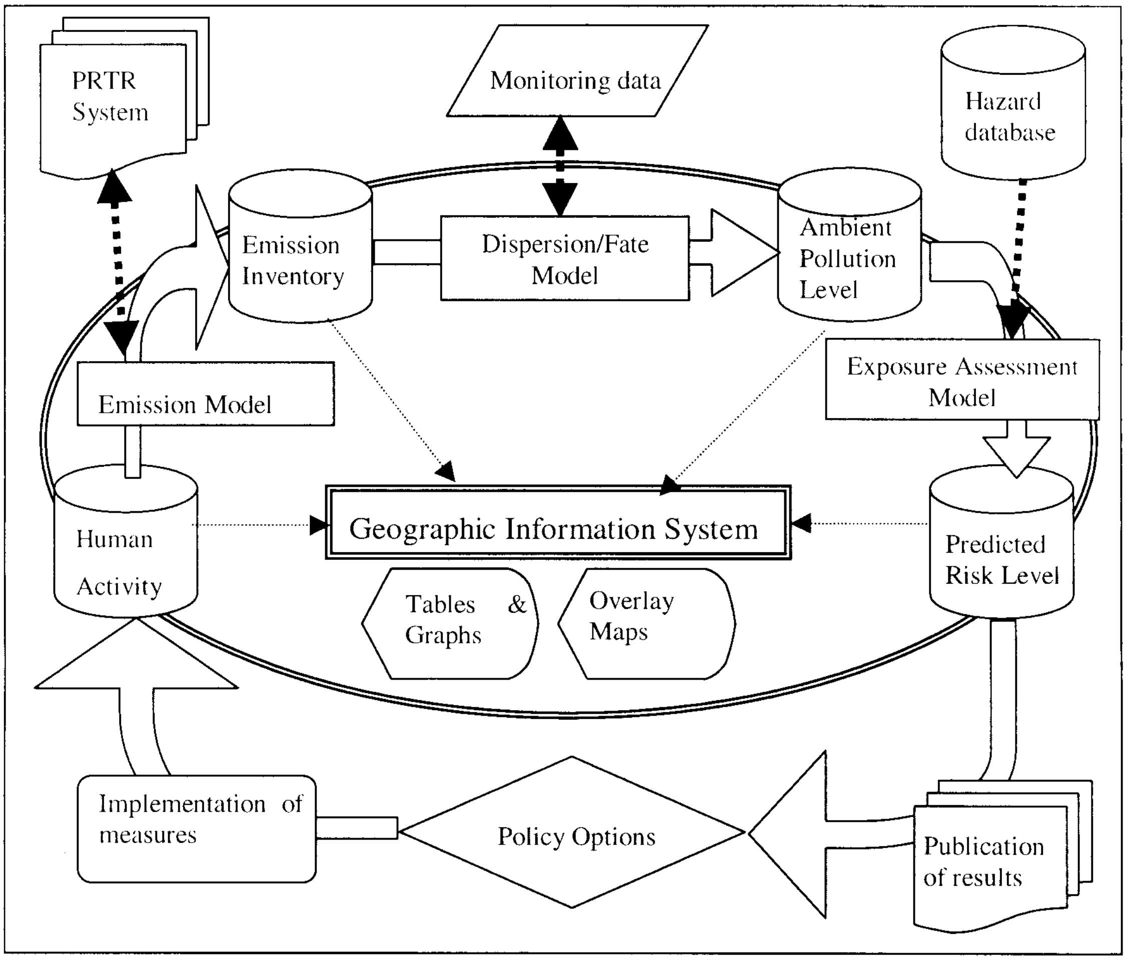

Figure 1 Overall framework of the GIS-based risk assessment system

Major contents of data files and sub-models are listed in Table 1. A cross-media dispersion/fate prediction model is being developed, which solves equilibrium among environmental media and transportation across grids by iterative calculation. An overview of the model is shown in Figure 2.

One of the most important points of the system design is "transparency". The system is designed to present not only final results from the assessment but also assumptions and databases behind the procedures of the assessment. Interactive and visual man-machine interfaces will be helpful in this aspect.

Some modules have been already set up in the system, others are under development or will be in due time. The system is constructed on Windows95 using GIS Software, spreadsheets, and programming language.

Table 1 Major components of data files and sub-models of the information system

Stages	Contents of data files	Sub-models & parameters
Human Activity	Population Industrial production Traffic Volume	Emission factor Area-source model Mobile source model
Emission Inventory	Point Sources Non-point sources - Line sources (e.g. Trunk roads) - Area sources (e.g. Households) Input from PRTR survey	Atmospheric dispersion model - Gaussian plume model - Grid model Cross-media fate model
Ambient Pollution Level	Results from dispersion/fate model Periodic monitoring data	Exposure assessment model Chemical hazard database (e.g. unit risk)
Predicted Risk Level	Results from exposure model - by single substance - total risk by multiple substances	

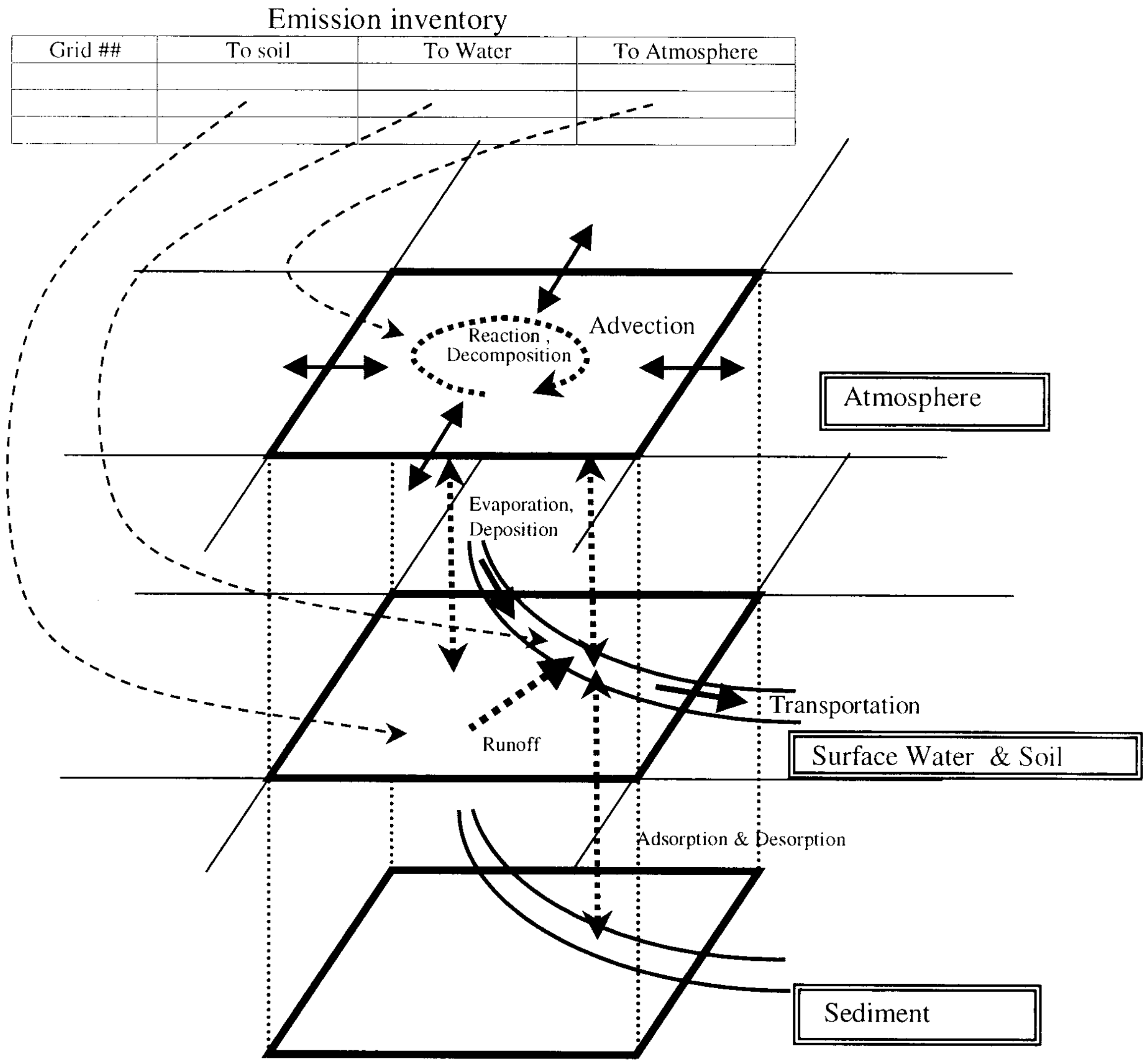

Figure 2 Overview of cross-media grid model

4.2 Geographic data storage and handling

Geographic data handling of the system is mainly based on 1 kilometre's grid scheme, which is most commonly used in Japanese nation-wide GIS. Each grid is given a unique 8-digit code. National Ministries and Agencies have made various thematic digital data files of 1-km grid resolution available. For example, the Census Bureau published demographic census every 5 years, the Geographical Survey Institute published more than 50 items covering topography, land-use, infrastructures, and so on, the Ministry of International Trade and Industry published commercial sales and manufacturing productions. In addition, many other data files, including some of environmental monitoring data and installation registry data, accompany with this grid code set. This enables us to overlay different thematic information onto a single geographic plane of GIS.

These set of digital data files are useful as well for estimating spatial distribution of pollutant release from non-point sources, such as households, agricultural activities, and mobile sources. This technique was actually applied in the Japanese PRTR pilot survey.

4.3 Case study

During past two years, overall framework of the system was designed, and core modules of the system are under programming. In order to examine usefulness of the system, a first case study is on going with collaboration with a local government, independently from the pilot PRTR survey. Though the system is designed ultimately to cover multi-media exposure assessment, the first case study focuses on carcinogen emissions to air and hence exposures from inhalation. Benzene and 1,3-Butadiene are selected as priority substances for the case study, considering that they are thought to be emitted both from point sources and non-point sources, and to have relatively high estimated risks according to the results from ambient monitoring. Chlorinated organic compounds are next candidates of the study, of which periodic monitoring has been also carried out since 1997.

Future directions

At present, the system is under development only for internal use, in order to examine its feasibility, variability and effectiveness within broad scope of risk assessment, management and communication. On the other hand, Japanese PRTR system is only in the very early stage. Therefore it is premature to discuss whether we could link this system with PRTR system. Nevertheless, experiences in the system development may have many implications for future design of PRTR system and effective use of its results.

The Massachusetts Department of Environmental Protection Toxics Use Reduction Program

William T. Panos
Director, Massachusetts Department of Environmental Protection

I. Introduction

Toxics use reduction is a specific form of pollution prevention that focuses on reducing the use of toxic chemicals or the generation of hazardous waste by improving the products and processes of industrial production. Regulated firms may choose to reformulate products, re-design production processes, substitute more benign chemicals for toxic chemicals, upgrade and improve production equipment, streamline operations, upgrade maintenance, or recycle and reuse materials in production processes.

The Massachusetts Toxics Use Reduction Act (TURA) was unanimously passed by the state legislature in 1989. TURA established new responsibilities for industries as well as state agencies. Each year Massachusetts companies that use in excess of 25,000 or 10,000 pounds (depending upon use), of a listed toxic or hazardous chemical, must report their use of chemicals and pay a fee to the Department of Environmental Protection (DEP). The data from these reports is compiled by DEP in an annual report that is then released to the public. Since 1994, companies that reported on the use of these toxic chemicals are required to prepare a Toxics Use Reduction Plan on how they would reduce or eliminate the use of those chemicals in their processes. Companies are not necessarily required to implement all elements of the Plans, but every two years the plans must be reviewed and updated. The Plans and the Plan Updates must be certified by a specially trained and licensed professional called a Toxics Use Reduction Planner. A Plan Summary is submitted to the Department each planning year noting the projections that a firm is planning to achieve in its Plan.

The fees that the DEP collects each year are used to fund four complimentary governmental programs established to implement the requirements of TURA.

- *The Department of Environmental Protection (DEP) administers TUR regulations, reporting, provides multimedia enforcement and compliance services, co-ordinates agency toxics activities with the federal Environmental Protection Agency, manages TURA program data and licenses TUR Planners.*

- *The Administrative Council on Toxics Use Reduction - made up of directors of state agencies, along with the Toxics Use Reduction Advisory Board - made up of representatives of various interest groups - serves as the co-ordinating and policy setting body.*

- *The Office of Technical Assistance provides TUR workshops and forums as well as non-regulatory confidential technical advice to firms seeking to implement toxics use reduction programs,*

- *The Toxics Use Reduction Institute at the University of Massachusetts Lowell provides education and training, research on new materials and processes, a technical library and* *special laboratories for testing surface cleaning technologies.*

According to DEP information, more than 950 Massachusetts firms have participated in the Toxics Use Reduction Program. Some 450 of these firms have dropped out of the program for a variety of reasons, but most often because they reduced or eliminated the use of any listed toxic chemical. By 1997, firms had reported on seven complete years of toxic chemical activity. This information, compiled from the annual reporting, reveals that significant progress has been made in meeting the state's toxic waste (or "by product") reduction goal. For example, the data reveals that over six years firms generated 37 million pounds, or 34% less toxic waste and used 209 million pounds or 24% less toxic chemicals.

In 1994, 580 facilities prepared plans and in 1996, 470 facilities needed to update them. This past year a survey was conducted of the firms to discern the effects of the TURA reporting and planning. The survey results show a broad positive attitude towards the planning requirements and a serious commitment to implementing their plans.

The following are some examples of environmental information that can be extracted from DEP TURA data. Trade secret data or confidential business information is excluded from all data reported here. These examples do not offer analysis or conclusion, but simply provide a snapshot of what is happening in Massachusetts.

The top five toxic chemicals used in Massachusetts and ranked by greatest use are:1)Styrene Monomer; 2) Copper; 3) Sodium Hydroxide; 4) Hydrochloric Acid and 5) Sulphuric Acid. The top five toxic chemicals generated as *by-product* in Massachusetts are: 1) Sodium Hydroxide; 2) Toluene; 3) Sulphuric Acid; 4) Copper and 5) Ethyl Acetate.

In 1996 the Commonwealth of Massachusetts used 1,285,000,000 pounds of toxic chemicals, shipped 551,000,000 pounds of toxic chemicals within products, generated 139,000,000 pounds of toxic waste and released 66,000,000 pounds of toxic emissions to the environment. This information is from both the Massachusetts TURA program and federal Toxic Release Inventory program.

II. Companies and Communities

TURA benefits both companies and communities by reducing toxic chemicals in their environments. In a recent program evaluation, Massachusetts industries credited TURA with helping them increase their manufacturing efficiency and improve their bottom lines. TURA industrial filers documented real economic benefits as a result of their toxic use reduction efforts, benefits that far outweigh the costs associated with the program and its implementation. These results are among the best in the country and our confidence in the integrity and benefit of the information is higher than it has ever been. The following are examples of companies participating in the TURA programs and results they have achieved.

- *As part of its commitment to continuous process improvement, Cranston Print Works of Webster used toxics use reduction (TUR) to reduce environmental impact, improve occupational safety, and reduce operational costs. Implementation of in-process acid recycling, process control charting, and carbon dioxide treatment of wastewater has resulted in a 430,000 pounds/year of reduction of acetic acid and the elimination of 2.66 million pounds/year of sulphuric acid.*

- *According to Jack Bailey, Director of Environment, Health and Safety at Acushnet Rubber Company, implementing toxics use reduction had impacts greatly beyond what he originally* *expected. While others are waiting to see what will happen with ISO 14001 the international environmental standard, Acushnet's efforts to become the first company in Massachusetts to achieve ISO 14001 certification were realised in conjunction with the Toxics Use Reduction program activities.*

Acushnet, which employs 850 people at two locations in New Bedford, designs and manufactures elastometric products and high performance o-ring seals. Acushnet's customers include Ford, Chrysler, General Motors, Lexmark and Xerox. Jack Bailey, who had already worked extensively with the TURA agencies, attended an ISO 14001/TURA workshop organised by the Office of Technical Assistance and requested an intern the Toxics Use Reduction Institute. By using the systems and data points established through TUR planning and reporting, along with the company's ISO 9001/QS-9000 quality management system, Acushnet Rubber Company was well on its way to conforming to the ISO 14001 standard.

- *In late 1994, Kidde Fenwal, a fire suppression equipment manufacturer in Ashland, sought advice from the Massachusetts Office of Technical Assistance. Company engineers were looking for a way to make coating operations more efficient and reduce emissions in the manufacture of automatic fire suppression systems and gas ignition controls. OTA staff suggested that the company investigate replacing its conventional coating operations with a state-of-the-art, computer-controlled coating application system with coating that cured using ultra violet light (UV) technology. The old technology used a solvent based coating that relied on a high volatile organic compound (VOC) content to achieve curing through evaporation of the VOC's into the air. The new technology achieved curing without releasing VOC's into the air.*

This year the Toxics Use Reduction Program has combined the Industry Matching Grants and the Cleaner Technology Demonstration Sites program. The goal of the combined program is to provide companies with the opportunity to test and demonstrate new cleaner technologies as well as showcase their accomplishments.

At Utopia Cleaners in Arlington converted to a wet cleaning process and new used water and detergents to clean clothes instead of perchloroethylene. Last year, Utopia Cleaners opened its doors to others in the industry and community by participating in the DEP Environmental Results Program and the TURA Demonstration Sites program. Utopia has shown others in the dry cleaning industry how to dry clean without creating additional environmental impact and has been a model for information transfer to other Korean American Dry Cleaners and communities throughout Massachusetts.

The Toxics Use Reduction Networking program encourages community involvement in toxics use reduction through a series of grants offered to groups around the state. Grants were awarded to foster TUR and municipal integration, and to foster TUR and community awareness.

One of the most exciting grants for last year went to the Smith Vocational & Agricultural High School in Northampton. Not only will the school develop a curriculum to teach students about toxics use reduction, but they will actually implement toxics use reduction in the school's shops. According to the science teacher administering the program, "Employers are demanding mare sophisticated skills of the school's graduates. This is one more tool we can offer our graduates to help them compete in the job market. "

The Toxics Action Centre a non-profit environmental organisation which provides assistance to *residents concerned with local environmental hazards. The Centre produces "Toxic Profiles" for communities from Department of Environmental Protection information regarding TUPA. The geographic or place-based analysis performed, combines press releases, and interviews from Centre staff and community, representatives, to discuss the use of toxic chemicals in a town or region of Massachusetts.*

III. Program Agencies

The Department of Environmental Protection is charged with ensuring that firms comply with the Toxics Use Reduction Act. During the first several years of the program DEP promulgated the TURA regulations, developed the documents for TURA planning and reporting, created compliance guidance documents, developed the TUR Planner licensing program and created the TUR data management system. In addition to working with the regulated community, the department also works closely with environmental and industry groups, the state legislature, federal environmental agencies and communities seeking to understand and utilise the value of the TURA program.

The DEP monitors corporate compliance with the Toxics Use Reduction Program through submittal or TUR reporting information, multimedia inspections and co-ordination with other state and federal agencies. During the last five Years the department has conducted thousands of multimedia facility inspections within companies that use, manufacture or store toxic substances. One component of multimedia inspections involves reviewing the Toxics Use Reduction Plan, which is kept on site at the facility and is not sent to the DEP.

Inspections and compliance reviews of reporting information have generated over 500 TURA-related enforcement actions and collected over $100,000 in fines. In addition, the DEP has created over 1,000 pages of simple language guidance, forms and instructions that allow the regulated community to understand and comply with TURA. To complement the guidance information, the DEP has conducted over 100 events throughout the state to allow the regulated community access to TUR program regulators and compliance assistance professionals within DEP.

The DEP has also developed and maintains one of the most advanced, state-level data systems for toxic chemical information in the United States. The TURA database contains information from over 150,000 toxic chemical documents and other toxics information from Massachusetts businesses. The information contained in the system is made available to the TURA program agencies, the public, communities and to the federal government through numerous analytical tools and the Internet. The TURA home page at DEP is one of the agency's most visited destinations for individuals and organisations.

The Office of Technical Assistance (OTA) offers direct, hands-on technical assistance to Massachusetts firms trying to implement toxics use reduction at their facilities. The office includes over 20 technical assistance specialists organised into five regional teams in order to serve companies throughout the state. The OTA staff provide free, confidential consultations to firms without the threat of regulatory enforcement. Over the past five years OTA has made more than 1,400 site visits at more than 600 facilities offering thousands of hours of technical assistance. In addition, OTA has sponsored nearly 250 events attracting more than 16,600 participants.

The Toxics Use Reduction Institute is a multi-disciplinary research, training and education centre located at the University of Massachusetts Lowell. The Institute conducts and sponsors a number of research and training activities to promote toxics use reduction. As well as conducting research and training activities in-house, the Institute has developed valuable relationships with industry, academia and community groups to enhance expertise and maximise program impact.

The TURA Program is administered under a special Administrative Council made up of the directors of various state agencies including the Executive Office of Environmental Affairs, the Department of Environmental Protection, The Department of Public Health, the Department of Economic Development and the Department of Labour and Workforce Development. The Administrative Council is advised by a broad-based Advisory Board with representatives appointed from the state Attorney General's office, the Massachusetts Water Resources Authority, local wastewater authorities, both large and small businesses, state-wide environmental organisations, organised labour, health policy organisations, and the general public.

IV. Summary

Since 1990 the Massachusetts Toxics Use Reduction Program has reshaped the relationship between state environmental agencies and the Commonwealth's industries, and promoted new ways to protect the environment and the economy. There has been a sharp decrease in this state's generation of hazardous waste and an impressive decline in the amount of toxic chemicals used in Massachusetts manufacturing. These reductions have occurred without substantial costs to industry, and in many cases firms have realised operational savings. Public environmental and toxic chemical information has improved in Massachusetts since the implementation of toxic use reduction, and TURA is currently being reviewed as a model for the proposed federal expansion of the Toxics Release Inventory program.

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The Use of the ICI Environmental Burden Approach to Prioritise Environmental Improvement Projects

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Introduction

In 1990 ICI set its Group Environmental Objectives including the target of a 50 % reduction in waste concentrating on the most hazardous. This lead to a series of imaginative approaches to reaching this goal but with a recognition that this did look effectively at reduction in environmental impact and in addition did not always give good value for money. It was also apparent that some projects whilst making a significant environmental improvement e.g. by reducing acidic emissions to water, resulted in the production of more inert waste such as gypsum.

At the same time in the UK a new permitting regime called Integrated Pollution Control (IPC) was introduced. This came into effect in April 1991 for all new operations and large combustion plants. It was introduced for existing plants over the following 5 years with the chemical industry being phased in over the period 1993-95. One of the key features of IPC was that the concept of Best Available Techniques Not Entailing Excessive Costs (BATNEEC) would be used to minimise environmental emissions. This was generally not possible for the existing plants within the timescale set for putting the new authorisations in place and hence a feature of the authorisations was that there would be a section requiring 'Improvement Plans' in each authorisation. This also applies to new plants and to authorisations reviewed in the future as BATNEEC is seen to be dynamic. The improvement conditions generally require the operator to carry out a study on a particular topic and issue a report within a set time period on a specific aspect of the plant.

Development of the Environmental Burden Concept

The first chemical plants within ICI that were subject to IPC were in the North East of England at Teesside and were followed a year later by those in the North West of England at Runcorn. At both sites it was necessary to obtain about 15 IPC authorisations and in each case there were 8 - 12 improvement conditions requiring reports to be submitted over a period of up to 18 months. It was clear that after the reports were submitted that Her Majesty's Inspectorate of Pollution, which later became part of the Environment Agency, would be seeking implementation of whatever was described as BATNEEC after discussion. The potential costs of this were high and if tackled on an authorisation by authorisation basis would result in a less than ideal solution for these large manufacturing complexes. It was believed by ICI that this could be understood by, and agreement reached with, the regulators to look at the improvements on a site basis.

There were two key issues at Teesside in terms of environmental improvement (i) a plan to significantly improve the quality of the River Tees and (ii) local concerns over air quality in this highly industrialised area. The River Tees, to which all aqueous emissions were discharged, had been heavily polluted for decades and there were plans to improve it such that it would support migratory fish such as salmon. The key issue was, therefore, increasing the dissolved oxygen content of the water and hence the oxygen demand of aqueous effluent was a key parameter. Air emissions were a local concern and also had high media interest because of an alleged link with asthma in children with the steel and chemical industries being targeted as potential causes. The key question in improving both water and air quality was *"which of the potential improvement plans gave the largest environmental benefit ?"* The answer was relatively simple in terms of oxygen demand as it was known which plants on the Wilton Site generated the highest load and the cost of improvements was known. A scheme involving the construction of a large effluent treatment plant to deal with both domestic and industrial effluents was developed and ICI agreed with both the operator of this plant and the regulator the order in which plants would be connected so that the maximum benefit was obtained with the cost phased over several years. Air emissions were more difficult to deal with because the problem could not be defined by a single parameter e.g. the site emitted materials such as acid gases, VOC's and hazardous materials such as benzene and butadiene. The concept of Environmental Burden developed from this study when it was realised that no sensible method of comparing emissions to air with emissions to water was possible and that also it was not possible to quantitatively compare the different emissions such as acid gases and toxics to air. This was further developed and became the ICI Environmental Burden Concept as described in the booklet.[13] This is also available on the Internet at :

http://www.ici.com

Application of the Environmental Burden Concept in VOC Reduction Plans*:*

At the Runcorn Site of ICI Chemicals & Polymers a number of plants are operated producing chloroalkanes, HFC's and HCFC's. All of these plants are authorised to operate under IPC legislation. A common feature of the Improvement Conditions was a requirement to review methods of reducing volatile organic compound emissions and these had to be submitted for each authorised process. The Site chose to use the Environmental Burden approach for each process and for the Site as a whole and have demonstrated that it is better to treat a limited number of vents on some of the processes rather than achieve a fixed percentage reduction on all vents. This achieves significant environmental improvement in a phased way at a lower cost.

ICI had been collecting emission data for all its plants from 1992 in anticipation of a PRTR being a requirement of the IPC legislation. A further assessment was made of all 95 vent streams was carried out to better quantify emissions and a consolidated list of these was produced showing the annual mass emissions. The Environmental Burden of these emissions was also listed against the appropriate categories.

[13] Environmental Burden: The ICI Approach

An extract from the table is shown below :

Vent	**VOC's**	**Global Warming**	**Carcinogens**	**Ozone Depletors**	**POCP**
	tes	tes CO_2	tes C_6H_6	Tes CFC 11	tes C_2H_4
1.00	2870.00	31570.00	573.00	0.00	473.00
2.00	101.00	18305.00	0.00	14.00	9.00
3.00	1020.00	11105.00	0.00	0.00	40.00
4.00	2700.00	16590000.00	0.00	90.00	0.00
5.00	9.00	99.00	0.00	0.00	1.00
6.00	15.00	1667.00	0.00	2.00	0.00
7.00	920.00	10120.00	0.00	0.00	211.00
8.00	1708.00	18788.00	1040.00	0.00	460.00

A range of options for emission reduction were considered including :

minimisation at source
solvent absorption
incineration
refrigeration

and were costed.

At the time of this study an incinerator was being commissioned on site to deal with a number of vents and a second was being planned (primarily to deal with the very large global warming issue of vent 4 above). The options selected for further study included additional connections to the incinerators in a phased manner. Graphs were used to demonstrate which vents would be treated by the existing and planned incinerators and indicate those selected for further study. Charts were also produced showing the percentage reduction in emissions against cumulative cost. Examples of these are appended. Eventually a scheme was developed that will reduce emissions, in the key environmental burden categories by 90 % with the major gains being achieved early. This was much more effective in terms of environmental improvement and expenditure than dealing with each plant individually.

SESSION VI

Identifying Future Directions and Challenges

Working Group J

Estimation Techniques for Small Point and Diffuse Sources

Estimation of Release and Transfers from Non-Point Sources in the PRTR Pilot Project in Japan

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Introduction

Chemicals are being released to the environment not only from so-called "point sources" like factories and establishments, but also from other diffuse sources (so-called "non-point sources"). The latter include pesticide spraying, mobile sources like automobiles, use of paint and detergents at home, etc.

It is important to know the total releases including those from non-point sources when we conduct environmental exposure assessment and consider risk management. Therefore, the Environment Agency tried to estimate the release and transfer from non-point sources by using available statistical data in the PRTR Pilot Project in Japan in 1997-1998. (See details of the pilot project in another paper.)

Framework

Classification of non-point sources

Important non-point sources are as follows.

1. Pesticides spraying: farmland, gardening, forest, golf courses and public gardens;
2. Mobile sources: automobiles, motorcycles, ships, railway cars, etc.;
3. Households: emissions to atmosphere of paint solvent, etc., sewage from households, solid waste such as batteries;
4. Small and medium-sized establishments: establishments of industries not designated as point sources, and those which belong to designated industries as point sources but are smaller than designated scales.

These non-point sources were classified into further detailed categories following discussions by the "Working Group for PRTR Data Arrangement and Estimation of Release from Non-point Sources". The result is shown in Table 1.

Other non-point sources not included in Table 1 may exist, but we do not go into further detail here. Further classification will be discussed in the future, taking into account opinions from every direction.

Table 1: Classification of Non-point Sources

Categories	Sub-Categories		Remarks	
Pesticide Spraying	Farmland		Paddy Fields, Truck Farm, Orchards, etc.	*
	Gardening			*
	Forest		Aerial Spraying on Forest	*
	Golf Courses			*
	Public Gardens			*
Mobile Sources	Automobiles		Passenger Cars, Trucks, Buses	*
	Motorcycles			*
	Ships		including Fishing Boat, excluding Ocean-going	*
	Aircraft			
	Railway Cars			*
	Other		Construction Machinery (Bulldozers etc.)	
			Agricultural Machinery (Tractors etc.)	
			Industrial Machinery(Forklifts)	
Households	Emission to Air	Paint	Solvent, Raw Materials, etc.	*
		Insecticides	for Domestic and Gardening Use	
		Moth Repellent		*
		Solvent for Aerosol Products		*
		Adhesives	for Plywood etc.	*
		Tap water	Trihalomethane	*
		Other		
	Sewage from Houses	Tap water	Trihalomethane	*
		Detergent	Synthetic Detergent etc.	*
		Other		
	Solid Waste	Batteries	Electrodes and Electrolyte	*
		Lighting Appliances	Fluorescent Lamps	
		Other		

Table 1: Classification of Non-point Sources (continued)

Categories	Sub-Categories		Remarks	
Small and Medium-Sized Establishments	Small and Medium-sized Industries (Other than Designated Industries)	Fisheries and Culture	Soil-Resistant Agent for Fishing Net etc.	
		Special Trade Construction	Painting Construction	*
		Fuel Retail Trade	Service Stations	*
		Dyeing Service	Dyestuffs	
		Photo Studios	Photo Development	*
		Funeral Service	Crematories	
		Car Repairing	Painting	*
		Veterinary Hospitals		
		Medical Service	Excluding Dental Technician Office etc.	*
	Less than Designated Scales	Each Designated Industry		
Other			Combustion of Biomass, etc.	

Note: Categories with symbols №*” are those in which releases and transfers were tried to be estimated in the Pilot Project.

Range of estimation in the Pilot Project

In this Pilot Project, we tried to estimate release and transfer from as many categories as possible, but the categories which were finally estimated are restricted to those which have "*" in the last columns in Table 1. When designated regions proved to have no sources related to the categories in question, or we could not get sufficient information necessary to the estimation, the estimation were not conducted. Accordingly, it should be noted that the results shown here are not estimations of all release and transfer from non-point sources, and that some estimation may not have high accuracy.

Results

Pesticide spraying

(a) Objects of estimation and summary of estimation method

Pesticides are used not only in farmland but also in other various places like golf courses, forest, public gardens, etc. Furthermore, the types of pesticides used depend on their purposes. Accordingly, pesticides for estimation were chosen in following manners and quantities of release were estimated category by category.

- i) By summing up ingredients of all registered pesticides, shipped quantity of each designated chemical in each prefecture was calculated. All of the above quantity was assumed to be released to the environment.
- ii) Types of pesticides used were chosen for each purpose.
- iii) After choosing pesticides which are used in gardening, forest, golf courses and public gardens, their used quantities for purposes in question were estimated by the use of the Input-Output Tables etc., and finally, their used quantities in farmland were estimated by subtracting the above quantities from the total shipped quantities.
- iv) Used quantities in the designated regions were estimated by using corresponding area for farmland, forest, golf courses and public gardens of each city, or by using number of workers of each city for gardening. As for farmland, areas of paddy fields, truck farm, orchards, etc. were used dependently on purposes of pesticides. Quantity of release to each environment medium (air, water, soil) was not identified.

The flowchart is shown in Figure 1. This time, we assume that quantities of sold pesticides, used pesticides and released pesticides to the environment are all equal. In other words, no consideration was given to the real behaviour of pesticides in the environment. For example, pesticides sprayed to paddy field may be decomposed so that the quantities released to pubic water may be reduced, and pesticides sprayed to soil may be decomposed and absorbed. This is equal to the case in which no consideration is given even if chemical substances released from chimneys are decomposed soon after. Accordingly, the quantities of chemical substances to which man and wildlife are really exposed are thought to be smaller than estimated here. It should be noted that only released quantities to the environment are to be reported and estimated in PRTR, so that it does not show their subsequent fate in the environment.

(b) The numbers of chemicals whose releases were estimated (Table 2)

Sub-Categories	Farmland	Gardening	Forest	Golf Courses	Public Gardens
Chemicals	42	5	2	18	6

Uses of pesticides were identified by "Pesticide Guidebook" etc. Based on the result, types of pesticides used in each category were judged and their quantities of release were estimated.

(c) Estimated release of principal pesticides (Table 3)

Chemicals	Releases (ton/year)	Rates(%)				
		Farmland	Gardening	Forest	Golf Courses	Public Gardens
Bromomethane	201	100	0	0	0	0
1,3-Dichloropropene	157	100	0	0	0	0
Chloropicrin	41	100	0	0	0	0
Iprobenfos	17	100	0	0	0	0
Mancozeb	16	99	0	0	1	0

Pesticides used in farmland are further classified into types for rice, , for vegetables, for fruit trees, etc., and each of them includes various functions like herbicides, insecticides, fungicides, fumigants, etc. All of these types were summed up and total release was estimated for each category. The quantities shown in Table 3 are not the sum of used formulations but are the sum of designated chemicals included in the formulations. As mentioned earlier, estimations were made on the assumption that quantities of sold pesticides, used pesticides and released pesticides to the environment are the same.

Table 3 shows that most of the pesticides with large quantities are used in farmland. As for bromomethane, about 20 tons of release was reported from point sources in addition to the figure in Table 3. (Please note that the release estimation in the pilot project is limited to three local areas, i.e. nation-wide figures are not shown.)

Mobile sources

(a) Objects of estimation and summary of estimation method

Estimation of release from mobile sources was made concerning automobiles, motorcycles, ships and railway cars. The chemicals estimated were very limited, e.g. hydrocarbons and aldehydes in emission gas released by the combustion of fuel like gasoline.

Estimation method in case of automobiles is outlined below.

i) Emission factors of designated chemicals for each vehicle type were calculated based on measured data for domestic vehicles. If no data were available in Japan, other data like those in Europe were substituted.
ii) National fuel consumption by each vehicle type for each emission factor category was calculated by using national fuel consumption by each vehicle type classified by the Statistics on Transport, number of vehicles owned and mean running distance of each vehicle type.
iii) Based on the national fuel consumption by each vehicle type shown above at ii), fuel consumption by each vehicle type in each region was estimated by using total running distance of each vehicle type in each region.
iv) Quantities of release of each designated chemical in each region was estimated by using emission factors of designated chemicals for each vehicle type and fuel consumption by each vehicle type in each region.

The flowchart is shown in Figure 2. A different method was used for motorcycles. As for ships, release in each region was estimated by estimating fuel consumption in each harbour zone.

In the method shown above, the most important are the emission factors of designated chemicals for each vehicle type. Although there are very few available data measured in Japan, it may cause big errors to adopt measured data in Europe and the United States. This time, emission factors were estimated based on few available data in Japan, and European data were used only when no data were obtained. In any case, available emission factors cover neither all vehicle types nor all running modes, therefore the results may include some errors. It will be necessary to accumulate more measured data in Japan and to improve accuracy of emission factors in the future.

On the above conditions, construction machinery, agricultural machinery and industrial machinery were excluded from the present estimation due to their difficulties.

(b) Estimated release of principal chemicals and their comparison with point sources (Table 4)

Chemicals	Releases From Mobile Sources (ton/year)	Rates(%)			Releases from Point Sources (ton/year)
		Automobiles Motorcycles	Ships	Railway Cars	
Xylene (mixed isomers)	246	99	1	0	6,250
Toluene	241	99	1	0	5,400
Formaldehyde	195	97	3	0	44
Benzene	148	99	1	0	80
Acetaldehyde	82	97	3	0	4

Table 4 shows releases of principal chemicals from mobile sources and their comparison with point sources. Releases from automobiles and motorcycles are much bigger than those from ships. It should be noted that estimation methods are different from category to category, that some categories were not estimated this time, and that releases from point sources may be smaller than real values because there are some unreported data.

Release from households

(a) Objects of estimation and summary of estimation methods

Chemicals released from households include those used as products at home and released during or after the use, and those included in building materials etc. and re-leased little by little.

Estimation of releases of chemicals from households is more difficult than others, because various chemicals enter and exist in houses so that the selection of chemicals is not so easy. Chemicals whose releases were estimated had been selected by members of the Working Group. Various methods for estimation were tried for each source and for each chemical. Typical examples of such estimation are those of adhesives used for plywood and those of paints. Their estimation methods can be outlined as follows:

i) Total national shipped amount of designated chemicals etc. were calculated by using available statistical data or by hearing manufacturers associations. Then, ratios of demands of chemical used were investigated by using other statistical data.

ii) Total national consumption of each designated chemical was calculated for each use, and then total national release for each use in each demand sector was estimated by using the Input-Output Tables etc. (Adequate emission factors were also used if necessary).

iii) Release in each area was estimated by using indexes related to each use (population, total floor area of new dwelling unit, etc. of each city).

The estimation methods described above have some unfounded assumptions at some steps. Therefore, the results of estimation of releases may have some errors. Even the selection of chemicals for estimation should be reviewed later.

(b) The number of chemicals whose release or transfer were estimated (Table 5)

Sub-Categories	Emission to Air	Discharge to Water	Transfer of Solid Waste
Chemicals	17	3	2

The number of chemicals estimated to be released to air was biggest, and the others were relatively small. Transfer of solid waste from plasticisers included in plastics, etc. was not estimated, but only a few chemicals such as metals in batteries were selected.

(c) Estimated release of principal chemicals from houses and comparison with other sources (Table 6)

Chemicals	Principal Use or Sources	× Releases (ton/year)		
		House-holds	Rest of Non-Point	Point Sources
Toluene	Paints (solvent)	837	704	5,400
Xylene (mixed isomers)	Paints (solvent)	792	650	6,250
p-Dichlorobenzene	Moth repellents	661	0	0
Formaldehyde	Adhesives (for plywood Etc.)	78	201	44
Ethanol amine	Synthetic detergents	22	0	50

Releases from paints and moth repellents seemed to be major ones from houses. Some releases and transfers (e.g. those of insecticides for houses, mercury in waste fluorescent lamps, etc.) were tried to be estimated unsuccessfully due to lack of data. Further accumulation of data will be needed. It should be noted that all releases from paints, adhesives, moth repellents, etc. including their indoor releases were regarded as “emission to air”, so that releases to the ambient air may be smaller.

Release from small and medium-sized establishments

(a) Objects of estimation and summary of estimation method

The small and medium-sized establishments consists of the following two groups.

i) establishments belonging to those industry categories mainly comprising smaller-sized establishments where chemicals are normally used
ii) establishments belonging to designated industry categories but smaller than designated scales

In the pilot project, estimation was made only for i) shown above. The reason why ii) shown above was excluded was that appropriate indexes were not found for estimation of release from small and medium-sized establishments. To conduct such estimation more accurately, data of production or consumption of chemicals may be needed. The methodologies and parameters should be identified in the future.

Almost equally to the methods of estimation for "households", releases in each area were estimated based on total national releases for a certain use in a certain demand sector by using adequate indexes.

(b) Number of chemicals whose release or transfer were estimated (Table 7)

Industries	Special trade Construction	Fuel retail Trade	Photographic Studios	Automobile Repair services	Medical Services
Chemicals	12	3	2	13	1

As for special trade construction and automobile repair services, releases of various chemicals like solvents and materials included in paints were estimated. In addition, volatile ingredients in gasoline for fuel retail trade, photographic sensitive materials and photo-developing chemicals for photographic studios, and disinfectants for medical services were also estimated.

(c) Estimated release of principal chemicals from small and medium-sized industries and comparison with other sources (Table 8)

Chemicals	Principal Use or Sources	Releases (ton/year)		
		Small and Medium-Sized Industries	Rest of Non-Point	Point Sources
Toluene	Paints (solvent)	463	1,080	5,400
Xylene (mixed isomers)	Paints (solvent)	404	1,040	6,250
Benzene	Gasoline	34	148	80
2-Ethoxyethyl acetate	Paints (solvent)	7	14	135
Formaldehyde	Disinfectants	6	273	44

The estimated chemicals were restricted to those related to paints, ingredients included in gasoline, etc. The release of formaldehyde was estimated on the assumption that it was used as disinfectant in hospitals. It must be examined weather or not establishments in these industry categories should be requested to report as point sources.

Conclusions

Releases and transfers of chemicals by pesticide spraying, and those from mobile sources, houses and small and medium-sized establishments were estimated by the Environment Agency of Japan. It is important to estimate these releases and transfers but the methodologies and parameters used should be examined and the accuracy should be improved.

Estimating Environmental Releases from Diffuse Sources: A Guide to Methods

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1. Introduction

General remarks

The ultimate goal of any environmental policy is improvement of the quality of the environment. The effectiveness of an environmental policy is greatly improved if it is based on well established databases containing information about the emissions from all relevant sources to all compartments. In many countries such Pollutant Release and Transfer Registers (PRTRs) are present, or in the process of being developed.

Establishing an environmental policy usually starts with the treatment of the contribution of main industrial point sources. For these sources measurements are often present, and measuring or calculating the emissions is relatively easy. Besides, the responsible companies can be addressed and a system of permits aiming at reducing the emissions can be established. The emissions usually are established from information about the situation in the individual plant.

For estimating the emissions from other sources a different approach is needed. Sources of information are in general statistical information about activities, tools from geographical information systems and well defined emission factors. As the information available may differ greatly for different regions, the first step should be an evaluation of the available information. The approach taken and the accuracy to be achieved are determined by the level of available information.

Definition of diffuse sources

The definition of diffuse sources is dependant on the purpose of the emission inventory. A local inventory can often afford to calculate or even measure emissions from every small plant present, using statistical emission factors if necessary. On a regional or national level these sources can for practical reasons only be treated as diffuse sources. For road traffic, measurements for every individual car are not feasible on any level but a calculation for an individual road using traffic intensity and statistical emission factors is possible on all levels. On the other hand the statistical approach is also used for calculation of, for instance, the fugitive emission from sources such as leaking of pumps and flanges. Real diffuse sources are for instance the contributions from deposition or leaching from soil, but these sources can only be calculated from models where the primary emissions provide the input. The methods described in this chapter aim at a national or regional inventory. The emission factors information referred to in the references makes an inventory on a more local level possible.

2. Estimating Emissions from Diffuse Sources

2.1 Small and medium-sized enterprises

Sources of emissions

Small and medium-sized enterprises can be divided into two categories:

- enterprises in categories where the bigger plants are treated as point sources; In this category two situations can be distinguished. In some branches the emissions from smaller enterprises can be extrapolated from the bigger ones. In other branches the technology and/or the abatement methods are very different for the smaller companies.
- categories like chemical cleaners, bakeries or service stations whose activities are directly related to the population density.

Data needed for calculation

Emission factors reported in literature usually give the emissions from a given process related to production. As production information usually is not available at plant level for small and medium-sized companies, a top-down approach is generally used. Nation-wide production statistics can be used for a first approach calculation. In many cases, however, the relation between total production and the processes used has to be provided by expert judgement. Localisation of industrial activities is sometimes available from other statistics. If the number of employees per activity is known, a localisation of the emissions may be possible by defining "emission factors" per employee. If an acceptable number of large plants have been incorporated in the system a down scaling approach can be used. It should be borne in mind, however, that the smaller companies may use fewer abatement techniques and simpler technology than the larger plants. For service branches like bakeries, a top-down approach should be used, using nation-wide calculations about consumption.

Estimation methods

The estimation methods are closely related to the information available and are described above.

Discussion and analysis

The contribution of emissions from small and medium-sized enterprises to total emissions is dependant on the activity described. For branches like refineries or chemical industry, where the main activities take place in big plants, the contribution to the total emissions of the branch may be minor. For branches like, for instance, the metal products industry, the number of small plants greatly exceeds the number of big plants. The emissions of the service industry are generally minor. There are, however, exceptions like dry cleaning, where the emissions of halogenated hydrocarbons give a relevant contribution to the national emissions.

2.2 Transport and Traffic

Sources of emissions

The following categories of emissions should be distinguished:

- road traffic (exhaust emissions, defrosting roads, solid waste);
- shipping (exhaust emissions, water pollution);
- railroads (fuel combustion, corrosion of electrical wires);
- air transport (emissions to air, noise).

Data needed for calculation

Road traffic

For the calculation of emissions to air, information about the traffic production should be available. As one of the factors determining the emissions is the travel mode this information should be at least available for the mode categories highways, town traffic, and traffic on other roads, for passenger cars, vans, and motorcycles. Traffic production for individual roads can be determined by counting the number of cars passing. Nation-wide, traffic production estimations can be based on information about fuel consumption.

Emission factors for a mean car travelling in one of these modes should be calculated. Data needed for this calculation are:

- the distribution of the fuel use over the different car types (petrol, diesel, LPG);
- the age and size of the cars;
- the penetration of catalyst use.

As these factors are continuously developing, the emission factors for a mean car should be continuously actualised, in most cases at least yearly. Emissions to water and soil from defrosting are derived from the amount of salt used in a given season. The solid waste production can be calculated from information about scrapping or recycling methods.

Shipping

Air emissions from inland shipping can be calculated from estimations of the amount of fuel used related to the traffic production on certain shipping routes. Emission factors per fuel unit can be derived from the information about road traffic engines. Water pollution by oil losses can be estimated in relation to the information about the number and the category on a shipping route.

Emissions from seagoing shipping are calculated in about the same way. Emission factors per unit of fuel under circumstances met in practice are determined by Lloyds. Lloyds Register is also an excellent source of information traffic intensities and their locations, for inland routes of seagoing ships combined with local information from harbour authorities.

Emissions from recreational shipping can be calculated from estimations of fuel use. As the traffic intensity is very much determined by seasonal variations, these estimations require a lot of expert judgement. Generalised emission factors are available from literature.

Railroads

Emissions to air from railroad traction using fossil fuels can be calculated from intensities and emission factors from literature. Emissions from electrified railroads are limited to copper emissions from wear of overhead wires. The railroad companies usually can derive this information from the wear losses in their replacement programme. Brakes may produce a certain amount of fine dust, depending on the technology used.

Air transport

Calculation of emissions at airports are based on the number of landing/take-off (LTO) cycles per aircraft type. Emission factors for these calculations are available from literature. It should be borne in mind that the taxi/idle phase is in general the most polluting stage. The "time in mode" for this stage may be different for different airports. Emissions during flight can be calculated from the fuel consumption and emission factors from literature.

Estimation methods

The emissions from road traffic can be calculated from the traffic production per driving mode and emission factors for the mean car. In many cases the main highways where individual traffic intensities are measured are treated as line sources, whereas the remaining traffic is related to the population density.

The calculation of the emissions from other traffic sources is already described above.

Discussion and analysis

Emissions to air from road traffic given an important contribution to air pollution. This especially applies to nitrogen oxide and hydrocarbons. If the penetration of modern catalysts is low also emissions of lead may contribute to water and soil pollution. Application of catalysts also results in some emissions of dinitrigenoxide. The solid waste produced by cars is a problem that has not been adequately solved in many countries.

2.3 Agriculture

Sources of emissions

The following emission sources should be distinguished:

- use of pesticides, herbicides, and fungicides;
- excess manure production;
- combustion emissions from heating of greenhouses;
- use of tractors and harvesters;
- burning of waste.

Data needed for calculation

Pesticide use

For the estimation of emissions from pesticide use a top-down as well as a bottom-up approach can be used. Both approaches have their limitations and a good fit between the results is not easy to achieve. In the topdown approach statistical information about production, sales and the import/export situation is gathered. This approach usually does not give much details about the relevant individual substances. Having sold a given amount does not mean that it has been used in a given year.

The bottom-up approach is based on an inventory of the different cultures for which pesticides are used. Estimations based on expert judgement are made of the amount of a given substance used in a given period. As the different cultures often can be localised from sources like remote sensing the geographical aspects can be treated much better. However this approach is entirely dependant on local expert judgement.

Another problem is that both methods only give the amounts used, not the distribution over the environmental compartments. Model calculations based on the application methods and the chemical properties of the substance can give an answer. The well-known Mackay model which incorporates only chemical and physical properties of the substance is sometimes used for a default approach.

Excess manure production

Manure production by cattle raising is in principle a component of an equilibrium management system. If however cattle raising is present on an industrial scale like it is in The Netherlands, ammonia emissions and emissions of nitrogen and phosphorus to water and soil cause environmental problems. Data needed for emission calculations are the number and type of animals, and the applied stable and manure treatment methods.

Combustion emissions from greenhouse cultures

The amounts of fuel used for the heating of greenhouses are usually available from energy statistics. Emission factors for the installations used are available from literature.

The amounts of fuel used are also related to the nature of the cultures for which they are used. Details about these cultures can in many cases be derived from national statistics.

Use of tractors and harvesters

Statistics about the fuel used for tractors and harvesters are rarely available. If no statistical material can be found expert judgement is needed. If the amount of fuel is available calculations can be made using emission factors derived from the factors for road traffic.

Burning of waste

Burning of waste is related to certain cultures as potato raising or orchards. Statistic information is seldom available. Expert judgement, also looking at experiences from other countries should be used.

Estimation methods

The emission should be estimated using the tools described above. The main problems in calculation of the emissions from agriculture are the definitions and the availability of basic material. Even the localisation of the emissions is with the tools of modern geographical information systems not much of a problem.

Discussion and analysis

In most countries the contribution of agriculture to national pollution is only caused by pesticide use. The contribution of excess manure only gives problems in countries like The Netherlands where the natural equilibrium is disrupted. If a rather clean fuel as natural gas is used for greenhouse heating the contribution is of secondary importance. The other sources mentioned are only of local importance.

2.4 Consumers and product use

Sources of emissions

The following emission sources can be distinguished:

- combustion emissions from space heating and cooking;
- emissions of volatile organic compounds from solvents and other products;
- emissions to water from cleaning and sanitary processes;
- miscellaneous emissions that can be related to the population density. This are for instance emissions from corrosion processes, domestic animals, etc.;
- emissions of solid waste.

These intensity of the emissions is directly related to the population density. Commercial activities, local traffic and some categories of small enterprises can be in many cases related to the population density.

Data needed for calculation

Information on the number of inhabitants with the desired geographical distribution should be available. Most emission factors can be calculated from nation-wide statistical information. Combustion emissions can be calculated from energy statistics and fuel related emission factors from literature. Emissions from solvent containing products are determined by the composition of the products. In some countries regulations obliging manufacturers or importers to provide this information are available. Otherwise default estimations based on expert judgement should be made. Statistics about solid waste production and estimations about the composition should be made.

Estimation methods

The emissions can be calculated by defining emission factors per inhabitant from the information mentioned above. For emissions to air a localisation of the number of inhabitants is sufficient for further evaluation or for instance transport modelling. For emissions to water an insight in the transport and treatment activities is necessary for complete evaluations. In the Emission Inventory in The Netherlands these aspects are treated in separate modules of the PRTR system. If a structure for transport and treatment of solid waste is present this should also be incorporated as a separate module.

Discussion and analysis

Emissions from consumers and product use can be important diffuse sources of pollution, especially on a local level. For nation-wide calculations relevant contributions are given to air emissions of volatile organic substances, emissions to water of phosphates and organics, and solid waste. Indoor air quality is mainly determined by emissions from heating and solvent use.

2.5 Natural Sources

Sources of emissions

An important source of pollutants, even on a world scale are the vulcanoes.
Contributions from this source can be an important source of certain substances, even on a world scale. Soil processes, especially in anaerobic situations can contribute to emissions of hydrogen sulfide or nitrogen compounds. Hydrocarbons are emitted from the leafs and needles of trees.

Data needed for calculation

The emissions from natural sources can only be calculated from local situations using the approach described in literature. Especially the emissions from soil and vegetation are determined by properties of soil types, mean temperatures and other variables.

Estimation methods

Localisation of relevant sources like vulcanoes or swamps can be done from available geographic information. Emission factors are available from literature. Estimation of emissions from vegetation or soils can be based on the scarce available literature translated to regional meteorological conditions and soil types.

Discussion and analysis.

The contribution of emissions from vulcanoes often is relevant even on a world scale. The same applies probably for the emissions from oceans. Emissions from vegetation or soil in general only contribute to the background concentrations. Exceptions may be certain densely wooded areas where "blue haze " may be present.

2.6 Other sources of pollution

General remarks

In the preceding chapters the main primary sources of pollution have been treated. However when the results from a Pollutant Release and Transfer system are compared with measurements in the environment the contributions of secondary sources should be taken into account in the important validation process.

Sources of pollution

Examples of secondary sources of pollution are:

- deposition of air pollutants to water and soil;
- leaching of soil contaminants to groundwater and surface water;
- air emissions of particles, deposited at a short distance;
- emissions from storm sewers and rainwater sewage systems;
- emissions to soil from landfills.

Estimation methods

Estimation of emissions from secondary sources generally is done by developing some sort of modelling directed at the relevant situation. Calculation of deposition and leaching are often incorporated into air and soil transport models. Discussions about the contribution of emissions of particles like lead from motorcars or copper from railways wires result in some expert judgements. Emissions from sewage collection and treatment systems are dependant on the quality of the provisions and should be estimated for the local situation. For emissions from landfills some modelling can at least provide default values.

3. INCORPORATING DIFFUSE SOURCES INTO THE NATIONAL DATABASE

General remarks

The first step in establishing a PRTR should be making an overview of the environmental problems, the activities that would probably give the biggest contribution to them, and the substances involved in these problems. Such inventories have been made for many countries as well as on the international level. However the priority of the environmental problems and the activities contributing to them may be very different in different countries. The approach has already been described in the Guidance document "Implementing a National PRTR Design Project".

The next step should be an inventory of the information available about the most relevant activities. How many of them can be regarded as point sources and is the amount and the quality of the information available sufficient for a first estimation of total emissions. For point sources where insufficient information is available or diffuse sources in general an inventory of statistical or marketing information available should be made. Emission factors suitable for calculating emissions should be derived either from literature or from comparisons with situations elsewhere.

For efficiency reasons this inventory should be made in three steps. This avoids spending a lot of effort in calculations for sources that may be irrelevant at a later stage. These steps are:

- A quick gathering of available information without trying to achieve optimal accuracy. This material should be evaluated, leading to conclusions about priorities and activities that should be looked after in more detail. Also white spots should be identified.
- An improvement of the system directed at the priorities identified in the first step.
- A verification program in combination with modelling and measurements of environmental quality. If an acceptable fit of data and measurements can be achieved the ultimate goal of an environmental management system can be realised.

Useful tools

- **Geographical information systems**

The activities should be located within governmental as well as technical boundaries. The governmental boundaries have to do with provinces, towns, water boards and other responsible authorities. The technical boundaries have to do with applications for instance for modelling or spatial planning. For air pollution modelling a grid cell system is needed, for water pollution modelling relevant catchment areas have to be defined. The developments in GIS tools have solved the problems of different location identifications. There are several software packages available where information layers can be combined and subdivisions can be made. Digitalisation of line and area elements has of course to be done. In practice the grid co-ordinates are the starting point. Sometimes there are tools available linking addresses with grid co-ordinates or grid cells. If this is not the case the activities have to be located on maps and the co-ordinates of the activity introduced into the system. The GIS tools can add the labelling for the other digitalised governmental or technical boundaries. ¨

- **Emissions at the source vs. emissions into the environment**

For emissions into air the source is usually also the place where the emission enters the environment. For emissions into water and to a lesser extent also for solid waste emissions this is often not the case. As the PRTR needs the emissions at the source for target group monitoring and the emissions into the environment for transport modelling and environmental quality monitoring the development of a module describing the transport and treatment for wastewater and solid waste might be considered. Besides the transport of wastewater may also provide some diffuse contribution by emissions from storm sewers, emergency outlets or low quality sewer systems. In reporting emissions however care should be taken that the same emissions are not reported twice.
A related problem is the contribution to environmental quality from deposition of air pollutants or leaching of polluted soil. The figures considered usually are produced by models. Again in the presentation care should be taken for the difference between these secondary pollutants and the primary pollutants.

- **Models for calculating the distribution of emissions over the different compartments**

For several activities the environmental compartment to which the emissions should be attributed is not very clear. This is for instance the case with several pesticide applications but also for instance for lead from exhaust gases from motorcars. There are several models available for making these calculations. However these models usually use assumptions about particle size or application techniques that may be rather difficult to establish for a given situation. A very simple model using only the properties of the substance is the Mackay model. This is however only suitable as a default method.

- **Using composition profiles for standard mixtures**

Some of the emissions produced by an activity are in fact mixtures of individual chemical compounds. Some of these compounds may be individually relevant for policy makers. This is the case for instance for hydrocarbons from motorcars or PAH's from several processes. Incorporating the whole list of possibly interesting substances in the database is not very efficient. Therefore a separate module containing process related profiles of the mixtures can be developed and used whenever individual substances have to be reported.

- Estimation of the accuracy of emission factors and emissions

For comparisons of the quality of the different data it is important that the quality criteria used are defined. A simple classification that works in practice originated from American EPA and is now applied in the EMEP/UNECE Atmospheric Emission Inventory Guidebook. This classification uses the following definitions:

A. An estimate based on a large number of measurements made at a large number of facilities that fully represent the sector.

B. An estimate based on a large number of measurements made at a large number of facilities that represent part of the sector.

C. An estimate based on a number of measurements made at a small number of representative factories, or an engineering judgement based on a number of relevant facts.

D. An estimate based on a single measurement or an engineering calculation derived from a number of relevant facts and some assumptions

E. An estimate based on an engineering calculation derived from assumptions only.

4. APPLICATIONS IN THE NETHERLANDS

Development over the years

In the Netherlands the first steps for the establishment of an integrated PRTR were made as early as 1974. During the years the system has gradually developed into a direct policy supporting tool. In 1989 the National Environmental Policy Plan made an important contribution to this development, defining target groups and targets for those groups and at the other hand environmental themes and indicators for those themes. The system was adapted to this approach. Other adaptations occurred as new tools became available or new requests from international, national and regional authorities occurred. This process of adapting and improving is still going on.

It should be mentioned that the PRTR is operated as a single system incorporating tools for different applications. The distinction between " Individual registration" for point sources, and "Collective registration" for other sources, is only related to the organisation of the data gathering. In general the point sources will have a more accurate location indication, and more data will be derived from measurements, but there is not a sharp borderline between both input systems.

Situation in 1998

In 1992 the three ministries concerned with environmental problems decided that the Emission Inventory Database should become the national database from which all information about emissions should be provided to the users. Based on this decision a structure was developed in which the three ministries (Spatial planning and the Environment, Traffic and Public Works, and Agriculture) and their supporting institutes work together with the National Institute for Public Health and the Environment, Statistics Netherlands and the organisation TNO who has been giving the technical support during the whole development process. These activities are coordinated by the Environmental Inspection who is responsible for the final products.

Every year a national report is produced by several expert teams in which the partners are represented. The teams report to a central committee chaired by the Environmental Inspection. The data accepted by the partners are used for actualisation of the database and are available to the public.

Target groups and environmental themes

In the National Environmental Policy Plan the different activities were aggregated in so-called target groups. With representatives from these target groups covenants are established in which the reduction goals for the coming years are defined. Also environmental themes are defined and an indicator system is developed enabling the policymakers to monitor the developments.

TARGET GROUPS or SOURCE CATEGORIES

- Refineries

All refineries in The Netherlands are treated as point sources. The main emissions are determined at the plant itself. The information is introduced into the general system using tools like the hydrocarbon profiles or the metal content of crude oil.

- Power plants

All power plants are treated as point sources. The emissions are based on measurements at the stacks supplemented by emission factors or profiles for individual hydrocarbons.

- Waste disposal

The waste burning plants are treated as point sources. The emissions are measured at the stack. The landfills are individually located in the system on a 500x500 meter grid basis but their emissions to air and water are calculated from a model using the material of a yearly statistic containing information about amount and type of waste and emission abatement measures taken.

- Industry

The 500 biggest companies are treated as large point sources. They are present in the system with individual emissions which are either measured, or calculated with emission factors. The data are provided by the companies with a verification by the competent authorities. For emissions into water a great part of the information comes from the competent authorities who have extensive measuring programs. In the near future only the 320 biggest companies will be obliged to provide data in a standardised format. A verification programme is being developed.
For profiles and external wastewater treatment the tools from the general system are used. The other 40.000 industrial companies are located with name and address, an activity code, the number of employees and emissions generally calculated from the contribution to nation-wide production. The grid location is derived from an available address/grid tool. They are also connected to the wastewater transport and treatment module. The total database available contains about 400.000 companies, but the greater part is in trade sectors. A discussion about their contribution to pollution is not finished yet.

For practical reasons a small part of the industrial activities is related tot the population density. Examples are bakeries and small dry-cleaning activities.

- Agriculture

Agriculture is treated as a non-point source. The main pollution sources in The Netherlands are pesticide use and excess manure production, with minor sources like harvesting machines and tractors. All activities are attributed to a 500x500 meter grid. Information comes from a number of sources which don't quite agree in some cases. Pesticide use comes from a combination of sales figures with two enquiries using different selections. The relation with the individual crops is provided by agricultural consultants, the distribution over the different compartments is provided by a model from an institute related to the agricultural University, and the location is mainly based on remote sensing information and topographical maps. The taskgroup mentioned above reach consensus about the optimal figures for a given year. Figures about the number of cattle come from the same statistics mentioned above but discussions about the penetration of abatement techniques and their effectiveness still need some expert judgement.

- Traffic and transport

Traffic is treated partly as a line source and partly as a non-point source. For the main roads traffic intensities for different types of cars are measured on a regular basis. These location of these roads is in the system in a digitalised form and emissions are calculated by using emissions factors per car/km for the relevant driving mode. The rest of the emissions from road traffic is calculated top-down by Statistics Netherlands using fuel statistics and some enquiries about car use by consumers. These emissions are located by relating them to the population density.

Emissions from sea-going and inland shipping are calculated from data from bridges and locks or harbour information. Recreational shipping is still mainly estimated by expert judgement. The railway company has an excellent database which provides all relevant information. Calculations for airports are based on information from the individual airports and international emission factors.

- Consumers

Data on the location of different types of houses on a 500x500 meter grid are provided by a joint project from the Postal Service, Statistics Netherlands and the National Planning Office. They locate addresses with an indication about the sort of activity belonging to the address. A simple adding program provides the number of houses. The number of inhabitants is yearly related to the number of houses from information about the number of inhabitants per town. In an earlier stage the total number of inhabitants per town available was distributed over the relevant areas using assumptions about population density in certain types of areas.(town-centre, nineteenth century area, suburb...) There are a great number of activities related to the population density. Some give only minor contributions, others like solvent use or paint application are relevant on a national level.

- Transport and treatment of wastewater

Data regarding this target group are in a separate module in the PRTR database.

- Production of drinking water

This is a target group of minor importance. Discussions about the aspects to be monitored are not finished yet.

- Trade, services, government and research organisations

This is a target group that has many links with other activities. Special monitoring targets are not defined yet.

- Nature

While this is not an official target group definition, incorporation into the database is necessary for achieving the complete picture. Data about natural areas are derived from topographic maps combined with satellite information. Emission factors for hydrocarbons from trees ask for a subdivision between different types of trees. At the moment this is provided by a combination of a rather old statistic from 1982 and the satellite data. Other interesting areas like wetlands are located from topographical maps. All data from these maps will be available shortly in a digitalised form from the Topographic Service.

ENVIRONMENTAL THEMES

The following environmental themes have been identified in The Netherlands:

- Climate change

The main substance is of course carbon dioxide provided mainly by power plants, traffic, and spatial heating. Other contributions come from methane (sources landfills, ruminants, anaerobic processes), or dinitrogenoxide (some industrial processes, agriculture, and some natural processes)

- Acidification

The main substance regarding acidification has always been sulphur dioxide from combustion processes, with nitrogen oxides from traffic and industry in second place. In The Netherlands ammonia from excess manure is an important source especially because the cattle concentrations are located near the scarce woods.

- Eutrophication

Eutrophication of lakes and rivers by excess phosphorus and nitrogen compounds is especially for The Netherlands an important problem. The cause is the great number of rather shallow lakes who are very vulnerable to this sort of pollution. After the use of phosphorus compounds in detergents has been forbidden agriculture is the main source, combined with remobilization from sludges deposed earlier.

- Dispersion

Dispersion is a rather wide defined theme including the entry into the environment of all undesired substances. In practice the indicator used is mainly based on pesticide use by agricultural and partly also non-agricultural activities.

- Waste disposal

The problems around waste disposal are rather specific for the Netherlands as the space available for landfills is in a dense populated area very small. Activities are directed at reducing the amount of solid waste by consumers and stimulating reuse.

- Disturbance

Disturbance is a theme directed at reducing noise and smell. Noise abatement measures are directed at airports, main roads and sometimes at special industrial activities. Smell reductions are relevant near certain industrial activities and in the Netherlands also in the areas where cattle raising with excess manure production is present. Criteria for the intensity of the problem are the number of people exposed to certain levels of noise and/or smell.

- Dehydration

While The Netherlands is a rather wet country there are still areas where the use of water for agriculture or industry caused the lowering of the groundwater level below acceptable limits. The degradation of natural areas caused by these aspects made it a relevant theme in several areas.

- Squandering

This is an environmental theme that has a lot to do with public awareness. There is a close relationship with life-cycle projects and stimulation of reuse of waste.

All environmental themes are linked with indicators with are based on the contribution of individual substances to the general theme indicator. This provides the policymakers with a tool to monitor the effects of the environmental policy on the quality of the environment. (Ref. A. Adriaanse Environmental policy performance indicators.(1993) SDU printing office ISBN 90 12 08099).

5. REFERENCES

General literature

There is an extensive literature available about methods for estimating emissions and establishing emission inventories, especially for emissions to air. The US Environmental Protection Agency has produced a great number of very relevant publications. Literature about emission inventories integrated over the different compartments is scarce. The Netherlands started as early as 1974 with such an inventory but the results are for the greater part published in Dutch. Emission inventories of solid waste are developing. The discussions are at the moment mainly directed at definition problems. The following publications could be useful:

[1] USEPA (1981), Procedures for Emission Inventory Preparation, Chapters I, III, and IV.
[2] OECD (1996), Council recommendation on implementing Pollutant Release and Transfer Registers.
[3] Evers, C.W.A. (1998), National Pollutant Emission Register in The Netherlands, Ministry of Housing, Spatial Planning and the Environment, The Netherlands.
[4] Ministry of Housing, Spatial Planning and the Environment (1998),
Emission Data for The Netherlands, 1996 and estimates 1997.
[5] WHO (1993), Assessment of sources of air, water and land pollution.

Emission Factors

[6] USEPA (1985, updated regularly), Compilation of Air Pollutant Emission Factors AP 42.
[7] EMEP/CORINAIR (1996), Atmospheric Emission Inventory Guidebook.
[8] Ministry of Housing, Spatial Planning and the Environment (1996),
Handbook of Emission Factors (earlier reports mostly in Dutch).

[9] National Institute for Public Health and Environment (1994),
Studies on processes in Industry in The Netherlands.
The Hague, August 1998

Quantifying Methane Emissions from Rice Fields

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Methane (CH_4) is the second most important greenhouse gas (GHG); it has strong ability to absorb infrared radiation and has a relatively short atmospheric lifetime of about ten years. Natural wetlands and rice paddies account for about one-third of the total estimated source strength of 515 Tg CH_4 yr^{-1} (Houghton et al. 1992); of this amount, 20-150 Tg CH_4 yr^{-1} is attributed to contribution from ricelands (Minami 1993). The estimates entail very large uncertainties.

The world's annual rice production should increase by 65% in the next 30 years to feed the expected population. With scarcity of good land for cultivation, production increases should come from intensified agriculture of irrigated rice lands. Irrigated rice land comprises about 54% of the world's total harvested areas (Table 1). Irrigated rice ecosystems seem to be the major source of global methane emissions from ricefields (Nueue and Roger 1994). Estimates of N_2O and CH_4 sources, however, have a very fragile and experimental base (Ruttan 1992).

The major objective of this paper will be to review current information and knowledge on processes and factors that influence the production, consumption/oxidation, and transfer of methane from flooded fields to the atmosphere as a basis for assessing data requirements and quantifying methane releases from wetland rice ecosystems.

Methane production

The flooded rice fields provide optimum conditions for methanogenesis, CH_4 formation, because of anaerobic conditions at neutral pH, optimum temperature, and the presence of high and easily degradable carbon inputs (Nueue and Roger 1994). Methane is an end product of strictly anaerobic fermentation of degradable carbon in the soil (Nueue 199). Methanogens can metabolise only in the strict absence of free oxygen at redox potentials (Eh) range between –300 to –150 mV (Wang et al. 1993, Nueue 1993, Cicerone and Oremland 1988, Connel and Patrick 1969). CH_4 production is optimum at soil pH between 5.75 and 8.75; at soil pH below 5.75 and above 8.75 CH_4 production may decrease (Wang et al. 1995). Methanogens are pH-sensitive populations; they thrive well over a relatively narrow pH range of 6-8; the optimal being 7 (Oremland 1988, Alexander 1977). The application of chemical fertiliser, particularly urea, affects CH_4 production to the extent that it may shift the soil pH toward or away from the pH range of CH_4 generation; soil pH also affects microbial activity, and plant litter and root exudates (Wang et al. 1995). High soil temperature speeds up CH_4 production, but the effect may be manifested only in daily and not in weekly or monthly total amounts. Low salt content, especially sulphate concentrations will enhance CH_4 production.

Easily degradable crop residues, fallow weeds, and soil organic matter constitute the major source of organic substrates for initial CH_4 production, while root exudates, senesced roots, and aquatic biomass appear to be more important sources of carbon for methanogens at later rice growth stages (Sass et al. 1991). CH_4 production generally increases during cropping season, although the population density of methanogens remains fairly stable (Schutz et al. 1989), which indicates that if carbon is not exogenously supplied, an increase in plant-borne materials explains the increase in CH_4 produced. The rate and pattern of organic matter addition and decomposition determine the rate and pattern of CH_4 production. CH_4 production data are obtained from anaerobic incubation of field soils.

Low and imbalanced nutrient supply, acidic or allic reactions, high kaolinitic clay content, and/or high bulk density (Nueue and Scharpenseed 1987, Nueue and Roger in press) slow down decomposition of organic matter and methane production. Significant amounts of active oxidants restrict CH_4 production, and more decomposable carbon may be mineralised into CO_2 (Nueue and Bonjawat in press).

Methane consumption/oxidation

The rice plant has the potential for regulating the amount of CH_4 to be released into the atmosphere because it also conducts O_2 that oxidises CH_4 into CO_2. Rice plants supply atmospheric O_2 to the roots for respiration via a special vascular system, the aerenchyma. The supply of O_2 to the rhizosphere enhances the population and activity of CH_4 oxidisers (metanotrophs) which lead to consumption of CH_4 before it is emitted (Hanson 1980). In effect, because O_2 diffusion into rice roots enhances the population and activity of metanotrophic bacteria in the rhizosphere, it creates a potential internal sink for CH_4 by oxidising CH_4 at the rhizosphere before it is released into the atmosphere.

Wagatsuma et al. (1992) assumed that CH_4 produced in the anaerobic soil layers can be used by metanotrophic bacteria as it passes through the upper oxidised soil layer. About 80% of the potential diffusive CH_4 is used in methane oxidation in the soil surface (Conrad and Rothfuss 1991). Up to 60% of the CH_4 produced during a rice growing season may be oxidised before it reaches the atmosphere (Holzapfel-Pschorn et al. 1986, Sass et al. 1991). Methane oxidation in the rhizosphere is considered the most important internal sink for CH_4 produced in the soil profile (Holzapfel-Pschorn and Seiler 1986).

Another candidate for CH_4 sink in a flooded rice soil system is percolation water. Experiments have shown that a portion of the CH_4 produced in the plow layer is carried to the subsoil by percolation (Kimuar et al. 1992b). Percolating water also transfers organic solutes and dissolved gases into the subsoil or groundwater where leached CH_4 may be oxidised or released into the atmosphere elsewhere (Kimura et al. 1992). However, percolation could be a negligible sink for CH_4 because soil puddling before transplanting or seeding creates an almost impermeable layer that restricts further water movement. Inasmuch as water is also becoming a limiting production resource for rice cultivation, the impermeable soil layer created during puddling could save lot of water for the farmers.

Net methane release into the atmosphere

Methane released from the paddy fields is a net result of the amount produced in anaerobic microenvironments and that CH_4 amount oxidised and consumed in aerobic microenvironments. The CH_4 produced in flooded rice soil can be transferred to the atmosphere by different pathways such as (1) ebullition, (2) diffusion, and (3) through roots and stems of rice plants.. However, most of the exchange of CH_4 in wetland-plant systems is between plants and atmosphere (Seiler et al. 1984, Nouchi et al. 1990, Rennenberg 1992), which takes place through the aerenchyma, a specialised gas-conduit system that also permits diffusion of O_2 into the rice rhizosphere (Sass 1995). Up to 90% of the CH_4 produced in the rhizosphere is released to the atmosphere through the rice plants (Seiler 1984, Holzapfel-Pschorn et al. 1986). Rice plants favour CH_4 fluxes by supplying plant-borne carbon for fermentation and acting as "chimney" for CH_4 (Nueue and Roger 1993).

At the beginning of rice cropping season, CH_4 flux from rice field escapes to the atmosphere mainly by ebullition – emergence of gas bubbles, while diffusive transfer of CH_4 through the water column was shown to be minor in rice field bubbles (Wassmann et al. 1996). Only minor build-up of CH_4 in the pore water has been observed (<400 (m) and CH_4 emission by ebullition or bulk diffusion has been observed to be minimal (Sass and Fisher 1995). The transfer of CH_4 through the rice plants gradually increases with plant growth and becomes the dominant pathway at the reproductive growth period (Wassmann et al. 1996).

Any alterations or amendments to the flooded rice environment that will modify its biophysical and chemical properties away or toward optimum conditions and parameters for production and consumption of CH_4, will affect the magnitude of net CH_4 released to the atmosphere. For example, a reduction in supply of exogenous organic matter and water removal to aerate soils will drastically cut down CH_4 emission, the converse may be true for increased CH_4 production. Incorporating partially burned straw induces highest increase in CH_4 emissions compared to when the straw is tilled into the soil and allowed to decompose aerobically before planting. (Sass et al. unpubl). Similarly, green manure or rice straw enhances methane release more than composted materials do because composting depletes easily degradable carbon and transforms organic substrate into more stable humus (Nueue 1993). Where irrigation water supply is not limiting periodic aeration, by temporary draining, of irrigated rice fields significantly decreases CH_4 emissions. A short drainage period (2 d) approximately every 3 wk during the growing season can reduce seasonal CH_4 emissions from irrigated rice fields to an insignificant amount (<1 g m^{-2}) (Sass et al. 1995, Sass and Fisher 1995). But the drainage practice consumed much more water than the amount needed for continual soil flooding and it could lead to release of $_{N\#O}$, another greenhouse gas with greater warming potential than both CO_2 and CH_4.

Application of chemical fertilisers improves plant growth and therefore increases methane emissions and probably its production. Fertilisers increased rice tillers, vegetative biomass, and yields; increased tillers provide more pathways for the net methane produced to escape into the atmosphere.

In terms of tillage and other cultural practices, transplanting of rice compared with direct seeding of pre-germinated seeds on puddled fields may emit more CH_4 because the longer growth duration of transplanted rice would require longer flooding duration. However, if not pre-controlled, weeds grow abundantly in directly seeded rice fields and direct seeded rice has been observed to develop more extensive root systems than transplanted rice. If weeds are controlled mechanically or manually, entrapped CH_4 would be freed into the atmosphere and weeds, together with exudates from more developed root system, could provide methanogens with adequate carbon substrates to produce more CH_4. Wassmann et al. (1998) summarised the factors in irrigated rice fields that significantly influence methane emission rates and the impact mechanisms and their effects on stimulation or inhibition of emission production and emissions (Table 2).

Measuring methane flux from paddy fields

Generally, CH_4 and N_2O fluxes from paddy fields are estimated (1) chamber methods, and (2) micrometeorological approaches.

<u>Chamber system</u>

The basic operating principle for chambers is to restrict the exchange of air with the atmosphere to magnify changes in the concentration of the emitted (or absorbed) gas in the head space. Chambers for CH_4 measurement in paddy fields are constructed of aluminum profile and plexiglass siding with a basal area of 1 m2 and height is adjusted according to plant height. There are two types of chamber: (1) open chamber system, and (2) closed chamber system.

In an open chamber system, a constant flow of air through the headspace is maintained and the gas concentration attains a steady difference from the background concentration in the ambient air. The flux is calculated from:

$$F = v ((_g - (_b)/A$$

Where F is the flux density, v is the gas flow rate, $(_g$ is gas density within the chamber, and $(_b$ is the background gas concentration, and A is the chamber basal area.

In a closed chamber system air in the headspace is not replaced and the gas concentration changes continuously. Syringe samples of CH_4 are taken to measure concentration change, which is used to calculate gas flux to or from the soil-water plant system:

$$F = (V/A) d(_g/dt,$$

Where V is the volume of the headspace, A is the chamber basal area, $(_g$ is gas density, and t is time.

Closed chambers are almost universally used because of low cost, practicality, and simple construction. However optimum sampling occasions and intensities have not been established yet. Furthermore, because the enclosed area is usually (1 m^2 and soil gas emissions vary considerably from point to point, chamber flux measurements tend to be highly variable. Therefore, spot or point measurements can be misleading particularly the practice of reporting in annual units like kg ha^{-1} $year^{-1}$.

Methane concentration from gas samples taken by chamber system is determined by gas chromatograph fitted with a flame ionisation detector (FID/GC).

All the evidence identifying rice (Oryza sativa) paddies are the most important anthropogenic source of atmospheric CH_4 comes from chambers (Watson et al. 1990).

<u>Automatic multi-chamber system</u>

To measure long term CH_4 emissions and to compensate for point-to-point variation, Schutz and Seiler (1989) and Kanematsu et al. (1994) multichamber system had been developed for measuring methane emissions for rice fields. Sampling and analysis of gases collected in closed chambers. Automatic multichamber system allows the analysis of large numbers of samples with time, hence they can be used to investigate field variations and accommodate replications. The system can continuously collect data on the daily and seasonal variations in methane emission rates from ricefields.

Until recently, chambers have been preferred for CH_4 and N_2O emission measurement because they are the only feasible way to detect small fluxes involved, which are typically less than 1 umol m^{-2} s-1. With the development of new sensors, like the tunable diode laser (TDL), CH_4 and N_2O emissions can now be estimated by micrometeorological approaches but it would take some years before their application become routine (Demead 1995).

<u>Micrometeorological approaches</u>

Micrometeorological approaches integrate CH_4 releases from over larger areas so they take care of the point-to-point variations inherent with the chamber technique. In a nutshell, micrometeorological techniques to measure trace-gas fluxes over a crop layer entail simultaneous measurement of gas concentration gradient and the eddy diffusion coefficient for the scalars. Flux is obtained from:

$$F = -Kc\ (dc/dz)$$

Where: F is the vertical CH_4 flux (g m^{-2} s-1), c is the CH_4 density (g m-3), and Kc is the eddy diffusion coefficient for CH_4 (m2 s-1).

Depending on conditions any of the following techniques can be used to estimate trace-gas fluxes: (1) gradient diffusion, (2) eddy correlation, (3) eddy accumulation, (4) wind profile, (5) aerodynamic methods, (6) energy balance, and (7) mass balance methods (Denmead 1993, Denmead 1995).

<u>Comparison between chamber and cicrometeorological methods</u>

CH_4 fluxes estimated by automated chamber system were compared with those obtained by micrometeorological approaches from flooded rice fields at the IRRI, Philippines (Kanemasu et al. 1995). CH_4 concentration gradient was estimated using the TDL system, while eddy diffusivity was measured by three micrometeorological approaches (1) energy balance, (2) eddy correlation, and (3) wind profile--gradient diffusion.

On all sampling occasions, CH_4 fluxes measured by any of the micrometeorological techniques were consistently higher than those obtained using the chamber technique. However, Kanemasu et al. (1995) attributed the difference in measured fluxes largely to variation in soil organic carbon between chamber and micrometeorological fields. The preceding weed fallow in the micrometeorological fields resulted in higher level of organic inputs and soil organic carbon (2.1%) than the chamber fields (1.6%).

Quantifying methane releases from rice fields

Despite the intricate web of factors and processes that determine CH_4 production, consumption, and the resultant emissions, the different studies revealed parameters that generically determine CH_4 emission which could be the basis for estimating its release into the atmosphere.

<u>*In situ* measurement</u>

Database

In sum, Nueue (1990) deduced that on the average the following soil properties will affect CH_4 production, consumption, and emission; (1) water regimes, (2) Eh/pH buffer, (3) carbon supply, (4) temperature, (5) texture and mineralogy, and (6) salinity. Rice varietal characteristics should also be included in the database. To complete the dataset, the following information should also be included: country, province, latitude, longitude, elevation; water management; fertiliser sources and amounts; weeding and pesticide application schedules; climate data; should constitute the minimum data set for better estimates of methane released from rice fields.

Temporal variation

Methane emissions vary within the day and within a cropping season. Timing of measurement is therefore one of the considerations in estimating CH_4 fluxes from the rice fields.

Diel changes CH_4 emissions were sensitive to diel variations in soil temperature; no phase difference was observed between the temporal course of the soil temperature and that of CH_4 emissions (Sass et al. 1991a). Diel changes in soil solution temperature are the major controlling factor and partial pressure of CH_4 being major modifier (Wang Bujun 1995).

Buendia et al. (1998) analysed two years of bi-hourly CH_4 fluxes measured by automatic sampling systems in China, Indonesia, Philippines, and Thailand to test less-intensive sampling strategies for CH_4 measurement using manually operated closed chamber system for point or spot measurement of CH_4 in flooded rice fields. Even though the sampling sites covered two climatic zones (temperate and tropical zones), results from the analyses could be compared because all the sites used the same reference treatment. The reference treatment consisted of IR72, rice variety; water management, flooded; and mineral fertiliser application, 120 kg NPK ha^{-1}.

The linear regression of the mean diel flux (F_d) on daytime bi-hourly CH_4 fluxes, that is from 0600 to 1800 h local time, indicated that fluxes at 0600, 1200, and 1800h contributed significantly to F_d. The mean diel flux can be estimated by a general equation:

$$F_d = [(aF_6 + bF_{12} + cF_{18})/12] \times 24$$

Where: F_d = mean diel flux, mg m^{-2} d^{-1}
F_6 = flux sample at 0600h, mg m^{-2} h^{-1}
F_{12} = flux sample at 1200h, mg m^{-2} h^{-1}
F_{18} = flux sample at 1800h, mg m^{-2} h^{-1} and
a, b, and c are constants that vary according to rice crop growth period and climatic zones (Table 3).

Buendia et al. (1998) validated this equation by comparing mean diel fluxes predicted by the equations with those actually measured by automatic sampling system from a continuously flooded rice field at IRRI. Mean diel flux predicted by equation 1 differed from those that were actually measured by about 12.1% in the dry season and by 6.1% in the wet season.

Seasonal variability CH_4 production and emission followed closely plant development with no apparent leverage of temperature. Depending on the presence of organic materials, increased CH_4 production and emission may be observed land preparation. Then it ebbed at transplanting and rose during the vegetative phase. Emissions peaked at panicle differentiation during a period of rapid root development, probably due to increase root exudation from the rapidly growing root tips. Emissions were relatively constant during the reproductive stage, and decreased during late grain filling.

When the mean diel flux had been estimated, regression analysis was done also to estimate the mean seasonal CH_4 flux for a 100-day rice, grown under continuously flooded field and treated with chemical fertiliser. The analysis produced the following relationship:

$$F_s = 10F_{10}+10F_{20}+10F_{30}+33F_50+7F_{70}+7F_{77}+7F_84+9F_{98})$$

Where: F_s = seasonal flux in mg m^{-2},
F_x = mean diel flux,
at x=10, 20, 30, 50, 70, 77, 84, 91 and 98 days after planting, and
10, 33, 7, and 9 = weights indicating the duration each F_x has occurred.

Using this equation, the seasonal mean CH_4 release in the dry season was calculated to be equal to 1049.8 mg m^{-2} compared to actually measured release of 1001.1 mg m^{-2}. In the wet season, seasonal

CH_4 flux was predicted at 3700 mg m^{-2}, which was 7.5% lower than the actually measured seasonal flux of about 4000 mg m^{-2}.

Thus, for spot or point measurement of CH_4 transfer to the atmosphere, the closed chamber method may be applied with acceptable precision.

Spatial variability

Point to point variability of soil gas emissions is notoriously large; variations in soil emission rates by factors of two within distances of a few meters are commonplace and 10-to-1 variations occur frequently (Matthias et al. 1980, Galbally et al. 1985). In an experiment, point measurements of CH_4 emission varied between plots that received similar treatments (Sass et al. 199). Using geostatistics, Folorunso and Rolston (1984) calculated that it would require as many as 350 measurements to estimate the true mean N_2O flux within (0% on a 3- x 36-m experimental plot. Locational differences in CH_4 emission among study sites in China are attributable to spatial heterogeneity of soil properties, climate system, rice varieties, fertiliser treatment, and water management (Wang MX and Shangguan 1995). Table 4 showed a summary of methane fluxes obtained from empirical measurements at various rice ecosystems in different parts of the world (Nueue and Boonjawat in press).

Inventory method

Most national greenhouse gas inventory teams, particularly in Southeast Asia employ the (IPCC) inventory model to estimate CH_4 releases from paddy fields (Francisco et al. 1997, Boonpragob 1997). The method uses a combination of default average CH_4 fluxes and an inventory of hectarage distribution of different rice ecologies. Emission is calculated as follows:

$$G = S \times E$$

Where: G = emission, S = rice hectarage differentiated by rice ecosystems, and E = emission factors. Experience with the inventory model indicated that the prescribed emission factors were not necessarily appropriate to all regions of the study area. The emission factors do not necessarily reflect the heterogeneity of the rice fields, that is why whenever available, national empirically determined average CH_4 fluxes are substituted into the equation. The precision of the estimate should also be considered because it may have inherent large variation, for example an average CH_4 flux of 230 mg $m^{-2} d^{-1}$ used in the inventory of CH_4 emissions from irrigated rice in the Philippines ranges from 8 mg $m^{-2} d^{-1}$ to 650 mg $m^{-2} d^{-1}$. In an integration workshop, the national greenhouse gas inventory teams of 5 countries in Southeast Asia considered the CH_4 emission calculated using the IPCC model first approximations, and would progressively be refined as new information or knowledge are generated.

Merging in situ results with GIS-based or RS-based datasets

Methane releases at national, regional or global scale can be quantified by using results from field experiments on CH_4 releases and the controlling factors and processes. At best, mechanistic models of CH_4 fluxes should be built given the experimental findings and the model validated and used to extrapolate releases from national or regional scale using a general information system (GIS) of controlling factors and processes. In the absence of a mechanistic prediction model, statistical averages of CH_4 fluxes from experiments discriminating finer categories of rice ecosystem could be used in place of a mechanistic model together with GIS-based information.

As more sensitive sensors become available remotely-sensed data and information could be used with the mechanistic models to calculate methane emission from larger areas like regional or global scale.

Generalisations

The eclectic factors and cultural practices that influence methane production and consumption create great variations in rates of CH_4 release in rice fields. But as understanding about processes and factors that control CH_4 production, consumption/oxidation, and release from different rice ecosystems to the atmosphere become more encompassing and deep, uncertainties in the estimates of CH_4 fluxes should narrow down. Some scientists believe that there are enough understanding and knowledge to be able to build mechanistic models of CH_4 fluxes now, which could complement advances in GIS and other remote sensing observation systems in predicting methane emissions from rice fields to the atmosphere. In the interim, statistical averages from field CH_4 flux measurements covering wider sampling domains and longer time period can be used in calculating average CH_4 releases into the atmosphere.

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Table 1. Distribution of ricelands by ecosystems ('000 ha), 1991. (IRRI World Rice Statistics 1993-94)

Region	Irrigated	Rainfed	Floodprone	Upland	Total area
ASIA	73571.74	37552.6	9800.71	10510.66	131343
East Asia	*34639.46*	*1987.59*	*0*	*848.95*	*37476*
Southeast Asia	*14925.35*	*15437.07*	*4346.11*	*2398.18*	*37014*
South Asia	*24006.93*	*20127.94*	*5454.6*	*7263.53*	*56853*
Latin America/USA	2917.36	375.33	119.004	3191.55	6595
Africa	917.47	843.6	1154.89	2302.04	5218
Australia	89	0	0	0	89
Rest of the world	907.28	0	0	123.72	1031
World	78402.85	38771.53	11074.604	16127.97	144276

Table 2. Flooded rice parameters and crop practices and their significance for methane emission rates (* = weak, ** = moderate, *** = high) as well as impact mechanisms and their effects (= weak, = moderate, and = high) on stimulation or inhibit

Factors	Significance	Impact mechanism	Effect
Organic amendments	***	Removal of plant residues	
		High doses of manure	
		Replacement of fresh manure by biogas residues	
		High organic inputs from floodwater	
Water management	***	Long duration of flooding	
		Continuous flooding in early season	
		Continuous flooding in late season	
		Strong leaching	
Soil	**	Indigenous methanogenic material	
		Chemical inhibition of methane production	
		Texture with high porosity	
Rice cultivar	**	Strong root exudation	
		High oxidation power	
		High diffusion resistance to methane transport	
		Short growth duration	
Climate	*	High and evenly distributed precipitation	
		Low temperature	
		Hazardous events	
Nutrient and crop Management	*	Use of sulphate fertilisers	
		High N inputs	
		Dense spacing of rice plants	
		Frequent soil disturbance	

Table 3. Results of linear regression analyses of bi-hourly fluxes at 0600h, 1200h, and 1800h on total diel flux. (Taken from Buendia et al. 1998).

Climate Zone	Growth Stage	Sample size	F6, F12, and F18 Coeffa	t-statb	r2
Tropical (Indonesia Philippines Thailand)	Planting to Panicle Initiation (PI)	500	5.2	24	0.99
			2.5	24	
			3.7	26	
	PI to Flowering	1040	5.4	31	0.99
			2.8	21	
			3.7	23	
		1040	12.8 (F6)	172	0.99
	Flowering to Harvest	780	6.6	29	0.99
			2.3	20	
			3.6	28	
Temperate (China)	Planting to Panicle Initiation (PI)	504	7.4	27	0.99
			3.4	27	
			1.4	15	
	PI to Flowering	720	6.9	21	0.99
			1.3	14	
			3.4	14	
		720	13.0 (F6)	97	0.98
	Flowering to Harvesting	540	4	13	0.96
			1.4	1.7	
			5.3	7.4	

Table 4. Minimum, median, and maximum CH4 fluxes from rice fields from seeding or transplanting to harvest. (Taken from Nueue and Boonjawat 1998)

Country	No	**Mean flux rate** (g CH4 m-2 d-1)			**Total emission** (g CH4 m-2)			Information source
(rice ecology)	obs	min	med	max	min	med	max	
China								*Wang, MX et al. 1993, 1995*
Irrigated	74	0.1	0.3	1.4	5	34	155	*Lu et al. 1995*
India								
Irrigated	7			0	0.1	0.7	2	*Mitra 1992*
Irrigated	3	0.2	0.3	0.4	20	25	39	*Adhya et al. 1994*
Rainfed	8				5	17	60	*Mitra 1992*
Deepwater	7				14	19	24	*Mitra 1992*
Indonesia								*Nugroho et al. 1994*
Irrigated	10	0.2	0.5	0.8	14	31	47	*Makarim et al. 1995*
Rainfed		4	0	0.1	4	8	10	
Italy								*Schutz et al. 1980*
Irrigated	22	0.1	0.3	0.7	12		77	
Japan								*Yagi and Minami 1990, 1991*
Irrigated	28	0		0.4	1		45	*Kimura and Minami 1995*
Korea (ROK)								
Irrigated	4	0.1	0.2	0.5	9	33	63	*Shin et al. 1995*
Philippines								
Irrigated	56	0.1	0.3	0.8	10	27	87	*IRRI 1996*
Rainfed	1	0.1			7			*Metra-Corton et al. 1995*
Spain								
Irrigated	1	0.1			12			*Seiler et al. 1984*
Thailand								*Jermsawatdipong et al.*
Irrigated	27	0.4	0.5	0.7	34	48	86	*Chairoj 1994*
Rainfed	4	0	0.2	0.5	1	15	68	*Kimura and Minami 1995*
Deepwater	2	0.1		0.2	12		32	*Chareonsilp et al. 1995*
								Siriratpiriya 1994
USA								
Irrigated	41	0.1	0.3	0.6	1	25	48	*Lindau et al. 1991*
								Cicerone et al. 1992

SESSION VI

Identifying Future Directions and Challenges

Working Group K

The Use of PRTR Data on the Regional and International Level

Potential Use of PRTRs as a Tool for Measuring Progress in Implementing Global Commitments to International Environmental Initiatives

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Developing Countries Overview

When we evaluate the information on how many countries have developed a PRTR or are in the process of doing so, or simply count the countries that at least have an implemented system for registering the release of toxic substances to the environment, the panorama is not very attractive. Nevertheless, the main emitting countries are included, so the situation seems not to be very bad in terms of knowledge of the load of emissions and transfer of chemical contaminants. Undoubtedly the situation will improve in the next years.

The hazards should be found out in other kind of comparisons. As recognised by Agenda 21, first of all is the distribution of riches and poverty. Developing countries also have other more urgent environmental problems to be solved: access to potable waters, potabilisation of waters, basic sanitation, sewerage and treatment of water, desertification and soil deterioration. In those countries public health shows that the higher morbidity rates, including those corresponding to children, are hydric diseases. Acute diarrhoea is still the cause of thousands of annual deaths.

In these countries the environmental dimension is quite different with respect to developed countries. The knowledge, perception and challenges are mostly to survive. The availability of resources is also different. Social and economical differences in these countries indicate the real distance that must be travelled before new PRTRs coming from them should be included in the international balance.

This does not mean that there are not possibilities to develop a PRTR in some countries with the minimum conditions for it. That will certainly benefit the environmental management in those countries and win supply information of global importance.

Principal Constraints in the Implementation of PRTRs in Developing Countries or in Countries with Economies in Transition

The principal constraints of the national PRTRs are the following:

- Low availability of material and human resources to develop the actions implied in a PRTR.
- Difficulties in the definition of goals and of the main users and beneficiaries.
- Absence or delay in the minimum infrastructures required by the PRTRs in legal, institutional, technical and administrative terms.
- Insufficient availability of data bases on the emissions and transfer of chemical substances as well of environmental monitoring.
- Isolation or poor communication of the government with industry and people in subjects related with environmental management.

- Absence of leadership and strength among the institutions with responsibilities in research and environmental protection.
- Insufficient comunitary environmental education and participation in the environmental problems related with potential risks to health and negative effects of toxic chemical substances in the environment.
- Inability to identify the most important environmental problem of the nation, territories or localities.
- Presence of other environmental priorities than the PRTRs.

The first constraint is the most accounted by the international agencies with respect to the PRTR's implementation in developing countries. Certainly, the absence of financial resources is a big limiting factor but not the only one and, sometimes, neither the most important.

A New Dilemma for Developing Countries

Many developing countries are facing a new and difficult dilemma in that there is a pressure to establish chemical management policies and programs in order to protect population and environment. In addition, the international community, through declarations and international agreements, is encouraging all countries to develop the infrastructure to manage chemical safety. Developing countries need to fulfil these requirements with the constraints after mentioned.

Basis for the Establishment of a PRTR in Cuba

The Cuban Government has always maintained an active participation in matters related with the environmental management. This position was encouraged after the United Nations Conference on the Environment and Development (UNCED) held in Río de Janeiro en 1992. Cuba prepared and started the implementation of its national version of the Agenda 21@ National Program of Environment and Development, in 1993. The Cuban government paid special attention to Chapter 19 devoted to the appropriate management of toxic chemical substances.

Development of a European Polluting Emissions Register

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Introduction

An inventory of "principal emissions and sources responsible" is being developed by the EU, in accordance with the requirement of Council Directive 96/61/EC concerning integrated pollution prevention and control, the so-called "IPPC Directive". The inventory, which will cover only installations included within the scope of the Directive, mostly large industrial installations, will be drawn up on the basis of data provided by the EU Member States.

The purpose of this paper is to describe the legal basis of the inventory in the context of the IPPC Directive, and to discuss some of the issues that are being addressed.

Legal Context-the IPPC Directive

1. Purpose

In September 1996, the EU Council of Ministers adopted Council Directive 96/61/EC on Integrated Pollution Prevention and Control, commonly known as the "IPPC Directive". Its purpose is to achieve integrated prevention and control of pollution arising from the activities listed in its Annex.

2. Scope and timing

In terms of installations covered, the Directive includes a wide range of industrial activities grouped into six categories: energy industries, production and processing of metals, mineral industry, chemical industry, waste management, and other activities such as pulp and paper, tanning, and certain agricultural activities. The Directive is aimed mostly at large installations, but there are some exceptions. For most sectors there are capacity thresholds to determine which installations are covered, but the chemical industry is a notable exception since there are no thresholds and only a reference to "production on an industrial scale". The thresholds in some of the other sectors are low enough to catch some small or medium-sized enterprises.

In terms of environmental scope, the Directive covers a very wide range of environmental impacts, including polluting emissions to air, water and land, production/disposal of waste, energy use, accidents and site contamination. Emissions may take the form of substances, heat, noise or vibration, and are considered as pollution if they "may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment".

The provisions of the Directive must be transposed into national law in the EU Member States by 30 October 1999, and will apply immediately to new installations covered by the Directive, as well as to existing installations undergoing substantial modifications. Other existing installations have an eight-year transition period until the year 2007 before all the provisions of the Directive apply.

3. Operator Obligations

The Directive sets general principles governing the basic obligations of the operators of industrial installations. First and foremost among these is the obligation to take “all the appropriate preventive measures against pollution, in particular through the application of the best available techniques”.

Other obligations of the operator involve:

- the avoidance of waste production, recovery of waste where possible, and waste disposal “avoiding or reducing any impact on the environment”,
- the efficient use of energy,
- accident prevention and mitigation, and
- the return of the site of operation to a satisfactory state upon definitive cessation of activities.

4. Main provisions

Fulfilment of these obligations is ensured by means of an integrated permitting procedure. Permit applications must include information on the installation and its activities, the substances and energy used or generated, emission sources, conditions of the site, the nature and quantities of the foreseeable emissions as well as the likely environmental impact, proposed abatement techniques, measures taken for the prevention and recovery of waste, and the measures planned to monitor emissions. Likewise, the permit issued by the competent authority must contain conditions ensuring that the operator obligations are met. Permit conditions should normally take the form of emission limit values based on best available techniques (BAT).

Member States must ensure that the competent authority follows or is informed of developments in BAT. An effective integrated approach to pollution control is ensured by requiring full co-ordination between competent authorities in cases where more than one is involved. IPPC further ensures adequate protection of the environment by providing for additional measures to be taken in cases where environmental quality standards cannot be met by BAT alone. Permits must be reconsidered and updated if necessary at regular intervals and in the event of a substantial change in the operation of an installation.

Member States are required to provide the Commission with regular information concerning the implementation of the Directive, and the Commission is required to organise an exchange of information on BAT between Member States and industry. The Directive further provides for notification and consultation between countries in cases where there are significant trans-boundary effects. Although the IPPC Directive does not itself set uniform Community-wide emission limit values for any substances, it leaves in force emission limit values provided for by existing Directives and provides for new emission limit values to be set in the future where a need for such action is identified.

Last but not least, the Directive also contains a number of provisions relating to access to information and public participation in the permit procedure. Permit applications, permit conditions and the results of release monitoring must all be made available to the public. The permit applications must be available “for an appropriate period of time…to enable [the public] to comment on them before the competent authority reaches its decision”.

5. Obligation to set up an inventory

It is in the context of public access to information that the Directive requires the European Commission to publish, every three years, an "inventory of the principal emissions and sources responsible", on the basis of the data supplied by the EU Member States. Detailed requirements concerning the data to be submitted, along with "measures to ensure inter-comparability and complementarity" between the inventory and other registers are to be established by the Commission, with the assistance of a regulatory Committee of Member states' representatives. This Committee must agree on such measures, acting by a qualified majority, before the Commission can adopt them.

So far, the Committee has met twice, in November 1997 and June 1998. The second part of this paper is devoted to a discussion of the main issues addressed in these meetings.

Although no deadline for first publication of the inventory is specified in the Directive, the current intention is to adopt the necessary measures by the end of 1999. The first inventory would then be published in 2001, based on data collected in 2000.

Issues Addressed So Far

6. Purpose of the Inventory

The preamble to the Directive explains that "the establishment of an inventory of principal emissions and sources responsible may be regarded as an important instrument making it possible in particular to compare pollution activities in the Community". It does not say, however, for whose benefit the information is primarily aimed, nor exactly what kind of comparisons should be made. One of the first issues to be discussed was therefore what purpose the inventory should serve, and what implications this would have for the kind of information to be published.

From the beginning, the Commission emphasised the importance of the inventory as a tool for public information. Apart from serving the objective of transparency as an end in itself (the public "right to know"), public access to emissions data should serve as an important and constructive pressure on industry to improve its performance. For this purpose, the naming of individual installations (e.g. a list of the "top ten polluters" for each substances) alongside presentation of more aggregated data seems important.

Some members of the Committee preferred, however, to stress the interest of the inventory as a tool for policy makers and the consequent need to present aggregated data, e.g. at sectoral level, which will be of help in directing public policy.

Although differences still persist as to which priority to give these two objectives, it is clear and generally agreed that the inventory can and should be designed to satisfy both.

Issues concerning data confidentiality were addressed in the context of naming installations in the published inventory, since some EU Member States have rather strong data protection laws. It appears, however, that this will not be a problem provided that only emissions data, and not economic activity data, are presented. Although the link between emissions and economic data (such as rates of production) is clearly of interest, it is currently felt that the ability to name installations is of higher priority. It may be that some comparisons between emissions data and economic data can still be made at an aggregated, sectoral level.

7. Scope of the inventory

In view of the legal basis of the inventory, the basic scope of installations covered is identical to that of the Directive as a whole, in other words installations carrying out the activities set out in Annex I. It should be noted that the provision setting up the inventory applies to all installations – new and existing – from the date that the Directive is transposed into national law, so the inventory will apply to both new and existing installations as soon as it is established.

Ideally, and in accordance with the aim of the Directive, the register should cover all emissions to air, water and land. It quickly became clear, however, that emissions to land presented a problem: most land contamination occurs via the other media (air and water), and the inventory will only cover direct releases from the installation and will not address the subsequent fate of pollutants. Direct site contamination is generally felt to be a historical problem rather than an ongoing problem within the EU, and it would seem to be difficult to establish an inventory of such "emissions". The inventory will therefore cover emissions to air and water.

It is also felt by most members of the Committee to be of interest to include waste, although there is some doubt over the legal definition of "emission" in the context of the Directive. Assuming that it turns out to be legally possible, the Commission will explore ways to include waste.

8. Substances and thresholds

So far, however, most of the attention has been focused on how to design an inventory including emissions to air and water. One of the early decisions was that the list of substances or parameters should not be the same for air as for water, since the main pollutants of concern are not the same. Another decision was that, since the inventory is supposed to cover only the principal emissions and sources, and since reporting mechanisms and data availability vary considerably from one Member State to another, the number of substances/parameters should be fairly modest – perhaps 20 or so for each medium.

Criteria for the selection of these substances should include the "indicative list of main polluting substances" provided in Annex III of the Directive, the total amount of emissions from IPPC installations within the EU, the toxicity and ecotoxicity of the substances, the availability of data and the political priority (e.g. the existence of national emission reduction programmes).

For each substance or parameter, it has been decided that reporting thresholds, expressed as annual emissions, should be used to decide which IPPC installations should report for which substance. Initial lists of substances/parameters, together with suggested reporting thresholds, have been proposed by the German delegation. The intention is that the thresholds should be set at a level that would catch most – for example, 90% – of the total emissions of that substance from IPPC installation within the EU. These lists and thresholds will be further discussed in a working group. It was agreed at the second meeting that the list for air emissions should include at least some greenhouse gases.

9. Reporting unit

In order to ensure comparability of the data, it is of fundamental importance to agree on the basic reporting unit. In the Directive, an "installation" is defined as "a stationary technical unit where one or more activities listed in Annex I are carried out, and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution".

This definition was drafted, however, more for the purpose of defining exactly what is covered by the Directive than for the purpose of providing a coherent definition of a reporting unit for the inventory. In general terms, the dilemma is the following: if individual technical units are regarded as the basic reporting unit, it could become extremely cumbersome – and expensive – to determine which emissions from a site come from which unit, particularly in the case of an integrated chemical works, for example. Many installations would fall under the emission thresholds. On the other hand, if emissions are reported at site level, important information regarding which emissions result from which kinds of activities could be lost. Moreover, the definition of "site" seems to present as many difficulties as the definition of "installation". Another question was what to do about emissions from non-IPPC activities carried out on the same site as IPPC activities.

Since the Directive talks of "installations", the trend of the discussions in the second meeting was therefore that these should be the basic reporting unit, but that where two or more installations are operated on the same site by the same operator the thresholds should refer to emissions aggregated over those installations. Emissions from entirely different activities on the same site should be distinguished, but the level of dis-aggregation should not be too detailed, particularly in cases where there are technical problems in distinguishing the precise source of an emission within the site. Emissions from associated activities in the sense of the Directive's definition of "installations" should be included, while inclusion of separate non-IPPC activities carried out on the same site as IPPC activities could be at the discretion of the operator.

10. Data quality and data flow

The quality of data is seen as an important issue. Although use of measured data is considered to be generally preferable to estimates, exclusive use of measured data is not a realistic goal. Perhaps more important than the status – measured or estimated – of the data is that this status should be transparent. The CORINAIR graduated system for expressing data quality could provide a useful model for the inventory. It has been emphasised that data quality also involves elements such as timeliness, completeness, consistency and comparability.

Use of the European Environment Agency's (EEA) European Environmental Information and Observation Network (EIONET), both in its institutional and its (developing) electronic form, should provide a suitable mechanism for data transmission. The EEA will draw up a working paper on data quality and data flow to be discussed at the next meeting, with a view to developing a code of good practice.

11. Source nomenclature

Use of an agreed nomenclature for classifying the sources of emissions is clearly necessary in order to facilitate statistical processing of the data and therefore maximise the potential use that can made. The European Commission's Statistical Office (Eurostat), in co-operation with the EEA, has been developing a Nomenclature of Sources of Emissions (NOSE) consisting of the NACE nomenclature for economic activity combined with a process nomenclature (NOSE-P).

Many Committee members feel that using Annex I of the Directive as a classification tool would provide the simplest and most transparent solution. Nevertheless, the desirability of adopting an agreed nomenclature that is used for different emission reporting systems that exist at national, European and international level is generally agreed, and NOSE appears to be a promising attempt.

It is therefore intended to use both Annex I and NOSE. A second working group will be convened in order to adapt NOSE to the requirements of the IPPC inventory and to work on the linkages between NOSE and Annex

Concluding Remarks

Developing an inventory at European level presents a number of challenges. As with all European policy-making, chief among these is the diversity of national systems. Although it is the European Commission that will establish the "format and particulars" of the inventory, as well as measures to ensure inter-comparability and complementarity between the inventory and other registers, the EU Member States are responsible for collecting the data, checking its quality and forwarding it to the Commission. The EEA is expected to have an important role in processing and presenting the data.

Furthermore, the Member States are closely involved, through their participation in the regulatory Committee, in the design of the inventory. This design must take into account the administrative infrastructure and political structure in the Member States, while at the same time providing a sufficient degree of harmonisation in order to ensure that the data is really comparable. The starting point for the work is one in which some Member States have advanced, centralised, integrated systems in place, while others have more decentralised or single-medium approaches and others still will need to develop reporting mechanisms almost from scratch.

The constructive spirit and degree of consensus in the two Committee meetings held so far suggests that these challenges can nevertheless be overcome, and that the European inventory will indeed turn out to be an important tool for public information and environmental improvement.

The CEC's North American PRTR Program

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The CEC is an international organisation whose members include Canada, Mexico and the United States. The CEC, which is based in Montreal, Quebec, Canada, was created under the North American Agreement on Environmental Co-operation to address regional environmental concerns, help prevent potential trade and environmental conflicts, and promote the effective enforcement of environmental law. The Agreement complements the environmental provisions established in the North American Free Trade Agreement. The CEC carries out a work program on environmental issues that are of interest to all three North American countries.

The CEC is a tri-national agency - our official languages are Spanish, English and French. Therefore, all our formal publications, as well as our workplan, are available in all three languages, both in hardcopy and on the internet via our homepage <http://www.cec.org>.

The CEC recognises the importance of PRTRs, such as the TRI in the US, the NPRI in Canada, and the new PRTR system in Mexico. In addition, Article 10.2(a) of the North American Agreement on Environmental Co-operation states that the Council may consider and develop recommendations regarding the comparability of techniques and methodologies for data gathering and analysis, data management, and electronic data communications on matters covered by the Agreement. Therefore, one of our programs is focused on North American Pollutant Release and Transfer Registers.

An important milestone was the signing of a resolution by the representatives of the North American environment ministers in June 1997, entitled “Promoting Comparability of Pollutant Release and Transfer Registers (PRTRs)”. In this resolution, the governments have formally recognised the value of PRTR information to assist in environmental risk reduction and decision making, to allow for public access to environmental information, while acknowledging that each national PRTR program is unique.

The resolution and the CEC work program provide for a number of specific items, including:

- The annual production of a report analysing publicly available PRTR data. We are currently preparing to publish the report based upon 1995 data, and preparing to select a consultant for the preparation of the 1997 data report. Work on the 1996 data report is underway.

- Collaboration in the development of an internet site to present the matched subset of data from each of the three national PRTRs and provide information on the degree of comparability.

- The development of an implementation plan to enhance the comparability of North American PRTRs.

- Continued support for the development and implementation of the Mexican PRTR system.

Copies of the resolution are available via the CEC homepage.

A project such as this is only possible with the assistance and co-operation of the involved national programs - the Canadian, US and Mexican programs have provided essential support throughout the development of this report. Industry and NGOs have provided important input during the consultative review portion of the process. This cross-border interest came naturally to the North American PRTR programs - once the program, or the idea of a program, was firmly in place, the countries were quite keen in learning more about each other's programs.

The CEC PRTR program has published three reports. The first, entitled *Putting the Pieces Together*, examined the status of North American PRTRs. The remaining two reports, which compare publicly available North America PRTR information, are entitled *Taking Stock - 1994 Data* and *Taking Stock - 1995 Data. T*hese reports can either be downloaded from our homepage or requested from the CEC.

The *Taking Stock* reports compare and analyse publicly available information in the national PRTR databases and provide insight to the information on a North American basis. This information can be used by industry, NGOs, government and persons interested in examining the North American environment on a regional basis.

In comparing the data, we examined both the complete data sets and the common subset of data - the subset that contained comparable types of facilities reporting for the same pollutant set. The common subset of data is significant: the data reported on forms for substances and industrial categories common to both NPRI and TRI represented 68 percent of the total releases and transfers in the NPRI database and 84 percent of those in TRI.

Some of the key findings of the *Taking Stock - 1995 Data* report include:

- Facilities in the United States dominated releases and transfers of listed pollutants in 1995, as reported to North American PRTRs. This is true both generally and for all types of releases and transfers. However, based on the relative size of the two reporting systems (by the number of facilities that report and the number of forms they submit), Canadian releases and transfers represent a larger share of all release/transfer types, except for transfers to municipal sewage treatment plants.

- Releases and transfers were concentrated in the south-eastern United States, and on both the Canadian and US sides of the Great Lakes.

- The 50 largest facilities (far less than 1 percent of all reporting facilities) generated 26 percent of total releases and transfers. In particular, they dominated injection of listed substances to underground wells, releases on-site to land and discharges to surface waters. The large facilities' waste management methods tended to concentrate on one release medium or transfer type.

- Average releases and transfers per facility were twice as high in NPRI as in TRI. This significant difference does not appear to arise from the average number of forms (pollutants) reported by each facility, from differences predominating in the use of chemicals at NPRI versus TRI facilities, or from differences in reporting thresholds between the two PRTRs.

- For 1995 to 1997, NPRI facilities project a reduction in total releases and transfers of 14 percent, compared to 4 percent for TRI facilities (these TRI projections are based on waste management quantities for release, disposal, and transfers to treatment, comparable to total releases and transfers). Industries projecting the largest reductions were the Canadian pulp and paper industry and the US chemical industry - each with about one-half the net decrease projected for NPRI and for TRI, respectively.

- Among Canadian industries, paper products manufacturers accomplished the greatest reductions in total releases and transfers from 1994 to 1995. The industry ranked third in 1995 for total releases and transfers, down from first for 1994. In TRI, facilities reporting multiple industry codes reported the largest reduction from 1994 to 1995. Overall, though, TRI industries showed very little change in ranking.

- The states and provinces with the largest releases and transfers were the same for 1994 and 1995 for the matched data set: Texas, Ohio and Louisiana; and Ontario, Quebec and Alberta, respectively.

Certainly, the creation and the role of the CEC in North America remains unique. The national governments provide our funding in equal parts, and the CEC supports the efforts of the national governments. The facilitation role of the CEC has been well-received. Everyone involved gains a new perspective on environmental issues. The three governments are able to work together effectively on these tri-national issues and individual environmental agencies may more effectively meet their goals.

The Use of PRTR Data for Monitoring the Progress of Global Environmental Commitments

Panel Presentation

Taka Hiraishi
United Nations Environment Programme

Introduction

The use of PRTRs can provide considerable benefits to governments, industry and the general public. It provides a set of data critical to governments for pollution prevention and control and for chemicals management. It promotes voluntary industry reductions in releases of toxic chemicals and engages citizens about possible toxic risks to their communities.

But there are other uses of PRTRs that go beyond national considerations. There are a number of regional agreements and global environmental conventions that have requirements that could be met using PRTRs. PRTRs are tools that promote protection of the world's environment - both by helping countries to promote national reductions in toxic releases and by helping compliance with global environmental treaties.

The Global Environmental Treaties

Since the adoption of Agenda 21 at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, countries have committed themselves to several international initiatives to reduce or eliminate releases and transfers of chemical products that cause adverse effects to the environment, human health and/or wildlife.

Some of these international initiatives are just voluntary programmes, while others represent legally binding instruments with requirements that governments have to comply with.

Under these programmes, countries are required to report releases into the environment of different types of pollutants. The data reported by countries is then used to evaluate the effectiveness of pollution prevention programmes and to evaluate the compliance with international regulations.

PRTRs can be used in this context by sharing data on releases of specific chemicals and promoting public awareness. Examples of potential uses of PRTR data at international level are:

- The Montreal protocol on substances that deplete the ozone layer has requirements for reporting annual data on destruction of certain substances and for promoting public awareness.
- The Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal has requirements for annual detailed reporting of quantities of wastes imported and exported. But beyond the trans-boundary movement area, the treaty calls for undertaking domestic steps for waste minimisation and public awareness.

- The FCCC calls for national inventories of anthropogenic emissions of all greenhouse gases not controlled by the Montreal Protocol - communicated to all parties with associated public awareness.
- Regional seas -Virtually all call for reducing the impact on the marine environment from land based activities, including toxic releases. PRTR can be used to measure the progress of these pollution prevention activities.
- Persistent Organic Pollutants (POPs). Negotiations have begun for a convention to reduce or eliminate the releases of POPs into the environment. Some measures such as global emissions inventory will be needed to determine progress in emissions reduction. UNEP has already been asked to begin formulating approaches to measure reductions of Pops.

PRTR data can also be used in conjunction with data from other non-chemical treaties to assess the impact of toxic chemicals releases in sensitive ecosystems. For example: by mapping PRTR data with migratory information on species, a relationship could be established between the release of specific chemicals into the environment and the number of species that live in, or migrate from a given region.

With the growth in the number of international environmental initiatives to reduce the releases of chemicals, the reporting requirements are also growing, therefore countries are encouraged to research for more systematic approaches to report releases of different types of pollutants in a standardised manner. This would eventually reduce costs related to technology, training, staff time etc., avoiding duplications of efforts. This is particularly important for developing countries, where resources are very much limited.

Conclusions

International Environmental Treaties, dealing with chemicals, have reporting requirements of periodic data on chemical releases into the environment or transfers. This data is used to monitor compliance with international regulations and to evaluate the effectiveness of pollution prevention programmes. PRTRs are tools that could be used to provide such data.

SESSION VI

Identifying Future Directions and Challenges

Working Group L

PRTR Development in Transitional and Industrialising Nations

No papers presented

SESSION VII - SUMMARY OF CONFERENCE

No papers presented

SESSION VIII

LOOKING FORWARD

The Future Development of PRTR Programs: PRTRs in 2020

Mark Hyman
Environment Australia

Introduction

Over the past ten years or so, many countries, especially but not only OECD countries, have introduced PRTR programs. Typically, these programs are established with more than one objective, that is they are designed from the outset to achieve several ends simultaneously. These objectives, commonly, are:

1. to provide information to the public about releases to the environment, and transfers, of pollutants of concern ("community right-to-know");
2. to establish an information base on pollutant releases and transfers, to assist governments in decision-making;
3. to promote improved environmental performance, especially by industry, through the release of public information about releases and transfers of pollutants.

A fourth objective, less commonly listed with the three above, is to collect information for international reporting purposes, or otherwise to meet international obligations, e.g. those of Chapter 19 of Agenda 21. For most countries this is a second order objective.

This paper examines the way in which PRTR design and evolution have varied according to the emphasis placed on the different objectives, and examines some of the possible evolutionary pathways which PRTR programs might follow over the next twenty years. Because it is forward looking, this paper is necessarily speculative. It is intended to serve as a thought-starter, to stimulate debate on pathways for evolution of PRTRs. Nothing in it should be taken to represent the policies of the Australian Government or of any other body. Any reference to the PRTR of another country is the author's own perception and should not be taken to reflect the views of the government concerned.

A Flexible Tool

One of the characteristics of PRTR programs, world-wide, is their propensity for frequent and ready amendment. Many PRTR programs are phased in or are tested as pilot programs before introduction; they often grow, for example by expansion of the reporting list, by extension of coverage to include additional industry sectors, by inclusion of diffuse sources as well as point sources, or by inclusion of new classes of chemicals such as pesticides.

Besides these changes, PRTRs are highly variable in design and scope. Often the variability appears to result from the emphasis given to one or other of the objectives mentioned above. Thus the US PRTR, the Toxics Release Inventory (TRI), was strongly driven by the community right-to-know objective, and that appears to have influenced some of its design features. For example, if the aim is to inform the community about chemical risk, then the reporting list should be long enough to include many or most of the pollutants which may be of interest to people in the community. And because community right-to-know concepts are mostly focused on the right of the public to information about industry's environmental performance, the TRI and other PRTRs like it have tended to collect information from point sources. These sorts of programs often appear to be derived from and influenced by chemicals management programs, and they therefore reflect the interests of such programs in managing a wide range of chemicals.

By contrast a PRTR aimed mainly at providing information to guide government decision-making will have a tendency to a shorter list of reportable pollutants (because governments may only need information on those pollutants that are priorities for government action). This shorter list may be counteracted by increased emphasis on accuracy. This kind of PRTR is also likely to include diffuse sources as well as point sources, since governments need to know about all sources of priority pollutants, not only the point sources, if they are to take informed policy decisions. It is also possible that the information might not be made publicly available, or only in an aggregated form. These programs may derive from classic pollution prevention interests, and are therefore likely to focus on those pollutants of concern in that context, for example, criteria air pollutants or releases of nutrients to water. By contrast, programs developed as an adjunct to chemicals management systems sometimes omit such pollutants completely from their reporting list.

A PRTR that is aimed mainly at exposing performance by industry, making it accountable and stimulating waste minimisation and cleaner production may be linked to licensing systems and limited to the companies and pollutants which are covered by such systems. The UK PRTR would appear to exemplify such an approach.

The sheer number of design parameters that are involved in establishing a PRTR mean that each instrument can be designed to be very different to the next. It also means that there are many choices and opportunities for amendment to PRTRs as experience is gained or as objectives are adjusted. The following matrix shows how different design parameters may change as different objectives are emphasised.

Design parameter / Objective	Length of list	Diffuse emissions	Available to community	Government reporting	Accuracy
Community right-to-know	Longer	No	Yes	Yes	Less important
Government information	Shorter	Yes	Not necessarily	Yes	More important
Cleaner production	Longer	No	Yes	Not necessarily	Less important

International Convergence

As more countries develop PRTRs, there is increasing interest in comparing one PRTR with another, and also to harmonise PRTRs in similar parts of the world. The experimentation of different countries with different program parameters has led to an accumulation of experience which can then be drawn on by others. Thus over time a kind of received wisdom is developed which encourages other countries to follow successful models and indulge in less experimentation of their own. International harmonisation of different PRTR systems in a given region is also clearly a force for standardisation of design and for reduction in variation and innovation.

It therefore appears that there are competing pressures influencing the development and design of PRTRs across the world. One set encourages variability and design innovation; the other encourages standardisation and harmonisation. These are of course not the only pressures that influence what a PRTR looks like: other pressures include costs to government or to reporters; community demand for information; industry attitudes to regulation; cultural and political context; and so on. But the weight given to the fundamental objectives which underlie PRTR design will remain influential in determining how each country solves its PRTR design puzzle.

PRTR evolution over the next 20 years

Given these competing pressures and influences, how will these policy instruments evolve in the future? Answering that question requires a good deal of speculation and guesswork but it may be food for thought for those charged with managing and developing these instruments if some ideas are brought forward about possible lines of development. For the purposes of this analysis it may be useful to follow the line of thought already established in this paper, that is, that the direction of development of a PRTR is heavily influenced by the primary objective it is serving or the objective which receives the greatest emphasis.

One line of evolution has already been pioneered in some parts of the world, notably in some US States, and that is an inventory based on toxics use reduction. Such an evolutionary pathway derives from an emphasis on chemicals management, community right-to-know and industry performance, and tries to convert a PRTR from an "end of pipe" instrument to a cleaner production instrument. The concept involves supplying information on inputs of listed chemicals as well as releases and transfers; it is proposed that such an emphasis encourages reduction in the use of hazardous chemicals and therefore has a strong preventive effect. Such instruments have been strongly attacked by industry groups, however, because of the threats involved to the commercial interests of companies through exposure of commercially sensitive and valuable information about production and sales. On the other hand, they are strongly supported by some environmental groups.

An alternative course of evolution is a strengthening of the community right-to-know aspect of PRTR operation so that increasing information is made available to local communities on such matters as the amounts of chemicals stored at any given site or other details of the operation of a facility. One of the implications of this line of evolution is that a PRTR starts being composed of increasingly local data which either cannot be aggregated at a higher level, or which if aggregated cannot be understood or analysed or used. There is thus a loss of the sense of a PRTR being a national data base of information which can be interrogated to provide national level information, as well as being a repository of dis-aggregated information at the facility level.

If emphasis is placed on the need for government to have information for its own purposes, PRTRs could evolve in quite different directions. They could, for example, have modules which collect information on specific areas of government policy interest, for example, it is conceivable to contemplate a PRTR that has accurate focused information on particular suites of pollutants, some for domestic purposes and some for international purposes. Thus there could be an air pollutants module, a module for ozone depleting substances, a water pollutants module, a POPs releases module, a greenhouse gases emissions module, and so on. Making this information available to the public would not necessarily be done in order to meet community right-to-know expectations as normally understood, so much as to ensure that governments are accountable to the community for their performance as providers of environmental quality. It is even conceivable that a PRTR could be used to obtain emissions information which could serve as the basis for a greenhouse gas emissions international trading regime, however far-fetched that may seem.

If the emphasis is on industry performance and cleaner production, a PRTR may take the form of a set of accounting standards under which companies must report the environmental performance of their facilities. Emissions of pollutants is clearly one such aspect of environmental performance, but under this scenario it need not be the only one. The growing interest in corporate environmental reporting is seeing reports covering resource consumption, energy efficiency, waste generation and recovery and so on. If companies were required to report this information by means of an enforced accounting standard the same information could be generated for each facility as is currently generated for PRTR purposes, but it would be reported by each company (in, say, an annual report) rather than being compiled by governments. Under this model there might be no single aggregated data base (although that would still be possible), so some of the advantages of a unified system might be lost; the attraction of this model is that the cost to governments would be very low. If a system of this kind were to work, the accounting standard would need to include clear rules for how data was to be gathered and presented.

It is now common practice for countries to establish and enforce accounting standards for financial information; there is no obvious reason why similar kinds of standards could not be applied to environmental reporting, and used to provide information to the community along the lines of a PRTR but through a different means. Under such a system release and transfer information might be only a subset of a much larger range of information. This model of PRTR evolution might be seen to be driven by both community right-to-know objectives and company performance objectives.

The growth of industry-run schemes which resemble PRTR programs, e.g. reporting under Responsible Care by the chemical industry, suggests that the trend to non-regulatory solutions in many countries may lead to PRTRs which are delivered under non-regulatory arrangements, to a greater or lesser degree. One option is a completely voluntary scheme, but there are others, e.g. reporting by a facility could lead to a relaxation of other regulatory requirements or a different kind of licence. As PRTRs are often thought of as ‘soft’ regulation, with no requirement to change environmental performance, only report on it, approaches that are integrated with the regulatory system and involve trade-offs within could be seen as a departure from the PRTR concept or closely aligned with it, depending on the perspective taken.

The analysis to this point has concentrated on changes in design according to how data would be collected. Perhaps an equal flourishing of possible uses of data can be expected. It is already the case that PRTR data is used by investors, in marketing real estate, and to guide community action, just to choose three examples; possible future uses of the data may only be limited by the imagination of those who access it. Monitoring the increasing number of international, regional, national and local plans and programs aimed at recording or reducing emissions; and ever more tightly tying emissions of pollutants to ambient levels; are only two of the most obvious uses.

In light of the potential wide variation in the direction of PRTR evolution, it may be worth asking whether the trend to international harmonisation of PRTRs will act as a brake on further experimentation. This need not be the case, of course: it may, for example, be possible to have a harmonised ‘tier’ of PRTR for a region, under which sit varied national PRTRs which suit each country’s particular needs; but even that would imply some constraint on the design of the program, to ensure no duplication of obligations for reporting entities. This area of concern will doubtless be food for thought in coming years.

It is apparent that many of the lines of PRTR evolution are potentially reconcilable with each other, and that in practice the likely course of PRTR growth and change will in all probability be a hybrid among competing options. Policy development in the environment field over the past 20 years has been marked by dynamism, change, experimentation and adoption of a multiplicity of complementary approaches. There is no reason to suspect that the next 20 years will be in any way different.

SESSION IX - CLOSING OF THE CONFERENCE

International PRTR Conference: Closing Remarks

Hiroki Sawa, Environment Agency of Japan
Director General
Environmental Health Department

I am Hiroki Sawa, Director General of the Environmental Health Department of the Environment Agency of Japan. I would like to say a few words in closing now, at the end of the International PRTR Conference.

First of all, I would like to express warm appreciation to the main organiser, the Organisation for Economic Co-operation and Development, beginning with Ms. Joke Waller-Hunter, Director of the Environmental Directorate, Claudia Fenerol, and other personnel.

I would like also to thank the Conference Chairs Mr. Mark Hyman and Ms. Susan Hazen, and the Chairs of the working groups.

Also our heartfelt appreciation goes to the persons who came from overseas and all over Japan, for their enthusiastic discussions during these two and a half days, which have helped make the Conference very fruitful.

At this conference, persons from many countries have been able to get together, share their experiences in PRTRs, and discuss the direction of future development -- countries which already have experience in PRTRs, those which are now making efforts to introduce PRTRs, and not only OECD countries but also others from around the world who are interested in PRTRs. I believe that this has been a big achievement.

For the Environment Agency of Japan, which has done its utmost to co-operate in the holding of the Conference, it is a great pleasure to end on this successful note.

As stated by Mr. Kurihara, Parliamentary Vice-Minister of the Environment Agency, at the opening of the Conference, the roles which PRTRs must fulfil for the appropriate environmental management of chemical substances are extremely important. In closing, I sincerely hope that as you return to your countries, the new information and knowledge that you have gained from this Conference will be useful in the development of PRTRs.

Thank you.

ADDITIONAL REPORTS SUBMITTED TO THE CONFERENCE

Provisional Translation

Promotion of Risk Management Activities of Industries for Better Management of Chemicals: Summary of Interim Report

Joint Committee: Safety Measures Committee and Risk Management Committee
Chemical Products Council, Japanese Ministry of International Trade and Industry (MITI)

I. Necessity of the Improvement and Enhancement of Risk Management Activities of Industries

- Since it is not possible to set a regulatory standard for chemical substances whose hazard has not been scientifically associated with adverse health effects, control of such chemical substances has been entrusted to the industries handling them.

- Since chemical substances are handled in multifarious ways, the industries which know the actual conditions of handled chemical substances have a primary responsibility to handle them properly and manage their risk in the most appropriate manner.

- Taking into account the vital importance of protecting human health and the environment, it is necessary to devise innovative measures to improve and enhance risk management activities of industries.

For improving and enhancing risk management activities of industries, measures described in sections II to IV below should be carried out in a comprehensive manner:

II. Rules to Be Established for the Promotion of Risk Management Activities of Industries

1. Material Safety Data Sheet (MSDS)

(1) Acquisition and recognition of chemical hazard and handling information is a prerequisite for better management of chemicals.

- The MSDS system, whose purpose is to ensure the transfer of hazard and handling information at the occasion of trade of a chemical from a supplier to a user, needs to be fully implemented.

- Provision of an MSDS system is mandatory in many developed countries, including the United States, EU countries, Canada, and Australia.

(2) In order to further improve and enhance risk management activities of users of chemical substances, suppliers, such as manufacturers, importers and distributors of chemicals, should be obligated to provide their customers with the MSDS on the occasion of trading chemical substances.

2. Introduction of PRTR

(1) Significance of PRTR

- Promotion of risk management of chemicals by industries.

- Enhancing public awareness concerning environmental emissions status of chemicals.
- Using data collected by the PRTR system for environmental policies and chemical risk management policies conducted by governments.

(2) Steps being taken for introduction of a PRTR system in Japan

The Japanese Chemical Industry Association has been developing estimation methods related to PRTR data, with the support of the Ministry of International Trade and Industry, since 1992. They began to make public the results in an annual emissions report form 1996. Keidanren (The Japanese Economic Federation) has been taking the lead in expanding these efforts to overall industry sectors since 1996. Keidanren issued its first annual emissions status report in 1998, which is the first report to cover all industries and the whole country. The Environment Agency of Japan also conducted a local PRTR pilot project in 1997 and published a report on it in 1998.

(3) Design of PRTR system

Taking into consideration the importance of a PRTR system in promoting chemical risk management activities of industries, the OECD Council recommendation on introduction of PRTR systems and implementation status of PRTR systems in other countries, the Chemical Products Safety Council of the Ministry of International Trade and Industry stressed that the legislative measure for introduction of the PRTR system in Japan needed to be enacted as soon as possible. The following is guidance for design of the PRTR system.

- *Chemical substances subject to PRTR (PRTR chemicals)*

Chemical substances subject to reporting requirements of the PRTR system should be selected based on scientific evidence.

- *Business establishments subject to PRTR reporting requirements*

In principle, all business establishments using PRTR chemicals should be subject to the PRTR reporting requirement. However, *de minimus* thresholds should be set in terms of the size of business establishments and volume of chemicals being handled in each facility.

- *The organisation to which the report on release and transfer of chemicals should be submitted*

Business establishments subject to the annual reporting requirements on the amount of release and transfer of PRTR chemicals should submit their report to the national government. Business establishments' awareness of the amounts of their release and transfer of PRTR chemicals through compilation of the report will encourage them to assess their management activities of chemical substances. Based on the assessment, improvement and enhancement of such management activities will be promoted.

- *Aggregation and publication of data*

(a) Aggregation, compilation, and publication of release and transfer data by the Japanese government

The government should aggregate release and transfer data in terms of chemicals, industrial sectors, business sizes and regions, etc, and make public the aggregated data. Such publication would assist business establishments to know their levels of release and transfer in relevant aggregated categories.

(b) Government's handling of release and transfer data of individual sites

i) Disclosure of site specific data upon request

In order to maintain transparency of the status of chemical management activities being conducted by a business establishment, the government should disclose, upon request, individual site data related to the amount of release and transfer of each PRTR chemical.

ii) Protection of trade secrets

While the government should apply a strict criteria for judging what constitutes a trade secret, it should also protect legitimate trade secrets. Judgement on trade secrets should be made by an administrative organisation which has extensive professional expertise on technologies and the competitive environments in the industries to which a business establishment claiming trade secrecy belongs.

(c) Provision of data to local authorities

In order for local governments to take appropriate measures to enhance control of chemical substances and protect the environment conforming to regional situations, the government should provide collected data, both individual site data as well as aggregated data, to local governments.

- *Estimation of PRTR chemical amounts from non-point sources*

The government should endeavour to collect information and conduct research concerning PRTR chemical emissions from moving sources, such as automobiles, and dispersing sources, such as farmland. The government should make public the results of this research, together with data acquired from business establishments subject to the PRTR reporting requirements.

- *Provision of information and education on the PRTR system as well as technical guidance*

Information and education on the PRTR system should be provided to parties concerned including industries and the public, and a sufficient amount of time before its implementation should be ensured, in order to make good preparation for implementation of the PRTR system. Technical guidance is to be given, particularly to small and medium sized enterprises, on methods for calculating the amount of release and transfer of PRTR chemicals.

- *Collection and building up of a hazard database*

The government should endeavour to construct a hazard database for PRTR chemicals to ensure effective implementation of the PRTR system in Japan.

- *Promotion of risk communication*

Businesses establishments should make an effort to provide the public with information concerning the status of their risk management activities in relation to PRTR chemicals, in order to gain the public's better understanding of their risk management activities. The government should support their efforts by, for example, preparing a guidance manual for risk communication.

(4) Relationship between PRTR system and various environmental regulations

- Establishment and implementation of a PRTR system will promote improvement and enhancement of risk management activities of business establishments and will be greatly preventive against possible adverse effects caused by chemicals.

- If accumulated scientific knowledge reveals the causal relation between the hazard of a PRTR chemical and adverse effect on human health, and if information collected by PRTR presents a possibility that the exposure level of the chemical could cause possible adverse effects on human health, the chemical should be controlled under the relevant regulations, such as the Air Pollution Control Law, Water Pollution Control Law, and the Chemical Substances Control Law.

(5) Risk management activities of business establishments stimulated by the implementation of the PRTR system and the resulting effect on reducing the emissions of PRTR chemicals

It would be worth considering measures to promote industry's voluntary initiative to control and reduce the emissions of PRTR chemicals, in order to ensure effective risk management activities of industries.

Financial incentives should also be considered, which encourage business establishments to invest in upgrading their equipment aimed at enhancing their chemical management.

(6) Expected role of the local government

Local governments are expected to promote risk communication between local inhabitants and business establishments, as well as plan and implement chemical substance control measures, including provision of technical assistance to local business establishments. And they are also expected to plan and implement appropriate environmental policies which meet local environmental situations.

(7) Promotion of industry's initiative to operate a voluntary PRTR system

Industry is encouraged to continue a voluntary PRTR system in business groups, in which member companies have a common interest to control the release and transfer of additional chemicals besides those listed in the national PRTR system.

III. Improvement of Intellectual Basis for Promoting Chemicals Risk Management Activities

1. Promotion of collection and better use of chemical hazard information

(1) Promotion of gathering and better use of chemical hazard information by industries

- In order to promote gathering and effective use of chemical hazard information by industries, a system should be devised that would provide the incentive for industries to gather hazard information.

- It is important to promote effective use of hazard data submitted to the government by industries in the course of implementing relevant regulations, making sure that clear rules and procedures are established to treat trade secrets contained in the data.

(2) Construction of a comprehensive hazard database

The government should construct a comprehensive hazard database for better provision of chemical hazard information to the public and industries. The database should be linked to databases both in Japan and abroad, and should be configured to allow users one-stop access to comprehensive hazard information.

2. Development and dissemination of chemical hazard assessment method

The government should develop, prepare and disseminate internationally standardised methods for testing and assessment of chemical hazard.

3. Fostering specialists in the field of chemical risk management and the establishment of a professional research institute for continuous conduct of chemical hazard/risk assessment

- Specialists who can arrange, systemise and evaluate chemical hazard information should be fostered.

- Establishing a research institute which conducts scientific research and investigation of chemical hazard/risk assessment should be considered. Such institute would be expected to collaborate with other research institutes internationally.

IV. Promotion of International Harmonisation

Japan has to further enhance its participation in international collaborative work in relation to chemical risk management (e.g. risk management programme of the OECD, POPs treaty negotiation, international harmonisation work in the development of evaluation and testing methods for chemical hazard, hazard classification and labelling,

etc). The ministries concerned should make further efforts to harmonise Japanese chemical control systems with international systems.

V. Implementation of the Proposals Made in This Report

- It is essential to take concrete actions, in co-operation with other ministries, including drafting necessary legislation to realise proposals made in this report.

- This council considers it may be necessary to resume its deliberation to consider policy measures reflecting the information obtained through implementation of the PRTR.

- The council welcomes the opportunity to have active exchange of opinions with other councils which belong to other ministries and agencies.

ANNEX I - FINAL STATEMENT

Final Statement
OECD International Conference on PRTRs
9-11 September 1998, Tokyo

The OECD International Conference on PRTRs, through a dialogue involving participants from governments, industry and public interest groups of OECD countries and other UN Member States,

- re-emphasises the recommendations of Agenda 21 and the OECD Council Recommendation on implementing PRTRs and encourages countries to establish PRTR systems and community right-to-know programs;

- recognises the progress made in many countries towards the development and implementation of national PRTR systems;

- encourages all countries without PRTR systems to consider the initiation of national PRTR design processes, and to ensure that all affected and interested parties participate in these processes and have the knowledge and capacity to ensure effective participation;

- encourages the OECD to continue to take the lead in facilitating the international exchange of experience on important issues of PRTR design and implementation;

- calls upon multi- and bilateral development co-operation agencies to support developing countries and countries with economies in transition in securing the incremental cost requirements associated with the design and implementation of national PRTR systems in the initial phase;

- calls upon UNITAR, UNEP and other relevant international organisations, as well as countries with existing PRTR systems, to increase assistance to developing countries and countries with economies in transition to strengthen national capacities and capabilities to design and implement national PRTR systems; and

- calls upon the OECD Secretariat in preparing the 1999 report to Council to provide an analytical description of existing and developing PRTRs, identifying key features that may contribute to success based on experience to date.

ANNEX II - STATEMENT BY NON-GOVERNMENTAL ORGANISATIONS (NGOS)

NGO Recommendations to OECD/UNEP/UNITAR for Incorporating Right-to-Know Principles into PRTRs

OECD International Conference: "PRTRs: National and Global Responsibility" Tokyo, Japan, 11 September 1998

We would like to thank the OECD for affording NGOs the opportunity to again participate in this international process, and for promoting NGO involvement in the development of PRTRs in individual countries. The OECD process to date has been productive, and has established a solid foundation on which to fulfil the Agenda 21 promise of citizen right-to-know. The present conference has underscored the fact that the PRTR experience has been more successful and less difficult than is generally thought.

In order to further the process of implementing PRTRs world-wide, we recommend that the international agencies take the following steps, which have been expressed repeatedly throughout this week's conference.

1. Perform and publish an evaluation of existing PRTRs, particularly in terms of essential minimum refining elements. The evaluation must be made with full NGO participation. Minimum elements of a PRTR include at least the following:

   - An enforceable legal basis for PRTRs;
   - Comprehensive reporting and full public disclosure of chemical-specific, facility-specific and geographically-specific data;
   - Comprehensive reporting of inputs, releases and transfers to all media, including the product medium, and to all waste sites:
   - Periodic (at least annual) collection and analysis;
   - Standardised elements and database structures that allow comparability and effective use of data;
   - Mechanisms for public feedback to ensure continual improvement;
   - Continual and widespread dissemination and easy access to PRTR data and relevant ancillary information, including use of state-of-the-art telecommunications developments.

2. Begin a dialogue with the UN Economic Commission for Europe (ECE), to develop a legally binding international instrument for PRTRs applicable world-wide.

3. Encourage ongoing NGO participation in all aspects of the PRTR process at both national and international levels, and build the capacity of public constituencies to help design, support, use and continually improve PRTRs.

4. Put particular effort into assisting developing countries and countries in transition with construction of PRTRs, with special attention to helping meet obligations of international agreements which exist or are currently under negotiation. such as the Framework Convention on Climate Change Convention (FCCC), the Basel Convention, the ECE LRTAPS Convention protocols on sulphur dioxide, POPs and heavy metals, the WHO/UNEP POPs Convention, the ECE protocol and Convention on Access to Information, and the Convention on Prior Informed Consent (PIC).

5. Facilitate development of one or more regional PRTRs in order to refine database standards, encourage technology transfer, promote data sharing, provide analytical frameworks and otherwise promote international co-operation.

ANNEX III - LIST OF PARTICIPANTS

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ON POLLUTANT RELEASE AND TRANSFER REGISTERS

PRTRs: NATIONAL AND GLOBAL RESPONSIBILITY

9-11 September 1998
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ANNEX IV - AGENDA

OECD INTERNATIONAL CONFERENCE ON POLLUTANT RELEASE AND TRANSFER REGISTERS (PRTRS)

AGENDA

PRTRS: National and Global Responsibility

Rihga Royal Hotel Waseda
Tokyo, Japan
9-11 September, 1998

Hosted by the Environment Agency of Japan

Held in Co-operation with UNEP Chemicals and UNITAR

WELCOME

Welcome to the PRTR Conference!

Over the past few years, Pollutant Release and Transfer Registers (PRTRs) have increasingly become an important tool for governments wishing to obtain data about releases to air, water, soil and wastes transferred off-site. Given the dynamic level of PRTR activity world-wide since UNCED in 1992, this conference is designed to assess the current status and progress of PRTRs -- to take stock of where we are today and to look forward to what still needs to be done.

The objectives of the conference are to (1) share lessons learned from existing or emerging PRTRs and to identify the impediments and opportunities created; (2) to evaluate the national and international role of PRTRs as an environmental policy tool for sustainable development; and (3) to identify future directions and challenges nationally and internationally. To help us meet these objectives, the conference will have both plenary and working group sessions. The plenary sessions are designed to inform you about the current status of PRTRs and to discuss what is needed in the future. Working group sessions are designed to address specific topics of interest so that key issues can be discussed, lessons learned and successes can be shared and ways forward can be clarified.

Over the next few days, we encourage you to actively participate in the conference and take the opportunity to interact with all participants. We hope you will learn more about PRTRs, help us evaluate how they are working, and identify future directions.

We are pleased that you are able to attend the conference and look forward to working with you over the next three days.

OBJECTIVES

- To share lessons learned from existing or emerging PRTRs - impediments and opportunities
- To evaluate the national and international role of PRTRs as an environmental policy tool for sustainable development
- To identify future directions and challenges nationally and internationally

Tuesday, September 8

14h00-18h00		**Registration** at the Rihga Royal Hotel and the Keio Plaza Hotel
18h30		**Reception** Hosted by the Environment Agency of Japan, Royal Hall, Rihga Royal Hotel

Wednesday, September 9

09h15-10h00	**Session I**	**Opening Plenary**
10h00-10h30		**Break**
10h30-12h30	**Session II**	**Plenary**: *PRTR Systems: Experiences in Design and Development*
12h30-14h00		**Lunch** Hosted by the Environment Agency of Japan, Diamond Hall, Rihga Royal Hotel
14h00-16h30	**Session III**	**Concurrent Working Groups***: Sharing Lessons Learned*

Working Group A	Working Group B	Working Group C	Working Group D
Implementing an Effective PRTR Design Process	*PRTR Implementation*	*Outreach, Training and Education Programmes*	*Generating and Reporting PRTR Data*

16h30-17h00		**Break**
17h00-18h00		**Working Groups Report to Plenary**
19h00		**Dinner** Hosted by the Environment Agency of Japan, Hana Room, Keio Plaza Hotel

Thursday, 10 September

09h00-9h45	**Session IV**	**Plenary**: *PRTR Systems: Experiences in PRTR Implementation and Use*
09h45-11h45	**Session V**	**Concurrent Working Groups**: *Evaluating the Role of PRTRs as an Environmental Policy Tool*

Working Group E	Working Group F	Working Group G	Working Group H
Role of a PRTR Nationally and Globally: Focus on Governments	*Role of a PRTR Nationally and Globally: Focus on the General Public and NGOs*	*Role of a PRTR at the Community Level*	*Role of a PRTR Nationally and Globally: Focus on Industry Sector/Reporters*

11h45-12h00		**Break**
12h00-13h00		**Working Groups Report to Plenary**
13h00-14h15		**Lunch** Hosted by the Environment Agency of Japan, Diamond Hall, Rihga Royal Hotel
14h15-16h30	**Session VI**	**Concurrent Working Groups**: *Identifying Future Directions and Challenges*

Working Group I	Working Group J	Working Group K	Working Group L
New and Evolving Uses of PRTR Data	*Estimation Techniques for Small Point and Diffuse Sources*	*The Use of PRTR Data on the Regional and International Level*	*PRTR Development in Transitional and Industrialising Nations*

16h30-17h00		**Break**
17h00-18h00		**Working Groups Report to Plenary**

Friday, September 11

9h00-11h00	**Session VII**	**Plenary**: *Summary of Conference*
11h00-11h30		**Break**
11h30-12h45	**Session VIII**	**Plenary**: *Looking Forward*
12h45-13h00	**Session IX**	**Closing Remarks**

CONFERENCE AGENDA

Tuesday, 8 September, 1998

14h00-18h00 **Registration at the Rihga Royal Hotel and Keio Plaza Hotel**

18h30 **Reception Hosted by Environment Agency of Japan, Royal Hall, Rihga Royal Hotel**

Wednesday, 9 September, 1998

SESSION I - PLENARY
Opening

09h15-10h00 **Co-Chairs:** Susan Hazen, United States Environmental Protection Agency (USEPA), Tokuhisa Yoshida, Environment Agency of Japan, and Mark Hyman, Environment Australia

Welcome: Kenji Manabe, Minister of State, Director-General of the Environment Agency of Japan

Opening Address: Joke Waller-Hunter, Director, Environment Directorate, OECD

Keynote Speaker: Nay Htun, Assistant Administrator and Regional Director, United Nations Development Programme

10h00-10h30 **Break**

SESSION II - PLENARY
PRTR Systems: Experiences in Design and Development

10h30-12h30 **Objective:** To provide an overview of existing PRTRs and systems under development or being pilot tested: perspectives of governments.

Speakers:
- Chris W. Evers, Ministry of Environment, The Netherlands
- Susan Hazen, USEPA
- Mark Hyman, Environment Australia
- Teruyoshi Hayamizu, Environment Agency of Japan
- Achim Halpaap, United Nations Institute for Training and Research (UNITAR)

Discussion Points:
- Highlights of systems (characteristics, goals, etc.)
- Share lessons learned and successes
- Practical experience and insights gained

12h30-14h00 **Lunch** ***Hosted by the Environment Agency of Japan, Diamond Room, Royal Rihga Hotel***

SESSION III - CONCURRENT WORKING GROUPS
Sharing Lessons Learned

14h00-16h30

Working Group A - Implementing an Effective PRTR Design Process

Objective: To review experiences gained by countries in implementing a PRTR design process and to draw generic conclusions which may assist other countries in initiating the process of developing a national PRTR system.

Chair: Achim Halpaap, UNITAR

Working Group B - PRTR Implementation

Objective: To build on the experience of countries in dealing with issues that arise during the implementation and operation of PRTR programmes.

Chair: François Lavallée, Environment Canada

Speakers:
- Luis R. Sánchez Cataño, Instituto Nacional de Ecologia, Mexico
- Pieter Van der Most, Ministry of Environment, The Netherlands
- Steve Humphrey, Environment Agency of the UK

Working Group C - Outreach, Training and Education Programmes

Objective: To present existing and tested strategies for outreach, training and education; to discuss the effectiveness of each strategy and under what conditions they have proven effective; and to identify areas where new strategies need to be developed, tested and implemented.

Chair: Susan Hazen, USEPA

Speakers:
- Steve Russell, Chemical Manufacturers Association, USA
- Mark Winfield, Canadian Institute of Environmental Law and Policy
- Lisa Nichols, Commission for Economic Cooperation (CEC), Canada
- David Roe, Environmental Defense Fund, USA

Working Group D - Generating and Reporting PRTR Data

Objective: To identify an array of alternatives to generating and reporting data from the perspective of both the reporters and the regulatory bodies and to examine the issues and controversies that have arisen over these alternatives in practising PRTR systems.

Co-Chairs: Dorothy Bowers, Merck & Co., USA, and
Tadao Iguchi, Mitsubishi Chemical Corporation, Japan

Speakers:
- Dorothy Bowers, Merck & Co., USA
- Tadao Iguchi, Mitsubishi Chemical Corporation, Japan
- Mark Hyman, Environment Australia

16h30-17h00 Break

17h00-18h00 Working Groups Report to Plenary

19h00 Dinner ***Hosted by the Environment Agency of Japan, Hana Room, Keio Plaza Hotel***

Thursday, 10 September, 1998

SESSION IV - PLENARY
PRTR Systems: Experiences in PRTR Implementation and Use

09h00-09h45 **Objective**: To provide an overview of existing PRTRs and systems under development or being pilot tested; perspectives of industry and non-governmental organisations.

Speakers:
- Keiichi Higuchi, Keidanren (Japan Federation of Economic Organizations), Japan
- Mariko Kawaguchi, Green Consumer Research Group, Japan
- Dorothy Bowers, Environmental Safety and Policy, Merck & Co., USA
- Wilma Subra, Louisiana Environmental Action Network, USA

Discussion Points:
- Share lessons learned and successes
- Practical experience and insights gained

SESSION V - CONCURRENT WORKING GROUPS
Evaluating the Role of PRTRs as an Environmental Policy Tool

09h45-11h45

Working Group E - Role of a PRTR Nationally and Globally: Focus on Governments

Objective: To assess the usefulness of a PRTR for setting priorities, measuring progress and enhancing the reduction of the pollution burden, from a government point of view.

Chair: Luis R. Sánchez Cataño, Instituto Nacional de Ecologia, Mexico

Speakers:
- Patrick Kennedy, USEPA
- Chris Evers, Ministry of Environment, The Netherlands,
- Mark Hyman, Environment Australia
- Teruyoshi Hayamizu, Environment Agency of Japan

Working Group F - Role of a PRTR Nationally and Globally: Focus on the General Public and Non-Governmental Organisations

Objective: To identify the best ways to address public data needs in countries with a PRTR, developing a PRTR, and considering a PRTR, and to explore what is and is not working in meeting public needs for PRTR data.

Chair: Warren Muir, Hampshire Research Institute, USA

Speakers:
- Mariann Lloyd-Smith, National Toxics Network, Australia
- David Roe, Environmental Defense Fund, USA
- Laura Durazo, Proyecto Fronterizo de Educacion Ambiental. A.C., Mexico
- Jeremy Wates, Friends of the Earth, Ireland

Working Group G - Role of a PRTR at the Community Level

Objective: To (1) examine through lessons learned, how PRTRs are used as a tool for community right - to-know, and to (2) discuss how effective PRTRs have been in empowering communities to stimulate pollution reduction.

Chair: Robert Hogner, Florida International University, USA

Speakers:
- Wilma Subra, Louisiana Environmental Action Network, USA
- Mark Winfield, Canadian Institute of Environmental Law and Policy
- Mary Taylor, Friends of the Earth, UK
- John Chelen, The Unison Institute, USA

Working Group H - Role of a PRTR Nationally and Globally: Focus on the Industry Sector/ Reporters

Objective: To (1) identify and describe how the collection of information for, and use of data from PRTRs supports (or detracts from) company-wide environmental goals; and (2) identify elements of a PRTR system that promote (or hinder) better environmental management.

Chair: Phillip Roberts, ICI Chemicals and Polymers Limited, UK

Speakers:
- Ron Outen, Jellinek, Schwartz & Connolly, Inc., Representing the Synthetic Organic Chemicals Manufacturers Association (SOCMA), USA
- Tadao Iguchi, Mitsubishi Chemical Corporation, Japan
- Phillip Roberts, ICI Chemicals and Polymers Limited, UK

11h45-12h00 **Break**

12h00-13h00 **Working Groups Report to Plenary**

13h00-14h15 **Lunch** ***Hosted by the Environment Agency of Japan, Diamond Room, Rihga Royal Hotel***

SESSION VI - CONCURRENT WORKING GROUPS
Identifying Future Directions and Challenges

14h15-16h30

Working Group I - New and Evolving Uses of PRTR Data

Objective: To (1) present some of the innovative uses of PRTR data; to (2) highlight the flexible nature of PRTR systems; and to (3) show how PRTR data is information that can be used to meet the respective needs and goals of governments, industry and the public.

Chair: Susan Hazen, USEPA

Speakers:
- Yuichi Moriguchi, National Institute for Environmental Studies, Environment Agency of Japan
- William Panos, Massachusetts Department of Environmental Protection, USA
- Jeremy Wates, Friends of the Earth, Ireland
- Phillip Roberts, ICI Chemicals and Polymers Limited, UK

Working Group J - Estimation Techniques for Small Point and Diffuse Sources

Objective: To examine the relevance and estimation of the environmental burden by other than large point sources for which a reporting obligation is not feasible and to discuss the need for harmonisation of methodologies for the estimation of emission data.

Chair: Chris W. Evers, Ministry of Environment, The Netherlands

Speakers:
- Shizuko Ota, Environment Agency of Japan
- Pieter Van der Most, Ministry of Environment, The Netherlands,
- Tolentino Moya and Jariya Boonjawat, Southeast Asian Regional Center for START (SARCS), Thailand

Working Group K - Use of PRTR Data on the Regional and International Level

Objective: To explore the existing and potential uses of PRTRs as a tool for measuring the progress of implementation of national commitments to international environmental initiatives and to identify key issues, challenges and opportunities in sharing PRTR data on the regional and international level.

Chair: Osmany Pereira, UNEP Chemicals

Speakers:
- Peter Wicks, European Commission Directorate-General XI, Belgium
- Lisa Nichols, Commission for Environmental Cooperation (CEC), Canada
- Taka Hiraishi, UNEP

Working Group L - PRTR Development in Transitional and Industrialising Nations

Objective: To (1) identify opportunities and challenges of introducing a PRTR as an environmental management tool in transitional and industrialising countries, and (2) to develop practical recommendations which address specifically the needs of these countries towards developing and implementing national PRTR systems.

Chair: Achim Halpaap, UNITAR

16h30-17h00 Break

17h00-18h00 Working Groups Report to Plenary

Friday, 11 September, 1998

SESSION VII - PLENARY
Summary of Conference

9h00-11h00 **Objective:** To summarise outcomes from the conference and to indicate how PRTRs can complement national and international efforts towards sustainable development.

Presentations: Working Group Session Chairs

Discussion Points:
- Summary of outcomes
- Discussion of how a PRTR is working as a tool for sustainable development
- Discussion of how to enhance the use of PRTRs to complement national and international efforts towards sustainable development

11h00-11h30 **Break**

SESSION VIII - PLENARY
Looking Forward

11h30-12h45 **Objective:** To discuss future directions and the potential evolution of PRTRs as well as the next steps for the international PRTR agenda.

Speaker/Chair: Mark Hyman, Environment Australia

Discussion Points:
- Where do efforts need to be focused to help countries wishing to establish a PRTR?
- What can be done to improve PRTRs?
- The evolution of PRTRs – what could a PRTR look like in the future?
- Where should international efforts be focused over the next five years?

SESSION IX - PLENARY
Closing

12h45-13h00

Closing Remarks: Hiroki Sawa, Director-General, Environmental Health Department, Environment Agency of Japan

Working Group Session Guides

SESSION III : SHARING LESSONS LEARNED
Working Groups A-D

Working Group A: Implementing an Effective PRTR Design Process

Chair: Achim Halpaap, United Nations Institute for Training and Research (UNITAR)

Objective: To review experiences gained by countries in implementing a PRTR design process and to draw generic conclusions that may assist other countries in initiating the process of developing a national PRTR system.

Background: Countries which have PRTR systems in place, or which have started work on a national PRTR, have chosen different ways to initiate the development of a national PRTR system. In the case of the United States, for example, national legislation on community right-to-know paved the way for USEPA to design and implement the US Toxic Release Inventory. In the case of Canada, Australia, and Mexico, national multi-stakeholder processes were initiated by the respective national environmental authorities during which important PRTR design questions were addressed through a dialogue involving all concerned parties. In the case of Sweden, the Czech Republic and Switzerland, initial PRTR work focused on working with a select number of companies to implement a PRTR pilot reporting trial through which practical experiences towards designing and operating a national PRTR system have been gained. Each of these approaches provides valuable lessons learned from which other countries may be able to benefit.

Key Discussion Points:

- Which approaches, or aspects thereof, have proven to be successful and effective in initiating/implementing a national PRTR design process and why?
- Which approaches, or aspects thereof, did not achieve their intended objective and why?
- Based on these lessons learned, what are some generic principles to keep in mind when initiating a national PRTR design process?

Working Group B: PRTR Implementation

Chair: François Lavallée, Environment Canada

Objective: To build on the experience of countries in dealing with issues that arise during the implementation and operation of PRTR programmes.

Background: Issues can arise during the implementation of PRTRs or during the operation of programmes that can affect the acceptance of the programme by stakeholders and the quality of the information collected. The main activities of a functioning PRTR programme are:

- Identifying potential reporting facilities;
- Providing reporting guidance, including information for estimating releases;
- Enforcing reporting requirements;
- Ensuring data collection method and methodology;
- Ensuring quality assurance/quality control (QA/QC) of data;
- Processing and analysis of data;
- Ensuring public access to data; and
- Storing data.

Each of these elements presents different challenges for both new and ongoing programmes. By sharing experiences, potential problems during implementation can be minimised.

Change is inevitable even for established programmes in order to respond to implementation issues that arise over the years or in response to new needs or policy directions. In some cases, changes are simply operational modifications that are implemented as part of an existing programme. In other cases, the changes may represent a complete rethinking of the fundamental operation of the programme. Consequently, implementation issues are of concern both for those who are implementing **new** PRTR programmes and for **mature** programmes undergoing significant change. New programmes and mature programmes will benefit from sharing their experiences. Successful implementation of a smooth transition from design to a working programme is essential to the success of a PRTR.

Key Discussion Points:

- Identify critical elements of a programme.
- Implementation issues for new and existing programmes.
- Techniques for mitigating problems/resolving issues.

Speakers

- Luis R. Sánchez Cataño, Instituto Nacional de Ecologia, Mexico
- Pieter Van der Most, Ministry of Environment, The Netherlands
- Steve Humphrey, Environment Agency of the UK

Working Group C: Outreach, Training, And Education Programmes
Chair: Susan Hazen, United States Environmental Protection Agency (USEPA)

Objective: To present existing and tested strategies for outreach, training and education; to discuss the effectiveness of each strategy and under what conditions they have proven effective; and to identify areas where new strategies need to be developed, tested and implemented.

Background: Many countries have implemented PRTR systems over the past decade. These various systems, while individually unique, share some common characteristics, including the use of outreach, training and education programmes to inform information providers and information users about the system, its strengths, its weaknesses and its planned uses. These programmes have evolved in ways which make them as unique as the systems they support and have been tailored to meet the needs of individual stakeholders and to serve very specific purposes. As we move forward internationally on the development of PRTR systems, and as more nations implement this type of strategic environmental management tool, there is much to be shared in the areas of outreach, training and education and undoubtedly, there remain new strategies to be developed and applied. By utilising existing and tested strategies where appropriate, resources will be saved, pilot testing avoided, success assured and harmonization achieved in a seamless and straightforward fashion. Where new strategies need to be developed, joint consultation will assure maximum benefit from resource investments and harmonization of new approaches.

Focus Areas for the Panel: The panel will present papers that represent 4 individual approaches and perspectives on outreach and training.

- **Steve Russell,** Chemical Manufacturers Association, USA
  This presentation will provide insight into the approaches that U.S. industry has taken to assure that the public, the press and others have a full understanding of the relationship between facilities and their home communities.

- **Mark Winfield**, Canadian Institute of Environmental Law and Policy, Canada
  This presentation will provide the perspective of a non-governmental organisation that is focusing on educating the public on how to access and use PRTR-like information. It will present a number of basic uses for PRTR data and identify some of the obstacles involved in public access and government distribution of information.

- **Lisa Nichols**, Commission for Economic Cooperation (CEC), Canada

  This presentation will provide the perspectives of an organisation trying to co-ordinate and use PRTR data from a number of different nations. It will also address the varying responses and attitudes towards dissemination of data in various countries.

- **David Roe**, Environmental Defense Fund, USA
  This presentation will provide the perspective of a well established environmental group that has been working with the US PRTR for a decade. It will highlight a number of sophisticated tools for using PRTR data and insight into informed public involvement in environmental decision-making.

Working Group D: Generating and Reporting PRTR Data

Co-chairs: Dorothy Bowers, Merck & Co., USA
Tadao Iguchi, Mitsubishi Chemical Corporation

Objective: To identify an array of alternatives to generating and reporting data from the perspective of both the reporters and the regulatory bodies and to examine the issues and controversies that have arisen over these alternatives in practising PRTR systems.

Background: The underpinning of any PRTR system is the data on which the registry is based, yet how the data is generated by the reporter and how the data is tabulated and released by the regulatory body are often given scant attention prior to the implementation of the registry. Real life experience and pilot programs have identified issues that should be reconciled **before** the registry begins operations.

Key discussion points:

- The goals of a PRTR system must be defined in order to determine what data must be generated and how the data will be reported to the regulatory body and by the regulatory body to the public.
- The scope of the PRTR system must clearly define what kinds of facilities must report and what releases/transfers are to be reported. A high ratio of collected emissions data verses total emissions is important as a basis for determining reduction measures.
- The capacity of the regulated entities to provide data must be considered when the chemicals are selected and the accuracy is specified. The capacity of the regulatory body to manage data collection and report accurately and on a timely basis must also be considered.
- System boundaries must be defined for facilities and clearly described in public reports.

Questions for discussion:

- Is data to be reported for specific chemicals only or for total emission streams? Are the chemicals to be identified by the reporter according to a threshold of use or a threshold of release?
- What “releases and transfers” are reported; only those that reach the environment or only those that leave the facility or all of those that exit a process? How is on-site recycling or treatment considered?
- Are only releases and transfers from processes counted; or are releases from support facilities included such as power plants and office buildings?
- What are the options for data generation: estimation, monitoring, mass balance, or other factors? How can we determine the most cost effective option for different situations?
- How are releases/transfers handled when they are from: (i) jointly owned facilities; (ii) from facilities that are transferred from one owner to another; (iii) from facilities that are operated on a site by a separate corporate entity; (iv) from facilities that are operated jointly on a separate site for several other facilities?

- How does the regulatory body characterise the releases/transfers if some directly reach the environment and others are partially destroyed whereby only a portion reaches the environment?

- Is data for previous years corrected to reflect improved data generation techniques; changes in reporting requirements; or deletions from the chemical list? If so, how is the correction system managed?

Presentations:

- **Dorothy Bowers**, Merck & Co., USA
- **Tadao Iguchi**, Mitsubishi Chemical Corporation, Japan
- **Mark Hyman**, Environment Australia, *National Pollutant Inventory, Industry Handbooks*

SESSION V: EVALUATING THE ROLE OF PRTRs AS AN ENVIRONMENTAL POLICY TOOL
Working Groups E-H

Working Group E: Role of a PRTR Nationally and Globally: Focus on Governments
Chair: Luis R. Sánchez-Cataño, Instituto Nacional de Ecologia, Mexico

Objective: To assess the usefulness of a PRTR for setting priorities, measuring progress and enhancing the reduction of the pollution burden, from a government point of view.

Background: The goal of any PRTR is not simply to collect data, but to provide information that can be used by government, industry and the public to improve the sound management of chemicals. The use of a PRTR can provide considerable benefits to a government, such as establishing environmental priorities, measuring the progress of the environmental policies and providing information that can be used in other environmental regulations.

Key Discussion Points:

- Potential roles for a national PRTR:
- Environmental policy framework;
- Environmental performance of reporting facilities;
- Permitting and compliance of regulated facilities concerning discharges to air, water and land;
- Public access to facility level information;
- Pollution prevention, source reduction and waste minimisation;
- Air quality management (greenhouse gas reduction plans);
- Water pollution control;
- Environmental health risk analysis and emergency response; and
- Exposure assessment, risk assessment, risk analysis, etc.

- Issues that could affect the potential of PRTRs:
- Quality assurance and quality control of reported data;
- Information management and data dissemination;
- Data background information use and relationship with other data bases; and
- Costs

Expected Outcome:

Based on the outcomes of this session, the working group will draft recommendations to the conference on future actions needed to overcome barriers to achieving an enhanced use of PRTR information.

Speakers:

- Patrick Kennedy, USEPA, *Comment on Pollutant Release and Transfer Registers (PRTRs) from the viewpoint of Environment Exposure Assessors*
- Chris Evers, Ministry of Environment, The Netherlands,
- Mark Hyman, Environment Australia
- Teruyoshi Hayamizu, Environment Agency of Japan

Working Group F: Role of a PRTR Nationally and Globally: Focus on the General Public and Non-governmental Organisations

Chair: Warren Muir, Hampshire Research Institute, USA

Objective: To identify the best ways to address public data needs in countries with a PRTR, developing a PRTR, and considering a PRTR, and to explore what is and is not working in meeting public needs for PRTR data.

Background: The public and non-governmental organisations have been major users of PRTR data, where such systems exist. Representatives of the public and non-governmental organisations are participating on national committees in most of the countries seeking to design such systems. In addition, citizens' environmental rights are being defined internationally, including the right to data, such as are provided by PRTRs.

This working group will consist of a series of presentations by a panel of representatives of non-governmental organisations (NGO) and the public from countries with PRTRs, ranging from the well established to as yet to be developed, followed by a wide ranging discussion on the need for PRTR data and on public uses of such data from a national and global perspective.

Key discussion points:

- The public's need for environmental data and right to information;
- Key characteristics of PRTRs that meet public needs;
- New uses for PRTR data and systems of PRTR data dissemination; and
- What has worked and not worked in meeting public needs for PRTR data and how this depends upon the circumstances of individual countries.

Questions for discussion:

- What are the differences in public needs for PRTR data between developed and lesser developed countries?
- In what ways are the need for PRTRs addressed by international treaties/conventions?
- What types of reports using PRTR data have had the greatest impact on the environmental performance of the reporting industry?
- What means of data dissemination best meet the needs of the public in different countries?
- What are some of the major trends in public use of PRTR data?

- Does public interest in such data diminish over time?

Presentations:

- **Mariann Lloyd-Smith**, National Toxics Network, Australia, *National Pollutant Inventory (NPI)- A National Environment Protection Measure (NEPM)*
- **David Roe**, Environmental Defense Fund, USA
- **Laura Durazo**, Proyecto Fronterizo de Educacion Ambiental, A.C., Mexico, *Challenges and Opportunities of Meeting Public Needs Through NGO Involvement in the PRTR System in Mexico*
- **Jeremy Wates**, Friends of the Earth, Ireland

Working Group G: Role of a PRTR at the Community Level

Chair: Robert Hogner, Florida International University

Objective: To (1) examine through lessons learned, how PRTRs are used as a tool for community right - to-know, and to (2) discuss how effective PRTRs have been in empowering communities to stimulate pollution reduction.

Background: A rich history of community uses of PRTRs is being developed as PRTRs are adopted and developed. Indeed, the unique effectiveness of PRTRs for serving a multiplicity of "sustainability-related" interests and uses originates in community involvement in national PRTRs as they are developed, implemented, and improved over time. Our discussion should focus on sharing the lessons learned — ***the good, the bad and the ugly*** — that this history offers us. These shared national experiences should offer the potential for PRTRs to be — globally, nationally, and locally — even more effective.

Key Discussion Points:

- *Community*, across nation boundaries, means different things. How do we, perhaps even should we, increase the likelihood of strong community involvement in PRTR development where resistance to such might be found in political, historical, or cultural tradition?

- The strength of PRTRs over other tools for managing relations between community and physical environment is in its systematic use of public disclosure of relevant information.

Questions: How do we enhance the capabilities of varying community groups, i.e. PRTR stakeholders, to effectively and efficiently use PRTR information?

- PRTR stakeholders have differing and sometimes competing, perhaps even opposing, interests. PRTR experience offers us models both of community conflict and of community co-operation as PRTR-related public issues originated and are resolved.

Questions: Is co-operation or conflict 'natural' to PRTR community uses? Are conflict and co-operation differing stages of PRTR community use? Is either conflict or co-operation more desirable given the overall goal of sustainability or are both equally effective?

Presentations:

- **Wilma Subra**, Louisiana Environmental Action Network, USA, *Evaluating the Role of a PRTR at the Community Level*
- **Mark Winfield**, Canadian Institute of Law and Policy, Canada
- **Mary Taylor**, Friends of the Earth, UK
- **John Chelen**, The Unison Institute, USA

Working Group H: Role of a PRTR Nationally and Globally: Focus on Industry Sector/Reporters
Chair: Phillip Roberts, Imperial Chemical Industries (ICI), UK

Objective: To (1) identify and describe how the collection of information for, and use of data from PRTRs supports (or detracts from) company-wide environmental goals; and (2) identify elements of a PRTR system that promote (or hinder) better environmental management.

Background: Over the last few years, there has been a tremendous growth in the amount of environmental information companies are providing to the government and the general public. In some cases, this has been in response to requests made by governments; in other cases, companies have taken upon themselves to voluntarily collect and publicly report environmental data. While collecting, compiling and reporting data obviously imposes costs on a company, evidence suggests that this exercise can also provide benefits. For instance, after reviewing these data, some companies have realised that a not insignificant amount of their products were being released as pollutants and thus simply wasted. And, with a finite amount of resources available to manage environmental releases, companies with PRTR-like data available can identify problematic emission release points and target resources where they can do the most good.

Key Discussion Points:

Questions that will be addressed by the working group include:

I. *Collection of PRTR data*
   A. For a company currently subject to PRTR reporting: Does the collection of this information follow typical internal management processes that existed before PRTRs, or did new ones have to be developed (e.g., following the introduction of PRTR reporting, is the work of the persons responsible for air, water and waste discharges more integrated than before)? If there has been a change due to PRTR reporting, has this been a positive development?
   B. For a company not subject to PRTR reporting: would the collection of such data change the way information is managed in the company's environment department?

II. *Use of PRTR data*
   A. Do companies use data collected for PRTR reporting for internal purposes? If so, describe such uses.
   B. Are there other internal uses of such data which could be beneficial, but have not been attempted yet? If so, why not?
   C. What role does PRTR data play in the setting of environmental priorities and as a tool for tracking progress?

III. *Design of PRTR Systems*
   A. Are there changes that could be made to PRTR reporting forms that would facilitate the internal use of the information collected for environmental management purposes (e.g., the definitions used in PRTR reporting requirements should be consistent with the ones used in other government regulations which would facilitate the comparison of results)?

B. Are there aspects of the reporting process that limit a company's ability to use PRTR data internally (e.g., the PRTR reporting year does not match a company's financial reporting year/companies who operate internationally)?
How could PRTRs be designed to help companies better manage the environment?

Presentations:

- **Ron Outen,** Jellinek, Schwartz & Connolly, Inc., Representing the Synthetic Organic Chemicals Manufacturers Association (SOCMA), USA
- **Tadao Iguchi**, Mitsubishi Chemical Corporation, Japan
- **Phillip Roberts**, ICI Chemicals and Polymers Limited, UK

SESSION VI : IDENTIFYING FUTURE DIRECTIONS AND CHALLENGES
Working Groups I-L

Working Group I: New and Evolving Uses of PRTR Data
Chair: Susan Hazen, United States Environmental Protection Agency (USEPA)

Objective: To present some of the innovative uses of PRTR data; to highlight the flexible nature of PRTR systems; and to show how PRTR data is information that can be used to meet the respective needs and goals of governments, industry and the public.

Background: One of the most important features of PRTR systems is their flexibility. This flexibility encourages new and innovative uses of the PRTR system and its data for addressing environmental concerns. The benefit is the ability to use PRTR data to make more effective and efficient decisions for reducing releases and transfers of chemicals. Innovative uses by one party also can be emulated by other parties. These parties might simply copy the new use of the PRTR data or it might build on the innovation, which can be copied, and improved upon, by still other parties.

There are two aspects to the flexibility. One is in the design of the PRTR system. While it is vital to note that PRTR systems must be designed to meet each nation's needs and goals, it also should be noted that PRTR systems can meet both international and local objectives. It is possible, for instance, for a group of nations to decide to establish base-line data that each nation should collect. The goal is to allow the nations to track and compare progress internationally. Similarly, local governments can build on their national PRTR systems to gather additional data. This data, collected from local facilities, can help the local government address local concerns.

A second aspect of the flexibility of PRTR systems is the ability for each sector of society to use the data for its particular needs. PRTR data is information that can be used in conjunction with other information to better understand an environmental situation. There is a strong history of how governments, the public, and industry have used PRTR data with other information to reduce the releases and transfers of chemicals. It is how each of these parties uses the PRTR data to achieve these results that leads to the many new and innovative uses of PRTR data.

Focus Areas for the Panel: The panel will present papers that represent 4 individual approaches and perspectives on new and evolving uses of PRTR data.

- **Yuichi Moriguchi**, Environment Agency of Japan, *Potential Use of PRTR Data for GIS-based Simulation/Presentation System on Risk Assessment, Management and Communication*

This presentation will focus on the use of PRTR data in the creation of an integrated model for area-based quantitative risk assessments. The model is constructed on Geographic Information System (GIS) software. Mr. Moriguchi will highlight the relationship between the point-source information available from PRTR systems with other types of information obtainable from GIS systems, such as socio-demographic statistics.

- **William Panos**, Massachusetts Department of Environmental Protection, USA

This presentation will discuss the role that governments can play in working with industry and local communities. In particular, this presentation will show how local governments can build on the national PRTR systems to meet the specific needs of that region.

- **Jeremy Wates**, Friends of the Earth, Ireland

This presentation will highlight the role of PRTR systems at the international level. The European Union has called on its 15 member nations to implement PRTR systems. By establishing base-line data that should be collected by all the PRTR systems, the EU will be able to obtain comparable PRTR data across Western and Central Europe.

- **Phillip Roberts**, Imperial Chemical Industries, (ICI), UK, *The Use of the ICI Environmental Burden Approach to Prioritise Environmental Improvement Projects.* This presentation will show how PRTR data can be used by industry to achieve environmental policies. ICI has used PRTR data to prioritise chemicals of concern. In the process, ICI's facilities can focus their resources to reduce the use and emissions of the targeted chemicals.

Working Group J: Estimation Techniques for Small Point and Diffuse Sources

Chair: Chris Evers, Ministry of Environment, The Netherlands

Objective: To examine the relevance and estimation of the environmental burden by other than large point sources for which a reporting obligation is not feasible and to discuss the need for harmonisation of methodologies for the estimation of emission data.

Introduction: A pollutant emission register can be based on reported, calculated or estimated emission data depending on the nature and the size of the polluting sources. Polluting sources can be related to their size in the following three categories:

a) large point sources of large industrial facilities;
b) small point sources of small and medium-sized enterprises;
c) diffuse sources of traffic and transport, agriculture and residents.

Key Discussion Points:

Each topic will include a short introduction (5 to 10 minutes) by a facilitator (see below), followed by discussions.

- "Estimation methods" for the emissions by different source categories:
  a) Estimation methods for small and medium-sized enterprises in different industrial branches
  b) Estimation methods for traffic and transport
  c) Estimation methods for agriculture and land use
  d) Estimation methods for consumers and product use

- Information needs -- the use of guidance manuals with available estimation techniques:
  a) Statistical information on activity rates
  b) Guidebooks with emission factors
  c) Available documentation

Presentations:

- **Shizuko Ota**, Environment Agency of Japan, *Estimation of Release and Transfer from Non-Point Sources in the PRTR Pilot Program in Japan*
- **Pieter Van der Most**, Ministry of the Environment, The Netherlands, *Estimation Methods for Traffic and Transport/Estimation Methods for Consumers and Product Use*
- **Tolentino Moya and Jariya Boonjawat,** Southeast Asia Regional Center for START (SARCS), Thailand

Working Group K: The Use of PRTR Data on the Regional and International Level

Chair: Osmany Pereira, UNEP Chemicals

Objective: To explore the existing and potential uses of PRTRs as a tool for measuring the progress of implementation of national commitments to international environmental initiatives and to identify key issues, challenges and opportunities in sharing PRTR data on the regional and international level.

Background: The use of PRTRs can provide considerable benefits to governments, the public and industry. It provides a set of data critical to governments for pollution prevention and control and for chemicals management. It promotes voluntary industry reductions in releases of substances of concern and engages citizens about possible risks in their communities.

But there are other uses of PRTRs that go beyond national considerations. There are a number of regional agreements and global environmental conventions that have requirements that may be met using PRTRs. This working group will focus on exchanging experiences on this subject and identifying future directions in this regard.

Discussion: Discussions will focus on identifying the challenges/constraints to and the opportunities/benefits from sharing PRTR data beyond national boundaries. It should cover technological, political, economical and social implications across different interested parties - governments, industry, communities, international and non-governmental organisations.

Expected Outcome:

Based on the outcomes, the working group will draft recommendations to the conference on future actions needed to overcome the possible impediments to making better use of PRTR information internationally.

Presentations:

- **Peter Wicks**, European Commission Directorate-General XI, *Development of a European Polluting Emissions Register*
- **Lisa Nichols**, Commission for Environmental Cooperation (CEC), Canada, *The Use of PRTR Data Internationally*
- **Taka Hiraishi**, UNEP, PRTR as a Tool for Monitoring Progress of Global Environmental Commitments

Working Group L: PRTR Development in Transitional and Industrialising Countries
Chair: Achim Halpaap, UNITAR

Objective: To identify opportunities and challenges of introducing a PRTR as an environmental management tool in transitional and industrialising countries and to develop practical recommendations which address specifically the needs of these countries towards developing and implementing national PRTR systems.

Background: A growing number of developing countries and countries, with economies in transition, have initiated or expressed interest in developing a national PRTR system. Countries where formal national PRTR activities have been initiated over the past years include, for example, Cuba, Mexico, the Czech Republic, Slovakia, and the Republic of South Africa.

In reviewing the experience gained in these countries, the motivating factors for initiating national PRTR systems seem to manifold and include, *inter alia*, the opportunity of PRTRs to:

- provide all interested and concerned parties both inside and outside of government with consolidated information on local and national pollutant releases and transfers;
- identify opportunities for pollution prevention opportunities at the source;
- assist national decision makers in setting priorities for reduction of risk associated with priority pollutants;
- streamline existing reporting requirements into one single, multi-media emission inventory; and
- meet reporting obligations under international and/or regional conventions.

At the same time, however, some obstacles have been identified by transitional and industrialising countries once they moved from the PRTR design stage to the implementation of a national PRTR system.

Key Discussion Points:

- Which entities/groups are interested in having access to PRTR data in transitional and industrialising countries, both within and outside of government?

- What, if any, are the main opportunities/intended uses of PRTR systems in transitional and industrialising countries, e.g., are they considered an effective tool to assist companies in identifying pollution prevention opportunities at the source, do they contribute to streamlining reporting requirements?

- What, if any, are the main constraints in implementing PRTR systems in transitional and industrialising countries (e.g., human resource constraints, technical issues, financial limitations, political commitment) and how can they be addressed?

HOTELS

Rihga Royal Hotel Waseda
1-104-19 Totsuka-machi, Shinjuku-ku,
Tokyo 169-0071
Tel: 03 5285 1121
Fax: 03 5285 4321

Keio Plaza Hotel
2-2-1 Nishi-shinjuku, Shinjuku-ku,
Tokyo 160-8330
Tel: 03 3344 0111
Fax: 03 3345 8269

TRANSPORT

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Keio Plaza Hotel. If you are staying at the Keio Plaza hotel, you have two options:

(1) Airport Limousine to Keio Plaza Hotel (3000 yen). You will find the counter for the Airport Limousine in the airport arrivals lobby; or

(2) Narita Express (NEX) train to Shinjuku Station (2910 yen on weekdays, 3110 yen on weekends). As you exit from customs at Narita Airport, look for signs directing you downstairs to the Narita Express ticket counter and the platform. From Shinjuku Station, it is a five minute walk to the Keio Plaza Hotel.

The Airport Limousine is the most direct and convenient of the two options

Rihga Royal Hotel. If you are staying at the Rihga Royal Hotel, you have two options:

(1) Airport Limousine to Keio Plaza Hotel (3000 yen). You will find the counter for the Airport Limousine in the airport arrivals lobby. From the Keio Plaza Hotel, take a taxi to the Rihga Royal Hotel (about 15 minutes and 1500 yen); or

(2) Narita Express (NEX) train to Shinjuku Station (2910 yen on weekdays, 3110 yen on weekends). As you exit from customs at Narita Airport, look for signs directing you downstairs to the Narita Express ticket counter and the platform. From Shinjuku Station, take a taxi to the Rihga Royal Hotel (about 15 minutes and 1500 yen).

Daily Transport Between Keio Plaza Hotel and Rihga Royal Hotel (where Conference will be held):

(1) Chartered buses to the Rihga Royal Hotel will be provided each morning and each evening for participants staying at the Keio Plaza Hotel.

(2) Transportation will also be provided to the Reception Dinner and the Cocktail from/to Keio Plaza Hotel. A bus schedule will be provided to you when you register.

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