Consultation Regulation Impact Statement – Management of chemical environmental risks

National Environment Protection Council Service Corporation (NEPCSC)

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Abbreviations

Abbreviation	Description
ABS	Australian Bureau of Statistics
AMSA	Australian Maritime Safety Authority
APS	Australian Public Service
APVMA	Australian Pesticides and Veterinary Medicines Authority
BAU	Business as usual
BDE	Brominated Diphenyl Ether
CFCs	Chlorofluorocarbons
CIE	Centre for International Economics
COAG	Council of Australian Governments
DDT	Dichloro-diphenyl-trichloroethane
ECHA	European Chemicals Agency
EPA	Environmental Protection Agency
EPHC	Environment Protection and Heritage Council

[1] Liability limited by a scheme approved under Professional Standards Legislation.

Abbreviation	Description
FRLI	Federal Register of Legislative Instruments
FTE	Full time equivalent
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
HBCD	Hexabromocyclododecane
HCFCs	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
ICNA Act	*Industrial Chemicals (Notification and Assessment) Act 1989*
IGA	Intergovernmental agreement
IMAP	Inventory Multi-tiered Assessment and Prioritisation
LIA	*Legislative Instruments Act 2003*
MOU	Memorandum of Understanding
NChEM	National Framework for Chemicals Environmental Management
NEPCSC	National Environment Protection Council Service Corporation
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NOHSC	National Occupational Health and Safety Commission
NTC	National Transport Commission
ODSs	Ozone Depleting Substances
OECD	Organisation for Economic Co-operation and Development
PACIA	Plastics and Chemicals Industries Association
PCB	Polychlorinated Biphenyls
PEC	Priority Existing Chemical
PFCs	Perfluoroalkyl compounds
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
POPs	Persistent Organic Pollutants
ppb	Parts per billion
PV	Present Value
PwC	PricewaterhouseCoopers
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RIA	Regulatory Impact Assessment
RIS	Regulation Impact Statement
SAICM	Strategic Approach to International Chemicals Management
SCEW	Standing Council on Environment and Water

Abbreviation	Description
SES	Senior Executive Service
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SGG	Synthetic Greenhouse Gases
SPF	Scheduling Policy Framework
tbd	To be determined
TSCA	*Toxic Substances Control Act*
US	United States of America
VET	National Vocational Education and Training regulator
WELS	Water Efficiency Labelling and Standards

Executive summary

The purpose of this Consultation Regulation Impact Statement (Consultation RIS) is to explore options to address gaps in environmental protection arising from infrequent and inconsistent implementation of the risk management actions needed to reduce the environmental impact of industrial chemicals, as requested by the Council of Australian Governments (COAG) arising from the Chemicals and Plastics Regulatory Reform Agenda.

The problem

The Environment Protection and Heritage Council (EPHC), the Productivity Commission and COAG have agreed that the regulatory framework surrounding the management of chemical environmental risks in Australia is incomplete and needs improvement to address unmanaged risks to the environment which could result in loss of ecosystem function, contamination of water or soil, effects on human health through exposure in air, water and soil, loss of amenity and costly remediation.

In general, responsibilities for regulation are shared between jurisdictions. The Commonwealth undertakes most hazard and risk assessment at a national scale and the states and territories typically deal with on-ground risk management and control of use. The key problem in the environment area is that jurisdictions are often not undertaking the risk management actions recommended as needed to protect the environment from those industrial chemicals[2] that have been identified by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) as likely to have environmental impacts unless managed appropriately.

The reasons for this low uptake of NICNAS recommendations (as noted by the Productivity Commission in its 2008 *Research Report on Chemicals and Plastics Regulation*) include:

- the lack of a national, coordinating body to transform recommendations made by NICNAS about the management of environmental risks into operational risk management decisions for nationally consistent implementation by jurisdictions
- limited provision for consultation with environmental agencies during the development of the NICNAS risk management recommendations
- the absence of a formal, legislative link between recommendations made by NICNAS about the management of environmental risks and action from environmental regulators in each jurisdiction.

These gaps reflect the shorter history of chemical regulation to protect the environment compared with longer established sectors, such as workplace health and safety, which already have in place mechanisms to address similar problems. In effect, the regulatory system for environmental protection is not yet complete.

The low frequency of adoption and implementation of NICNAS recommendations is likely to lead to environmental damage. It also undermines national regulatory effectiveness, as some environmental risks identified by NICNAS may be left unaddressed (or only partially addressed) in some jurisdictions.

Variation between jurisdictions in implementing risk management requirements for industrial chemicals can lead to confusion for regulated businesses, give rise to differences in compliance costs between businesses across state borders, and increase the costs for some businesses operating in more than one jurisdiction (to the extent that jurisdictions have adopted and implemented NICNAS environmental risk management recommendations).

[2] Under the Commonwealth *Industrial Chemicals (Notification and Assessment) Act 1989*, an industrial chemical is any chemical that has an industrial use (s 7(1)). The term 'industrial use' is defined to mean a use other than an excluded use (s 7(2)). The term 'excluded use' is defined in s 7(2) and includes use as an agricultural or veterinary chemical, therapeutic use and use as certain foods or food additives..

The problem needs to be addressed. Priority existing chemicals recently assessed and needing management include chemicals of global concern. Of the new chemicals being assessed by NICNAS, typically 10 to 20 per annum are assessed as likely to have environmental impacts if not appropriately managed. Chemicals recently assessed include some which, if discharged to aquatic environments, would be likely to cause significant fish kills and the destruction of other aquatic organisms. Such discharges could lead to a long-term aquatic ecosystem collapse, especially in enclosed water-bodies. In addition to the direct environmental impact of these chemicals, there may be costly impacts on water quality for human consumption, amenity, fisheries and watering of livestock.

In addition, over the next decade, the number of industrial chemicals requiring action by jurisdictions will increase markedly as NICNAS, with the help of the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC), begins the assessment of the 38,500 industrial chemicals that were grandfathered into the Australian Inventory of Chemical Substances. These chemicals, currently allowed to be used in Australia, have not previously been assessed for their health and environmental risks. The first 3,000 of these chemicals will be assessed over the next four years, perhaps identifying 300 chemicals requiring environmental risk management. This means that environment agencies in each jurisdiction will need to make decisions on environmental risk management actions for perhaps 80 new and existing chemicals per year if significant environmental harm is to be avoided.

Other problems limiting the effectiveness of the regulatory framework for managing chemical risks to the environment are:

- the absence of a mechanism (such as labelling) to communicate environmental risk management information to users of at-risk chemicals
- the lack of a cost effective, well-designed framework for implementing monitoring of high risk chemicals in the environment to determine whether regulatory actions are effective.

Objectives

The objective of government action is to protect the environment and the Australian people by improving the effectiveness and efficiency of risk management actions for industrial chemicals that have the potential to cause environmental harm.

Options to address the problem

To address the identified gap in environmental protection, this Consultation RIS assesses three options for reform (relative to the base case, or status quo). These aim to create collaborative and cooperative approaches for reaching national decisions on environmental risk management.

Option 1

Non-statutory development of national environmental risk management decisions

National environmental risk management decisions would be developed by a Working Group for the Standing Council on Environment and Water (SCEW), in the form of model legislative provisions. These model provisions would not have legal force, but would be drafted to be incorporated by jurisdictions into their legislative frameworks with as little change to the model provision text as practicable.
This option would not include a statutory framework similar to that of Option 2 and Option 3. Accordingly, the process for making risk management decisions would not be underpinned by statutory timeframes or appeal mechanisms. Furthermore, jurisdictional adoption of the national decisions would be voluntary.

Option 2

National decision developed under Commonwealth legislation and adopted and implemented using Commonwealth, state and territory legislation

Decisions on environmental risk management conditions would be made by a delegate of the SCEW, or Commonwealth environment minister, in accordance with new Commonwealth legislation. Where the NICNAS assessment report identifies that specific environmental risk management control are required, the delegate would refer the report to an independent advisory body (established under the Commonwealth legislation) and consult with state and territory agencies. Once made, the decision would automatically be incorporated into, and would be enforced under state and territory legislation and (to some extent) Commonwealth legislation.

Option 3

New risk management framework fully implemented under single national system

The national environmental risk management decisions would be made under Commonwealth legislation. The Commonwealth legislation would also specify compliance and enforcement measures that would apply nationally (either directly under the Commonwealth legislation, or also through state and territory legislation mirroring or applying by reference the Commonwealth legislation). This is in contrast to Option 2, which relies on the individual compliance and enforcement measures already present in state and territory legislation. This model of implementation would require legislative change from current arrangements.

Impact analysis

Table 1 summarises the findings of the impact analysis. Chapter 6 and Appendix F provide more detail and an explanation of the methodology used to estimate impacts (including key modelling assumptions).

Table 1: Impact analysis summary (Present Value,[3] over 10 years)

	Option 1	Option 2	Option 3
Costs			
Industry	$65.5 million	$108.9 million	$108.9 million
Government	$11.2 million	$18.3 million	$27.8 million
Total	$76.7 million	$127.2 million	$136.7 million
Benefits	$85.7 million	$142.8 million	$142.8 million
Net benefit	**$9 million**	**$15.6 million**	**$6.1 million**

Notes: Present values have been calculated using a discount rate of 7 per cent.

[3] Present Value is a concept used in Economics and Finance to take account of the time value of money (i.e. that a dollar in the future is worth less than a dollar today). It achieves this by factoring down future costs and benefits (using a discount rate) into present values – allowing costs and benefits from all relevant time periods to be compared directly. Present Values are generally represented as the aggregate of all costs and benefits over a set time period (in the case of this Consultation RIS, 10 years).

Each of the options should increase the effectiveness and efficiency of the regulatory framework for managing chemical environmental risks relative to the status quo. They would achieve this by ensuring that all environmental risks identified by the NICNAS risk assessment process would be addressed (through the development of a risk management decision), and by increasing the likelihood that all jurisdictions would adopt and implement risk management decisions (reducing the potential for regulatory gaps). It is important to note that the estimated benefits may be underestimates given that it is difficult to measure all aspects of environmental harm that would occur if no risk management was implemented. Similarly, there will be non-quantified environmental benefits such as protection of biodiversity and of ecosystem services and benefits to industry such as strengthening public confidence in the effectiveness of the chemicals regulatory system.

The options would centralise the process of making risk management decisions (allowing governments to realise efficiencies) and increase the consistency of environmental outcomes and requirements – which would, in turn, reduce the burden on relevant businesses that operate across more than one jurisdiction.

Options 2 and 3 would likely be more effective and efficient than Option 1. Option 3 would result in greater national consistency than Option 2.

It should be noted that:

- The impact analysis outlined in Table 1 does not take into account the costs and benefits of any mandatory labelling scheme that could be implemented in the future. The details of how environmental labelling would work are still in development. Furthermore, any finalised environmental labelling scheme would be subject to a separate RIS process.

- The Decision RIS will incorporate a higher standard analysis (e.g. the distributional impacts on each of the jurisdictions), drawing on additional information collected through the public consultation process and PwC's ongoing liaison with Australian governments.

- This Consultation RIS does not explore funding options but encourages the submission of views on funding arrangements. A range of alternative options for resourcing the proposed risk management framework could be considered, including cost recovery arrangements.

Conclusion

The Consultation RIS has assessed Option 2 as representing an improvement over the base case and is the preferred option for the purpose of public consultation. This conclusion is underpinned by the following reasoning:

- All options, if they were consistently applied, would represent an improvement over the base case, as they would ensure that all environmental risks identified by the NICNAS risk assessment process are addressed in a national risk management decision. Relative to the base case, each option would also increase the extent to which risk management decisions are adopted consistently by jurisdictions – reducing, in turn, the potential for regulatory gaps between jurisdictions and the burden on some businesses that operate across more than one jurisdiction

- While Option 1 is the least costly of the options (at least in terms of quantified costs), the voluntary nature of the regulatory framework it would introduce means that it would be less effective than Options 2 and 3. While jurisdictional adoption and implementation of risk management decisions are likely to be more frequent and consistent than the base case, inconsistencies are likely to remain – allowing regulatory gaps to emerge between jurisdictions and delayed or inconsistent management of risks to the environment and to human health through the environment.

- Option 2 and Option 3 would introduce regulatory frameworks that are markedly more effective than the base case because they ensure national adoption of a single risk management decision for each relevant chemical. They would reduce the potential for regulatory gaps between jurisdictions, provide greater certainty for industry, reduce the regulatory burden for businesses operating in more than one jurisdiction and would better address the identified objective of protecting the environment and human health.

- Option 3 would introduce a regulatory framework that would result in greater national consistency than Option 2 particularly in relation to implementation. However, Option 3 would impose additional costs to establish the new regulatory framework.

- Option 2 would impose considerably fewer costs on government in terms of establishing and operating the new regulatory framework than Option 3 (which is reflected in the greater net benefit for Option 2 compared to Option 3). It is for this reason that Option 2 is preferred.

In relation to the gap in environmental protection, there is recognition that the regulatory system for managing industrial chemicals in Australia, which involves all levels of government and industry, is effective in managing most aspects of health and safety and that it is only a limited number of chemicals which have significant environmental impacts.

Contents

1 About this Consultation RIS

1.1 Purpose

This Consultation RIS examines options to address gaps in environmental protection arising from the current problems of infrequent and inconsistent implementation of the risk management actions needed to reduce the impact of industrial chemicals.

It has been prepared for the Standing Council on Environment and Water (SCEW) in response to COAG's request to the EPHC in November 2008 to develop proposals to better manage chemical impacts on the environment under Outcome 16 of the National Partnership Agreement to deliver a Seamless National Economy. These proposals arose from COAG's Chemicals and Plastics Regulatory Reform Agenda.

The purpose of a Consultation RIS is 'to canvass the regulatory options under consideration, in order to determine the relative costs and benefits of those options'.[4] Following public consultation, a Decision Regulation Impact Statement (Decision RIS) will be prepared; the purpose of which will be to draw conclusions on whether cooperative national regulation is necessary, and if so, on what the most efficient and effective regulatory approach might be, taking into account the outcomes of the consultation process.

This Consultation RIS follows the COAG Best Practice Regulation Guidelines for regulatory proposals made by Ministerial Councils and National Standards (the Guidelines).

The Consultation RIS is provided to stakeholders for comment. Particular stakeholder input is sought on those areas where further data are needed and/or where assumptions made in the analysis need to be verified and agreed. The Consultation RIS provides a valuable means through which government and stakeholders can consider policy and regulatory options in a focused way.

It is important to note that this Consultation RIS is being developed during the same period in which the Australian Government is conducting a Better Regulation Ministerial Partnership review of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS). Given the timing of these two processes, the Consultation RIS process does not necessarily reflect the final conclusions of the NICNAS review, though it will note potential areas of overlap in the scope of issues considered.

1.2 Report structure

This Consultation RIS is structured as follows:

- **Chapter** 2 provides background and policy context for the Consultation RIS
- **Chapter** 3 describes the problem that governments are seeking to address
- **Chapter** 4 establishes the objective of government action
- **Chapter** 5 describes the policy options being considered in this Consultation RIS
- **Chapter** 6 outlines the impact analysis that has been undertaken on each of the options
- **Chapter** 7 summarises the conclusions of the Consultation RIS and evaluation of any reforms.

[4] Council of Australian Governments (2007), Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies.

1.3 Opportunities to comment on this Consultation RIS

Input is now sought from stakeholders on the proposals outlined in this RIS. Feedback is welcomed on the analysis and conclusions and any other aspect of the RIS document. As part of the consultation process focus groups will be held in Adelaide, Brisbane, Hobart, Melbourne, Perth and Sydney to discuss and collect feedback about the Consultation RIS.

Stakeholders should indicate if their submission is confidential and/or clearly indicate sections that may contain confidential or sensitive information that is not for publication.

Feedback received during the public comment period will be used to inform the development of the Decision RIS. In line with COAG's *Best Practice Guidelines*, the Decision RIS will detail:

- how stakeholders were engaged with during the public comment period
- the views of those consulted, including substantial disagreements
- how these views have been taken into consideration.

The closing date for submissions is 28 June 2013.

Responses to the RIS can be lodged as follows:

In writing

The Executive Officer
National Environment Protection Council Service Corporation
C/-NChEM Secretariat
GPO Box 787, Canberra Act 2601

By email

NCHEMSecretariat@environment.gov.au

1.4 Consultation questions

Throughout this Consultation RIS, a series of consultation questions are posed to encourage stakeholders to respond. These are detailed below and included in the relevant sections of the Consultation RIS.

Box 1: Consultation questions

Problem analysis

1 Does the analysis in the problem chapter accurately reflect your experience and understanding of industrial chemical regulation to protect the environment in Australia?

2 Is there any additional or contrary information that should inform the development of the Decision RIS?

3 Are you aware of any planned or proposed changes to the chemical industry that are likely to affect the current rate at which new chemicals are being introduced or change the number of chemicals that are likely to require risk management to protect the environment?

4 Are you aware of any examples (in addition to those described in Appendix B) where industrial chemicals have had an impact on the environment in Australia? If so, can you describe the nature and extent of these environmental impacts?

5 Have there been any costs to business in your area associated with environmental damage or contamination from industrial chemicals?

Objectives

6 Are there any other objectives that should guide government action regarding the risks posed by the environmental hazards of chemicals?

Options

Option 1 *involves creating a single suite of national environmental risk management decisions by agreement amongst jurisdictions outside a legislative framework, with jurisdictions maintaining the discretion around whether to implement these decisions in their legislation or not implement them.*

Option 2 *involves creating a single suite of national environmental risk management decisions under Commonwealth legislation but with compliance and enforcement measures implemented through the legislation of each jurisdiction.*

Option 3 *involves creating a single suite of national environmental risk management decisions under Commonwealth legislation with fully consistent and obligatory implementation nationwide, including the application of nationally consistent compliance and enforcement measures in all jurisdictions.*

7 Do you consider that the proposed approach under Options 1, 2 or 3 will address the identified gaps and lead to greater consistency and better protection for the environment? If so, can you provide some examples where you think it will have an impact? If not, could you please detail your reasons?

8 If you do not consider that environmental risk management would be improved in the context of industrial chemicals, what would you suggest needs to occur to achieve a better outcome? Are there alternative options to address the problem identified?

9 What consultation mechanisms for industry applicants would be appropriate?

10 For Option 2, would additional confidence from stakeholders result if an expert, independent advisory body helps ensure that risk management actions are appropriate and effective?

11 If much of the implementation, compliance and enforcement were completed through each jurisdiction's own legislation, as outlined in Options 1 and 2, would you be concerned that this may detract from the national consistency in application of the decision?

Impact analysis

12 What proportion of businesses that introduce, process, distribute, use and dispose of industrial chemicals operate in more than one jurisdiction?

13 What impact does inconsistent regulation of chemical environmental risks have on your business? What is the nature and scope of these impacts?

14 What costs does your business currently incur to comply with NICNAS risk management recommendations in relation to the environment (whether or not they are formally adopted by jurisdictions)? Does this create a competitive disadvantage for businesses that do comply compared with those that do not?

15 Do you consider the costs and benefits identified in this RIS to be realistic? Are there any additional costs or benefits that should be included in the benefit/cost analysis? Do you have any available data that would assist in quantifying monetary costs or benefits?

16 Do you think the options would have a different effect on small business compared to industry more broadly?

17 Do you think the options would have an effect on communities and community groups? What types of impacts may these groups experience?

18 Do you think the options would have an effect on individuals?

19 Do you have any available data on current costs that may be avoided if any of the options were implemented?

20 Will implementing Options 1, 2 or 3 create new opportunities for business, industry or community groups?

21 What effects are the options likely to have on competition? Are the options likely to restrict competition? If so, can this be mitigated?

22 If the regulation of new chemicals were to be cost recovered, would this have an impact on the number of chemicals introduced into Australia? Would research and development be restricted? Should some categories of chemical be exempt from cost recovery, and if so, why? Would you support tiered fees, so that chemicals which require the most consideration for risk management have a higher fee, and chemicals which do not require environmental risk management have no fee at all?

23 Do you think the assumptions made to estimate impacts of the options are appropriate for your business or industry circumstances?

Impact analysis: Option 1

24 If you are a business involved in the handling, storage, use and/or disposal of industrial chemicals, how much staff time are you likely devote to understanding the new regulatory arrangements outlined in Option 1?

25 If you are a peak industry body, how many of your members are likely to devote time to understanding the changes?

26 Are there any other costs that your business or industry would bear as a result of making environmental risk management decisions under Option 1? How significant is this scale of cost to your operations?

27 Do you think that Option 1 would have any compliance implications for your business or industry relative to the base case? If so, what would be the nature and scope of these implications?

28 Are there any additional costs that would be imposed on your business or industry under Option 1 compared to the base case?

29 Do you have any concerns about a regulatory framework based on model legislative provisions? Do you think that developing model legislative provisions would lead to greater implementation of NICNAS recommendations by the jurisdictions relative to the status quo? Do you think they would improve consistency in how jurisdictions implement NICNAS recommendations?

30 To what extent do you think Option 1 is likely to impact on risks to the environment and the efficiency with which these risks are managed relative to the base case?

31 Do you foresee any benefits of Option 1 over Options 2 or 3 in effectively addressing the problem?

Impact analysis: Option 2

32 If you are a business involved in the handling, storage, use and/or disposal of industrial chemicals, how much staff time are you likely devote to understanding the new regulatory arrangements outlined in Option 2?

33 If you are a peak industry body, how many of your members are likely to devote time to understanding the changes?

34 Are there any other costs that your business or industry would bear as a result of making environmental risk management decisions under Option 2? How significant is this scale of cost to your operations?

35 Do you think that Option 2 would have any compliance implications for your business or industry relative to the base case? If so, what would be the nature and scope of these implications?

36 Are there any additional costs that would be imposed on your business or industry under Option 2 compared to the base case?

37 To what extent do you think Option 2 would better manage risks to the environment and increase the efficiency of managing these risks for all stakeholders relative to the base case?

38 Do you foresee any benefits of Option 2 over Options 1 or 3 in effectively addressing the problem?

Impact analysis: Option 3

39 If you are a business involved in the handling, storage, use and/or disposal of industrial chemicals, how much staff time are you likely devote to understanding the new regulatory arrangements outlined in Option 3?

40 If you are a peak industry body, how many of your members are likely to devote time to understanding the changes?

41 Are there any other costs that your business or industry would bear as a result of making environmental risk management decisions under Option 3? How significant is this scale of cost to your operations?

42 Do you think that Option 3 would have any compliance implications for your business or industry relative to the base case? If so, what would be the nature and scope of these implications?

43 Are there any additional costs that would be imposed on your business or industry under Option 3 compared to the base case?

44 Do you think that a national regulator would offer greater benefits relating to the other options considered?

45 Do you foresee any benefits of Option 3 over Options 1 or 2 in effectively addressing the problem?

2 Background and context

2.1 Policy context

In 2006, COAG identified chemicals and plastics as a 'regulatory hotspot' and established a Ministerial Taskforce on Chemicals and Plastics Regulatory Reform to develop measures to achieve a streamlined and harmonised system of national chemicals and plastics regulation. As part of this work, the Productivity Commission was engaged to examine Australia's system of regulating chemicals and plastics across all sectors. In 2008, it released its *Research Report on Chemicals and Plastics Regulation,* which identified a number of reform initiatives to improve the efficiency and effectiveness of the chemical management framework in Australia.

The Productivity Commission recognised that existing national regulatory arrangements for industrial chemicals were not sufficient to provide adequate environment protection and identified this gap as one of the four main areas of public policy concern in relation to the management of hazardous chemicals.

The chief concern was that environmental risk management recommendations arising from the national risk assessments of industrial chemicals conducted under NICNAS were not generally being adopted by state and territory risk management regulators.

The Productivity Commission report made a number of recommendations to address the identified problems, including:

- the establishment of an independent body to provide risk management advice on the management of the environmental impact of individual chemicals to the EPHC (recommendation 9.2)
- the introduction of mandatory labelling of chemicals to provide instructions on environmentally sustainable management to chemicals users, if there is a demonstrated net benefit to the community (recommendation 9.1)
- the consideration of developing a performance measurement framework for monitoring the impact of chemicals on the environment and human health (recommendation 9.3).

In response to the recommendations of the Productivity Commission, COAG directed the EPHC (the predecessor of the SCEW) to develop proposals to better manage chemicals impacts on the environment under Outcome 16 of the *National Partnership Agreement to deliver a Seamless National Economy*. The SCEW is using this Consultation RIS to consider a range of options to address the problems identified by the Productivity Commission and respond to COAG on this issue.

More details on the policy context and COAG's requests are provided in Appendix A.

2.2 The use of chemicals in Australia and the rationale for government intervention

As the Productivity Commission notes, chemicals 'have become integral to the functioning of the Australian economy'.[5] There are an estimated 50,000 chemicals approved for use in Australia, which are formulated into over 400,000 trademarked products.[6] One of the peak industry bodies, Plastics and Chemicals Industries Association (PACIA), has reported that Australia's chemicals and plastics industry has an annual turnover of $33.6 billion and contributes $11.5 billion to gross domestic product a year. In 2006, the Australian Safety and Compensation Council (now Safe Work Australia) estimated that there were 573,700 workplaces in Australia

[5] Productivity Commission (2008) Research Report on Plastics and Chemicals Regulation, Canberra.

[6] COAG (2008) Report on the Control of Chemicals of Security Concern. Available at: http://www.nicnas.gov.au/About_NICNAS/FAQs/Existing_Chemicals/Approved_Chemicals.asp.

with chemical users.[7] These workplaces span a range of industry sectors (including agriculture, construction, education, manufacturing and mining) and a range of sizes (from multinational conglomerates to family-owned businesses).

Chemicals provide the community with a wide range of benefits. They are drivers of industrial and agricultural productivity, and facilitate advances in consumer products and medical treatments. These benefits notwithstanding, chemicals can, in some circumstances, cause harmful impacts on the environment. Indeed, Australia has a legacy of environmental damage caused from chemical use, industrial processes and waste disposal. In New South Wales, for example, places such as Homebush Bay, as well as Botany and nearby areas, were contaminated by various toxic chemicals after more than a century of industrial operations. These chemicals include chlorinated hydrocarbons that have leaked into the ground creating large plumes of contaminated groundwater and contamination of sediments in Sydney Harbour by dioxins, furans and heavy metals.

Inappropriate disposal of dry-cleaning fluid still causes significant groundwater contamination with remediation costs of several million dollars per site. Pesticides such as aldrin and dieldrin can still be detected at contaminated sites, in sewage biosolids, and in the fat of fish and marine mammals even though the use of these chemicals was phased out over a decade ago. Other well known examples include industrial chemicals such as polychlorinated biphenyls (PCBs) and insecticides such as dichloro-diphenyl-trichloroethane (DDT) (see Chapter 3 and Appendix B for more detail).

Exposure to certain chemicals in the environment can also harm human health. For example, the World Health Organization has estimated that the global burden of disease attributable to environmental exposure and management of selected chemicals is at least 4.9 million deaths (86 million Disability-Adjusted Life Years) per year.[8] This represents 8.3 per cent of the total deaths and 5.7 per cent of the total burden of disease worldwide, which is greater than the burden of all cancers. These numbers are likely to underestimate the real burden attributable to chemicals, as a range of chemicals with known health effects (such as dioxins, cadmium, mercury or chronic exposure to pesticides) were not included in the analysis due to incomplete data.

Benefit-Cost studies in the United Kingdom prior to the introduction of a new European Union wide regulatory scheme for industrial chemicals estimated benefits to the United Kingdom arising from the regulation of four example chemicals. The benefits ranged from the order of hundreds of thousands of pounds (methiocarb), through tens of millions of pounds (tributyltin), through hundreds of millions of pounds (DDT), to a benefit of over a billion pounds in the case of PCBs[9]. Converting that figure to Australian dollars and adjusting for inflation gives a benefit of regulating PCBs of $1,374,834,000. PCBs, once used as coolants in transformers and other electrical equipment cause a wide variety of health problems including being carcinogens for animals and probable carcinogens for humans; as well, they have serious immune, reproductive, neurological and endocrine effects. Substantial quantities still require disposal in Australia. The quantified benefits of regulating PCBs were estimated largely in the context of human cancer and not specifically environmental factors but this included cancers arising from exposure to PCBs in the environment.

Given the potential for harm, there has long been pressure on government to intervene to manage the environmental impact of chemicals. Such intervention may be warranted if it is targeted at addressing sources of market failure, and if the benefits of intervention justify the costs. In its landmark research report on chemicals and plastics regulation, the Productivity Commission identified three general sources of market failure in relation to the environmental risks of chemicals, ranging from negative externalities to information failure (Box 2). It is on the basis of the market failures that governments across Australia have intervened to manage the environmental risks of chemicals.

It is important to note that Australia has a number of obligations to regulate chemical environmental risks under international law. These include nine Council Decisions produced under the Organisation for Economic

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7 Australian Safety and Compensation Council (2006) Draft Regulation Impact Statement: Proposed Revisions to the National OHS Framework for the Control of Workplace Hazardous Substances and Dangerous Goods. Available at: http://www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Publications/Documents/409/Draft_RIS_Proposed%20Revisions%20to%20the%20National%20OHS%20framework_control_workplace_Hazardous_substances_Dangerous_good.pdf.

8 Annette Prüss-Ustün et al (2011), 'Knowns and Unknowns on Burden of Disease due to Chemicals: A systematic review', Environmental Health, 10:9.

9 Giacomello, Anna Maria, et al (2006), *The Benefits of Chemicals Regulation*, prepared for Defra, Lancaster.

Co-operation and Development (OECD) Chemicals Programme and the Stockholm Convention on Persistent Organic Pollutants. Appendix B contains an example of perfluorinated chemicals, one of which has been listed under the Stockholm Convention.

Box 2: Market failures in relation to the environmental risks of chemicals

Negative externalities from use – the use of some chemicals may provide an individual business with a net benefit, but may impose significant costs on the environment that are not offset by corresponding benefits. In this situation, the individual business has weak incentives to minimise the impact of its chemical use on the environment, as it does not directly or completely bear the environmental costs of this use.

Negative externalities from the discharge of chemicals and waste disposal – similar to chemical use, the discharge and disposal of chemicals can impose significant costs on the environment that are not directly or completely borne by the responsible party.

Information failures – businesses may not have sufficient information to manage the environmental risks associated with their use/disposal of chemicals effectively. Businesses may lack such information because:

- they are unaware that certain chemicals pose risks to the environment
- the complexity of the risks associated with the chemical mean that management of risks is not properly conducted
- information about the effective management of environmental risks is costly to obtain, (and for introducers/distributors to provide). In this case, the costs associated with obtaining information serve as a barrier to appropriate action.

Source: Productivity Commission, Plastics and Chemicals Regulation, Research Report, Canberra, 2008.

2.3 Current regulatory arrangements in Australia

Australia has established regulatory and self-regulatory arrangements that aim to manage the risks posed by the human health and safety and environmental hazards of chemicals. There are two important characteristics to note about these arrangements:

- Chemical regulation is multifaceted – it spans multiple policy portfolios (traditionally organised around distinct end uses, such as industrial chemicals, agricultural chemicals and veterinary medicines, pharmaceutical and therapeutic goods, and food), numerous government departments and agencies, and all levels of government.
- Current responsibility for chemical regulation primarily rests with state and territory governments. The Commonwealth is responsible for implementing international agreements (Appendix D), regulating international trade regarding chemicals, and undertaking most national hazard and risk assessments.

With regard to environmental issues, inter jurisdictional cooperation is managed primarily through SCEW which is responsible for 'the delivery of COAG's strategic themes by pursuing and monitoring priority issues of national significance which require a sustained, collaborative effort, and overseeing delivery of a range of policy, implementation and governance functions, including management of projects'.[10]

The role of NICNAS

Consistent with its statutory mandate under the *Industrial Chemicals (Notification and Assessment) Act 1989* (ICNA Act), NICNAS plays an important role in Australia's regulatory framework for managing the environmental risks of industrial chemicals. Its primary responsibility is the assessment of risks associated with the importation, manufacture and use of new chemicals and existing chemicals.

[10] NEPC Service Corporation (2011) COAG Standing Council on Environment and Water. Available at: http://www.ephc.gov.au/.

In this respect, it performs the technical expert risk assessment role envisaged by the Productivity Commission which considered that: '…industrial chemical hazard and risk assessments should ideally be performed by a dedicated technical expert agency separately from the subsequent standard setting needed to manage the risks of those chemicals. The case for separation of assessment from standard setting is particularly strong for industrial chemicals because they are used in a variety of ways, and the standard setting would more appropriately be handled by experts in the field.'[11]

As in most other countries, the regulation of chemicals in Australia is on a risk management basis. Even where a chemical is assessed as hazardous, it may still be desirable to allow use of the chemical because it provides significant benefits when used for its intended purpose, provided appropriate management can reduce the risks associated with its use. In deciding whether to allow the use of the chemical, a risk assessment is conducted. The risk assessment will consider four sequential elements:

i. the inherent hazardous character of the chemical by examining whether it is toxic to human health or the environment (hazard assessment)

ii. to what degree the proposed use will expose humans or the environment to the chemical based on such factors as quantity, frequency of use, duration of exposure and distribution in the environment (exposure assessment)

iii. what likelihood and degree of harm will result from this exposure (risk characterisation)

iv. whether there are risk management actions that could limit the likelihood of harm to an acceptable level and, if so, to identify the necessary risk management actions and communicate the risk management recommendations to the national, state or territory risk management regulator.

Once the risk management regulator has received the risk management recommendations arising from the risk assessment, the regulator will decide which risk management actions to take and will implement them. This forms the fifth and final element of the process.

NICNAS has limited risk management functions (though it does have some power to regulate the use of industrial chemicals by issuing permits). Its primary role is the risk assessment function described above which results in the making of recommendations to safeguard human health and/or the environment in relation to the 'importation, manufacture, handling, storage, use, emission limits or disposal of a chemical'.[12] These recommendations are not binding and implementation of the recommendations is left to the discretion of each risk management regulator. Of the 150 to 200 new chemicals that are subject to the NICNAS assessment process each year, approximately 10 to 20 require and receive recommendations relating to environmental risks.

In order to encourage greater consistency in chemical regulation across jurisdictions, a number of national regulators or statutory agencies have been established to develop risk management decisions for industrial chemicals in different sectors. These agencies, which receive the NICNAS risk management recommendations relevant to their sector, include:

- The Standard for the Uniform Scheduling of Medicines and Poisons (the Poisons Standard) –developed by the National Drugs and Poisons Scheduling Committee, consists of decisions regarding the classification of medicines and poisons into Schedules for inclusion in the relevant legislation of the states and territories. The purpose of the Poisons Standard is to promote uniformity in the scheduling of substances and in labelling and packaging requirements across the States and Territories.

[11] Productivity Commission (2008) Research Report on Chemicals and Plastics Regulation, p.62. The term "standard setting" used by the Productivity Commission encompasses the stage of risk management decision and implementation, as distinct from risk assessment or risk management recommendation.

[12] Productivity Commission (2008) Research Report on Plastics and Chemicals Regulation, Canberra. In conducting the risk assessment for environmental impacts, NICNAS is assisted by SEWPaC under a service level agreement arrangement.

- The National Transport Commission (NTC) – an independent statutory body responsible for developing, monitoring and maintaining uniform or nationally consistent regulatory and operational reforms relating to road, rail and intermodal transport. The Australian Dangerous Goods Code, which is published by the NTC, covers human health and safety and environment protection during transport

- Safe Work Australia – a statutory agency which develops model legislation, regulations, codes of practice and compliance and enforcement policies relating to work health and safety and Worker's Compensation to protect human health. Safe Work Australia is composed of representatives from the Commonwealth, states and territories, union/employee groups and employer groups.

There is currently no equivalent national body to develop national environmental risk management decisions. Consequently, there is no cooperative oversight of chemical regulation from environment ministers. In most jurisdictions, environment agencies are responsible for risk management of industrial chemicals to protect the environment. This is done through general environmental management, pollution and waste control measures under local government, state, territory or Commonwealth environment protection controls. Each jurisdiction's approach to regulation varies, reflecting their different environments and the manner in which different regulatory regimes have evolved.

As discussed in Section 2.1, the lack of a cooperative national framework in which to ensure that environmental risk management decisions for industrial chemicals are made and implemented has been identified by all jurisdictions, EPHC, the Productivity Commission and COAG as a major factor in the low uptake of NICNAS risk management recommendations by environmental regulators.

The National Framework for Chemicals Environmental Management

Recognising some of the problems that existed with the environmental regulation of chemicals, the EPHC endorsed the National Framework for Chemicals Environmental Management (NChEM) in 2007. This framework consists of four linked action areas based on better involvement of state and territory environmental regulators:

- Environmental risk assessment – strengthening our ability to assess chemical risks by enhancing consultative mechanisms among national chemical assessment agencies and state and territory environment agencies.

- Environmental controls – improving approaches to, and consistency in, environmental regulatory and management of chemicals.

- Feedback of information – Improving our understanding of chemical impacts and the feedback of information to the national assessment agencies.

- Prioritising action – establishing an inclusive and transparent process to identify and deal with higher concern chemical issues.[13]

Under the National Framework, the EPHC – succeeded by the SCEW – has developed a Chemicals Action Plan, published environmental risk assessment manuals for industrial and agricultural and veterinary chemicals, and undertaken preliminary analysis about options for the environmental labelling of chemicals.

The implementation of the National Framework is discussed further in Section 3.1 and Section 5.1.

Industry initiatives

In addition to formal regulatory mechanisms, the leading national industry bodies for the chemicals and plastic industry (PACIA; http://www.pacia.org.au/) and the hygiene, cosmetic and specialty products industry (ACCORD: http://www.accord.asn.au/) promote innovative global and national industry programs which foster environmentally sustainable practices amongst their members.

[13] EPHC (2007) Principles for Better Environmental Management of Chemicals – Ministerial Agreement. Available: http://www.ephc.gov.au/sites/default/files/CMgt_Rpt__Principles_for_Better_Management_of_Chemicals_Ministerial_Agreement_200706.pdf. Accessed: 29 November 2011.

Chemical labelling standards and codes

Environmental labelling for industrial chemicals is currently only mandatory in certain circumstances. This constraint currently limits its usefulness in being able to provide risk management information to users of industrial chemicals compared with pesticides where it is the principal means of providing user guidance.

Appendix C provides greater detail about how different regulatory schemes treat environmental labelling.

Monitoring chemicals in the environment

Monitoring the level of specific chemicals in the environment is part of a range of compliance and enforcement activities undertaken or required by environmental agencies in most jurisdictions for certain circumstances, such as licence conditions for facilities, or for monitoring environmental health issues such as air quality.

At a national level, SEWPaC undertakes monitoring projecting in accordance with Australia's international treaty obligations, such as the Stockholm Convention on Persistent Organic Pollutants. This monitoring is part of a global effort to evaluate the effectiveness of management actions under the Convention in reducing the level of listed Persistent Organic Pollutants in the environment.

The relevance of monitoring to measurement of regulatory effectiveness is discussed in Section 3.3.

3 Identified problems

In order to make a case for government action, a Consultation RIS must first establish the problem that government is seeking to address. This problem forms the basis for further analysis in the Consultation RIS. The objective for government action and policy options should align closely with the description of the problem.

Analysis of the problem in a Consultation RIS typically involves a focus on market failures that governments should address. In this Consultation RIS, while market failure is still relevant, the principal focus is on regulatory failures that exist in current regulatory arrangements – that is, the extent to which current regulatory settings are not achieving their intended objective.

This chapter will address three key problem areas. These relate to the low adoption rate and inconsistent implementation of NICNAS environmental risk management recommendations, the communication of risk management information, and the monitoring of the effectiveness of risk management actions. In discussing these problems, this chapter will:

- present evidence of the magnitude of each problem
- demonstrate that existing regulation is not adequately addressing the problems
- identify relevant risks, including the risks of not introducing regulation
- present a clear case for additional government action.

3.1 Importance of implementing environmental risk management recommendations

While most chemicals are safe to use, some chemicals can cause significant environmental damage if not managed appropriately. Once these chemicals are released into the environment, they can have adverse impacts not only on biota such as fish, aquatic organisms, plants, insects and soil microbes, but also have flow of effects for human health. Humans are exposed to chemicals in the environment through the water they drink, the food they eat and the air they breathe.

Globally, there are numerous examples of chemicals which were widely used for many years before it was realised that they were having serious impacts on the environment and human health. Some of these toxic chemicals persist in the environment for many years, become distributed worldwide and accumulate through the food chain harming both animals and humans.

As a result, all OECD countries have implemented regulatory arrangements to protect human health and the environment from the adverse effects of chemicals. This typically begins with the four step risk assessment process of hazard assessment, exposure assessment, risk characterisation and risk management recommendations leading to proposed risk management recommendations being communicated to the appropriate risk management regulator (described in Section 2.3, The Role of NICNAS).

In Australia, for industrial chemicals, the four sequential elements of risk assessment are undertaken under NICNAS with the assistance of SEWPaC, but the implementation of the NICNAS risk management recommendations is done by the regulatory agencies such as state and territory environment agencies. If the risk management actions are not implemented or implemented after a significant period of time, the regulatory system is ineffective and there is little or no control over the release of the chemicals into the environment even though those chemicals may have been assessed under NICNAS as capable of causing significant harm to the environment and humans.

As noted by the Productivity Commission, the implementation of environmental risk management measures based on these recommendations has been infrequent and inconsistent.

The central finding of the Productivity Commission report was that, while '[c]urrent regimes are broadly effective in managing risks to health and safety', they are 'less effective in managing risks to the environment'.[14]

A range of previous studies (Appendix E) support this conclusion, including the 2008 NICNAS paper *Uptake of NICNAS's Priority Existing Chemical Recommendations by Government Chemical Management Bodies.*[15] The paper found that recommendations 'were not generally directly adopted by states and territories' though it was noted that the intent of the recommendations were at times addressed in broader projects, generic actions or legislation by states and territories.[16]

The lack of direct uptake is still the case, as shown by the results of a survey that was sent to jurisdictions to inform the development of this Consultation RIS. Respondents were asked to indicate whether and how their jurisdiction had implemented a number of NICNAS recommendations. As Table 2 illustrates, only one of the recommendations was implemented by all jurisdictions.

Table 2: Have jurisdictions taken steps to implement the state or territory component of select NICNAS risk management recommendations?

NICNAS recommendation	Jurisdiction A	Jurisdiction B	Jurisdiction C	Jurisdiction D
Triclosan				
Recommendation 7	Yes	Yes	Yes	Yes
Recommendations 8a, 8b and 8c	Yes	No	No	Yes
Recommendations 8a	Yes	No	No	Yes
Recommendations 8b	Yes	No	No	Yes
Recommendations 8c	Yes	No	No	No response
Sodium Cyanide				
Recommendation 4a	Yes	Not directly	No	Not directly
Recommendation 4b	Yes	Not directly	No	Not directly
Recommendation 5a	Yes	Not directly	No	Not directly
Formaldehyde	No	No	Not applicable	Not directly
Methylcyclopentadienyl Manganese Tricarbonyl	Yes	Not directly	No	No response
Tetrachloroethylene	Yes	Not directly	Not applicable	No response

Source: PwC survey sent to NChEM Working Group

Causes for not implementing environmental risk management action

The reasons identified by the Productivity Commission for the infrequent and inconsistent uptake of risk management measures based on NICNAS recommendations were threefold.

First, while the hazards and risks of new and existing chemicals can be assessed under NICNAS, its environmental risk management recommendations are not mandatory. It is left to the discretion of jurisdictions to implement risk management measures based on NICNAS recommendations.

Second, unlike other policy areas (e.g. poisons scheduling, transport and workplace safety), there is no national body to consider NICNAS environmental risk management recommendations and develop detailed and appropriate risk management decisions for implementation by jurisdictions.

Third, the provision for consultation with state and territory environment agencies during the development of the NICNAS risk management recommendations has been limited, which has resulted in recommendations that were impractical to implement in some jurisdictions (primarily due to the variance in control measures, policy settings and infrastructure available across jurisdictions). There is a Memorandum of Understanding (MOU) between the Ministers with responsibility for industrial relations in each jurisdiction relating to NICNAS, with a

[14] Productivity Commission (2008), Plastics and Chemicals Regulation, Research Report.

[15] NICNAS (2008), Uptake of NICNAS's Priority Existing Chemical Recommendations by Government Chemical Management Bodies.

[16] NICNAS (2008), Uptake of NICNAS's Priority Existing Chemical Recommendations by Government Chemical Management Bodies, p. 5.

committee that meets to discuss implementation of NICNAS recommendations. While the intention was that the Ministers were signing on behalf of their jurisdiction, the PC noted that it has largely been ineffective with respect to environmental recommendations.

It is important to note that these gaps reflect the shorter history that chemical regulation has had to evolve to protect the environment compared with longer established sectors, such as workplace health and safety, which already have in place mechanisms to address similar problems. In effect, the regulatory system for environmental protection is not yet complete.

The EPHC had recognised these problems through its own regulatory reform process that began in 2002, resulting in the NChEM process in 2007. As part of the implementation of NChEM, the EPHC improved communication arrangements between NICNAS and state and territory environment agencies through the environmental assessments conducted for NICNAS by SEWPaC. These efforts allowed increased consultation amongst jurisdictions when developing recommendations for Priority Existing Chemicals. Full implementation of NChEM, particularly the mechanisms for providing a structured basis for increased consultation for new chemicals[17] and a national decision making process for the consistent uptake of chemical risk management recommendations in all jurisdictions, awaited the outcomes of the COAG Chemicals and Plastics Regulatory Reform Agenda.

Important practical considerations recognised by the EPHC were the constraints on resources for chemicals management and lack of scientific and technical chemical expertise in most jurisdictions. Having a national coordination point which makes environmental agencies in each jurisdiction aware of relevant NICNAS recommendations and a cooperative approach which allows jurisdictions to share expertise in drafting risk management decisions are significant factors for most jurisdictions in facilitating uptake and implementation of the risk management actions.

Consequences of not implementing environmental risk management action

There can be real world consequences arising from the infrequent uptake and implementation of environmental risk management measures in response to NICNAS assessments. Based on the risk assessments, failure to manage the chemicals will result in environmental harm and, in some cases, adverse effects on humans through exposure to those chemicals in the environment.

For two reasons, these effects may not be immediately obvious. Firstly, in comparison with many OECD countries, Australia historically has conducted relatively little monitoring of industrial chemicals in the environment in order to assess whether they are present and having an effect. As a result, it may not be known whether the current risk management actions are effective. Secondly, the adverse effects of a chemical may take years to appear. Most of the industrial chemicals now the subject of international concern, such as the brominated flame retardants and perfluorinated compounds, have been used for decades in widespread applications involving daily exposure such as in electrical appliances, furnishings, cars and building materials under the assumption that they were safe for human health and the environment. This is a global problem and not unique to Australia.

Historical examples, which had their origin before current regulatory systems were established, show that the scale of the problems caused by poor management of industrial chemicals can be large and long lasting. Examples from the Sydney area include:

- At Rhodes Peninsula, the cost to remediate land contaminated with numerous chemicals, particularly dioxins, is said to have been over $170 million
- Sydney Harbour sediments are so contaminated with dioxins, furans, heavy metals and other toxic chemicals that there is a ban on commercial fishing in the harbour and there are significant restrictions on the consumption of fish caught recreationally

[17] NEPC Service Corporation (2008) Chemicals Action Plan for the Environment – First progress report. Available at: http://www.ephc.gov.au/sites/default/files/CMgt_NChEM_First_Progress_Report_Nov08.pdf.

- In the Botany Bay area, pumping up and remediating groundwater contaminated with chlorinated hydrocarbons has involved building a treatment plant at a cost of $167 million

- Sixteen thousand tonnes of hexachlorobenzene waste have been stockpiled since 1991 at Botany with Australia lacking any facility to safely dispose of the waste and no overseas country with a suitable facility prepared to accept it for destruction.

Most of the chemicals involved in these historical examples are highly toxic, become more concentrated up the food chain (bioaccumulate) and are persistent in the environment for many years. Some chemicals with similar persistent, bioaccumulative and toxic (PBT) characteristics are still in use. Two of these chemicals, which entered into use before NICNAS was established, have recently been examined under NICNAS as priority existing chemicals. They are penta-brominated diphenyl ether (BDE) and octaBDE which are man-made brominated flame retardants present in many articles still in daily use. Their effects are of global concern and both are now listed on the Stockholm Convention. Australia is considering ratification of their listing and SEWPaC is evaluating the capability of Australia's domestic management arrangements to deal with these chemicals as these arrangements must be suitable before Australia can complete ratification.

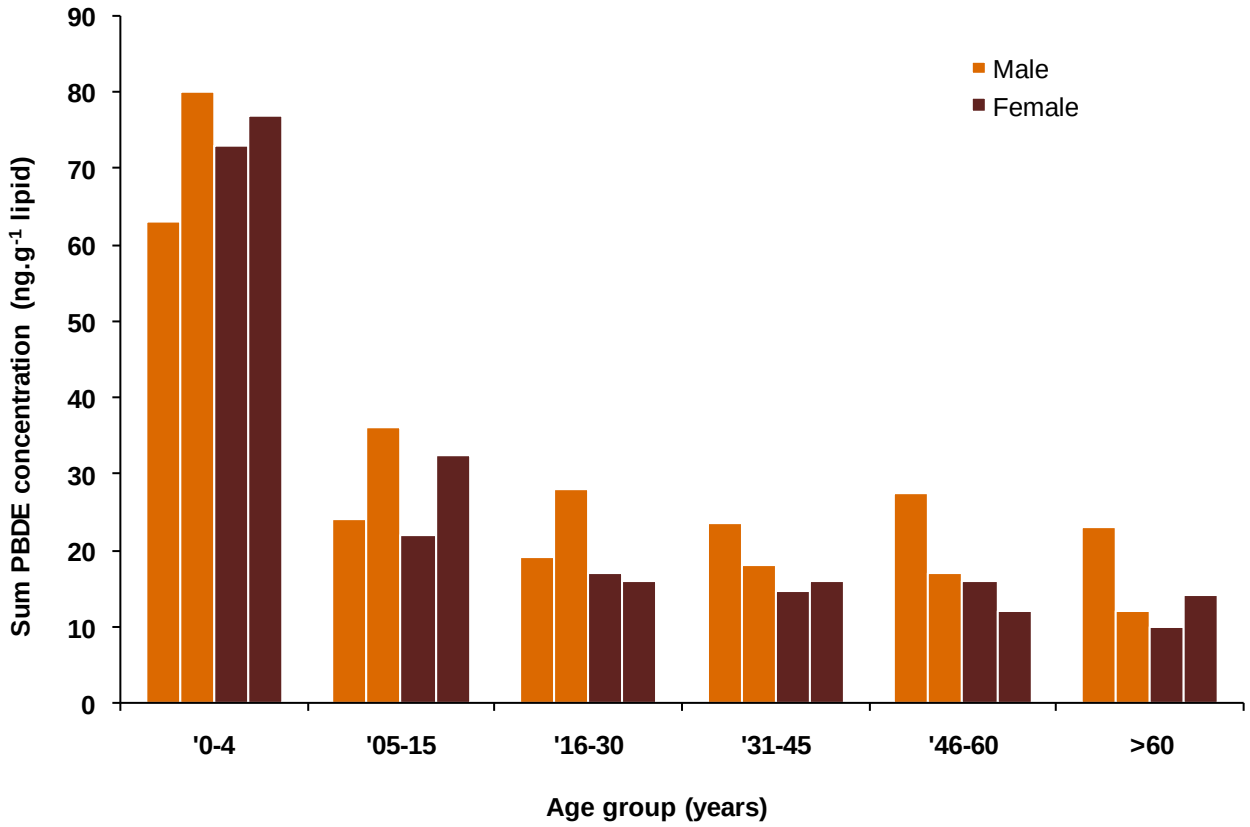
PentaBDE is a reproductive and neurodevelopment toxin which, under some circumstances, can impact thyroid hormones. Vulnerable groups include pregnant women and infants, as pentaBDE may affect the embryo's central nervous system development. In the environment, pentaBDE is acutely toxic to crustaceans and disturbs larval development. It affects reproduction in plankton colonies and bioaccumulates in higher food chain organisms including humans. It occurs widely in the global environment and has been detected in marine and terrestrial birds, sea and terrestrial mammals, sediments, soil, seafood and fish. It is found in high levels in top predatory birds and mammals in the Arctic, where trend analyses show a continuous increase. Its pollution of remote areas reflects its long range environmental transport including via movement through the air by adsorbing to particles. It is present in waste effluent, bio-solids, surface water and eventually sediments where it is ingested by worms, which creates a risk of secondary poisoning to organisms in the earthworm-based food chain.

In Australia, pentaBDE has been measured in indoor air, dust and the surface wipes of televisions, refrigerators, stereo equipment and DVD players, in aquatic environments and in human blood. It and other brominated flame retardants have been detected in many Australian animals, including Tasmanian Devils, in fish, squid and crabs from Sydney Harbour, in Eastern Grey kangaroos and in the eggs of birds such as Silver Gulls, White Ibis and Little Penguin. It has recently been detected in cot mattresses and textiles (such as baby clothes) that are still being imported into Australia.

OctaBDE has been widely used as a flame retardant in electrical and electronic equipment. Within the European Union, octaBDE is classified as toxic, due to its potential for effects on human health including the risk of harm to the unborn child and the possible risk of impaired fertility. In animal studies, octaBDE caused liver and thyroid effects and changes in neurobehavioural and reproductive organ development and was toxic to embryos in rats and rabbits. As with pentaBDE, octaBDE is widely found in office, household and urban environments. It is found in human blood and in the aquatic environment in Australia and in remote areas such as the Arctic.

PentaBDE and octaBDE are only two of the poly-brominated diphenyl ether (PBDE) flame retardant chemicals widely present in the Australian population. Studies by SEWPaC show that concentrations of these chemicals are highest in children under five years old (Figure 1). Overall, PBDE blood levels in Australian adults were much lower than those observed for adults in North America but slightly higher than those observed for adults in Europe and Asia. The concentrations of PBDEs in blood sera from Australians in the youngest age group were higher than children in European countries such as Norway and lower than the concentrations found in children from North America. While there is no direct evidence linking these levels to impacts on human health, action is being taken by most countries to prevent further increases in PBDEs such as pentaBDE and octaBDE.

Figure 1: Mean ΣPBDE concentration (ng.g-1 lipid) by gender and age, 2004-05



Source: Toms, Leisa et al (2006), 'Assessment of the concentrations of polybrominated diphenyl ether flame retardants in the Australian population: levels in blood', prepared for the Department of the Environment and Heritage, November, available at: http://www.environment.gov.au/settlements/publications/chemicals/bfr/pubs/bfr-blood.pdf.

Risk management actions have been taken to curtail the further use of penta- and octaBDE in Australia, but the steps taken illustrate the limitations of the regulatory system. Assessments on both chemicals were undertaken under NICNAS as priority existing chemicals. As there was no current importer or manufacturer of octaBDE, the Director of NICNAS was able to withdraw octaBDE from the Australian Inventory of Chemical Substances in 2007, thereby preventing its domestic manufacture or import as a chemical.[18] This does not prevent its import within manufactured articles, however, and does not prevent a new application for use and entry into the Inventory. PentaBDE is the subject of a temporary ministerial ban under Section s 61(2) of the ICNA Act, preventing its import into Australia or its domestic manufacture but this remains in force only until the Director of NICNAS publishes a final assessment report under s 60F of the ICNA Act.

Since the ICNA Act does not deal with chemicals in manufactured articles, the greatest problem in dealing with pentaBDE and octaBDE is to prevent the import of articles containing these chemicals and to safely dispose of the tens of thousands of articles still in use in Australia. These examples highlight that substantial cooperation from state and territory environment agencies will be needed to deal with the waste management issues for chemicals and chemicals in articles, again emphasising the need for effective cooperative mechanisms. Options 2 and 3 described later in this document would provide a mechanism for consideration of the waste disposal issues associated with chemicals in articles and provide a statutory framework for making a national risk management decision as well as ensure national adoption (Option 1 would not provide this framework).

It is likely that Australia's regulatory arrangements will continue to face industrial chemicals with potential for significant impacts on the environment and, through environmental exposure, on human health. The most

[18] Under Section 63 of the Industrial Chemicals (Notification and Assessment) Act 1989, a priority existing chemical must be removed from the Australian Inventory of Chemical Substances where it has been a priority existing chemical for at least 12 months,an application for assessment of the chemical has not been received and the Director has not caused the chemical to be assessed. Octa-BDE was removed from the inventory as no applications for assessment were received. Penta-BDE could not be removed from the inventory under this provision as applications for assessment were received.

recent example for a priority existing chemical has arisen from the June 2012 assessment under NICNAS of the chemical hexabromocyclododecane (HBCD[19]). This is another chemical which entered into use before NICNAS was established. The recent risk assessment under NICNAS concluded that risks to the environment are unacceptable and recommended that SCEW develop an action plan to address the levels of HBCD in the Australian environment arising from production and use of products and articles containing HBCD. This chemical is used as a flame retardant in the moulding of insulation panels, sheets and blocks for use in the construction of industrial and residential buildings. It is also used in polystyrene beads used in packaging and in beanbag fill, in plastic products such as printers and projectors and in polymer dispersions used for flame-retarding textile products such as polyester and polyester/cotton blend fabrics used to manufacture vertical, holland and roman blinds used for window shading in domestic residences and other buildings and some public seating. Accordingly, the range of articles in use and potential issues for waste disposal are complex. In addition, issues such as the availability and suitability of replacement chemicals must be considered. HBCD is considered of sufficient concern that it has been proposed for listing under the Stockholm Convention. Again, an effective action plan for appropriate risk management would require enhanced cooperation amongst jurisdictions.

In the absence of a standing arrangement for ensuring the uptake of environmental risk management recommendations, past actions to protect the environment have required special arrangements and have been restricted mostly to a few groups of chemicals, typically those with international implications. Examples include those dealt with under the *National Strategy for the Management of Scheduled Wastes* which was developed by the Australian and New Zealand Environment and Conservation Council from approximately July 1991 to November 1992. It included three management plans:

- PCB Waste Management Plan (prepared April 1994 to November 1995)
- Hexachlorobenzene Waste Management Plan (prepared August 1994 to November 1996)
- Organochlorine Pesticides Waste Management Plan (prepared July 1996 to September 1997).

With the substantial development time needed for this approach, which did not have an existing structure to facilitate implementation, it is one which could only be used for a small number of exceptional, high profile priority existing chemicals which could accommodate decision making over years rather than days.

Such an approach would not be appropriate for the 10 – 20 new-to-market chemicals with significant environmental impacts which come through the NICNAS new chemicals process each year. For these new chemicals, the company lodging a notification to introduce a new chemical will wish to bring its chemical to market as quickly as possible after a certificate of assessment is issued under NICNAS and will need to know what risk management requirements will apply in each jurisdiction. This will need a system which can consider the chemical immediately after it has been through the NICNAS process and quickly develop operational risk management decisions.

While most new industrial chemicals have relatively little environmental impact, those that do so can create significant environmental damage if not properly managed. On average, between 150 and 200 new industrial chemicals are assessed under NICNAS processes per year, as well as permits and two or three priority existing chemicals. Risks are assessed by considering both the intrinsic hazardous properties of the chemical (i.e. its toxicity) and the likely levels of exposure in the environment according to the proposed use pattern. Of the new chemicals being assessed under NICNAS, typically 10 to 20 per annum are assessed as likely to have environmental impacts if not appropriately managed. Chemicals recently assessed include some which, if discharged to aquatic environments, would be likely to cause significant fish kills and the destruction of other aquatic organisms. This could lead to long-term aquatic ecosystem collapse, especially in enclosed water-bodies. In addition to the direct environmental impact of these chemicals, there may be costly impacts on water quality for human consumption, amenity, fisheries and watering of livestock.

As the majority of these chemicals are expected to be used in multiple jurisdictions or nationally, consistency in uptake by all affected jurisdictions will be necessary for effective environmental protection and in avoiding confusion for companies using the chemical in different jurisdictions. It is important to note that use of these

[19] http://www.nicnas.gov.au/Publications/CAR/PEC/PEC34/HBCD_Report_June_2012_PDF.pdf

chemicals may offer significant benefits provided that their potential environmental impacts are safely managed.

Based on current trends, it is reasonable to expect that, over the next 10 years, the NICNAS new chemical process will identify between 10 and 20 new industrial chemicals per year as being likely to cause environmental harm if not properly managed.

In addition, the number of industrial chemicals requiring action by jurisdictions will increase markedly over the next decade as NICNAS, with the help of SEWPaC, begins the assessment of the 38,500 industrial chemicals that were grandparented into the Australian Inventory of Chemical Substances. These chemicals, currently allowed to be used in Australia, have not previously been assessed for their health and environmental risks. The first 3,000 of these chemicals will be assessed over the next four years, perhaps identifying 300 chemicals requiring environmental risk management. This means that environment agencies in each jurisdiction will need to make decisions on environmental risk management actions for perhaps 80 new and existing chemicals per year to avoid environmental harm.

If such harm occurs, public confidence in the current chemicals regulatory system will be significantly reduced. More positively, avoiding such harm should provide net community benefit. A study commissioned by the EPHC in 2009 estimated that the average (i.e. per chemical) benefit to be gained from jurisdictions taking more consistent and collaborative risk management action in relation to chemicals that have been assessed as posing a risk to the environment was $1.5 million (present value (PV), over 10 years, 2009 dollars).[20] The benefits in this context are primarily avoided costs (e.g. the costs that society would no longer have to pay to restore aquatic systems or remediate contaminated sites).

In considering this gap in environmental protection, it is important to recognise that the regulatory system for managing industrial chemicals in Australia, which involves all levels of government and industry, is effective in managing most aspects of health and safety and that it is only a small number of chemicals which have significant environmental impacts. The range of industrial chemicals used in Australia, and their effects, is similar to that for most OECD countries. With the establishment of improved mechanisms for inter-jurisdictional cooperation, the current potential for adverse environmental effects should be minimised.

Improving the efficiency of the regulatory framework

In those cases where individual jurisdictions are implementing risk management controls, the lack of a cooperative approach means that the potential benefits of economies of scale are not realised; rather, each jurisdiction must replicate the amount of resources and effort required to achieve the same objective. For instance, in seeking to adopt and implement a NICNAS risk management recommendation, actions which each jurisdiction must individually perform would include:

- monitor when a NICNAS assessment is published
- establish whether there are environmental risk management recommendations
- interpret the recommendation and determine how the recommendation is to be transformed into an operationally practical risk management action
- determine if a regulation is needed and draft the regulation
- implement the action, having identified the resources required for communication with stakeholders and for monitoring and compliance.

In contrast, national cooperation would allow for a single, environment body to monitor the NICNAS assessments and alert environment agencies in all jurisdictions when relevant chemicals are assessed; share scientific and legal resources in developing operationally effective risk management actions and drafting provisions to implement them; and share the development of communication information for

[20] Centre for International Economics (2009), Benefit Cost Analysis of NChEM Reforms: Impacts to industry, community and government, prepared for EPHC, Canberra.

stakeholders. Actions such as mandatory environmental labelling and developing effective environmental monitoring practices for chemicals which are widely distributed would more likely be feasible if done cooperatively at a national level.

Reducing the burden on industry

A cooperative approach amongst jurisdictions would be more likely to avoid inconsistencies between risk management requirements across jurisdictions which could lead to confusion among regulated entities; increasing, in turn, the potential that those entities will inadequately manage the environmental risks of chemicals. These inconsistencies can also:

- 'give rise to inequalities between businesses across state borders'[21] – as a regulated entity operating in one jurisdiction may not face the same level of compliance costs as a similar entity operating in another jurisdiction

- increase the costs on regulated entities operating in more than one jurisdiction, as they are required to spend additional resources understanding and navigating differing regulatory regimes.

The magnitude of this burden on industry is difficult to estimate. For instance, while this Consultation RIS has assessed that there are greater than 12,000 businesses that introduce, use or process industrial chemicals in Australia (see Appendix F), there is little available information that could be utilised to identify what proportion of these businesses operate in more than one jurisdiction. To address this information gap, there are questions in Section 1.4 that prompt stakeholder feedback about the burden on industry resulting from current regulatory arrangements.

3.2 Communication of risk

The Productivity Commission identified two additional problems that are hampering the effectiveness of the regulatory framework for the management of chemical environmental risks. The first of these relates to the communication of risk management information to users of industrial chemicals (Recommendation 9.1). There is considerable potential for information failure in the management of chemical environmental risks. As the Productivity Commission noted, '[i]nformation about the impact of chemicals on the environment is technically complex and costly to provide, and is likely to be underprovided by the market.'[22]

In other chemical policy areas, such as occupational health and safety, governments attempt to overcome this information failure by requiring the source manufacturer or importer to label hazardous chemicals. The purpose of this label is to provide information about the nature of the hazards, plus instructions and information on the safe storage, handling, use and disposal of the chemical.

As noted in the previous chapter, there is currently limited mandatory environmental labelling. The absence of such labelling may be denying users important information on appropriate risk management practices. As a result, there is the potential for more harm because of spills and inappropriate use and disposal.

SEWPaC already provides information on the appropriate environmental hazard classification in its risk assessments of chemicals for NICNAS and appropriate risk management actions. The practical issues of how this information could be conveyed in cost effective fashion through labelling is discussed in Section 5.2.

3.3 Monitoring

The second of the two additional problems identified by the Productivity Commission is that governments currently do not have adequate processes in place to determine whether regulation for the management of chemical environmental risks is effective (Recommendation 9.3). Fundamentally, this requires knowing whether the regulated chemical has reached levels in the environment where it is causing harm to the environment or human health.

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[21] Chamber of Commerce and Industry Western Australia (2007) Submission to the Productivity Commission Research Report into Chemicals and Plastics Regulation. Available at: http://www.pc.gov.au/__data/assets/pdf_file/0006/68775/sub023.pdf.

[22] Productivity Commission (2008), Plastics and Chemicals Regulation, Research Report.

While environmental monitoring for some purposes, such as aspects of air quality and water quality, are routinely conducted by environment agencies and may be required in licensing conditions for facilities, monitoring for industrial chemicals is infrequent. This reflects the general lack of uptake of risk management recommendations and the challenge in designing monitoring programs which are both environmentally effective and cost effective.

As noted by the Productivity Commission and reflected in its Recommendation 9.3, the decision to establish chemical monitoring programs requires careful consideration, preferably within a consistent framework. Ideally, the need for environmental monitoring should be considered when developing the risk management decisions for a chemical assessed as likely to have environmental impacts. Monitoring requirements would be tailored for the particular chemical and use to which the decision refers, with the aim of ensuring a scientifically sound result with the least possible cost. These requirements would be designed to measure the effectiveness of the risk management actions, according to national standards, and would be intended to harmonise with existing national monitoring programs.

It is expected that only a small proportion of decisions would include a requirement for some form of monitoring. These would be for those chemicals considered of greatest environmental concern. These chemicals would be additional to those chemicals listed under international agreements which are already being monitored through national sampling programs such as those conducted by SEWPaC. International listing and the risk management decision process would become the basis for choosing chemicals to be monitored. Further details of the performance monitoring framework are at Section 5.2.

3.4 Chemicals in Articles

The management of chemicals in articles is recognised as a global emerging issue within international agreements such as the Strategic Approach to International Chemicals Management, the Basel Convention on Transboundary Movements of Hazardous Wastes and the Stockholm Convention on Persistent Organic Pollutants. Options 2 and 3 described in this RIS would provide a mechanism to address such issues particularly in relation to waste disposal.

3.5 Summary – the case for government action

The key environmental problem to be addressed with the current regulatory arrangements for industrial chemicals is that risk management actions to protect the environment are often not being implemented to protect the environment from those industrial chemicals that have been identified under the NICNAS risk assessment process as likely to have environmental impacts unless managed appropriately. This problem arises primarily from difficulties for state and territory environmental regulators in adopting and implementing the NICNAS recommendations. This lack of uptake arises from structural and operational issues with the current regulatory arrangements for the environment which require further development to be comparable with longer established sectors such as workplace health and safety and poisons scheduling.

Addressing the problem is important. While most chemicals do not have significant environmental impacts, historical examples demonstrate that some poorly managed industrial chemicals can have major environmental and financial impacts. Industrial chemicals of global concern which are entered into use before NICNAS was established are already widely distributed in the Australian environment and in the Australian population and require active environmental management. These are being joined by new chemicals, some of which require effective environmental risk management for their safe use in the Australian market. Over the next decade, up to 80 new and existing chemicals per year will require effective risk management if environmental harm is to be avoided. Better engagement of state and territory environment agencies will be essential for this risk management to be achieved.

All jurisdictions, the EPHC, the Productivity Commission and COAG have concluded that changes to the current regulatory arrangements are needed to address this problem. Benefit cost analysis indicates that successfully addressing the problem will have a net community benefit.

4 Objectives of government action

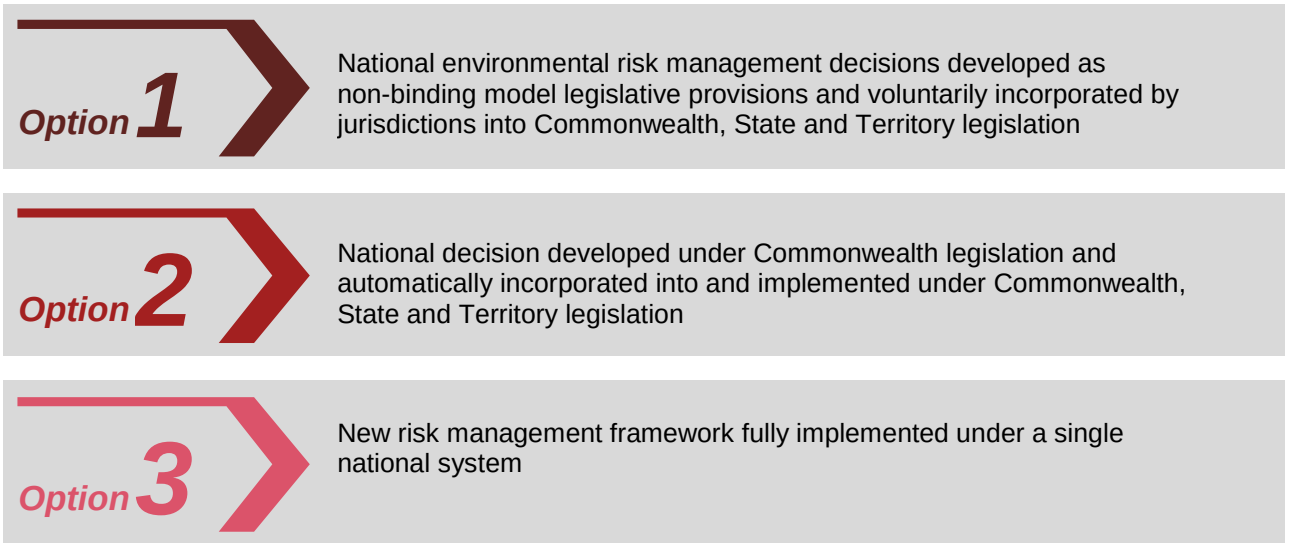
A Consultation RIS should clearly establish the objective of government action. This objective should relate to the statement of the problem (as provided in the previous chapter) and not prejudge a particular course of action. For instance, an objective should not assume a regulatory option is the only mean by which government should act to address the identified problems with current arrangements.

The objective of government action is to protect the environment and the Australian people by improving the effectiveness and efficiency of risk management actions for industrial chemicals that have the potential to cause environmental harm.

5 Statement of options

A Consultation RIS must identify a range of viable options to achieve (in whole or in part) the established objectives of government action. These options should include, where appropriate, non-regulatory, self-regulatory, and co-regulatory options.

The following sections outline three options to be assessed in this Consultation RIS. These are:



A base case is also described. Establishing the base case provides the basis for analysing the costs and benefits of each of the options.

It is noted that the Department of Health and Ageing and the Department of Finance and Deregulation are currently undertaking a review of NICNAS. As part of the review, a discussion paper for public comment was released in June 2012 with submissions closing in July 2012. Some of the proposals move away from the Productivity Commission's recommendations by extending the risk management powers available under NICNAS. The outcomes from the review are not yet known. As the base case cannot anticipate potential future changes that are uncertain, the status quo has been adopted as the base case. Should the role of NICNAS change, the relevance and operation of the options proposed in this Consultation RIS may be affected.

5.1 Base case

In a Consultation RIS, the base case is the scenario against which options for change are assessed. This is typically the current regulatory arrangements where these exist. The base case essentially represents the future state where governments do not act to address those problems or issues identified in the problem analysis in the Consultation RIS.

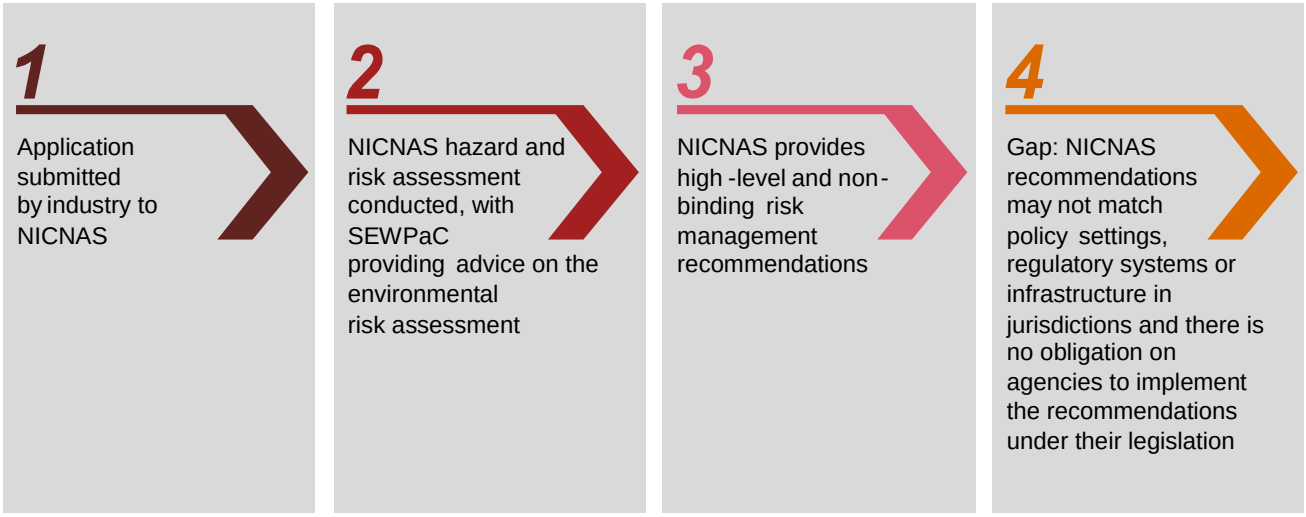
For this Consultation RIS, the base case assumes that all levels of government maintain the current framework for managing environmental risks associated with the handling, storage, use and disposal of industrial chemicals. In other words, the base case involves a continuation of the status quo. This includes:

- maintaining the role of NICNAS in developing its high level environmental risk management recommendations as part of the risk assessment process (noting SEWPaC provides expert scientific advice to NICNAS on the environmental risks of chemicals under assessment through a service level agreement)

- maintaining the current efforts by the SCEW to improve the interface between NICNAS and state and territory environmental agencies, through existing frameworks such as NChEM, which seeks:
  - The early integration of state and territory environment agency input into chemical assessments for Priority Existing Chemicals on an informal basis, so that environmental risks can be better identified and practical, cost-effective risk management strategies can be agreed where required. There are approximately 38,500 chemicals currently listed in the Australian Inventory of Chemical Substances that have not had an environmental or human health assessment undertaken. Chemicals are prioritised for assessment under NICNAS according to the criteria in Chapter 50B in the ICNA Act. These chemicals are called 'Priority Existing Chemicals'. It is important to note, however, that changes to the NChEM approach would likely be needed to accommodate the increased number of chemicals needing scrutiny with the initiation of the pilot program, the Inventory Multi-tiered Assessment and Prioritisation (IMAP) Framework, under NICNAS to rapidly assess 3,000 of the existing unassessed chemicals over the next four years
  - The development of more detailed information about on-the-ground situations and controls in each jurisdiction to inform the development of environmental risk assessment advice by SEWPaC for NICNAS and to flag priority areas for risk management for chemicals.

The existing process is outlined in Figure 2.

Figure 2: Existing risk management process



Although the NChEM initiative through its short term objectives has had some success in producing more specific environmental risk management recommendations for some Priority Existing Chemicals, it must be understood that NChEM has never been fully implemented. It had a range of short term objectives and outputs but its longer term objective, subject to the outcomes of the COAG reform process, was to go well beyond the existing base case in ensuring state and territory environment agency input into national decision making, agreeing a single national decision and having that decision implemented by all jurisdictions.

The base case retains the weaknesses that have discouraged the national uptake of environmental risk management decisions, which leaves the environment exposed to the risk of harm with the potential for consequent adverse impacts to human health and community amenity.

Under NICNAS there is no statutory authority to make and implement risk management decisions. There is no requirement and no established process through which NICNAS can readily incorporate the views of the environmental agencies in its recommendations or for environmental risk management recommendations to be developed into a form suitable for uptake and practical implementation by the jurisdictions. There is no statutory or other binding linkage to encourage or require jurisdictions to implement the NICNAS recommendations.

The current framework has duplication and overlap through requiring each state and territory government to develop its own response to NICNAS recommendations. Overall, this can cause high administration costs,

which may lead to governments which are resource-constrained not prioritising action to protect the environment in cases where this is shown to be necessary to avoid the risk of harm. As well, individual jurisdictions may lack chemical and ecotoxicological expertise which limits their ability to develop appropriate risk management responses.

Where action does occur there are typically inconsistencies in approach across jurisdictions, which can be confusing for the businesses affected by the regulation. The current system imposes unnecessarily high compliance costs on those businesses operating across jurisdictions that have to adhere to the differing rules and regulations. The differing regimes create the potential to distort competition where businesses are subject to differing compliance regimes and costs.

The current system does not address a range of information problems. Risk managers in the jurisdictions must wait five years in the vast majority of cases before the substances present in chemical formulations are listed on the Australian Inventory of Chemical Substances (except on the occasion where a notifier might have requested earlier listing of the chemical on the AICS). This contributes to the lack of uptake or to delays in action responding to NICNAS advice. It also has the potential to restrict the effectiveness of early action taken and the ability of businesses to comply with any rules.

Regulators are limited in their capacity for ensuring that people handling, storing, using or disposing of chemicals have ready information to assist them to minimise the risk of environmental damage from chemicals. This increases the risk that chemical hazards will not be correctly managed exposing the environment to an unnecessary risk of harm.

As described earlier, the approaches taken in other sectors such as poisons scheduling, transport and workplace health and safety provide for greater national consistency in risk management through formal mechanisms involving consultation amongst jurisdictions in reaching national risk management decisions. The base case does not provide for a formal arrangement for the environmental ministers or agencies from all jurisdictions to agree and implement national decisions on environmental risk management.

In summary, the base case has not been effective in delivering effective, nationally consistent and timely decisions to protect the environment that can be readily adopted and implemented within all jurisdictions. While environmental controls are currently placed on some industrial chemicals in different jurisdictions, these are not consistent nationally. The system has duplication and overlap and results in inconsistent regulatory approaches, which can have negative impacts on business and the environment. Gaps in the information system also likely hamper efforts to properly manage the risks to the environment of industrial chemicals. This creates inefficiencies and ineffectiveness in chemical regulation adversely affecting the environment, industry and community benefit.

Options 1, 2 and 3 which will be discussed below reflect the view of the Productivity Commission and COAG's response to the Productivity Commission's recommendations that environment ministers should have the mandate to set the environmental risk management controls, consistent with the governance frameworks that operate in the other sectors such as poison scheduling, transport and workplace. This reflects the understanding that:

- environmental portfolios are generally responsible for managing the release points of industrial chemicals to the environment, such as factory emissions and waste disposal, including the end of life disposal of articles containing chemicals and the regulation of landfills and sewage treatment plants

- the development of risk management decisions that can be readily adopted and implemented is more appropriately done by bodies which have expertise and familiarity with the environmental issues and available legislative and management options.

There is no intent in any of the options being considered to reconsider the hazard assessment, exposure assessment and risk characterisation conducted by the Director of NICNAS (described in Section 2.3. The Role of NICNAS). The purpose of each of the options is to consider the risk management recommendations from NICNAS to see how they can best be developed into operational risk management actions for effective implementation by the appropriate risk management regulator.

5.2 Option 1 – Non statutory development of national environmental risk management decisions as model legislative provisions

This option envisages the development of the national environmental risk management decisions by a Working Group for the SCEW in the form of model legislative provisions or regulations. These model provisions would be drafted to be incorporated by jurisdictions into their legislative frameworks with as little change to the model provision as practicable.

The model legislative provisions could be published on a website containing all the model decisions. It would be possible for states and territories to incorporate the model decision into their legislation by mechanisms appropriate to their jurisdiction (e.g. by reference to the decision or by including the text of the decision into their legislation). Each jurisdiction would have discretion as to which mechanism it uses to implement the model provision.

Unlike Option 2 and Option 3, the process for making risk management decisions would not be underpinned by a statutory decision making framework, but could be underpinned by an Intergovernmental Agreement between first ministers or a Ministerial Agreement between ministers for the environment. Jurisdictional adoption of the national decisions would be subject to the terms of the Agreement.

Under this option new industrial chemicals would continue to be introduced on receipt of the NICNAS assessment certificate, potentially in absence of binding risk management requirements in all jurisdictions. This could result in inconsistent chemical regulation between jurisdictions if there is a delay in considering and implementing some model legislative provisions. Accordingly there could be delayed and inconsistent environmental protection nationally.

To avoid creating new bodies and to reduce cost, it would not have an independent advisory body to provide risk management advice to SCEW.

The key elements of the framework under this option are set out below.

Implementation of risk management decisions

A new intergovernmental agreement could be developed or the 2007 Ministerial Agreement on Principles for Better Environmental Management of Chemicals could be amended to:

- establish the Working Group and detail its roles and functions
- establish the role of ministers
- set out how model legislative provisions will be developed and agreed, including stakeholder consultation requirements
- provide agreed timeframes to implement model legislative provisions
- set out the circumstances in which jurisdictions may decide not to implement (or not fully implement) certain model legislative provisions
- provide an undertaking to report progress in implementing provisions and provide text of final legislative provisions to ensure the best possible consistency between jurisdictions (this may occur quarterly, semi-annually or annually)
- provide for development of policy, guidelines and codes of practice for chemical management to protect the environment
- potentially, provide for ongoing work towards harmonisation of chemical legislation to protect the environment between state and territory

- detail financial arrangements to fund the Working Group
- provide for regular review of the Agreement and model legislative provisions to establish whether the objectives of the Agreement are being met.

Implementation of the risk management decisions and the model legislative provisions, including compliance and enforcement, would be the responsibility of each jurisdiction; however it would be possible over time to develop model reporting, compliance and enforcement provisions in the model legislative provisions if desired by the jurisdictions and it would be possible for jurisdictions to adopt these provisions over time.

It is likely that the decision making and consultation processes would be similar to those described in Option 2 (underpinned by a ministerial or intergovernmental agreement rather than by legislation), however, it would not have expert advice from an independent advisory body (Figure 3). Major features of the proposal would include:

1 The Commonwealth, states and territories would nominate legislative drafting officers and technical personnel to the Working Group

2 One jurisdiction would be nominated to take the lead to draft model national decisions. That jurisdiction would nominate a contact to receive NICNAS hazard and risk assessment reports for both new chemicals and priority existing chemicals on completion under NICNAS. This contact would develop a draft proposal for environmental controls to be applied to the chemical provide it and the NICNAS assessment report to the remainder of the Working Group

3 If the Working Group agreed to the draft proposal the Working Group would hold teleconferences to discuss drafting issues and methods. A draft model provision would be developed and agreed by the Working Group

4 This model provision would be considered by the SCEW or a delegate

5 If agreed, the model provision would then be made public and submissions invited from interested stakeholders. These would be considered before finalising the model decisions. If required a benefit/cost analysis would be undertaken

6 After the consultation process the model legislative provisions would be finalised by agreement between the Commonwealth, states and territories and would be published on a website containing all model decisions

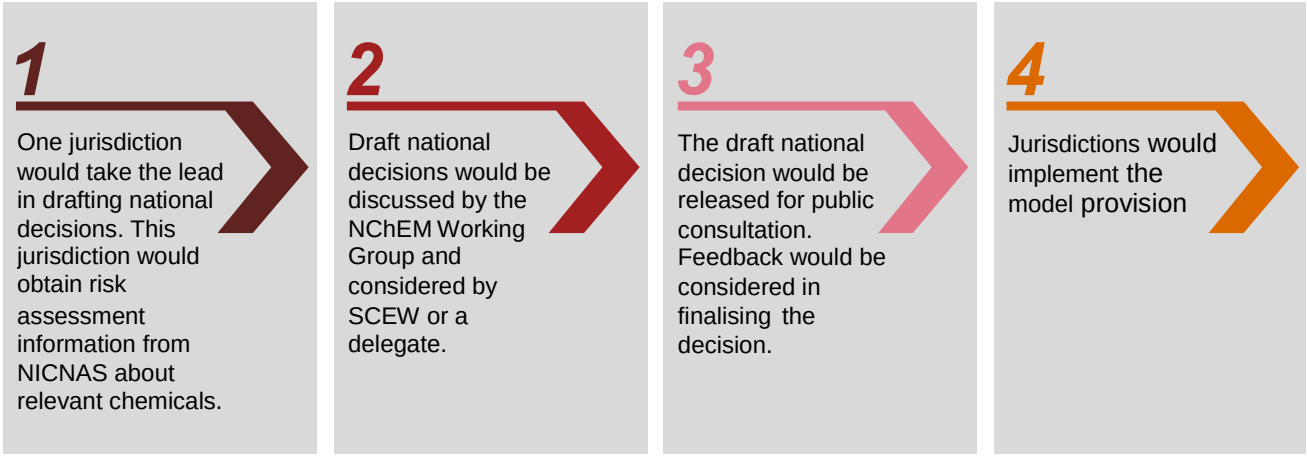
7 Jurisdictions would implement the model provisions by mechanisms appropriate to their jurisdiction such as by reference or passing legislation in substantially the same terms as the model legislative provisions. The ministerial or intergovernmental agreement would stipulate agreed timeframes for implementation, as well as agreed processes for derogation from the model legislative provisions

8 It would be possible for model legislative provisions to be made in respect of NICNAS assessment reports which have already been published but which include environmental recommendations that have not yet been directly addressed across all jurisdictions

9 Over time, the Working Group could potentially look to develop model legislation for chemical regulation with a view to harmonising requirements for chemical use, storage, handling, licensing and related issues. Model provisions for reporting, monitoring, compliance and enforcement might also be developed

10 The Working Group could provide advice on national chemical policy upon request from SCEW and report to the SCEW on implementation of the model provisions, chemical monitoring, pollution events, compliance and enforcement issues and related matters.

Figure 3: Option 1 risk management process



Implementation of the risk management decisions, including compliance and enforcement, would be the responsibility of each jurisdiction under its own legislation.

Communication

This element of the framework is the communication of risk management decisions to industry and the community. This communication allows for the decision to be known, most critically by those firms and workers who manufacture, sell, use, store, transport and dispose industrial chemicals.

National environmental decisions made under this option would be publicly notified shortly after they were made. Model legislative provisions would not become binding until incorporated in the legislation of a state or territory. Each jurisdiction would publish legislative amendments in accordance with normal jurisdictional practices. A register for the risk management decisions is also possible. In the case of a new chemical introduced under the ICNA Act, the applicant/notifier who applied for the NICNAS assessment certificate would also be advised.

Under this option, the model legislative provisions that are developed by the working group of the SCEW could include provisions for an environmental labelling scheme for industrial chemicals which require communication of environmental risks and risk management requirements (consistent with Recommendation 9.1 of the Productivity Commission report). For practical reasons, these model provisions would need to be implemented consistently between jurisdictions (noting that the commencement of the legislative provisions implementing the labelling scheme in each jurisdiction could be delayed until most or all jurisdictions have passed legislation implementing the agreed labelling requirements in the same terms).

Details of how mandatory environmental labelling could work might best be developed once a decision has been taken on the larger issue of which option is to be used for making and implementing the risk management decisions. At that point it might be subject to a separate RIS process. Given the voluntary nature of Option 1, however the adoption of mandatory environmental labelling would be more feasible under Options 2 or 3.

The matters in relation to mandatory environmental labelling under consideration for future development are as follows:

- Labelling Option A – A comprehensive labelling system such as that employed by agricultural chemicals where risk to human health and the environment are considered and any requirements for use communicated. This would apply to all chemicals thus providing certainty of where actions are or are not required

- Labelling Option B – A targeted scheme for particular chemicals on a case by case basis where information on environmental risk needs to be conveyed. This would not require labelling for every chemical. For example, it might apply to some cases of raw bulk industrial chemicals. It would be highly unlikely to apply to household goods which may contain industrial chemicals (for example in toiletries or

cosmetics). The information provided could be a risk or disposal statement or it could be a hazard-based statement.

Within this Consultation RIS, environmental labelling is being considered primarily as described for Labelling Option B – a risk management tool to be used in the risk management decision making process where it would have value in conveying specific risk management advice to guide the behaviour of the user.

The Productivity Commission suggested that any new environmental labelling requirements would be best incorporated into the existing or proposed workplace labelling requirements. For workplace health and safety, the manufacturer or supplier of a chemical into a workplace is required to classify the chemical according to hazard. If it meets certain hazard criteria then certain information must be provided through a Safety Data Sheet and a label. The 2010 Regulation Impact Statement for the proposed revisions to the National Occupational Health and Safety Framework for the Control of Workplace Hazardous Substances and Dangerous Goods identified four areas of cost to industry associated with the requirements:

- Training and familiarisation with the new scheme
- Reclassification of chemicals from the previous classification to the new classification
- Relabelling of chemicals
- Revision of Safety Data Sheet.

If Labelling Option B, were pursued, its scope could either be:

- All existing and new chemicals would be classified on environmental hazard and some would be labelled, as currently occurs for chemicals in the workplace. This would utilise the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) as for classification and labelling chemicals used in the workplace. The GHS is a single, globally harmonised system for the classification of chemicals according to hazard and has been adopted by the majority of Australia's trading partners. As occurs for chemicals used in the workplace, much of the responsibility for classifying the hazard characteristics in order to determine whether labelling might be required would fall to importers. Of note is that most chemicals contain such data provided for overseas markets including environmental data on Safety Data Sheets which could be used by importers for classification.

- Only the Priority Existing Chemicals, IMAP and new chemicals that pass through the NICNAS process and are assessed as requiring environmental risk management would be classified and possibly labelled. SEWPaC already provides labelling information such as the GHS classification as part of its environmental assessments for NICNAS. Accordingly, the hazard characteristics would already be determined under the NICNAS process and therefore costs to industry associated with reclassification would not apply.

In either case, information would be conveyed through Safety Data Sheets and possible additional environmental information contained on a label. The label and Safety Data Sheet could state the obligations of the user for the management of that chemical, specific to the environment (such as reporting when a chemical is harmful to particular environments and how it should be managed). The focus of this communication would be on the handling, storage, use and disposal of an industrial chemical for environmental risks.

Recognising that many imported chemicals already contain environmental information in the Safety Data Sheet or may already be labelled for overseas markets with environmental information, two further sub options could be considered:

- new labelling for locally produced products and re-labelling imported products
- deeming existing labels to be compliant where they contained current environmental information assessed as suitable or meeting certain published criteria.

Lastly, consideration could be given to a timeframe for implementation such as a 5-year phase in.

The 2010 workplace chemicals labelling RIS models the change from labelling chemicals according to the National Occupational Health and Safety Commission classification to labelling according to the GHS. The cost of reclassification, re-labelling and revision of Safety Data Sheets for implementation of the GHS for workplace chemicals was estimated at $500 per chemical for continuing products, $200 for imports and $200 for exports. The incremental cost associated with the environmental classes would be a fraction of these costs since the aquatic environment hazard chapter is only one of the 30 chapters in the GHS (the GHS does not address terrestrial environmental hazards but these could be added in the future). Consequently, the overall cost and benefit figures will not be directly applicable to the environmental ones under consideration; however, it is expected that the costs will still fall within the four main areas of training, classification, relabelling and revision of Safety Data Sheets.

In addition, the scale is vastly different as the number of chemicals captured by environmental labelling would be considerably smaller than for workplace chemicals labelling. Workplace chemicals can be hazardous as a result of explosion hazards, flammability, oxidising hazards, gases under pressure hazards, self-reacting substance hazards, pyrophoric hazards, self-heating substance hazards, emission of flammable gases on contact with water hazards, corrosive hazards, eye damage hazards, sensitisation hazards, skin damage hazards, acute and chronic toxicity hazards, mutagenicity, carcinogenicity and so on. The workplace chemicals labelling RIS estimates that 40 per cent to 80 per cent of chemicals are hazardous for their purposes. Only a small subset of workplace chemicals will be hazardous to the aquatic environment and therefore possibly subject to environmental labelling.

Comment from stakeholders on the usefulness, design, costs and benefits of possible environmental labelling would be of great value.

Monitoring

This element of the framework would be intended to determine whether the risk management actions were effective in limiting the level of chemical in the environment to the concentration anticipated so that environmental harm was prevented; that is, was the regulatory action effective. It could also be undertaken to assist in forming an appropriate risk management strategy (such as by identifying sources and sinks of the chemical).

To do this, the risk management decision of the SCEW (or delegate) would include any relevant requirements for monitoring the levels of the chemical in the environment. Monitoring requirements would be tailored for the particular chemical and use to which the decision refers and therefore could include a variety of actors and may be either binding or voluntary depending on the particulars of the circumstance. These requirements would be designed to measure the effectiveness of the risk management actions, would be consistent with relevant national standards and methodologies, and would be intended to harmonise with existing national monitoring programs. Where possible, the design for the monitoring would allow interpretation of the data at regional, national or international levels.

It is expected that only a small proportion of decisions would include a requirement for some form of monitoring. These would be for those chemicals considered of greatest environmental concern. These chemicals would be additional to those chemicals listed under international agreements which are already being monitored through national sampling programs. International listing and the national risk management decision process would become the basis for choosing chemicals to be monitored within the performance measurement framework envisaged under Recommendation 9.3 of the Productivity Commission report.

The monitoring results would be examined not only to evaluate whether the risk assessment was correct and the risk management actions effective but also would be used to refine and improve future risk management actions. For example, a risk assessment might conclude that there are expected to be harmful levels of a chemical in sewage sludge. In the absence of monitoring, a decision could be taken to manage that risk through controlling or eliminating certain uses. Testing of levels of the chemical in sludges from sewage treatment plants with different levels of treatment could confirm the extent of that risk and what types of treatments may reduce that risk. This could result in a more tailored risk management strategy for future adoption (an example from the United States Environmental Protection Agency's assessment of the pesticide atrazine is at Appendix B).

This would allow both the setting of monitoring standards and the ability to monitor the effectiveness of the regulatory actions in preventing environmental harm.

Additional Policy Issues

Policy issues needing to be agreed by governments to underpin the operation of Option 1 would be incorporated in an intergovernmental agreement or equivalent. An MOU involving cooperation with NICNAS might also be desirable.

5.3 Option 2 – National decision adopted using Commonwealth, state and territory legislation

Under this option, decisions on environmental risk management standards would generally be made by a delegate of the SCEW or the Commonwealth environment minister, in accordance with new Commonwealth legislation. Where the NICNAS assessment report identified that specific environmental risk management conditions are required, the delegate would be required first to obtain advice from an advisory body (established under the Commonwealth legislation) and to consult with state and territory agencies. Once made, the decision would automatically be incorporated into, and would be enforced under, state and territory legislation and (to some extent) Commonwealth legislation.

The key elements of the framework under this option are set out below.

Process for making risk management decisions

Under this framework, a more structured process for making risk management decisions to manage the environmental impacts of industrial chemicals would be implemented. This process would give greater certainty and continuity of risk management actions between jurisdictions and would build upon existing risk assessment arrangements to reduce time and expense. The framework would result in nationally consistent decisions within statutory timeframes that are able to be automatically adopted by reference and implemented in each jurisdiction. All jurisdictions would contribute to the risk management decisions and commit to their implementation.

The new components of the framework, to be conducted under Commonwealth environmental legislation, are detailed in Figure 4.

Figure 4: Option 2 risk management process

Major features of the proposal would include:

1 The new process would consider the environmental risk management of new chemical applications submitted by industry to NICNAS. Existing chemicals would also be reviewed within this framework. For both new and existing chemicals, the new process would occur immediately after they have been assessed under NICNAS

2 The current process for conducting environmental hazard and risk assessments under NICNAS would continue, as would the preparation of the NICNAS high level environmental risk management recommendations. SEWPaC would continue to provide expert advice on the preparation of the environmental components of the assessments and recommendations to the Director of NICNAS

3 Once NICNAS had completed its assessment, the assessment and relevant background information would be passed to the delegate of the SCEW (or the delegate of the Commonwealth environment minister) for consideration of the risk management issues in accordance with new Commonwealth legislation. As described below, the legislation would require consultation with the aim of developing agreement with the states and territories. The delegate would not re-assess the hazard or exposure components of the NICNAS risk assessment. The value of the background information would be in providing understanding of the context for the risk management decisions. Confidential information would be protected under the environmental legislation

4 The delegate would develop the national decision for most of the chemicals requiring risk management; however, the delegate would escalate consideration of the decision to ministerial level in specific cases. This arrangement would allow efficiency in dealing with the great majority of chemicals but allow direct ministerial involvement where circumstances warranted

5 In order to ensure the availability of independent expert advice on scientific and technical aspects of environmental risk management issues, an independent advisory body of 5 – 9 individuals would be established within the new Commonwealth legislation to provide risk management advice on request to the delegate. The advisory body would be made up of individuals with relevant expertise. Members would not be representing any agency or organisation in their position, but would be chosen based on their expertise in issues associated with the environmental management of chemicals including in scientific disciplines such as environmental toxicology, chemistry and the like. The proposed committee would be similar in nature to the advisory committees within the poisons scheduling scheme

6 Where the NICNAS recommendations stated that specific environmental risk management controls are required, the delegate would request risk management advice from the independent advisory body and would then consult state and territory environment agencies to develop the risk management decisions in a form suitable for adoption by all jurisdictions. The key purpose of this stage would be to ensure that the technical requirements for effective environmental protection were developed into adequate, feasible and practical control requirements that could be implemented in each jurisdiction. Following this consultation, and once the jurisdictions were agreed (refer para 8 below for approach where agreement is not obtained), the delegate would provide the proposed risk management decision to the chemical applicant for consultation (in the case of a new chemical), or publish the proposed risk management decision and invite written submissions (in the case of a Priority Existing Chemical). Once the timeframe for submissions was complete, the decision maker would consider all submissions and make the nationally consistent environmental risk management decision for that chemical.

7 The decisions on environmental risk management would be made under the new Commonwealth legislation but the implementation of the decisions for those matters falling under state and territory responsibilities would require adoption of the decisions by the states and territories and implementation under their legislation. The Commonwealth would implement those components of the decision appropriate to its responsibilities and the Commonwealth legislation would contain compliance and enforcement provisions for Commonwealth responsibilities.

8 The intent of the decision making process would be to reach consensus amongst jurisdictions on the measures in the national environmental risk management decision. If this could not be achieved between agencies, the matter would be referred to the SCEW for resolution

9 After each national decision was made, it would automatically be adopted by reference into the legislation of each jurisdiction. It would then be enforceable in the form in which it was made by the SCEW or the SCEW's delegate. The decision would be notified publicly shortly after it was made. Unlike the base case, industry, community and government would quickly know the necessary risk management actions required to protect the environment and be confident that these actions would be applied nationally in all jurisdictions

10 It is expected that 10 to 20 or fewer of the 150-200 new industrial chemicals assessed under NICNAS per annum would require specific environmental risk management controls based on the assessment of the potential risk associated with the chemical. The national environmental decisions on low risk chemicals would be fast tracked without having to go through the advisory body, providing rapid legal assurance to the industry notifier of the chemical that additional environmental risk management controls would not be required by any Australian jurisdiction

11 Over time, previous recommendations made under NICNAS could be examined with a view to harmonising environmental risk management actions between jurisdictions

12 A separate source of chemicals potentially requiring environmental risk management but not necessarily involving the NICNAS process would be where a chemical is listed under an international agreement such as the Stockholm Convention on Persistent Organic Pollutants (POPs). SEWPaC, the lead agency for the Stockholm Convention and several other international chemicals agreements, could ask the delegate to seek the advice of the independent advisory body and to consult with the state and territory environment agencies to help develop appropriate national environmental risk management decisions for the listed chemicals being considered by Australia for ratification. This would benefit the existing treaty making process which includes the preparation of a RIS

13 When considering the environmental risk management issues associated with existing chemicals or those listed under an international Convention, consideration would be given also to the availability, suitability, health and environmental effects of any substitute or alternative chemicals (these issues are currently not part of a NICNAS assessment), as well as social and economic issues. These issues would be similar to the considerations underpinning regulatory impact analyses. Formal regulatory impact analyses have significant costs and timeframes associated with them. If undertaken for new chemicals, these costs would presumably fall to the importer or manufacturer

14 There could be a mechanism in the intergovernmental agreement between the Commonwealth, states and territories, and the relevant state and territory legislation, to allow jurisdictions not to incorporate certain national decisions where appropriate and required. The intention of such a provision would be to cater for the individual needs and circumstances in the derogating jurisdiction; however, it is envisaged that derogation should be considered only when it is apparent that a single decision for all jurisdictions is not feasible and would require a public statement of reasons to explain why the derogation was necessary. Derogation would not prevent other jurisdictions from implementing the risk management decisions where they had the ability to do so.

Measures to promote national consistency and limit timeframes and costs would include:

- make national risk management decisions under a single piece of Commonwealth environmental legislation with adoption by reference and enforcement of those decisions under state, territory and Commonwealth legislation rather than alternative methods which require extensive effort in multiple jurisdictions to retain consistency
- use a legislative approach to ensure accountability, transparency and adherence to statutory timeframes in the decision making process
- allow the statutory delegate to process and make most decisions, rather than referring all decisions for ministerial consideration
- establish the independent advisory body as a small, part-time committee with the ability to conduct much of its business by telephone, email or other methods rather than frequent face-to-face meetings
- service the advisory body by a secretariat within SEWPaC, which already maintains expertise in scientific environmental risk assessment
- ensure that the applicant notifying the chemical to NICNAS need not provide information additional to the NICNAS assessment or make any additional application for consideration under the environmental risk management process; the latter process would follow seamlessly after the NICNAS process

- allow the delegate to fast-track (e.g. 10 working days) the risk management decision making process for chemicals not considered to have environmental impacts by the NICNAS assessment; on current experience, fewer than twenty chemicals per annum would need a longer time frame for making the environmental risk management decision because of their higher risk and complexity of the decision.

Implementation of risk management decisions

Under Option 2, environmental risk management decisions would be implemented by the Commonwealth, state and territory governments, reflecting the powers of each level of government in this area. All states and territories would adopt the decision by reference and make it enforceable through primary or subordinate legislation; noting that where the NICNAS assessment was that specific environmental risk management controls are required, all jurisdictions would have been consulted during the decision making process and have had the opportunity to help form the decision.

The national environmental risk management decisions would be adequate, feasible and practical so that the necessary actions could be implemented in the regulatory framework of each state and territory. Because the decision would be applied directly by state and territory laws, it would not be necessary for each jurisdiction to draft its own decisions. The decisions would take account of jurisdictional differences in such practical matters as the type of facilities available for waste disposal as well as in the nature of the legislation available in each jurisdiction for implementation. Detailed knowledge of state and territory capacities for implementation is another major reason why consultation with the environment agencies of all jurisdictions during decision making would be highly important.

Through Commonwealth, state and territory consultation during the decision making, it should therefore be possible to secure agreement on the decision and be confident that the decision reflects jurisdictional capability and can be readily implemented.

Compliance and enforcement of the national environmental risk management decisions would remain the responsibility of state and territory governments where the components of the decision fall within their jurisdiction. Similarly, the Commonwealth would be responsible where the components pertained to its responsibilities.

Communication

Policy elements as described for Option 1, however under Option 2, national decisions in relation to labelling could be made under Commonwealth legislation and incorporated automatically into, and implemented under, State, Territory and Commonwealth legislation.

Monitoring

Policy elements as described for Option 1, however, under Option 2, national decisions in relation to monitoring could be made where required under Commonwealth legislation and incorporated automatically into, and implemented under, State, Territory and Commonwealth legislation.

Additional Policy Issues

As for Option 1.

5.4 Option 3 – New risk management framework fully implemented under a single national system

Option 3 would go further than Option 2 in achieving not just a nationally agreed decision with a consistent environmental outcome, but also fully consistent implementation nationwide, including the adoption of nationally consistent compliance and enforcement measures by all jurisdictions.

This option would involve the creation of a national regulator to administer chemical regulation and the appointment of inspectors to ensure monitoring, compliance and enforcement functions were met. It is likely that personnel fulfilling the functions under the Commonwealth legislation would be drawn from existing enforcement agencies in each jurisdiction.

Process for making risk management decisions

The same process for decision making would be followed as for Option 2 with the decision reached under a single piece of Commonwealth legislation (Figure 5). The decision making process would still involve consultation with state and territory regulators, even though there would be a single piece of national legislation to cover the entire framework.

Figure 5: Option 3 risk management process

Implementation

This option would allow for the entire environmental risk management framework to be implemented nationally under a single legislative system. This is the key characteristic that differentiates it from Option 2, where the implementation of decisions under Commonwealth, state and territory legislation may not be uniform.

Under Option 3 the national environmental risk management decisions would be made under Commonwealth legislation. Commonwealth legislation would also specify compliance and enforcement measures to be applied nationally, rather than relying on the national environmental risk management decisions being incorporated into, and implemented under state and territory legislation.

This model of implementation would require significant legislative change from current arrangements, where it is largely states and territories which have responsibility for making decisions in relation to the management of environmental risks and for making decisions in relation to the jurisdiction's compliance and enforcement mechanisms.

Depending on the final form of any specific proposal, it may be that the Commonwealth could enact enabling legislation without State assistance. If necessary in order to achieve a comprehensive framework, a cooperative legislative scheme between the Commonwealth and states could be entered into. Under a cooperative scheme, states could:

- refer power to the Commonwealth to allow the Commonwealth to enact a comprehensive framework; or
- pass state laws in substantially the same terms as a Commonwealth law (the Commonwealth law would itself only apply to a limited extent, eg, only in a territory, and the state laws would apply in each state); or
- apply the provisions of a Commonwealth law as amended from time to time (again, the Commonwealth law would itself only apply to a limited extent, and the state laws would apply particular aspects of that law in each state).

An intergovernmental agreement would outline how the national legislation would be implemented.

Regardless of which mechanism under Option 3 were to be selected, it is likely that state and territory enforcement bodies and officials could be given compliance and enforcement powers under Commonwealth legislation.

The specifics of how this legislative model could be implemented are still under consideration. It is relevant to note that there are a number of current national cooperative schemes which provide a high degree of uniformity in implementation.

Communication

Policy elements as described for Option 1 but the legislative mechanism would differ from Options 1 or 2.

Monitoring

Policy elements as described for Option 1 but the legislative mechanism would differ from Options 1 or 2.

Additional Policy Issues

As for Option 1.

5.5 Funding

A further issue for consideration for all three options is the funding basis for the improved risk management process. Several alternatives could be considered, each supported by different arguments and with different advantages. One perspective is that indicated by the Productivity Commission in *Lessons for National Approaches to Regulation*, its January 2009 supplement to the *Research Report on Chemicals and Plastics Regulation*. That document considered that mechanisms for public good activities such as frameworks for risk management ('policy-relevant standards') might best be funded by governments, with Commonwealth, state and territory governments sharing the cost when a national body was preparing model or template regulations that the jurisdictions subsequently adopt. By comparison, 'technical standards' set on a chemical-by-chemical basis might be more appropriately funded through cost recovery from the firms that use those chemicals.

This Consultation RIS does not suggest a preferred funding model but encourages the submission of views on funding arrangements.

6 Impact analysis

An impact analysis in a Consultation RIS identifies and, where possible, quantifies the costs and benefits of each of the options, relative to the status quo. The purpose of the impact analysis is to:

- provide stakeholders with an indication of the likely impacts that would arise from implementing the options
- prompt feedback from stakeholders about the assumptions and calculations used to estimate costs and benefits – this feedback is vital to the RIS process, and will help ensure the Decision RIS is able to draw on best available evidence.

Section 6.6 on page 52 summarises the results of the impact analysis.

In analysing the options, the following factors were considered at a broad level in assessing costs and benefits:

- efficacy in achieving stated outcomes (or likelihood of achievement)
- practicality and feasibility of the implementation approach
- environmental damage avoided (environmental protection)
- level of consistency achieved.

It should be noted that the Decision RIS will incorporate a higher standard analysis (e.g. the distributional impacts on each of the jurisdictions), drawing on additional information collected through the public consultation process and PwC's ongoing liaison with Australian governments.

6.1 Key information about costs and benefits

In analysing the impacts of the three options, this Consultation RIS focuses on two key types of impacts:

- those costs that would be incurred by government and industry in establishing and maintaining the new regulatory frameworks proposed under Options 1, 2 and 3 – these include such costs as legislative change, government staff time required to make risk management decisions, and education costs for industry
- those costs and benefits that would arise as a result of the new regulatory frameworks established under Options 1, 2 and 3 – these costs and benefits would be driven by the requirements outlined in individual risk management decisions.

This Consultation RIS has quantified the second type of costs and benefits by drawing on a previous cost benefit analysis commissioned by the EPHC. This study explored the likely impacts of reforming how governments manage the environmental risks of industrial chemicals. It did so by:

- identifying five chemicals (Table 3) that were believed to be representative of the types of chemicals that would likely be assessed under NICNAS as requiring risk management action to protect the environment, and the types of regulatory responses that governments would use to manage assessed risks
- estimating the costs and benefits (to government, industry and the community) if government regulated the environmental risks of the five representative chemicals in line with proposed reforms (the scope of these reforms were similar to those being explored in this Consultation RIS)

- estimating an 'average' (i.e. per chemical) cost and benefit of regulatory reform – this was achieving by applying a weighting to the likelihood that industrial chemicals like the five representative chemicals would be assessed under NICNAS.

It is these average costs and benefits that are drawn on in this Consultation RIS to estimate:

- the costs to government of operationalising risk management decisions
- the additional compliance costs to industry generated by risk management decisions
- the benefit to the community of a more effective regulatory framework.

It should be noted that the average costs and benefits of regulatory reform outlined in the EPHC study are present values – that is, they represent discounted costs and benefits over a 10-year period. This means that, for certain cost and benefit categories[23] this Consultation RIS takes into account costs and benefits that are incurred beyond the 10 year assessment period that underpins the impact analysis. For instance, in estimating the costs to government of operationalising risk management decisions in year 10 of the 10-year assessment period, this Consultation RIS (by relying on the present values of the EPHC study) is effectively counting costs through years 10 to 19.

This approach is deemed to be appropriate because:

- it allows this Consultation RIS to capture the full costs and benefits of environmental regulation, which generally arise over longer time periods
- it is applied consistently across the options, and does not favour any of the options.

Appendix F provides more detail about how the costs and benefits outlined in this chapter have been derived. Appendix H provides an overview of the EPHC study's methodology, while Appendix I provides a copy of the EPHC study.

Table 3: Representative chemicals underpinning the EPHC study

	Name	Means of regulating
Chemical 1	Gluteraldehyde	Education and information
Chemical 2	Sodium ethyl xanthate (SEtX)	Voluntary monitoring and enforcement
Chemical 3	Para-dichlorobenzene (p-DCB)	Licence changes
Chemical 4	Short chain chlorinated paraffins (SCCPs)	Phased in ban
Chemical 5	Chemical 'X' - a hypothetical chemical, chosen to highlight the upper bound of possible impacts.	Immediate ban

The costs and benefits of the three options have been estimated over a 10 year period. All one-off costs are assumed to be incurred (either by government or industry) during the first year of this period. Ongoing costs, meanwhile, will be incurred through years two to 10.

[23] That is, the costs to government of operationalising risk management decisions, additional compliance costs to industry generated by risk management decisions, and the benefit to the community of a more effective regulatory framework.

6.2 Option 1: Non-statutory development of national environmental risk management decisions as model legislative provisions

Under Option 1, national environmental risk management decisions would be developed by a working group for SCEW, in the form of model legislative provisions. These model provisions would not have legal force, but would be drafted to be incorporated by jurisdictions into their legislative frameworks with as little change to the provision text as practicable (i.e. the model provisions would provide suggested text for the final legislative provision). This option would not be underpinned by a national statutory framework similar to that of Option 2 and Option 3. Accordingly, the process for making risk management decisions would not include a requirement for jurisdictions to comply with statutory timeframes and specific appeal mechanisms would not be provided for. Furthermore, jurisdictional adoption of the national decisions would be voluntary. There would also be no decisions taken in relation to the remaining 200 or so chemicals a year, so there would not be a determination that no risk management is required. Consequently jurisdictions could implement controls at a later stage independently.

The purpose of Option 1 is to introduce a new framework to enhance the management of chemical environmental risks. The impacts of the option thereby primarily relate to the costs and benefits of implementing the new arrangements. The costs would concern the establishment of the Working Group (including required policy changes) and ongoing costs associated with the making, communicating and enforcement of risk management decisions (for both government and industry). The benefits, meanwhile, would relate to the creation of a centralised process to increase the chances that:

- risk management decisions are implemented across all jurisdictions for chemical risks identified by the NICNAS risk assessment process
- the development of these risk management decisions draws on the expertise of Commonwealth, state and territory regulators.

Because of these improvements, Option 1 is expected to reduce or prevent environmental damage for between 10 and 20 chemicals per year. As described in Chapter 3, such damage could involve the loss of aquatic ecosystem function, contamination of water or soil, and effects on human health through exposure in air, water and soil.

The sections below provide greater detail about the nature and scale of the impacts associated with Option 1, including how the option achieves the objectives of government action stipulated in Chapter 4.

6.2.1 Costs

Costs to industry

Option 1 would impose a one-off cost on industry in the form of staff time for businesses to educate themselves about the new regulatory arrangements. Table 4 outlines our quantified estimate of this one-off cost.

The process of making a risk management decision is not expected to impose any additional compliance costs on industry – to the extent that the Working Group solely relies on the information requested and collected from industry as part of the NICNAS process. Stakeholder feedback is sought about the likely impact of the risk management decision process on industry under Option 1.

Option 1 could increase the compliance burden on businesses that operate in jurisdictions which currently do not implement NICNAS recommendations on a consistent or systematic basis (or take action that would accord with the NICNAS recommendation). This compliance burden could include such costs as:

- purchase of materials and equipment required for compliance
- record keeping activities to ensure documents are generated and kept up to date and stored according to legislative requirements

- enforcement costs such as the resources required to facilitate audits and inspections undertaken by states and territories

- procedural costs such as those required by compliance activities such as safety inspections.

Despite the uncertainties involved, it was possible to quantify the additional compliance burden likely to be borne by industry under Option 1. This was primarily done by drawing on a previous cost benefit analysis commissioned by the EPHC. Table 4 outlines this estimate, while Appendix F details its basis.

Costs to government

Option 1 would impose a range of one-off and ongoing costs to government. The one-off costs would relate to:

- The establishment of the policy framework to support the Working Group – this would primarily involve amending the 2007 Ministerial Agreement on Principles for Better Environmental Management of Chemicals. This one-off cost has been quantified and is listed in Table 4

- The establishment of the Working Group – one possibility would be to restructure the NChEM Working Group to assume the responsibilities of the Working Group as outlined in Option 1. The likely costs that would be involved in this process were not able to be quantified. PwC will continue to work with all jurisdictions to collect data on the possible restructuring of the NChEM Working Group. This research will be incorporated in the Decision RIS

- Raising awareness among industry and the community about the nature and extent of the changes under Option 1. This one-off cost has been quantified and is listed in Table 4.

A key ongoing cost to government of Option 1 would be the staff time required to make the risk management decisions. Key personnel would include four staff to support the NChEM Working Group (part-time), and two Commonwealth drafters (part-time). Representatives from state and territory environmental protection regulators would also dedicate additional time (0.25 FTE per jurisdiction) to reviewing and commenting on draft decisions and supporting the NChEM Working Group more broadly. Table 4 outlines our quantified estimates of these ongoing costs to government.

Government would incur costs relating to the communication of risk management decisions to stakeholders (e.g. advertising costs, the development of promotional materials). Table 4 outlines our quantified estimates of these ongoing costs to government.

A further ongoing cost to government would relate to the operationalisation of risk management decisions. More specifically, depending on the nature and scope of each risk management decision, jurisdictions 'may have to alter their regulatory approaches to some industrial chemicals. In most cases, the change in their regulatory approach may require additional resources to undertake monitoring and enforcement activities as well as education and or collaboration with industry.'[24] Appendix G outlines the types of costs that governments are likely to incur.

Despite the uncertainties involved, it was possible to quantify the costs to all governments of altering their regulatory approaches because of risk management decisions generated under Option 1.This was primarily done by drawing on a previous cost benefit analysis commissioned by the EPHC. Table 4 outlines this estimate, while Appendix F details its basis. The costs include the possibility that legislative change may be required in some jurisdictions upfront to allow decisions to be taken up and implemented in a responsive and timely manner (given that there may be up to 10-20 decisions required a year).

Importantly, it is assumed that, under Option 1, jurisdictions would only adopt 60 per cent of the risk management decisions developed by the NChEM Working Group. This assumption:

- reflects the voluntary nature of the option

[24] Centre for International Economics (2009), Benefit Cost Analysis of NChEM Reforms: Impacts to industry, community and government, prepared for EPHC, Canberra.

- is derived from analysis of jurisdictional take up of national standards in other policy areas (see Appendix F for more detail)

- affects the costs to government and industry of Option 1 relative to Option 2 and 3 – as government and industry are likely to incur fewer costs under Option 1 because jurisdictions would be implementing fewer risk management decisions.

Under Option 1, it is possible that jurisdictions may have to subject risk management decisions generated by the NChEM Working Group to a regulatory impact assessment (RIA) process (as the risk management decisions would be developed in the absence of a broader legislative framework, like those that would be implemented under Options 2 and 3). The extent to which this is likely to occur would be dependent on legislative requirements in each jurisdiction, the nature of the change proposed in risk management decisions, and the expected impact of risk management decisions.

Due to the uncertainty surrounding these factors, it was not possible to quantify the ongoing costs to government of subjecting risk management decisions to a RIA process under Option 1. However, the average cost of undertaking a RIS process is $77,201 (2011 dollars) per jurisdiction.[25]

Labelling

As noted in Chapter 5, each of the options would introduce a regulatory framework that could impose labelling requirements on a chemical as part of a risk management decision. It is expected that only a small proportion of decisions would include a requirement for labelling (i.e. for those chemicals considered of greatest environmental concern).

This Consultation RIS has not examined the impacts of labelling under any of the options. The details of how environmental labelling would work are still in development. Furthermore, any finalised environmental labelling scheme would be subject to a separate RIS process.

Monitoring

As noted in Chapter 5, each of the options would introduce a regulatory framework that could impose monitoring requirements on chemicals as part of a risk management decision. It is expected that only a small proportion of decisions would include a requirement for monitoring (i.e. for those chemicals considered of greatest environmental concern).

Our broader analysis of the costs and benefits of Option 1 (and Options 2 and 3) captures the potential impacts of risk management decisions imposing monitoring requirements on industrial chemicals. More specifically, our analysis of:

- the costs to government of adjusting their regulatory approaches to industrial chemicals

- the additional compliance costs to industry

- the benefits to the community.

This is underpinned by a previous cost-benefit analysis commissioned by the EPHC (see Appendix H). This EPHC study incorporated a specific focus on monitoring and evaluation requirements in estimating the impacts of reforming the regulation of chemical environmental risks in Australia.

Summary of costs

Table 4 outlines the costs of Option 1 that were quantifiable. Appendix F provides greater detail of the methodology and assumptions used to calculate the estimates in Table 4.

[25] Ambusah, Sam and Catherine Pingiaro (2011),' Cost-effectiveness of regulatory impact assessment in Victoria', Staff Working Paper, Victorian Competition and Efficiency Commission, Melbourne.

Table 4: Quantifiable costs of Option 1

Cost categories	PV (over 10 years)
Costs to industry	
One-off	
Education costs	$519,000
Ongoing	
Additional compliance costs	$64,994,000
Total costs to industry	**$65,513,000**
Costs to government	
One-off	
Possible legislative change in jurisdictions	$583,000
Operational and organisational planning	tbd
Targeted awareness campaign	$865,000
Ongoing	
Staff time supporting Working Group	$1,250,000
Staff time – Commonwealth drafters	$453,000
Staff time – state and territory input to development of draft risk management decisions	$1,970,000
Communication costs	$536,000
Adjusting regulatory approaches to industrial chemicals	$5,535,000
Total costs to government	**$11,192,000**
Total quantifiable costs of Option 1	**$76,705,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.2.2 Benefits

Objectives of government action

As noted in Chapter 4, the objective of government action for the purposes of this Consultation RIS is to protect the environment and the Australian people by improving the effectiveness and efficiency of risk management actions for industrial chemicals that have the potential to cause environmental harm.

Option 1 would aim to achieve the first of these objectives (effectiveness) by creating a collaborative process that would ensure:

- Chemical environmental risks identified by the NICNAS risk assessment process are formally considered at a national level and, where required, a national risk management decision is developed to address these risks
- the development of national decisions is able to draw on practical information about policies and controls at the jurisdictional level – increasing the likelihood that the decisions would be adopted and implemented by all relevant governments.

As noted in Chapter 3, the NICNAS risk assessment process identifies approximately 10 to 20 new industrial chemicals each year as being likely to cause environmental harm if not properly managed. The scope of this potential harm includes the loss of aquatic ecosystem function, contamination of water or soil, and effects on human health through exposure in air, water and soil. A more effective regulatory framework would reduce the likelihood and consequence of such environmental damage occurring.

Option 1 would aim to achieve the second of the government's objectives (efficiency) by:

- centralising the translation of NICNAS environmental risk management recommendations into risk management decisions – this should allow individual jurisdictions that currently implement NICNAS risk management recommendations to expend less resources in considering and operationalising these recommendations

- increasing the likelihood that all jurisdictions would adopt and implement the national risk management decisions – depending on the level of uptake, this should provide greater consistency in environmental outcomes and requirements across Australia, which could, in turn, reduce the regulatory burden on some businesses that operate across more than one state/territory. For instance, under Option 1, businesses that deal with a chemical which is the subject of a risk management decision would only have to educate themselves, and develop processes and procedures to meet one set of environmental requirements. This is in contract with current arrangements, where these businesses may have to meet varied requirements across the jurisdictions in which they operate.

A constraint of Option 1 compared with Option 2 and Option 3 is that it relies upon voluntary measures which past experience suggests have less durability and adherence over time resulting in patchiness of uptake and implementation of decisions. The lack of clear statutory process in Option 1 is likely to produce less discipline in meeting timeframes, less transparency and less accountability in who is responsible for the decision-making. This will produce less predictability for industry than the statutory approach of Option 2 and Option 3 and poorer environmental protection.

Quantifying benefits

Quantifying the benefits associated with Option 1 is difficult. Doing so requires an understanding of factors that cannot be easily predicted *ex ante*. These factors include:

- the nature and scale of the chemical environmental risks that will require the development of a risk management decision

- the type and scope of controls that will be implemented as a result of each risk management decision.

Although there are many uncertainties, it was possible to quantify the benefits to the community of Option 1. These benefits primarily involve avoided costs due to a more effective regulatory framework for managing chemical environmental risks (e.g. the costs society would no longer have to pay to remediate a contaminated site). The benefits of Option 1 were primarily quantified by drawing on a previous cost benefit analysis commissioned by the EPHC. Table 5 outlines this estimate, while Appendix F details its basis.

With reference to the efficiency benefits, PwC will continue to collect information (through this Consultation RIS and ongoing discussions with all jurisdictions) that should allow these benefits to be quantified as part of the Decision RIS. Section 1.4 outlines a range of questions that will allow stakeholders to provide feedback on the efficiency benefits associated with Option 1 (as well as Option 2 and Option 3).

Table 5: Quantifiable benefits of Option 1

	PV (over 10 years)
Benefits to the community from a more effective regulatory framework	$85,654,000
Total quantifiable benefits of Option 1	**$85,654,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.3 Option 2: National decision adopted by Commonwealth, state and territory legislation

Under Option 2, decisions on environmental risk management standards would be made by a delegate of the SCEW (or Commonwealth environment minister), in accordance with new Commonwealth legislation. Where the NICNAS assessment report identified that specific environmental risk management conditions are required, the delegate would be required to obtain advice from an advisory body (established under the Commonwealth legislation) and to consult with state and territory agencies. Once made, the decision would automatically be incorporated into, and would be enforced under, state and territory legislation and (to some extent) Commonwealth legislation.

The purpose of Option 2 is similar to Option 1. Accordingly, the impacts of Option 2 are broadly aligned with those of Option 1. The key differences between the two options are:

- Option 2 would impose greater costs on government – primarily involved with the establishment and operation of the delegate and associated administrative structures
- the development of risk management decisions under Option 2 would draw on the advice of scientific experts – this would likely increase the effectiveness of the national decisions in addressing identified risks
- as adoption of the risk management decisions would be mandatory under Option 2, it is likely to result in a more effective regulatory framework.

The sections below provide greater detail about the nature and scale of the impacts associated with Option 2, including how the option achieves the objectives of government action stipulated in Chapter 4.

6.3.1 Costs

Costs to industry

Option 2 would impose a one-off cost on industry in the form of staff time for businesses to educate themselves about the new regulatory arrangements. Table 6 outlines our quantified estimate of this one-off cost.

Similar to Option 1, the process of making a risk management decision is not expected to impose any additional compliance costs on industry under Option 2.

Option 2 could increase the compliance burden on businesses that operate in jurisdictions which currently do not implement NICNAS recommendations on a consistent or systematic basis (or take action that would accord with the NICNAS recommendation). Table 6 outlines our estimate of these additional compliance costs, while Appendix F details its basis.

Costs to government

Option 2 would impose a range of one-off and ongoing costs on government. The one-off costs would relate to:

- the establishment of the legislative framework to support the new arrangements – this would involve the drafting and agreeing of an intergovernmental agreement (IGA), the Commonwealth developing and enacting supporting legislation to provide the SCEW (or Minister) and delegate with statutory powers, and the state and territory governments making legislative and other necessary policy changes to ensure that they are able to adopt the risk management decisions by reference
- operational and organisational planning to ensure the delegate, advisory body and secretariat have appropriate processes and frameworks in place to function effectively
- raising awareness among industry and the community about the nature and extent of the changes under Option 2.

Each of these one-off costs to government have been quantified and are listed in Table 6.

The ongoing costs to government of Option 2 would primarily relate to:

- staff time required to make the risk management decisions – key personnel involved in this process are the delegate (part-time), five advisory body members (part-time), three secretariat staff (part-time), and two Commonwealth drafters (part-time)
- representatives from state and territory environmental protection regulators dedicating additional staff time (0.25 FTE per jurisdiction) to reviewing and commenting on draft decisions and supporting the delegate more broadly
- the communication of risk management decisions to stakeholders (e.g. advertising costs, the development of promotional materials and fees for registering decisions on the Federal Register of Legislative Instruments)
- the operationalisation of risk management decisions – more specifically, depending on the nature and scope of each risk management decision, jurisdictions 'may have to alter their regulatory approaches to some industrial chemicals.

Table 6 outlines our quantified estimates of the ongoing costs to government of Option 2.

Summary of costs

Table 6 outlines the costs of Option 2 that were quantifiable. Appendix F provides greater detail of the methodology and assumptions used to calculate the estimates in Table 6.

Table 6: Quantifiable costs of Option 2

Cost categories	PV (over 10 years)
Costs to industry	
One-off	
Education costs	$519,000
Ongoing	
Additional compliance costs	$108,323,000
Total costs to industry	**$108,842,000**
Costs to government	
One-off	
Legislative change	$1,166,000
Operational and organisational planning	$1,259,000
Targeted awareness campaign	$865,000
Ongoing	
Staff time – delegate, advisory body and secretariat	$2,800,000
Staff time – Commonwealth drafters	$453,000
Staff time – state and territory input to development of draft risk management decisions	$1,970,000
Communication costs	$536,000
Adjusting regulatory approaches to industrial chemicals	$9,225,000
Total costs to government	**$18,274,000**
Total quantifiable costs of Option 1	**$127,116,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.3.2 Benefits

Objectives of government action

As noted in Chapter 4, the objective of government action for the purposes of this Consultation RIS is to protect the environment and the Australian people by improving the effectiveness and efficiency of risk management actions for industrial chemicals that have the potential to cause environmental harm.

Option 2 would achieve the first of these objectives (effectiveness) by creating a statutory process that would ensure:

- all chemical environmental risks identified by the NICNAS risk assessment process are formally considered at a national level and, where required, a national risk management decision is developed to address these risks
- the development of national decisions is able to draw on best available scientific evidence and information about policies and controls at the jurisdictional level (through structured input from the advisory body and state and territory regulators)

- all jurisdictions would automatically adopt and would then be expected to implement the single suite of national decisions (where relevant), reducing the potential for regulatory gaps to emerge between jurisdictions.

Option 2 would achieve the second of the government's objectives (efficiency) by:

- centralising the translation of NICNAS environmental risk management recommendations into risk management decisions – this should allow individual jurisdictions that currently implement NICNAS risk management recommendations to expend less resources in considering and operationalising these recommendations

- requiring all jurisdictions to adopt and implement the national risk management decisions by reference – this should provide greater consistency in environmental outcomes and requirements across Australia, which could, in turn, reduce the regulatory burden on some businesses that operate across more than one state/territory.

It should be noted that, while Option 2 would provide a national decision which should result in consistent environmental outcomes in each jurisdiction, the means of achieving much of the implementation, compliance and enforcement would be done through each jurisdiction's own legislation. Although the target environmental outcome would be nationally consistent and environmental requirements in meeting those outcomes would be nationally consistent, the regulatory mechanisms used to implement and enforce compliance with those requirements might differ between jurisdictions to some extent, reflecting differences between jurisdictions in the design of their existing environmental legislation. Nonetheless, Option 2 would provide a significant advance in national consistency compared with the base case.

Other benefits

Option 2 is likely to generate a range of additional benefits, beyond those associated with addressing the objectives of government action. These other benefits include:

- The national decisions would be taken under a single piece of Commonwealth legislation so state and territory legislation would not need to also provide for the decision-making process; this would also provide clear accountability for risk management decisions to Parliament and to industry and the community

- A clearly defined statutory process would provide industry with transparency and predictability regarding timeframes, decision-making responsibilities and consultation mechanisms. This, in turn, could:

  – provide industry with greater certainty, allowing business and investment decisions to be made on a firmer basis – this could potentially reduce the cost of bringing new substances to market[26] and improve the overall conditions for innovation by industry[27]

  – potentially allow industry to realise other efficiencies – for instance, studies examining regulator reform in other countries have identified that consistent chemical regulation can reduce legal and insurance costs for chemical users, require less staff effort to answer customer queries regarding chemicals and optimise internal risk management frameworks and practices.[28]

- The use of an expert, independent advisory body would provide additional confidence that the risk management decisions would incorporate the full range of environmental measures needed and be scientifically sound

[26] Giacomello, A et al (2006), The Benefits of Chemical Regulation, prepared for Defra's Chemical and Nanotechnology Division, p.10.

[27] Reihlen, S and H Luskow (2007), Analysis of Studies Discussing Benefits of REACH, p. 13; Fraunhofer ISI, Ökopol, 2004, Analysis of the costs and benefits of the new EU chemicals Policy – An examination based on selected sectors taking into account effects on competitiveness, innovation, environment, and health; Massey of GDEI, Tufts University 2005: Surviving REACH – A guide for Companies that Use Chemicals.

[28] Reihlen, S and H Luskow (2007), Analysis of Studies Discussing Benefits of REACH, p.12.

- Because the process for making national decisions would be provided for under Commonwealth legislation only, it would be easier to ensure that interaction with the ICNA Act is seamless, transparent and easily understood, including in relation to such matters as the timing of transfer of information, confidentiality of information and clarity of roles

- This option most closely mirrors the operation of others sectors managing industrial chemicals such as poisons scheduling, transport and occupational health and safety and completes the architecture of Australia's industrial chemicals management as envisaged by the Productivity Commission and COAG.

Quantifying benefits

Option 2 would generate benefits for the community, primarily in the form of avoided costs due to a more effective regulatory framework for managing chemical environmental risks. The benefits of Option 2 were quantified by drawing on a previous cost benefit analysis commissioned by the EPHC. Table 7 outlines this estimate, while Appendix F details its basis.

Table 7: Quantifiable benefits of Option 2

	PV (over 10 years)
Benefits to the community from a more effective regulatory framework	$142,757,000
Total quantifiable benefits of Option 2	**$142,757,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.4 Option 3: New risk management framework fully implemented under a single national system

Under this Option, the national environmental risk management decisions would be made under Commonwealth legislation. The legislation would also specify compliance and enforcement measures that would apply nationally (either directly under the Commonwealth legislation, or also through state and territory legislation mirroring or applying by reference the Commonwealth legislation). This is in contrast to Option 2, which relies on the individual compliance and enforcement measures already present in state and territory legislation. This model of implementation would require legislative change from current arrangements.

The purpose of Option 3 is similar to Options 1 and 2. Accordingly, the impacts of this option are broadly aligned with the other options. The key differences between Option 3 and Options 1 and 2 are:

- Option 3 would impose greater costs on government compared to Options 1 and 2 – these costs would be driven by the activities involved in establishing a national regulator and associated administrative structures

- Option 3 would likely result in a regulatory framework that is more effective than Option 1 (as adoption of risk management decisions would be mandatory)

- Option 3 would likely result in a regulatory framework that is more consistent than Options 1 and 2, reducing further the regulatory burden on relevant businesses that operate across more than one jurisdiction.

The sections below provide greater detail about the nature and scale of the impacts associated with Option 3, including how the option achieves the objectives of government action stipulated in Chapter 4.

6.4.1 Costs

Costs to industry

The establishment of a national regulator under Option 3 could impose some costs on industry. For example, industry may be consulted with in the establishment phase to inform the structure and operation of the regulator, and some costs may be borne by industry in attending outreach activities hosted by government to

become familiar with the new regulator and its activities more broadly. Stakeholder feedback is sought about the significance of these costs.

Option 3 would impose a one-off cost on industry in the form of staff time for businesses to educate themselves about the new regulatory arrangements. Table 8 outlines our quantified estimate of this one-off cost.

Similar to Option 1, the process of making a risk management decision is not expected to impose any additional compliance costs on industry under Option 3.

Option 3 could increase the compliance burden on businesses that operate in jurisdictions which currently do not implement NICNAS recommendations on a consistent or systematic basis (or take action that would accord with the NICNAS recommendation). Table 8 outlines our estimate of these additional compliance costs, while Appendix F details its basis.

Costs to government

Option 3 would impose a range of one-off and ongoing costs on government. The one-off costs would relate to:

- the establishment of the legislative framework to support the new arrangements – given that the intent of Option 3 is to establish a national regulator, the development of the enabling legislation for this body would require considerable staff time, as well as legal and drafting support
- operational and organisational planning to ensure the national regulator has appropriate processes and frameworks in place to function effectively
- raising awareness among industry and the community about the nature and extent of the changes under Option 3.

Each of these one-off costs to government have been quantified and are listed in Table 8.

The ongoing costs to government of Option 3 would primarily relate to:

- staff time required to make the risk management decisions – key personnel involved in this process would be the delegate (full-time), five scientific advisors (part-time), three support staff (full-time), and two Commonwealth drafters (part-time)
- staff time required to coordinate compliance and enforcement undertaken at the state and territory level (two staff, full-time)
- the communication of risk management decisions to stakeholders (e.g. advertising costs, the development of promotional materials and fees for registering decisions of the Federal Register of Legislative Instruments)
- the operationalisation of risk management decisions – more specifically, depending on the nature and scope of each risk management decision, jurisdictions 'may have to alter their regulatory approaches to some industrial chemicals.

Table 8 outlines our quantified estimates of the ongoing costs to government of Option 3.

Summary of costs

Table 8 outlines the costs of Option 3 that were quantifiable. Appendix F provides greater detail of the methodology and assumptions used to calculate the estimates in Table 8.

Table 8: Quantifiable costs of Option 3

Cost categories	PV (over 10 years)
Costs to industry	
One-off	
Education costs	$519,000
Ongoing	
Additional compliance costs	$108,323,000
Total costs to industry	**$108,842,000**
Costs to government	
One-off	
Legislative change	$3,117,000
Operational and organisational planning	$3,777,000
Targeted awareness campaign	$2,440,000
Ongoing	
Staff time – regulator	$6,080,000
Staff time – Commonwealth drafters	$453,000
Staff time – coordinating compliance and enforcement	$2,172,000
Communication costs	$536,000
Adjusting regulatory approaches to industrial chemicals	$9,225,000
Total costs to government	**$27,800,000**
Total quantifiable costs of Option 1	**$136,642,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.4.2 Benefits

Objectives of government action

As noted in Chapter 4, the objective of government action for the purposes of this Consultation RIS is to protect the environment and the Australian people by improving the effectiveness and efficiency of risk management actions for industrial chemicals that have the potential to cause environmental harm.

Option 3 would achieve the first of these objectives (effectiveness) by creating a statutory process that would ensure:

- all chemical environmental risks identified by the NICNAS risk assessment process are formally considered at a national level and, where required, a national risk management decision is developed to address these risks
- the development of national decisions is able to draw on best available scientific evidence
- all risk management decisions would be adopted and implemented by the national regulator, removing the potential for regulatory gaps.

Option 3 would achieve the second of the government's objectives (efficiency) by:

- centralising the translation of NICNAS environmental risk management recommendations into risk management decisions – as a result, governments should expend less resources in aggregate in considering and implementing NICNAS recommendations compared to the status quo
- entrusting the adoption, implementation and enforcement of all risk management decisions to a single, national body – this should provide the highest degree of national consistency in environmental outcomes and requirements across Australia. This would, in turn:
  - reduce the regulatory burden on some businesses that operate across more than one state/territory. It is important to note, however, that industry stakeholders have suggested that Option 3 could increase regulatory complexity if the boundaries between the proposed national regulator and the existing state and territory environment protection regulators were not clearly defined
  - provide the most reliable approach for achieving and maintaining long-term national consistency
  - provide a decision that would be immediately binding nationally once registered, providing consistency between jurisdictions immediately
  - provide good to comprehensive coverage of chemical activities, depending on how the scheme was established
  - (under a Commonwealth-only scheme) provide a direct means for Commonwealth legislation to implement Australia's obligations under international law.

Quantifying benefits

Option 3 would generate benefits for the community, primarily in the form of avoided costs due to a more effective regulatory framework for managing chemical environmental risks. The benefits of Option 3 were quantified by drawing on a previous cost benefit analysis commissioned by the EPHC. Table 9 outlines this estimate, while Appendix F details its basis.

Table 9: Quantifiable benefits of Option 3

	PV (over 10 years)
Benefits to the community from a more effective regulatory framework	$142,757,000
Total quantifiable benefits of Option 3	**$142,757,000**

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.5 Small business and competition impacts

It is not expected that any of the options would have a disproportionate impact on small businesses. The one-off education costs and ongoing additional compliance costs of the three options would be incurred by all relevant businesses that use industrial chemicals, and would not be targeted (deliberately or otherwise) at small businesses.

Likewise, it is not expected that any of the options would restrict competition. More specifically, none of the options would alter the incentives of suppliers to compete, change the ability of suppliers to compete, or affect the number and range of suppliers. Risk management decisions developed under the options are likely to impose requirements on the use, handling and disposal of particularly industrial chemicals. These requirements, however, would be imposed uniformly on all relevant businesses within a jurisdiction.

Stakeholder feedback is sought about whether any or all of the three options are expected to have a disproportionate impact on small businesses and/or restrict competition.

6.6 Impact analysis summary

Table 10 summarises the findings of the impact analysis. Appendix F provides more detail and an explanation of the methodology used to estimate impacts (including key modelling assumptions). Section 6.7 provides a breakdown of the government costs by jurisdiction.

Table 10: Impact analysis summary (PV, over 10 years)

	Option 1	Option 2	Option 3
Costs			
Industry	$65.5 million	$108.9 million	$108.9 million
Government	$11.2 million	$18.3 million	$27.8 million
Total	$76.7 million	$127.2 million	$136.7 million
Benefits	$85.7 million	$142.8 million	$142.8 million
Net benefit	**$9 million**	**$15.6 million**	**$6.1 million**

Notes: Present values have been calculated using a discount rate of 7 per cent.

Each of the options should increase the effectiveness and efficiency of the regulatory framework for managing chemical environmental risks relative to the status quo. They would achieve this firstly by ensuring that all environmental risks identified under the NICNAS risk assessment process would be considered at a national level and are addressed in a risk management decision, and secondly by increasing the likelihood that all jurisdictions would adopt and implement risk management decisions (reducing the potential for regulatory gaps). It is important to note that the estimated benefits may be underestimates given that it is difficult to measure all aspects of environmental harm that would occur if no risk management was implemented. Similarly, there will be non-quantified environmental benefits such as protection of biodiversity and of ecosystem services and benefits to industry such as strengthening public confidence in the effectiveness of the chemicals regulatory system.

The options would centralise the process of making risk management decisions (allowing governments to realise efficiencies) and increase the consistency of environmental outcomes and requirements – which would, in turn, reduce the burden on relevant businesses that operate across more than one jurisdiction.

Options 2 and 3 would likely be more effective and efficient than Option 1. Option 3 would result in greater national consistency than Option 2.

6.7 Scenario analysis

A key driver of the costs and benefits of the three options is the number of new industrial chemicals that will require the development of a risk management decision each year. The impact analysis outlined in this chapter (and summarised in Table 10) is based on the assumption that the regulatory frameworks established under each of the options would develop risk management decisions for 15 new industrial chemicals a year. This rate of development is derived from SEWPaC analysis of the number of new industrial chemicals that historically have been identified by the NICNAS risk assessment process as requiring risk management action to protect the environment.

Table 11 outlines the impact that changing the rate of development has on the net benefit of each of the options. More specifically, Table 11 illustrates that:

- reducing the rate of development by 50 per cent (i.e. Scenario 1) affects the net benefit of the options, and leads to a net cost for Option 3
- increasing the rate of development by 50 per cent (i.e. Scenario 3) increases the net benefit of the options.

Scenario 4 represents a rate of development that could potentially occur under the IMAP framework. As described in Section 5.1, 3,000 existing chemicals will be rapidly assessed under NICNAS over the next four years. SEWPaC anticipates that between 20 per cent and 25 per cent of these existing chemicals could be identified under NICNAS as requiring risk management action. If this were to occur, the number of industrial chemicals requiring the development of a risk management decision would increase to approximately 80 a year (over a 10 year period). Such a rate of development would lead to higher net benefits for all of the options.

It is important to note that Scenarios 1, 3 and 4 in Table 11 are based on the same assumed costs that government would face in establishing and operating the new regulatory frameworks as Scenario 2. In reality, government may decrease or increase these costs to ensure they are commensurate with the number of risk management decisions that would need to be developed each year (particularly in the context of Scenario 4, which is based on a rate of development five times greater than Scenario 2). This decrease or increase in costs would affect the net benefits of the options under the different scenarios.

Table 11: Net benefit summary, different scenarios for number of industrial chemicals requiring the development of a risk management decision each year (PV, over 10 years)

	Option 1	Option 2	Option 3
Scenario 1: 10 chemicals per year	$3,900,000	$7,200,000	-$2,300,000
Scenario 2: 15 chemicals per year	**$9,000,000**	**$15,600,000**	**$6,100,000**
Scenario 3: 20 chemicals per year	$14,000,000	$24,000,000	$14,500,000
Scenario 4: 80 chemicals per year	$74,500,000	$124,900,000	$115,400,000

Notes: Present values have been calculated using a discount rate of 7 per cent.

6.8 Cost to government summary

Table 12 provides a jurisdictional breakdown of the costs to government under each of the options. Generally speaking, the costs to the Commonwealth Government are primarily associated with designing, implementing and maintaining the new regulatory arrangements. The costs to state and territory governments, meanwhile, are primarily associated with adjusting their regulatory approaches to industrial chemicals because of the requirements of individual risk management decisions.

Table 12: Cost to government summary (PV, over 10 years)

	Option 1	Option 2	Option 3
Commonwealth	$3.5 million	$6.8 million	$18.3 million
State and territory	$7.7 million	$11.5 million	$9.5 million
Average state and territory	$1 million	$1.4 million	$1.2 million
Total	**$11.2 million**	**$18.3 million**	**$27.8 million**

The average costs to the states and territories have been estimated to range from $1 million to $1.4 million (PV, over 10 years) under the three options. The actual costs borne by the states and territories are likely to vary, depending on:

- the extent to which they currently adopt (and are likely to adopt in future) NICNAS risk management recommendations
- their current approach to regulating industrial chemicals
- the number of entities that are subject to risk management decisions and whether or not they are currently regulated.

7 Evaluation and conclusion

This Consultation RIS has identified and considered a range of problems with the current arrangements. It confirms that the base case does not adequately provide for the development, adoption and implementation of effective risk management of industrial chemicals to protect the environment and to provide consistency for industry. The problem is significant as up to 20 new industrial chemicals per annum are typically assessed as likely to cause environmental harm if not properly managed, in some cases with flow on effects for human health, the availability of natural resources and the costs of remediation. In addition, for the next several years, the number of chemicals requiring environmental risk management will increase four-fold as the "grandfathered" chemicals from the Australian Inventory of Chemical Substances are rapidly assessed.

As identified by the Productivity Commission and COAG, greater involvement of environment ministers and their agencies is needed in making and implementing the necessary risk management decisions to fill the existing regulatory gap in environmental protection.

Based on the analysis outlined in Chapter 6, Option 2 is assessed as representing an improvement over the base case and is the preferred option for the purpose of public consultation. This conclusion is underpinned by the following reasoning:

- All options would represent an improvement over the base case, as they would ensure that all environmental risks identified by the NICNAS risk assessment process are addressed in a national risk management decision. Relative to the base case, each option would also increase the extent to which risk management decisions are adopted consistently by jurisdictions – reducing, in turn, the potential for regulatory gaps between jurisdictions and the burden on some businesses that operate across more than one jurisdiction

- While Option 1 is the least costly of the options (at least in terms of quantified costs), the voluntary nature of the regulatory framework it would introduce means that it would be less effective than Options 2 and 3. While jurisdictional adoption and implementation of risk management decisions is likely to be more frequent and consistent than the base case, inconsistencies are likely to remain – allowing regulatory gaps to emerge between jurisdictions and delayed or inconsistent management of risks to the environment and to human health through the environment.

- Option 2 and Option 3 would introduce regulatory frameworks that are markedly more effective than the base case because they ensure national adoption of a single risk management decision for each relevant chemical. This would reduce the potential for regulatory gaps between jurisdictions, provide greater certainty for industry, reduce the regulatory burden for businesses operating in more than one jurisdiction and would better address the identified objective of protecting the environment and human health.

- Option 3 would introduce a regulatory framework that would result in greater national consistency than Option 2 particularly in relation to implementation. However, Option 3 would impose additional costs to establish the new regulatory framework.

- Option 2 would impose considerably fewer costs on government in terms of establishing and operating the new regulatory framework (which is reflected in the greater net benefit for Option 2 compared to Option 3). It is for this reason that Option 2 is preferred.

A timeline and key steps for implementation and review of government action will be developed following public consultation on this Consultation RIS and a final decision on the preferred option.

Ongoing monitoring of any reforms will be undertaken to ensure that the objectives are being achieved and whether any further reforms are necessary.

Appendices

Appendix A Policy context

In 2006, COAG identified chemicals and plastics as a 'regulatory hotspot' and established a Ministerial Taskforce on Chemicals and Plastics Regulatory Reform to "develop measures to achieve a streamlined and harmonised system of national chemicals and plastics regulation". As part of this work, the Productivity Commission was engaged to examine Australia's system of regulating chemicals and plastics across all sectors. In 2008, it released its *Research Report on Chemicals and Plastics Regulation,* which identified a number of reform initiatives to improve the efficiency and effectiveness of the chemical management framework in Australia.

In considering the industrial chemical framework as a whole, the Productivity Commission concluded that '…industrial chemical hazard and risk assessments should ideally be performed by a dedicated technical expert agency separately from the subsequent standard setting needed to manage the risks of those chemicals. The case for separation of assessment from standard setting is particularly strong for industrial chemicals because they are used in a variety of ways, and the standard setting would more appropriately be handled by experts in the field.'[29]

In general, this principle is reflected in the structure of the current regulatory system for industrial chemicals. Industrial chemicals are assessed under the *Industrial Chemicals (Notification and Assessment) Act 1989* (ICNA Act). This NICNAS assessment identifies the hazards and risks of a chemical based on its proposed uses. It includes consideration of human health, occupational health and safety and environmental impacts of the chemical. It also includes non-binding risk management recommendations.

The NICNAS assessment is then considered by regulatory bodies in each of the sectors, such as transport, poisons scheduling and the workplace (see descriptions below) according to their processes. The regulatory bodies formulate regulation (or "standards" as described by the Productivity Commission) taking into account the NICNAS assessment and other relevant matters. This regulation prescribes how a chemical is to be managed in practice to mitigate its risks. Commonwealth, states and territories cooperate in the making of risk management decisions and they implement them through their respective legislation.

National regulatory bodies to provide the forum and mechanism for this cooperation have been established for most sectors such as poisons scheduling, transport and occupational health and safety.

A comparable national regulatory body has not yet been established amongst environmental agencies. Consequently, there has been no national cooperative body to develop nationally consistent environmental risk management decisions and to facilitate implementation of the decisions through appropriate environmental legislation. In most jurisdictions, environment agencies are responsible for risk management of industrial chemicals to protect the environment. This is done through general environmental management, pollution and waste control measures under local government, state, territory or Commonwealth environment protection controls. Consequently, it is necessary that environment ministers and environment agencies have a major role in agreeing and implementing the environmental risk management decisions if they are to be effective and applied consistently.

Productivity Commission Recommendations

The Productivity Commission recognised that existing national regulatory arrangements for industrial chemicals did not provide adequate environment protection and identified this gap as one of the four main areas of public policy concern in relation to the management of hazardous chemicals.

The chief concern was that environmental risk management recommendations arising from the NICNAS industrial chemical assessments were not being consistently and systematically adopted by jurisdictions.

[29] Productivity Commission (2008) Research Report on Chemicals and Plastics Regulation, p.62.

The Productivity Commission noted that there have been a number of impediments to jurisdictions adopting environmental risk management recommendations in a timely manner, including:

- the lack of a national, coordinating body to transform recommendations made under NICNAS about the management of environmental risks into operational risk management decisions for implementation by jurisdictions
- limited provision for consultation with environmental agencies during the development of the NICNAS risk management recommendations
- the absence of a formal, legislative link between recommendations made under NICNAS about the management of environmental risks and action from environmental regulators in each jurisdiction.

To rectify this gap and bring the environment sector into line with the other sectors, the Productivity Commission recommended:

- the establishment of a "standards setting"[30] body to make recommendations to the environmental ministerial council regarding the management of the impact of chemicals on the environment (Recommendation 9.2 of the report)
- introducing mandatory labelling of chemicals to provide instructions on environmentally sustainable management to chemical users if there is a demonstrated net benefit to the community (Recommendation 9.1 of the report)
- considering the feasibility of developing a performance measurement framework for monitoring the impact of chemicals on the environment and human health (Recommendation 9.3 of the report).

COAG Decisions

In November 2008, COAG considered the Productivity Commission recommendations and directed the EPHC to develop proposals to better manage chemical impacts on the environment under Outcome 16 of the *National Partnership Agreement to deliver a Seamless National Economy*.

COAG requested a proposal for the establishment of a standard-setting body for chemicals in the environment, with supporting legislation as necessary, which would report to the EPHC. The proposal was to include possible cost-sharing arrangements between the Commonwealth and the states and territories. COAG noted that this approach would close a significant gap in the current arrangements for environmental protection and provide for a single national decision on the environmental management of chemicals which can be adopted by reference and applied consistently in all jurisdictions (Response to Productivity Commission Recommendation 9.2).

These new arrangements would result in a national regulatory framework overseen by environment ministers for managing the impact of chemicals on the environment, which would be comparable to the regulatory measures available in other sectors such as poisons scheduling, transport and workplace health and safety.

COAG also agreed that the EPHC should:

- examine the costs and benefits of mandatory environmental labelling of chemicals, recognising that legislative change may be required should the study demonstrate net benefit to the community from mandatory labelling (Response to Productivity Commission Recommendation 9.1)
- examine the feasibility of developing a performance measurement framework for monitoring the impact of chemicals in the environment, both for impacts on the environment and human health (Response to Productivity Commission Recommendation 9.3).

[30] In the Productivity Commission's supplementary report, Chemicals and Plastics Regulation: Lessons for National Approaches to Regulation Supplement to research report (2009), it became clear that "standards setting" was not the best description of the role of such a body. The role of the body was to provide risk management advice on the management of the environmental impact of individual chemicals.

In 2009, the COAG environmental reforms, including the risk management body, labelling and environmental monitoring, were included as a key project under Strategy 12 (reducing hazard and risk) of the COAG-endorsed *National Waste Policy: Less Waste, More Resources.*

The new COAG Standing Council on Environment and Water (SCEW), through the Consultation RIS currently under development, is considering a range of options to address the problems identified in the Productivity Commission inquiry and meet the decisions made by COAG to address these issues.

In doing so, the SCEW has noted that the three reforms (COAG responses to Recommendations 9.1, 9.2 and 9.3) could be combined to create a cohesive risk management framework to protect the environment from the hazardous effects of assessed industrial chemicals. Labelling (9.1) and monitoring (9.3) requirements for individual chemicals, where needed, would be included as part of the decisions agreed to through the process for making national environmental risk management decisions (9.2). As such, the Consultation RIS being developed integrates all three reforms.

Appendix B Chemical examples

Polychlorinated biphenyls

Polychlorinated biphenyls (PCBs) are a class of industrial chemical which have been internationally recognised as persistent organic pollutants (POPs) due to their persistent, bioaccumulative, toxic and long range transport properties. This chemical has created long term human health and environmental concerns.

PCBs had a range of uses, primarily in capacitors and transformers but also as flame retardants, ink solvents and plasticizers. The chemical characteristics including fire resistance, stability and high resistance to break down, led to their popularity but also lead to their persistence.

PCBs are immunotoxic and can damage the immune system, liver, skin, reproductive system, gastrointestinal tract and thyroid gland. Persistent chemicals demonstrate the problems of environmental contamination leading to long term human exposure risks and the consequent harm to human health.

From 1929 to 1989, 1.7 million tonnes of PCBs are thought to have been produced internationally. The risks of PCBs were identified in the 1970s and resulted in a phase out of commercial production. However, due to the stability of the chemical, equipment which contains the chemical is still in use or in stockpiles waiting for final disposal. In 2009, over 4,000 tonnes of PCB waste and contaminated equipment was destroyed in Australia. To ensure that human health and environmental risks are mitigated, disposal of PCBs requires destruction of the chemical using specialised facilities.

Dichloro-diphenyl-trichloroethane

Dichloro-diphenyl-trichloroethane (DDT) is a persistent organic pollutant and pesticide used for disease vector control. Initially used to protect against malaria, typhus and other diseases spread by insects in World War II, use was expanded to agricultural crops, especially cotton, prior to recognition of the toxic effects and bans in many countries. In Australia, uses included: control of various insect pests on fruit, vegetable pulse, oilseed and cereal crops as well as in forestry, pasture and turf situations; control of various insect pests and fungal diseases in seedbeds and on rose bushes; and to control external insect pests on livestock. Registration for DDT was cancelled in Australia in 1987 and from this date importation was prohibited.

The toxic effects of DDT were first recognised in the 1970s when egg-shell thinning for birds had such significant effects on bird populations that bans were initiated in many countries. Long-term exposure for humans is of particular concern for potential adverse health effects such as immunotoxicity, reproductive disorders and carcinogenicity.

The persistence of DDT (up to 50 per cent can remain in the soil 10-15 years after application), its ability to undergo long range transport and bioaccumulative properties has resulted in residues of DDT being detected in the Arctic and breast milk. Food-borne DDT residues remain the main source of human exposure for the general population despite significant reductions in use internationally.

DDT is one of the initial 12 chemicals listed on the Stockholm Convention on Persistent Organic Pollutants. The Stockholm Convention restricts the use and production of DDT to disease vector control in accordance with World Health Organization recommendations. Restrictions include indoor residual spraying (such as on the inside walls of buildings) where safe, effective and affordable alternatives are not locally available in a country. Continued use occurs in countries with need to control mosquitoes spreading malaria.

Perfluorinated chemicals

Perfluorinated chemicals are in current use for purposes such as stain-resistant coatings in fabrics, packaging, carpets and the like, fire-fighting foams and emulsifiers in plastics manufacturing. They have become widespread pollutants, are found in human and wildlife samples worldwide and have been shown to be toxic to the liver, the thyroid, neurobehavioral function and the immune system in laboratory animals.

The PFCs most commonly found in the environment are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). PFOS is extremely persistent and does not degrade. It bioaccumulates and biomagnifies in the food chain and highly elevated levels have been found in polar bear, seal, bald eagle, mink and arctic biota. Current exposure levels are thought to harm certain wildlife organisms (e.g. polar bear, fish-eating birds), including those found in remote locations such as in the Canadian Arctic. Effects include growth inhibition of birds and aquatic invertebrates; liver and thyroid effects in mammals; lethality to fish (US EPA, OECD 2002) and saltwater invertebrates (US EPA); and changes in biodiversity (Boudreau et al. 2003a, Sanderson et al. 2002) (Canada, 2007).

PFOS has now been added to the Stockholm Convention on Persistent Organic Pollutants in recognition that it is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and environmental effects such that global action is warranted. PFOS is still in use in Australia. Recently, researchers measured concentrations of 13 perfluoroalkyl compounds (PFCs) in five different endangered species of sea turtles that represented different trophic levels (Keller et al 2012[31]). The levels of the compounds seen in all five species approach the amounts known to cause adverse health effects in laboratory animals.

One of the original manufacturers of stain repellent treatments using PFOS and PFOA, 3M, continues to face class actions in the United States over health effects and contamination of drinking water from landfills, despite it ceasing production in the year 2000. In 2006, the US Environment Protection Agency, along with eight major companies launched a PFOA Stewardship Program, in which companies committed to reduce global facility emissions and product content of PFOA and related chemicals by 95 per cent by 2010, and to work toward eliminating emissions and product content by 2015.

Monitoring and the US Environmental Protection Agency

After concluding that certain current uses of the pesticide atrazine pose unreasonable adverse effects to human health and the environment, the Environmental Protection Agency (EPA) established an intensive monitoring program to test for atrazine residues in drinking water from approximately 30 community water systems to understand which systems might be at risk of exceeding the agency's levels of concern. This monitoring was enacted under an agreement between the EPA and the atrazine registrants (that is, the businesses that profit from atrazine) and required that the registrants conduct the drinking water monitoring program. It specified that if those registrants failed to do the monitoring, the atrazine products would be cancelled. It further specified that if, through that monitoring, levels in the watersheds exceeded a specified quantity, that use in that watershed would be prohibited. In this way the registrants could continue to sell and profit from the chemical, but were required to monitor on an ongoing basis to ensure exposures to atrazine in drinking water do not reach levels that pose a risk to public health. The EPA concluded that it had ecological risk concerns from the use of atrazine and identified the potential for community-level and population-level risk to aquatic ecosystems at prolonged concentrations of atrazine from 10 to 20 ppb. Accordingly, it also required atrazine registrants to implement an innovative, intensive ecological watershed monitoring program, as well as a risk mitigation process if atrazine water concentrations exceed the Agency's levels of concern for aquatic ecosystems.

The EPA concluded that the total or national economic impact resulting from the loss of atrazine to control grass and broadleaved weeds in corn, sorghum and sugarcane would be in excess of 2.0 billion dollars per year if atrazine were unavailable to growers. It did not, however, decide that this outweighed the harm to human health and the environment and instead maintained access to atrazine through the requirement for monitoring.

[31] J.M. Keller, L. Ngai, J.B. McNeill, L.D. Wood, K.R. Stewart, S.G. O'Connell and J.R. Kucklick. Perfluoroakyl contaminants in plasma of five sea turtle species: Comparisons in concentration and potential health risks. Environmental Toxicology and Chemistry, Vol. 31, No. 6, pp. 1223-1230 (June 2012). DOI: 10.1002/etc.1818.

Appendix C Chemical labelling

Chemical labelling standards and codes

The following list outlines how different regulatory areas treat environmental labelling:[32]

- Transport of dangerous goods – codes for the transportation of dangerous goods, whether by road, rail, air or sea, are based on the technical content of the UN Recommendations on the Transport of Dangerous Goods - Model Regulations. The Australian Dangerous Goods Code (road and rail) has specific provisions for inner labelling, however it also recognises GHS marking and labelling for inner packages, and requires outer labelling with dangerous goods class labels. As subsequent editions of the ADG Code are reviewed and harmonised with updated editions of the UN Model Regulations, the GHS requirements will continue to be reflected in the ADG Code. This ensures a high degree of consistency in classification and labelling.

- Workplace hazardous chemicals – the National Code of Practice for Labelling of Workplace Hazardous Chemicals does include some categories focused on hazards to the environment; however, it is not mandatory to include information relating to environmental hazard categories on the label of a workplace hazardous chemical

- Explosives – there is no compulsory environmental labelling for explosive, though there is some limited voluntary labelling

- Agricultural and veterinary chemicals – Australian Pesticides and Veterinary Medicines Authority (APVMA) requires labels to specify the conditions of use and address the requirements of protection of health, safety and environment based on risk analysis. The risk assessment of each product considers the proposed use of the product including volumes and spraying technologies in addition to the concentration of hazardous ingredients and other relevant issues. The APVMA conducts reviews of existing agvet chemical products, their active constituents and labels where potential risks to safety and performance have been identified. This is known as a risk based system because it is based on the potential for exposure to a chemical as well as the intrinsic hazard of the chemical. In contrast, GHS is a system of classification and labelling based on the generic hazard properties of chemicals. In the first instance, GHS labels on the basis of physical hazards (such as inflammability and combustibility), health hazards (such as acute toxicity and skin corrosion/irritation) and environmental hazards, but does not provide a risk assessment of a particular product or its uses

- Cosmetics – cosmetic labels must be in accordance with the *Trade Practices (Consumer Products Information Standards) (Cosmetics) Regulations 1991*. However, they do not need to be labelled for environmental hazards.

[32] Economic Associated (2010) Options for Environment Labelling- Productivity Commission Recommendation 9.1, prepared for NEPC Service Corporation, p 26-27.

Appendix D International agreements and developments

Basel Convention on the control of transboundary movements of hazardous waste and their disposal

Regulates the movement of hazardous and other wastes across international boundaries, and requires that such wastes are managed and disposed of in an environmentally sound manner. It also places certain obligations on Parties to ensure that hazardous and other wastes are appropriately managed within their own borders.

Australia became Party to the Basel Convention on 5 February 1992. To ensure Australia complies with obligations under the Convention, the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* was developed, which is administered and implemented by SEWPaC.

Stockholm Convention on Persistent Organic Pollutants (POPs)

This was implemented to protect human health and the environment from POPs that remain intact in the environment for long periods, become widely distributed, accumulate in the food chain, and pose a risk even at low concentrations. The Stockholm Convention requires Parties to eliminate or reduce the release of POPs into the environment, including from stockpiles and wastes.

Australia became a Party to the Stockholm Convention on 18 August 2004. SEWPaC is the lead agency for Stockholm Convention in Australia.

Rotterdam Convention on prior informed consent procedure for certain hazardous chemicals and pesticides in international trade

Regulates the import, export and international trade of hazardous chemicals. The objectives of the Rotterdam Convention are to promote cooperative effort in the international trade of certain hazardous chemicals, and facilitate the environmentally sound use of hazardous chemicals through information exchange. The Rotterdam Convention requires that notification to export a listed substance be given by an exporting Party, in addition to obtaining consent from an importing Party.

Australia became a Party to the Rotterdam Convention on 20 May 2004. SEWPaC is the lead agency for Rotterdam Convention in Australia.

Montreal Protocol on substances that deplete the ozone layer (protocol to the Vienna Convention for the protection of the ozone layer)

The Montreal Protocol established a mechanism to phase-out global production and consumption of ozone depleting substances (ODSs), including chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). It targets 96 chemicals in thousands of applications across more than 240 industrial sectors.

Australia acceded to the Vienna Convention for the Protection of the Ozone Layer in 1987 and ratified the Montreal Protocol on Substances that Deplete the Ozone Layer in 1989. Australia has met or will exceed all phase-out obligations, and will essentially complete the phase-out of HCFCs four years ahead of schedule, in 2016.

The *Ozone Protection and Synthetic Greenhouse Gas (SGG) Management Act 1989* puts in practice Australia's international commitments under the Montreal Protocol. It controls the manufacture, import and export of all ODSs and their SGG replacements. It also controls imports of refrigeration and air-conditioning equipment containing a hydrofluorocarbon (HFC) or HCFCs refrigerant and grants the Commonwealth the power to create a nationally consistent system to control the end uses of these harmful gases.

SEWPaC is the lead agency for the Montreal Protocol in Australia.

Council Acts and recommendations of the organisation for economic co-operation and development

There are a number of recommendations and decisions relevant to chemical management, including; the Recommendation of the Council establishing Guidelines in Respect of Procedure and Requirements for Anticipating the Effects of Chemicals on Man and in the Environment (C(77)97/Final); the Decision on the Minimum Pre-marketing set of Data in the Assessment of Chemicals (C(82)196/Final; Decision-Recommendation of the Council on the Systematic Investigation of Existing Chemicals (C(87)90/Final); and Decision-Recommendation on Further Measures for the Protection of the Environment by Control of Polychlorinated Biphenyls (C(87)2/Final).

International developments

The past decade has witnessed a strong push for how governments manage the risks posed by the environmental hazards of chemicals not only in Australia, but internationally as well. In 2002, the World Summit on Sustainable Development agreed to the goal that, by 2020, 'chemicals are used and produced in ways that lead to the minimisation of significant adverse effects on human health and the environment'.[33]

This goal forms the heart of the Strategic Approach to International Chemicals Management (SAICM). Developed by a multi-stakeholder and multi-sectoral Preparatory Committee, SAICM was adopted by the United National Environment Programme in February 2006. It is a policy framework to foster the sound management of chemicals and is comprised of an expression of high-level political commitment, an overarching policy strategy and a global plan of action.

In addition to SAICM, numerous governments around the world have sought to reform their regulatory frameworks for managing the risks posed by the environmental hazards of chemicals. The sections below highlight the key aspects of these broader reforms.

European Union

The regulation of chemicals in the European Union is based on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), which came into force on 1 June 2007. REACH requires businesses that manufacture or import one tonne or more of any given substance each year[34] to:

- register the substance with a centralised body (the European Chemicals Agency (ECHA))
- collect information about the properties and the uses of the substance, and undertake, where relevant, an assessment of the risks that the use of the substance may pose and how these risks should be controlled – this information is included as part of the registration process
- communicate enough information along the supply chain to allow safe use of the substance (e.g. through Safety Data Sheets and labelling).

REACH also places obligations on downstream users – primarily to abide by instructions of their supplier(s) via the safety data sheets and attached exposure scenarios, and to inform their suppliers of any new hazard information or if they think that the recommended risk management measures are not appropriate.[35]

Member States of the European Union are responsible for:

- evaluating information provided by businesses as part of the registration process

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[33] 'Plan of Implementation of the World Summit on Sustainable Development', http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf. Accessed on: 12 April 2012.

[34] If the chemical substance exceeds 10 tonnes per year, business is also required to complete a persistent, bioaccumulative and toxic (PBT) substance assessment as well as a very persistent and very bioaccumulative (vPvB) substance assessment using the criteria as described in REACH Annex XIII. If deemed as a PBT or vPvB substance, the chemical assessment must also include an exposure assessment and risk characterisation of the chemical which addresses all identified uses of the registrant. See: http://www.reachonline.eu/REACH/EN/REACH_EN/article14.html.

[35] European Chemicals Agency, 'Downstream user roles and obligations', http://echa.europa.eu/web/guest/regulations/reach/downstream-users/downstream-user-roles-and-obligations. Accessed on: 12 April 2012.

- authorising substances that are of very high concern (i.e. providing specific permission before such a substance can be used for a particular purpose, marketed as such, or as a component of a product)

- restricting the manufacture, sale or use of substances if they are believed to pose an unacceptable risk to human health and/or the environment.

The European Commission is reviewing REACH in 2012. As part of this review, it will assess the health and environmental benefits of REACH. A 2005 study estimated that 'the potential benefit of REACH on the environment and humans exposed via the environment ... to be a minimum of €150-500 mill in year 2017 with a potential long-term benefit over the succeeding 25 years of €2,800-9,000 mill'.[36]

Canada

The Canadian Government manages the risks posed by the environmental hazards of chemicals through the *Canadian Environmental Protection Act 1999*. Under this Act, the Ministries of Health and the Environment work in partnership to assess risks for:

- new substances manufactured or imported into Canada above certain thresholds since 1994

- existing substances – under the Canadian Environmental Protection Act 1999, the Canadian Government subjected all pre-1994 substances to a priority-setting exercise. This process identified approximately 4,300 substances as needing further attention – including approximately 200 substances (known as Challenge substances) that are potentially harmful to human health or the environment and represent the highest priorities for risk assessment and appropriate controls. Of these, two thirds (or 130) were categorised as Challenge substances based on environmental concerns.

The *Canadian Environmental Protection Act 1999* also provides Environment Canada and Health Canada with power to develop risk management controls for chemicals that are found to pose risks to the environment and human health. Given the constitutional division of responsibilities, the Canadian Government also works with the provinces and territories through the Canadian Council of Ministers of the Environment to develop Canada-wide Standards. These provide a mechanism to implement controls that are 'appropriate to the situation and to the unique authorities of the various governments'.[37]

In 2006, the Canadian Government launched the Chemical Management Plan. The purpose of this initiative was to integrate all of the Canadian Government's chemical programs into a single strategy, with the intention of meeting the 2020 goals set by the World Summit on Sustainable Development for sound management of chemicals.

Under the Chemical Management Plan and the Canadian Environmental Protection Act 1999, the Canadian Government has power to:

- conduct research on the presence of chemical substances in, and their effects on, humans and their environment

- to undertake monitoring and surveillance of levels of harmful chemicals in Canadians and their environment.

[36] DHI Water and Environment, 'The impact of REACH on the environment and human health', 2005, http://ec.europa.eu/environment/chemicals/reach/background/docs/impact_on_environment_report.pdf. Accessed on: 18 April 2012.

[37] Canadian Council of Ministers of the Environment, 'Canada-wide standards', http://www.ccme.ca/ourwork/environment.html?category_id=108. Accessed on: 12 April 2012.

United States

In the United States, the federal EPA has power under the *Toxic Substances Control Act 1976* (TSCA) to regulate chemicals that pose an unreasonable risk to human health or the environment. TSCA addresses chemicals that 'are manufactured, imported, processed, distributed in commerce, used, or disposed of in the United States', though it excludes certain substances (most notably, pesticides, drugs, cosmetics and food).[38]

Under TSCA, the EPA is responsible for both risk assessment and, where relevant, developing risk management decisions. In terms of risk assessments, the EPA conducts these for chemicals before they enter commerce (new chemicals) and those already in commerce (existing chemicals). However, because TSCA 'requires the EPA to demonstrate certain health or environmental risks before it can require companies to further test their chemicals ... [it] does not routinely assess the risks of the over 83,000 chemicals already in use'.[39]

In terms of risk management decisions, the EPA can make these if it finds that 'a reasonable basis exists that conclude that a chemical presents or will present an unreasonable risk to human health or the environment'.[40] If the EPA concludes that such a risk exists, it is also bound by TSCA to apply the least burdensome requirement that will adequately protect against such risk. Due to the high legal threshold it must meet to satisfy the above conditions, the EPA has issued regulations to control only five existing chemicals since 1976.[41]

In September 2009, the EPA released six essential principles for reform of chemicals management legislation to help inform debates about strengthening the effectiveness of TSCA. The EPA has also recently developed an Existing Chemicals Program Strategy to enhance its approach to managing the risks of existing chemicals, pending legislative reform.

In addition to TSCA, the EPA can pose controls on the chemicals that pose risks to the environment through:

- the *Pollution Prevention Act 1990* – this forms the basis of the 'national policy that pollution should be prevented or reduced at the source whenever feasible'[42]
- the *Resource Conservation and Recovery Act 1976* – this gives the EPA the authority to control hazardous waste during the generation, transportation, treatment, storage, and disposal of hazardous waste
- the *Clean Water Act 1972* – this establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters
- the *Safe Drinking Water Act 1974* – this authorises the EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water.

State governments in the United States also impose a range of controls on chemicals to manage environmental risks. The Californian EPA, for instance, assesses the risks posed by hazardous substances to human health and the environment and regulates the generation, handling, treatment and disposal of hazardous waste in California.

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[38] Government Accountability Office, 'Comparison of U.S. and Recently Enacted European Union Approaches to Protect against the Risks of Toxic Chemicals', August, 2007, http://www.gao.gov/new.items/d07825.pdf. Accessed on: 12 April 2012.

[39] Government Accountability Office, 'Observations on Improving the Toxic Substances Control Act', 2 December, 2009, http://www.gao.gov/assets/130/123792.pdf. Accessed on: 12 April 2012.

[40] Government Accountability Office, 'Comparison of U.S. and Recently Enacted European Union Approaches to Protect against the Risks of Toxic Chemicals', August, 2007, http://www.gao.gov/new.items/d07825.pdf. Accessed on: 12 April 2012.

[41] Government Accountability Office, 'Observations on Improving the Toxic Substances Control Act', 2 December, 2009, http://www.gao.gov/assets/130/123792.pdf. Accessed on: 12 April 2012.

[42] Environmental Protection Agency, 'Pollution prevention', http://www.epa.gov/oppt/p2home/pubs/laws.htm. Accessed on: 2 May 2012.

Appendix E Previous analysis and proposed reforms of Australia's environmental regulation of chemicals

Over the past decade, there have been numerous studies that have observed, analysed and reported on the risks chemicals pose to Australia's environment and the effectiveness of the current regulatory environment.

National Chemicals Taskforce report – 2002

In 2002, the EPHC established the National Chemicals Taskforce. The Taskforce was required to conduct a scoping study into Australia's chemicals management systems and how effective these systems were in managing environmental impacts of chemicals. The Taskforce completed its study and reported to the EPHC in May 2003. It concluded that there was an important need to improve the way chemicals were managed from an environmental perspective and stated the need for a national approach to ecologically sustainable chemicals management due to an 'environmental gap' in chemicals decision making.

To further the work of the Taskforce, the EPHC established the EPHC Chemicals Working Group (the Working Group).

Working Group on the environmental risk management of chemicals – 2003

On 2 October 2003, Ministers endorsed a work program of five key projects to be progressed by the Working Group. One of these projects (the Group's major long term project) was to develop a national framework for managing the environmental impact of chemicals. In June 2007, the EPHC agreed to the NChEM framework. NChEM aims to ensure that environmental considerations are fully integrated into Australian chemicals management systems, reduce the fragmentation and improve the streamlining of regulation and coordination of efforts across the various levels of government.

The Working Group also continued to assemble significant amounts of information about chemical management systems in Australia, identified issues in consultation with large numbers of stakeholders and developed proposals for environmental reform and submitted their findings to the COAG Taskforce and the Productivity Commission.

Taskforce on Reducing the Regulatory Burden on Business – 2005

On 12 October 2005, the Prime Minister announced the appointment of a taskforce to identify practical options for alleviating the compliance burden on business from Government regulation. *Rethinking Regulation: The Report of the Taskforce on Reducing Regulatory Burdens on Business* was delivered to the Australian Government on 31 January 2006. The report highlighted the need for a review of the Chemicals regulation framework given its complexity and multi-jurisdictional nature.

COAG's regulatory reform agenda – 2006

Following the release of *Rethinking Regulation*, COAG established a Ministerial Taskforce on chemicals and plastics (the Taskforce). The Taskforce was to review and develop measures to achieve a streamlined and harmonised system of national chemicals and plastics regulation. To assist the Taskforce, COAG agreed that the Productivity Commission would undertake a review regarding chemicals and plastics regulation in Australia.

The Taskforce developed an 'early harvest' reform package which COAG agreed to on 3 July 2008. The package consisted of 18 reform measures with three of the reforms regarding NICNAS. Then, on 29 November

2008, COAG agreed to an additional number of reforms in response to the Productivity Commission's research report.

Productivity Commission research report on chemicals and plastics regulation – 2008

The Productivity Commission was tasked with completing a study into chemicals and plastics regulation in Australia. The report was publicly released on 7 August 2008 and assessed Australia's current system of regulation including its effectiveness and its impact on productivity, competitiveness and efficiency. The report made 30 recommendations for reform to the current system to improve and enhance the management of chemicals and plastics. This included the recommendation of a new national governance framework to achieve better coordination of chemicals and plastics regulation.

Appendix F Impact analysis – methodology and assumptions

Common assumptions

Description	Value	Source
Discount rate	7 per cent	PwC
On-cost multiplier	1.165	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*.
On-cost and overhead multiplier	1.75	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*.
APS staff levels	SES Band 1 – $150,000 p.a./FTE EL2.1 – $115,059 p.a./FTE EL1.1 – $97,768 p.a./FTE APS6.1 – $74,729 p.a./FTE	Department of Sustainability, Environment, Water, Population and Communities (2011), *2011-2014 Enterprise Agreement*.
Remuneration Tribunal Salaries	Chair – $564 per day Member – $418 per day	Category 2 office holder Remuneration Tribunal (2012), *Determination 2012/13: Remuneration and Allowances for Holders of Part-Time Public Office*, Canberra .

Option 1: Non-statutory development of national environmental risk management decisions

One-off costs to industry

The establishment of a Working Group under Option 1 could impose some costs on industry in the form of staff time for businesses to educate themselves about the new regulatory arrangements. This Consultation RIS estimates that these costs would be approximately $519,000 (PV, over 10 years). This estimate is based on the following assumptions:

- That greater than 12,000 businesses would need to educate themselves about the new regulatory arrangements. This population figure is comprised of:
  - Introducers of industrial chemicals – in 2011-12, there were 4,759 businesses that were registered on the Register of Industrial Chemical Introducers under the ICNA Act.[43] It is assumed that all of these businesses would spend time understanding the change
  - Businesses that use industrial chemicals as part of their production processes, (but are not registered with NICNAS as introducers of industrial chemicals) – the number of these businesses is uncertain, given the lack of reliable statistics about industrial chemical users in Australia. To

[43] Department of Health and Ageing and the Department of Finance and Deregulation (2012), Discussion Paper: Review of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS), p.4.

overcome this uncertainty, a number of assumptions (detailed in Table 13) have been made, which are derived from PwC's previous experience in estimating the population of the chemical supply chain in Australia[44] and relevant statistics from the Australian Bureau of Statistics (ABS). Based on these assumptions, it is estimated that there are approximately 7,500 businesses that use industrial chemicals as part of their production processes and are not registered as an introducer.

- That each of the affected businesses would dedicate 45 minutes of staff time to familiarise themselves with the new system, at an average rate of $58.57 per hour (in current dollars). The time required for businesses to educate themselves about the regulatory changes under Option 1 is unknown. The estimate of 45 minutes is derived from a number of other RISs that have published detailed education compliance costs as part of their analysis.[45] The rate of $58.57 per hour, meanwhile, is derived from ABS statistics on average weekly ordinary time earnings for full-time employees in the private sector.[46]

Stakeholder feedback is sought about the reasonableness and significance of the assumptions listed above.

Table 13: Assumptions underpinning population estimates – industry education

ANZSIC codes (Division in parentheses)	(A)	(B)	(C)	(A) x (C)
Basic chemical and chemical product manufacturing (18) and Polymer product and rubber product manufacturing (19)	5,745	50 %	40 %	2,298
All other manufacturing divisions, except Food product manufacturing and Beverage and tobacco product manufacturing (13-7 and 20-5)	71,460	2.5 %	5 %	3,573
All mining divisions (6-10)	8,233	2.5 %	20 %	1,646
Total				**7,517**

Source: ABS (2012), 'Counts of Australian businesses, including entries and exits, June 2007 to June 2011', cat. no. 8165.0.

Ongoing costs to industry

Option 1 could increase the compliance burden on businesses that operate in jurisdictions that currently do not implement NICNAS recommendations on a consistent or systematic basis (or take action that would accord with the NICNAS recommendation). This compliance burden could include such costs as:

- purchase of materials and equipment required for compliance
- record keeping activities to ensure statutory documents are recorded and remain up to date
- enforcement costs such as the resources required to facilitate audits and inspections undertaken by states and territories
- procedural costs such as those required by compliance activities such as safety inspections.

[44] See: PwC (2012), Consultation Regulatory Impact Statement on Chemical Security: Precursors to Homemade Explosives.

[45] The Consultation Regulation Impact Statement for a National Construction Code estimated building practitioners would require approximately two hours to educate themselves about the regulatory changes associated with the introduction of the National Construction Code. The Regulation Impact Statement of Franchising Policy Reforms, meanwhile, estimates that franchisors would need to allocate around 15 minutes of their time to familiarise themselves with the regulatory changes. Forty-five minutes is seen as representing the mid-point between these two estimates.

[46] According to the ABS, in 2010-11, average weekly ordinary time earnings for full-time employees in the private sector was $1,255. Assuming a work week of 37.5 hours, this figure is equal to an hourly rate of $33.47. On-costs and overheads have been accounted for by using a multiplier of 1.75, in line with the Victorian Guide to Regulation. See: ABS (2012), 'Average weekly earnings, Australia, February 2012', cat. no. 6302.0; DTF (2011), Victorian Guide to Regulation, Melbourne.

It is difficult to estimate the additional compliance burden industry would face under Option 1, given that such an estimation would require knowledge of:

- the chemicals that would be subject to the risk management decision process by the NChEM Working Group over the next 10 years
- the nature and scope of the risk management decisions that the NChEM Working Group would develop in relation to these chemicals
- the extent to which jurisdictions could use their existing processes, systems and requirements to administer the risk management decisions released by the NChEM Working Group.

Notwithstanding the uncertainty that exists in relation to the above factors, it was possible to quantify the additional compliance burden likely to be borne by industry under Option 1 by drawing on CIE's previous analysis of the impacts of regulatory reform in relation to chemical environmental risks (as summarised in Table 18). According to this analysis, the average cost to industry (on a per chemical basis) of reforming the regulation of chemical environmental risks in line with the core characteristics of the three options examined in this Consultation RIS is $1.1 million (PV, over 10 years, in 2009 dollars). Using this as a basis, the additional compliance burden under Option 1 is estimated to be $65 million (PV, over 10 years). Table 14 outlines the key assumptions that underpin this estimate.

Table 14: Additional compliance costs under Option 1, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	60 per cent	Productivity Commission (2004), *National Workers' Compensation and Occupational Health and Safety Frameworks*
Average cost to industry	$1.2 million	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

The types of businesses that are likely to incur additional compliance costs under Option 1 are similar to the broad categories of businesses identified in the section on 'One-off costs to industry' above.

One-off costs to government

Policy change

The process of making risk management decisions under Option 1 may require an amendment to the 2007 Ministerial Agreement on Principles for Better Environmental Management of Chemicals for jurisdictions to agree:

- how decisions (and possibly model legislative provisions) will be agreed
- that all agreed model legislative provisions will be implemented within an agreed timeframe
- circumstances in which a jurisdiction may decide not to implement (or not to fully implement) certain model legislative provisions

- an undertaking to report progress in implementing regulations and provide text of final legislative provisions to ensure the best possible consistency between jurisdictions.

It is likely that the time and effort required to develop the mechanisms within the Ministerial Agreement would be less than that required to engender legislative change under Option 2 – given that the latter would involve both the development and agreement of an IGA plus the enactment/revision of legislation at the Commonwealth, state and territory levels. Accordingly, the estimated cost of changing the Ministerial Agreement under Option 1 would be approximately $583,000 (PV, over 10 years) – or half the cost of legislative change under Option 2.

Establishing the Working Group

One possibility is to restructure the NChEM Working Group. This body is not currently structured nor resourced to undertake the functions associated with developing risk management decisions. Consequently, it would need to be restructured to take on such a role and ensure its ability to effectively, efficiently and appropriately complete its new objectives. The one-off, upfront costs to restructure the Working Group would involve the following costs:

- time of government personnel, technical experts and consultation with key stakeholders to plan the Working Group's new objectives and design
- analysis of appropriateness of the Working Group to identify gaps between its current state and expected future state
- additional employment of suitable members (if required)
- establishment of new governance frameworks
- establishment of new operating policies and procedures.

Restructuring the Working Group is expected to be significantly less costly than establishing a national regulator (under Option 3). It is less clear whether the costs would be similar to or less than those incurred under Option 2. PwC is working with all jurisdictions to collect relevant data to quantify the costs of restructuring the NChEM Working Group. This research will be incorporated in the Decision RIS.

Raising awareness

Government would be required to raise awareness among industry and the community regarding the nature and extent of the changes under Option 1. Such a targeted awareness campaign could involve the development of communication material (such as a website and flyers), national advertising, engagement with relevant industry associations, and a series of public forums.

A number of recent COAG Consultation RISs have included detailed estimates of the likely costs involved to government in designing and implementing a targeted awareness campaign in the context of national reforms (see Box 3).

Box 3: Existing costs estimates for government of a targeted awareness campaign

The *Consultation Regulatory Impact Statement on Chemical Security: Precursors to Homemade Explosives* estimated that its stand-alone awareness campaign option would comprise:

- $615,905 in advertising expenses
- $675,500 in market research
- $138,160 in promotional material
- $240,888 in miscellaneous expenses
- $836,000 in annual staff costs over three years.[47]

This equates to $3.83 million (PV, over 10 years) in costs.

The *Packaging Impacts Consultation Regulatory Impact Statement* estimated there would be $2.2 million in upfront costs for communicating regulatory changes to stakeholders and then ongoing costs of $125,000 per annum.[48]

The *National Approach to Maritime Safety Regulation: Regulation Impact Statement* estimated in 2009 that it would cost $845,000 to advise stakeholders of the proposed reforms. This figure comprised three full time employees (FTEs) (at an average cost of $105,000) and $500,000 for "campaign material, PR consultancy, distribution, printing, industry events and publications."[49] The estimate of $845,000 was based on a larger national education campaign that the Australian Maritime Safety Authority (AMSA) managed "for all recreational and commercial vessel owners to upgrade to the 406mHz global positioning beacon and to become registered."[50]

It is anticipated that the awareness campaign under Option 1 would be of a similar scale (and, as a consequence, have similar costs) to the awareness campaign described in the *Maritime Safety RIS*. The reasons for this include:

- Like the awareness campaign described in the *Maritime Safety RIS*, the awareness campaign under Option 1 would focus on educating stakeholders about changes to an existing regulatory framework (i.e. the NICNAS risk assessment process and jurisdictional arrangements to manage the environmental risks of chemicals). This would likely require less effort and resources than educating stakeholders about the introduction of a new regulatory framework (which was the objective of the awareness campaign outlined in the *Chemical Security RIS*)
- Similar to the *Maritime Safety* awareness campaign, the awareness campaign under Option 1 would be targeting stakeholders that are relatively easily identifiable and contactable. For instance, it is envisioned that introducers of industrial chemicals (a key audience of any awareness campaign under Option 1) could be identified and contacted through NICNAS's registration database.

Accordingly, for the purposes of this analysis, the cost of an awareness campaign under Option 1 is assumed to be $865,000 (PV, over 10 years).[51] Stakeholder feedback is sought about the reasonableness of this cost estimate and associated assumptions.

[47] PwC (2012), Consultation Regulatory Impact Statement on Chemical Security: Precursors to Homemade Explosives, p. 164.

[48] PwC (2011). Packaging Impacts Consultation Regulatory Impact Statement: Attachment C Cost Benefit Analysis Report, p. 43.

[49] DITRDLG and AMSA (2009), National Approach to Maritime Safety Regulation: Regulation Impact Statement, p.105.

[50] DITRDLG and AMSA (2009), National Approach to Maritime Safety Regulation: Regulation Impact Statement, p.105.

[51] This figure represents the $845,000 cost estimate obtained from the National Maritime RIS, converted to 2013 dollars and represented as a present value.

Ongoing costs to government

Staff time – making risk management decisions

The restructuring of the NChEM Working Group and its new role in developing model legislative provisions may result in additional employment of staff. Table 15 outlines our cost assumptions for these staff members (drawing on advice provided by SEWPaC).

Table 15: Cost assumptions, staff time involved in making risk management decisions, Option 1

Staff level	Number of staff	FTE per staff	Total FTE	Total (PV, over 10 years)*
SES Band 1	1	0.25	0.25	$472,000
EL1.1	1	0.25	0.25	$308,000
APS6.1	2	0.25	0.50	$471,000
Total				**$1,251,000**

Notes: * including on-costs and overheads.

Staff time – Drafting risk management decisions

Based on advice from SEWPaC, it is estimated that two APS officers would be involved in the drafting process. Table 16 outlines our cost assumptions for these staff members.

Table 16: Cost assumptions, staff time involved in drafting risk management decisions, Option 2

Average staff level	Number of staff	FTE per staff	Total FTE	Total (PV, over 10 years)*
EL2.1	1	0.1	0.1	$145,000
EL1.1	1	0.25	0.25	$308,000
Total				**$453,000**

Notes: * including on-costs and overheads.

Staff time – State and territory input into the development of draft risk management decisions

Based on advice from SEWPaC, it is estimated that each state and territory environmental protection regulator would dedicate an additional 0.25 FTE of staff time to reviewing and commenting on draft decisions and supporting the NChEM Working Group more broadly. Table 17 outlines our cost assumptions for this additional staff time.

Table 17: Cost assumptions, state and territory staff time involved in reviewing and commenting on risk management decisions, Option 2

Average staff level	FTE per jurisdiction	Total FTE	Total (PV, over 10 years)*
The equivalent of EL1.1	0.25	2.0	$1,970,000

Notes: * including on-costs and overheads.

Communication costs

Government would incur some costs under Option 1 in communicating risk management decisions to relevant stakeholders (primarily industry and community groups). It is unknown at this stage what approach the secretariat would take to communicate risk management decisions, and how extensive its engagement with stakeholders would be. To account for this uncertainty, this Consultation RIS has relied on other studies that have estimated ongoing communication costs for national bodies involved in environmental regulation. For

instance, Chong et al estimated that the Water Efficiency Labelling and Standards (WELS) scheme had costs relating to 'ongoing promotion and awareness, awards, updating information materials' of $70,000 in 2008-09.[52]

Using this estimate as a guide, it has been assumed that government will incur ongoing communication costs of $536,000 (PV, over 10 years).

Adjusting regulatory approaches

Option 1 could impose additional costs on Australian governments if they are required to adjust their regulatory approaches to industrial chemicals because of individual risk management decisions. Estimating the quantum of these possible costs is difficult, given that such an estimation would require knowledge of:

- the chemicals that would be subject to the risk management decision process by the NChEM Working Group over the next 10 years
- the nature and scope of the risk management decisions that the NChEM Working Group would develop in relation to these chemicals
- the extent to which jurisdictions could use their existing processes, systems and requirements to administer the risk management decisions released by the NChEM Working Group.

Notwithstanding the uncertainty that exists in relation to the above factors, it was possible to quantify the costs to governments of adjusting their regulatory approaches under Option 1 by drawing on a previous cost-benefit analysis commissioned by the EPHC.

In 2009, the Centre for International Economics (CIE) was asked to examine the anticipated impacts of reforming the regulation of chemical environmental risks in Australia. The proposed reforms involved greater jurisdictional involvement in the NICNAS risk assessment process and the development of risk management recommendations, and the mandatory adoption of risk management recommendations by jurisdictions. While not exact, these proposed reforms share a similar approach to improving the regulatory framework for managing chemical environmental risks as the three options explored in this Consultation RIS.

To underpin their analysis, CIE first identified five chemicals that were seen to be representative of the type of chemicals that would likely require management to protect the environment. CIE then estimated the impacts (to government, industry and society) that would likely arise if the five representative chemicals were regulated in line with the proposed reforms. Lastly, CIE derived an average cost and benefit of the proposed reforms (i.e. on a per chemical basis), by making a number of assumptions about the frequency of which chemicals like the five representative chemicals would be assessed under NICNAS and subject to a risk management recommendation. Table 18 summarises the results of CIE's analysis. A copy of the CIE study that was submitted to the EPHC is provided at Appendix I.

[52] Chong, Joanne, Alex Kazaglis and Damien Giurco (2008), Cost Effectiveness Analysis of WELS, for the Australian Government Department of the Environment, Water, Heritage and the Arts, p.35.

Table 18: Estimated costs and benefits of proposed reforms to chemical regulation (PV, over 10 years), select chemicals

	Cost			
	Industry	Government	Total	Total Benefit
Chemical 1 – Education & information	$53,000	$12,000	$65,000	$0
Chemical 2 – Voluntary monitoring and evaluation	$16,000	$3,400	$19,000	$1,140
Chemical 3 – License changes	$2,842,000	$11,000	$2,853,000	$4,440,000
Chemical 4 – Phased in ban	$600,000	$271,000	$871,000	$77,500
Chemical 5 – Immediate ban	$2,353,000	$173,000	$2,526,000	$25,800,000
Average	**$1,115,000***	**$95,000***	**$1,210,000**	**$1,470,000**

Source: Centre for International Economics (2009), *Benefit Cost Analysis of NChEM Reforms: Impacts to industry, community and government*, prepared for EPHC, Canberra. * based on PwC analysis

Drawing on CIE's analysis, the estimated cost to all governments of adjusting their regulatory approaches to industrial chemicals because of risk management decisions generated under Option 1 is $5.5 million (PV, over 10 years). Table 19 outlines the key assumptions that underpin this estimate.

Table 19: Cost to all governments of adjusting regulatory approaches because of risk management decisions generated under Option 1, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	60 per cent	Productivity Commission (2004), *National Workers' Compensation and Occupational Health and Safety Frameworks*
Average cost to all governments	$101,000	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

It was assumed that jurisdictions will not adopt and implement all risk management decisions generated under Option 1. This assumption reflects the voluntary nature of the option. Our estimate that jurisdictions will adopt 60 per cent of risk management decisions developed and published by the NChEM Working Group is derived from a Productivity Commission inquiry into national Workers' Compensation and Occupational Health and Safety Frameworks. The Productivity Commission reported on the extent to which jurisdictions had adopted the National Standards of the National Occupational Health and Safety Commission (NOHSC) (Table 20). These National Standards were voluntary and 'intended to provide a foundation for national consistency and best practice in Australian Occupational Health and Safety arrangements.'[53]

[53] Productivity Commission (2004), National Workers' Compensation and Occupational Health and Safety Frameworks, Inquiry Report, Canberra.

Table 20: Status of adoption of priority National Standards (NOHSC), June 2002

	NSW	Vic	QLD	WA	SA	Tas	ACT	NT	Cwlth
Manual handling	Y	M	Y	M	M	Y	M	M	Y
Occupational noise	Y	M	M	Y	P	M	N	Y	Y
Plant	M	M	M	M	Y	Y	P	M	M
Certification	Y	Y	Y	Y	Y	Y	Y	Y	Y
Major hazard facilities	N	Y	Y	N	N	N	N	N	N
Hazardous substances	M	M	M	M	M	M	M	M	Y
Dangerous goods	N	Y	Y	N	N	N	N	N	N

Source: Productivity Commission (2004), *National Workers' Compensation and Occupational Health and Safety Frameworks*, Inquiry Report, Canberra, p.58. Y: the key elements have been fully adopted. M: most of the key elements have been adopted. P: only a proportion of the key elements have been adopted. N: the key elements have not been adopted.

Assuming that 'Y' is equal to 100 per cent adoption, 'M' is equal to 66 per cent adoption, 'P' is equal to 33 per cent adoption and 'N' is equal to 0 per cent adoption, then average jurisdictional adoption of the National Standards was equal to 60 per cent.

Benefits to the community

Quantifying the benefits associated with Option 1 is difficult. Doing so requires an understanding of factors that cannot be easily predicted *ex ante*. These factors include:

- the nature and scale of the chemical environmental risks that will require the development of a risk management decision
- the type and scope of controls that will be implemented as a result of each risk management decision.

Notwithstanding the uncertainty that exists in relation to the above factors, it was possible to quantify the benefits to the community associated with Option 1 by drawing on CIE's previous analysis of the impacts of regulatory reform in relation to chemical environmental risks (as described above and summarised in Table 18). According to this analysis, the average benefit to the community (on a per chemical basis) of reforming the regulation of chemical environmental risks in line with the core characteristics of the three options examined in this Consultation RIS is $1.5 million (PV, over 10 years, in 2000 dollars). Using this as a basis, the estimated benefits of having a more effective regulatory framework under Option 1 is $85.7 million (PV, over 10 years). Table 21 outlines the key assumptions that underpin this estimate.

Table 21: Benefits to the community under Option 1, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	60 per cent	Productivity Commission (2004), *National Workers' Compensation and Occupational Health and Safety Frameworks*
Average benefit to the community	$1.6 million	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

Groups in the community that are likely to benefit from a more effective regulatory framework for the management of chemical environmental risks include individuals or groups that:

- generate revenue (either directly or indirectly) from the environment (e.g. farmers, fishers and tourist operators)
- regularly come into contact with the natural environment (e.g. users of national parks)
- derive value from having a healthy environment.

Option 2: National decision adopted by Commonwealth, state and territory legislation

One-off costs to industry

Same for Option 1.

Ongoing costs to industry

The additional estimated compliance costs likely to be borne by industry under Option 2 are $108 million (PV, over 10 years). Similar to Option 1, this estimate is based on a previous cost-benefit analysis commissioned by the EPHC (this study is reproduced in Appendix H). As Table 22 illustrates, it has been assumed that jurisdictions will adopt and implement 100 per cent of risk management decisions under Option 2. This assumption reflects the mandatory nature of the option.

Table 22: Additional compliance costs under Option 2, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	100 per cent	PwC
Average cost to industry	$1.2 million	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

One-off costs to government

Legislative change

For government, the establishment of the decision-making bodies and processes (such as the delegate and independent advisory committee) under Option 2 would involve a range of one-off implementation costs. Key amongst these would be the cost involved in establishing the legislative framework to support the new arrangements. This would include:

- the Commonwealth, state and territory governments drafting and agreeing an IGA – setting out the objectives and principles governing the new decision-making process, and jurisdictional roles and responsibilities
- the Commonwealth Government developing and enacting supporting legislation to provide the SCEW (or Minister) and delegate with statutory powers to translate NICNAS environmental risk management recommendations into environmental risk management decisions
- legislation and other policy and administrative changes at the state and territory level to ensure that these governments are able to adopt the environmental risk management decisions by reference. Discussions with some jurisdictions suggest there are a number of ways in which this might be achieved. For example, existing licences (such as those on waste management) may currently refer to policy, so that complying with a recommendation would only require a change to the relevant policy. It would be more resource intensive to adopt decisions by reference in instances where it would require individual licensees to do something differently, or in instances where there is no licence in place.

Quantifying the cost involved in establishing the legislative framework to support Option 2 is difficult. Few studies have attempted to quantify the cost of legislative change as a general concept – particularly in the context of a cooperative legislative system, as envisioned in Option 2. This is due, in part, to the disparate stages and personnel involved in any legislative change, and the lack of mechanisms within most agencies and departments to track staff time easily.

Nonetheless, some estimates exist that provide an indication of the potential costs involved in establishing the legislative framework to support Option 2:

- In the *Packaging Impacts Consultation Regulatory Impact Statement* (released in December 2011), it was assumed that each regulatory change to the Commonwealth *Product Stewardship Act 2011* would cost approximately $700,000 (which would be borne by the Commonwealth).[54] This figure comprised of $400,000 in direct costs (e.g. consultation roadshow costs and consultancy fees) and $300,000 in staff costs

[54] PwC (2011), Packaging Impacts Consultation Regulatory Impact Statement: Attachment C Cost Benefit Analysis Report, p. 41.

- In 2004, the Western Australian Department of Local Government and Regional Development estimated that the average cost of legislative amendments drafted at the state level in 2003-04 was in the order of $52,000.[55]

While a small sample, on the basis of these studies, it is assumed that the cost of developing the IGA and required legislative and administrative change under Option 2 is $1.17 million (PV, over 10 years).

Table 23: Cost assumptions, legislative change, Option 2

Level of government	Number of entities	Value per entity (2013 $)	Total (PV, over 10 years)
State and territories	8	$65,825	$492,000
Commonwealth	1	$721,000	$674,000
Total			**$1,166,000**

Operational and organisational planning

Operational and organisational planning would need to be undertaken to ensure the body has appropriate processes and frameworks in place to function effectively. The following three key activities would need to be completed:

- identification and appointment of an appropriate delegate and advisory body members
- establishment of governance frameworks, particularly the relationship between NICNAS and the delegate and expert advisory committee
- establishment of operating policies and procedures.

Given the relative uniqueness of the delegate framework being proposed under Option 2, there are few previous examples (at least those that are publicly available) to draw on to estimate the costs of the operational and organisational planning described above. Accordingly, these costs were estimated by assuming that the extent of operational and organisational planning required for Option 2 would be considerably less than that required for establishing a national regulator under Option 3. To allow for quantification, it was assumed that, while establishing the national regulator would require 30 staff over one year (see the costs section for Option 3 below for more detail), the operational and organisational planning for Option 2 would require 10 staff over one year. This is equal to a present value of $1.26 million over 10 years (see Table 24).

Table 24: Cost assumptions, organisational and operational planning, Option 2

Number of FTEs	Average staff level	Total (PV, over 10 years)*
10.0	APS6.1	$1,259,000

Notes: * including on-costs and overheads.

Raising awareness

As for Option 1, government would be required to undertake a targeted awareness campaign to ensure relevant stakeholders (primarily industry and community groups) were aware about the nature and scope of the proposed changes, and what they may need to do to remain compliant with relevant legislation. For the purposes of this analysis, it is assumed that government would dedicate a similar level of resources to raising awareness under Option 2 as is assumed under Option 1. Accordingly, the estimated cost of a targeted awareness campaign under this option is $865,000 (PV, over 10 years).

[55] Western Australian Department of Local Government and Regional Development (2004), Annual report 2003–2004, Government of Western Australia.

Ongoing costs to government

Staff time – making risk management decisions

The process of making environmental risk management decisions would impose a range of ongoing costs on government. These costs would primarily involve salary and associated on-costs of key personnel involved in the decision-making process, such as the delegate, the advisory body members and the secretariat to support the delegate and advisory body. Table 25 outlines our cost assumptions for these staff members.

Table 25: Cost assumptions, staff time involved in making risk management decisions, Option 2

Position	Number of staff	FTE per staff	Total FTE	Average staff level	Total (PV, over 10 years)
Delegate	1	0.5	0.5	SES Band 1	$944,000*
Advisory body	5	0.25	1.25	1xChair 4xMembers***	$1,078,000**
Secretariat	3	0.25	0.75	EL1.1 (x1) APS6.1(x2)	$778,000*
Total					**$2,800,000***

Notes: * including on-costs and overheads. ** including on-costs. *** Remuneration Tribunal Salaries.

In line with general guidance on developing best practice regulation,[56] this Consultation RIS is using a multiplier of 1.75 to estimate the on-cost and overheads for the delegate and the secretariat. This multiplier covers such operating expenses as leave loadings, accommodation and shared services. For the advisory body, this Consultation RIS is only using a multiplier of 1.165 to estimate on-costs (again, in line with general guidance on developing best practice regulation).[57] Overheads have not been calculated for the advisory body, as it is anticipated that members of this body will primarily conduct their business by telephone, email and other like methods.

Staff time – Drafting risk management decisions

Same for Option 1.

Staff time – State and territory input into the development of draft risk management decisions

Same for Option 1.

Communication costs

Same for Option 1.

Adjusting regulatory approaches

The estimated cost to all governments of adjusting their regulatory approaches to industrial chemicals because of risk management decisions generated under Option 2 is $9.2 million (PV, over 10 years). Similar to Option 1, this estimate is based on a previous cost-benefit analysis commissioned by the EPHC (this study is reproduced in Appendix H). As Table 26 illustrates, it has been assumed that jurisdictions will adopt and implement 100 per cent of risk management decisions under Option 2. This assumption reflects the mandatory nature of the option.

[56] See: Department of Treasury and Finance (Vic) (2011), Victorian Guide to Regulation: Appendix C, p.13-4.

[57] See: Department of Treasury and Finance (Vic) (2011), Victorian Guide to Regulation: Appendix C, p.13-4.

Table 26: Cost to all governments of adjusting regulatory approaches because of risk management decisions generated under Option 2, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	100 per cent	PwC
Average cost to all governments	$101,000	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

Benefits to the community

Option 2 will generate benefits to the community equal to an estimated $143 million (PV, over 10 years). Similar to Option 1, this estimate is based on a previous cost-benefit analysis commissioned by the EPHC (this study is reproduced in Appendix H). As Table 27 illustrates, it has been assumed that jurisdictions will adopt and implement 100 per cent of risk management decisions under Option 2. This assumption reflects the mandatory nature of the option.

Table 27: Benefits to the community under Option 2, key assumptions

Assumption	Value	Source
Number of chemicals assessed under NICNAS each year	200	SEWPaC
Proportion of chemicals assessed under NICNAS that will require a risk management decision	7.5 per cent	SEWPaC
Proportion of chemicals that will be adopted and implemented by jurisdictions	100 per cent	PwC
Average benefit to the community	$1.6 million	EPHC study (Table 18), updated for inflation
Years of assessment period in which impacts are calculated	Years 2 to 10	PwC

Option 3: New risk management framework fully implemented under a single national system

One-off costs to industry

Same for Option 1.

Ongoing costs to industry

Same for Option 2.

One-off costs to government

Option 3 involves the creation of a national regulator to administer chemical regulation and appoint inspectors to ensure monitoring, compliance and enforcement functions are met.

Other studies provide an indication of the costs associated with establishing national regulators. For example, the establishment costs of the national rail safety regulator were estimated to be $38 million.[58] In the *National Approach to Maritime Safety Regulation: Regulation Impact Statement*, it was estimated that the total cost of establishing a national regulator would be $13.04 million.[59] The Commonwealth Government is currently budgeting $55.1 million over 2013-14 for the establishment of a National Vocational Education and Training (VET) regulator.[60] It is unlikely that a regulator for managing environmental risks of chemicals would be of the scale of the VET regulator, and therefore, would be expected to cost significantly less to establish.

To estimate the cost of establishing the national regulator under Option 3, this Consultation RIS focuses on three main cost areas:

- developing and drafting enabling legislation
- staff time costs involved in designing and implementing the national regulator during the transition period
- educating stakeholders about the new regulatory arrangements.

Legislative change – Commonwealth

The development of the national regulator would require enabling legislation. The cost of developing and drafting this legislation would primarily be borne by the Commonwealth. It would also likely be greater than the cost for the Commonwealth to undertake legislative change under Option 2 (i.e. $700,000), given that the legislation required to establish a national regulator would be more complex than the legislation required to codify the functions and powers of a delegate.

In the *National Approach to Maritime Safety Regulation: Regulation Impact Statement*, it was estimated that it would cost $2.45 million to draft and develop legislation for a national maritime safety regulator.[61] This figure comprised $300,000 in external legal advice, $1.73 million in staffing costs (equal to 15 FTEs during the first year) and $420,000 in drafting costs.

Given that the Maritime Safety RIS is similarly focused on establishing a national regulator in the context of cooperative partnership between the Commonwealth and the states and territories, the above estimates have been used as the basis of the calculations in this paper. Consequently, it is assumed that developing and drafting enabling legislation for the national regulator would cost $2.63 million (PV, over 10 years). This estimate comprises:

- $307,000 (PV, over 10 years) in external legal costs and $430,000 (PV, over 10 years) in drafting costs (both figures adjusted for inflation from the *Maritime Safety RIS*)
- $1.9 million (PV, over 10 years) in staffing costs, which is equal to 15 FTEs at an average staffing level of APS6.1.

Legislative change – States and territories

If the Commonwealth legislated as comprehensively as possible within its existing constitutional powers with no reference of power, the States and Territories may not need to enact any new legislation. If the Commonwealth legislated comprehensively with a reference of power, the States and Territories would need to enact legislation to refer the relevant powers to the Commonwealth. If a cooperative scheme was implemented in the manner discussed under the heading 'implementation' under Chapter 5.4, the States and Territories would need to enact either legislation that mirrored the relevant Commonwealth legislation, or legislation applying the provisions of the relevant Commonwealth legislation as State laws. While the State and Territory legislation

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[58] NTC (2009), Single, National Rail Safety Regulatory and Investigation Framework: Final Decision RIS, Volume 2, July, http://www.ntc.gov.au/filemedia/Reports/SingleNatRailSafRegRISVol2Jul09.pdf.

[59] Australian Maritime Safety Authority and the Department of Infrastructure, Transport, Regional Development and Local Government (2009) National Approach to Maritime Safety Regulation: Regulation Impact Statement, p.106.

[60] Department of Industry, Innovation, Science, Research and Tertiary Education (2012), National VET Regulator: FAQs. Available at: http://www.deewr.gov.au/Skills/Overview/Policy/NationalVETRegulator/Pages/FrequentlyAskedQuestions.aspx.

[61] DITRDLG and AMSA (2009), National Approach to Maritime Safety Regulation: Regulation Impact Statement, p.106.

required under each of these sub-options of Option 3 is different to the State and Territory legislation required under Option 2, costs have been estimated assuming the most onerous level of change required.

Operational and organisational planning

In designing and implementing the national regulator during the transition, staff would be required to undertake and complete the following key activities:

- identifying an appropriate regulator
- identifying suitable employees of the regulator
- establishing governance frameworks
- establishing operating policies and procedures.

In the *National Approach to Maritime Safety Regulation: Regulation Impact Statement*, it was estimated that 30 FTEs would be required to establish a national regulator. For similar reasons as outlined above, this estimate has been used as the basis of the calculations in this paper. Thus, it is assumed that staff time costs involved in designing and implementing the national regulator under Option 3 would be $3.8 million (PV, over 10 years) – based on an average staffing level of APS6.1.

Raising awareness

To ensure certainty for industry over the significant change of establishing a national regulator, outreach activities would be necessary to communicate the changes and the requirements to remain compliant. It is assumed that such a targeted awareness campaign would cost $2.4 million (PV, over 10 years). This estimate is derived from the *Consultation Regulatory Impact Statement on Chemical Security: Precursors to Homemade Explosives*.[62] It has been assumed that a more extensive awareness campaign would be required under Option 3 (and similar to that described in the *Chemical Security RIS*) given the significance and newness of the changes involved – particularly relative to Options 1 and 2 (both of which involve change within familiar boundaries of existing regulatory frameworks). Table 28 outlines our cost assumptions for raising awareness under Option 3.

[62] PwC (2012), Consultation Regulatory Impact Statement on Chemical Security: Precursors to Homemade Explosives, p.164.

Table 28: Cost assumptions, raising awareness, Option 3

Category	Value (PV, over 10 years)
Staff time	
EL2.1 x 0.5 FTE	$97,000*
EL1.1 x 3.0 FTE	$494,000*
APS6.1 x 1.5 FTE	$189,000*
APS4.1 x 0.5 FTE	$51,000*
Sub-total	**$831,000***
Communication costs	
Advertising	$594,000
Market research	$650,000
Promotional material	$133,000
Miscellaneous expenses	$232,000
Sub-total	**$1,609,000**
Total	**$2,440,000**

Notes: * including on-costs and overheads.

Ongoing costs to government

Staff time – making risk management decisions and coordinating compliance and enforcement

The process of making environmental risk management decisions would impose a range of ongoing costs on government. The same process for decision making would be followed as for Option 2 with the decision reached under a single piece of Commonwealth legislation. As such, the costs expected under Option 3 are expected to be broadly in line with those under Option 2, but with a national regulator – and thus the Commonwealth government – incurring the costs rather than the national body (which is expected to be funded under a cost-sharing agreement). This being said, Option 3 would involve significant transitional expenses when compared to Option 2.

The primary ongoing cost of a national regulator would be salary and related expenses. At this stage, the staffing structure and requirements of the national regulator is uncertain. To overcome this uncertainty, studies were consulted to derive an estimate of the likely ongoing staff costs of the national regulator. For instance:

- two reports examining the establishment of a national heavy vehicle regulator estimated that it would require between 27 and 60 staff to undertake its prescribed functions[63]
- the RIS examining the establishment of single, national rail safety regulator estimated that the new regulatory arrangements (which would involve a transfer of responsibilities from the states and territories to the Commonwealth) would result in no change to status quo staffing levels of 176.5 FTEs across all jurisdictions[64]

[63] DITRDLG (2009), A National Framework for Regulation, Registration and Licensing of Heavy Vehicles, p.73; Castalia Strategic Advisors (2009), Securing a National Approach to Heavy Vehicle Regulation, http://natroad.com.au/system/files/Castalia%20Report%20to%20NatRoad.pdf.

[64] NTC (2009), Single, National Rail Safety Regulatory and Investigation Framework: Regulation Impact Statement, Volume 1, p.14.

- a study examining the cost effectiveness of the WELS scheme estimated that it would require 12 staff to administer the scheme in 2008-09 at a cost of $1.32 million – though it should be noted that the WELS scheme is administered by a government department and not a stand-alone regulator.[65]

Of the three examples listed above, the WELS scheme is likely the most relevant for considering the future resourcing needs of the national regulator under Option 3. Thus, for the purposes of this analysis, it is assumed that the national regulator under Option 3 would require:

- the same level of staffing under Option 2 (i.e. the delegate, the advisory group and the secretariat) to make and communicate risk management decisions – though it is assumed that the delegate and secretariat would work full time in service of the national regulator, given the likely greater administrative and reporting requirements of a national regulator relative to the arrangements surrounding the delegate under Option 2

- two FTEs (one EL1 and one APS6.1) to manage and coordinate compliance and enforcement of risk management decisions across all jurisdictions – at this stage, it is anticipated that responsibility for compliance and enforcement would be delegated to the states and territories. Resources would be required at the national level, however, to coordinate the activities of all jurisdictions.

Overall, it is expected that 11 FTEs would be required to operate the national regulator under Option 3. These staff would be employed from year four onwards, with a cost of $8.3 million (PV, over 10 years). This figure includes all on-costs and overheads (see Table 29).

Table 29: Cost assumptions, staff time involved in making risk management decisions, Option 3

Position	Number of staff	FTE per staff	Total FTE	Average staff level	Total (PV, over 10 years)
Delegate	1	1	1	SES Band 1	$1,889,000*
Scientific advisors	5	0.25	1.25	1xChair 4xMembers***	$1,078,000**
Support staff	3	1	3	EL1.1 (x1) APS6.1(x2)	$3,113,000*
Compliance and enforcement – coordinators	2	1	2	EL1.1 APS6.1	$2,172,000*
Total					**$8,252,000**

Notes: * including on-costs and overheads ** including on-costs. *** Remuneration Tribunal Salaries.

Staff time – Drafting risk management decisions

Same for Option 1.

Communication costs

Same for Option 1.

Adjusting regulatory approaches

Same for Option 2.

Benefits to the community

Same for Option 2.

[65] Chong, Joanne, Alex Kazaglis and Damien Giurco (2008), Cost Effectiveness Analysis of WELS, for the Australian Government Department of the Environment, Water, Heritage and the Arts, p.35.

Appendix G Description of costs to government

The following is an extract from the report 'Benefit cost analysis of NChEM reforms'. This report is included at Appendix I.

Under each of the options, state and territory governments (as well as the Commonwealth) may have to alter their regulatory approaches to some industrial chemicals because of individual risk management decisions. In doing so, environmental regulators would need to rely on voluntary and quasi-regulatory approaches.

Cooperative and voluntary regulatory tools

The voluntary approaches embedded in the costs reflect:

- working with selected, licensed facilities to undertake monitoring and evaluation programs to better understand the level of discharges and nature of the chemical's environmental impact
- developing and administering education materials and programs to raise awareness among industrial chemical users about the necessary steps to minimise and/or neutralise the environmental risks of using a particular industrial chemical.

In most cases, these approaches are 'short term' cost imposts where the efforts last one or two years.

Mandatory regulatory tools

Many industrial chemical assessments would not necessarily lead to additional mandatory regulatory obligations. Where formal regulatory efforts are necessary, costs could take the form of:

- varying environmental licences for existing licensed facilities which would involve: time spent negotiating with licensed facilities on the condition variation; and monitoring and enforcing new environmental conditions. These costs are one-off with the assumption that environmental regulators would not have to renegotiate in the future
- expanding range of formally regulated facilities
- addressing problems associated with stockpiles and proper disposal of banned/phased out industrial chemicals
- enforcement and prosecution.

Appendix H EPHC study – overview of methodology

EPHC commissioned the Centre for International Economics (CIE) in 2009 to examine the anticipated effects of proposed reforms to the regulatory framework surrounding the management of chemical environmental risks in Australia. These reforms were included under the National Framework for Chemicals Environmental Management (NChEM), which was endorsed by the EPHC in June 2007.

To conduct its cost-benefit analysis, CIE first developed two scenarios – a business as usual (BAU) scenario and a change scenario. Table 30 provides a summary of how CIE defined these scenarios.

Table 30: Scenario definitions

BAU scenario	Change scenario
• Environmental regulators have limited interaction with the NICNAS progress regarding the selection of industrial chemicals for hazard and risk assessment, as well as in the assessment process itself and the subsequent development of management recommendations. • NICNAS recommendations are insufficiently specific and not expressed as actionable or enforceable statements. They also do not reflect jurisdictional chemical management practices, limiting the ability of jurisdictions to implement them. • No mechanism or national body that required implementation of NICNAS recommendations.	• Environmental regulators directly support NICNAS in its process to screen and identify priority chemicals. Their engagement will ensure that the NICNAS screening process considers the environmental risks across a wide range of different local environments, providing a more accurate national picture. • Improved communication linkages between NICNAS and state and territory environmental regulators that are responsible for the implementation, administration, and enforcement of environmental controls for industrial chemicals. • State and territory environmental regulators have greater involvement with the formulation of the management recommendations prior to the release of draft assessments. • A mechanism would mandate the adoption of management recommendations relating to environmental controls that arise from the NICNAS risk assessment process.

Second, to overcome the uncertainties involved in estimating impacts related to chemicals that have yet to be introduced or assessed in Australia, CIE chose five chemicals that were believed to be representative of the types of chemicals that would likely be assessed under NICNAS as requiring risk management action to protect the environment, and the types of regulatory responses that governments would use to management assessed risks (see Table 3).

Third, CIE estimated the costs and benefits (to government, industry and the community) if government regulated the environmental risks of the five representative chemicals in line with the change scenario. To estimate these costs and benefits, CIE drew on such data sources as:

- Priority Existing Chemical (PEC) assessments
- extensive consultation with environmental regulators in each of the jurisdictions
- academic literature and government reports about the scope and value of environmental damage in Australia, and the key environmental concerns going forward.

Table 31 summarises the categories used by CIE to quantify costs and benefits.

Table 31: Cost and benefit categories

	Costs to government	Costs to industry	Benefits
Chemical 1 – Education & information	• Staff and material costs to develop information sheet • Ongoing staff costs to administer information sheet	• Staff time to process information	• No environmental benefits are modelled since the management action is not anticipated to change the likelihood of environmental assets being exposed to the chemical
Chemical 2 – Voluntary monitoring and evaluation	• Staff time to review sample data	• Staff time to collect samples • Costs to analyse sample	• Avoided disruptions to recreational fishing
Chemical 3 – License changes	• Staff time renegotiating existing licences	• Staff time renegotiating existing license • Staff time in changing practices to align with new requirements	• Avoiding the costs associated with the restoration of an aquatic species
Chemical 4 – Phased in ban	• Staff time to liaise with industry	• Cost of substitution	• Avoiding the remediation of a contaminated site
Chemical 5 – Immediate ban	• Staff time in administering and enforcing ban • Staff time renegotiating existing licences	• Reduction in turnover	• Avoiding the remediation of a contaminated site

CIE calculated costs and benefits for each chemical over a 10 year period, and then applied a discount of 7 per cent to obtain present values.

Fourth, CIE used its estimated costs and benefits for the five representative chemicals to develop a probability distribution of potential costs and benefits of regulatory reform. This probability distribution was based on the following weightings:

- industrial chemicals like Chemical 1 - will account for 17 per cent of all assessed industrial chemicals over the next 20 years
- industrial chemicals like Chemical 2 - will account for 17 per cent of all assessed industrial chemicals over the next 20 years
- industrial chemicals like Chemical 3 - will account for 33 per cent of all assessed industrial chemicals over the next 20 years
- industrial chemicals like Chemical 4 - will account for 33 per cent of all assessed industrial chemicals over the next 20 years
- industrial chemicals like Chemical 5 - will account for 0.05 per cent of all assessed industrial chemicals over the next 20 years.

Using this probability distribution, CIE was able to estimate average costs and benefits (i.e. per chemical) of the NChEM reforms, as well as the net benefit over a 10 year period.

Appendix I EPHC study

www.TheCIE.com.au

Benefit cost analysis of NChEM reforms

Impacts to industry, community and government

Centre for International Economics
Canberra & Sydney May 2009

The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The CIE's professional staff arrange, undertake and publish commissioned economic research and analysis for industry, corporations, governments, international agencies and individuals. Its focus is on international events and policies that affect us all.

The CIE is fully self-supporting and is funded by its commissioned studies, economic consultations provided and sales of publications.

The CIE is based in Canberra and has an office in Sydney.

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Contents

Boxes, charts and tables

Glossary

AICS	Australian Inventory of Chemical Substances
ANZSIC	Australian New Zealand Standard Industrial Classification
BCA	benefit-costs analysis
BCR	benefit-cost ratio
CIE	Centre for International Economics
DEWHA	Department of the Environment, Water, Heritage and the Arts
DoHA	Department of Health and Ageing
EPHC	Environment Protection and Heritage Council
EPHSC	Environment Protection and Heritage Standing Committee
FTE	full time equivalent
ICNA Act	Industrial Chemicals (Notification and Assessment) Act 1989
M&E	monitoring and evaluation
NChEM	National framework for Chemicals Environmental Management
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
OBPR	Office of Best Practice Regulation
OHS	Occupational Health and Safety
PBT	Persistent, bioaccumulative and toxic
PEC	Priority Existing Chemical
PC	Productivity Commission
RIS	Regulatory Impact Statement
STP	sewage treatment plan

1 Introduction

Both in Australia and internationally, the importance of improving regulations and information systems underpinning the management of chemicals is receiving attention. Scientific information continues to emerge highlighting the widespread persistence and accumulation of chemicals in the environment. Mounting evidence points to the potential seriousness of their adverse impacts to the environment and human health.

At the same time, chemicals play an important role in our economy. They are widely used and can be found in nearly all consumer products or linked to their production. Given their pervasiveness, chemical regulation must be balanced. Regulatory approaches must weigh-up the benefits of chemical use against their potential to harm. Regulation needs to achieve its objectives efficiently, through accurate targeting and the use of instruments and procedures that involve the least possible 'collateral' cost. However, regulatory decisions about the scale and scope of regulation are often conducted in environments characterised by limited resources, competing demands and substantial information limitations.

Against this backdrop, the Australian Government has placed improved management of chemicals on the agenda for national reform. In June 2007, the Environment Ministers agreed to implement a national set of reforms for chemicals management, called National Chemicals Environmental Management (NChEM). It responds to the current gap between the assessment processes for industrial chemicals and environmental regulation across governments (and different levels of government).

As described in the 2006 Discussion Paper released by the Environment Protection and Heritage Council (EPHC):

> '…[NChEM] aims to ensure that environmental considerations are fully integrated into Australian chemicals management systems, reduce the fragmentation and improve the streamlining of regulation and coordination efforts across various levels of government'. (p. 4)

Purpose of this report

As part of best practice policy development, EPHC has commissioned CIE to examine the anticipated effects of NChEM. Consistent with principles set out by the

Council of Australian Governments (COAG)[1], this report outlines the costs and benefits of NChEM to society and evaluates the extent to which NChEM is anticipated to deliver net social benefits through improved environmental management of industrial chemicals.

The report follows a structure that is similar to a regulatory impact statement. It:

- discusses the motivation for NChEM reforms (Chapter 2);
- describes the key elements of NChEM (Chapter 3);
- identifies costs and benefits (Chapter 5); and
- presents the net impact and discusses the robustness of the economic assessment (Chapter 6).

In addition, appendices are provided that give greater detail of the economic assessment.

In conducting the economic evaluation, this report considers costs and benefits experienced by the industry, governments, and the community (and environment). A significant share of the NChEM reforms target improving the chemical assessment process, that is the supplied information and the employed decision making processes. However, this report focuses on how the result of these improved decision making processes have material effects for environmental health through changes to the actual behaviour of the community, industry and government.

1 COAG 2007, Best Practice Regulation A Guide for Ministerial Councils and National Standard Setting Bodies (referred to as the 'COAG Guidelines').

2 Drivers of NCheM reforms

Overview of chemicals management in Australia

The complexity of managing chemicals in Australia is well documented. Its roots lie in a number of factors. EPHC (2006) reports that around 50 000 chemicals are available in Australia for use in industrial, agricultural and veterinary purposes. Worldwide, this figure is nearly double. From a regulatory or policy perspective, chemicals have no natural grouping, comprising disparate uses and users; they have a multitude of avenues for posing risk to human health and the environment. The number and nature of chemicals (actively or previously used) are constantly changing. At the same time, our understanding of their secondary or potential impacts is limited and continuously evolving (either through experience or scientific exploration).

Given these features, the institutional structures that govern the assessment and use of chemicals generally revolve around their end use. Australia manages chemicals under four distinct and separate national regulatory schemes. The national agencies that implement these schemes are:

- National Industrial Chemicals Notification and Assessment Scheme (NICNAS) which is responsible for scientific assessment of chemicals that have an industrial use (including household chemicals, cosmetics and toiletries) being imported into or manufactured in Australia;
- Australian Pesticides and Veterinary Medicines Authority (APVMA) which is responsible for the regulation of chemicals used for agricultural and veterinary purposes;
- Therapeutic Goods Administration (TGA) which carries out assessment and monitoring activities to ensure the safety of therapeutic goods available in Australia; and
- Food Standards Australia and New Zealand (FSANZ) which oversees food standards and chemicals used as food additives.

A particular challenge of these institutional arrangements is to achieve consistent management of chemicals across the silos. A chemical that serves multiple end uses could encounter different assessments within each scheme. At the same time, the

management decisions within one scheme may have implications for decision makers in others.[2]

This report considers only one of the national schemes. It focuses on how industrial chemicals management, as a result of the assessment process undertaken by NICNAS, is affected by the reforms implemented under NChEM. Box 2.1 provides a definition of industrial chemicals under NICNAS.

2.1 Defining an industrial chemical

Industrial chemicals are defined by how they are used rather than how they are manufactured. The following defines an industrial chemical for the purposes of the Commonwealth Industrial Chemicals (Notification and Assessment) Act 1989.

> Under the Act, an industrial chemical is any chemical that has an industrial use. This includes specialty chemicals, dyes, solvents, adhesives, plastics, laboratory chemicals, chemicals used in mineral and petroleum processing, refrigeration, printing and photocopying, paints and coatings, as well as chemicals used in the home, such as cleaning products, cosmetics and toiletries.
>
> The Act specifically excludes articles radioactive chemicals and mixtures from notification and assessment requirements. Chemicals which are used solely as therapeutic agents, agricultural and/or veterinary chemicals, and/or food or food additives are also outside the scope of NICNAS. The definition of an industrial chemical is slightly different for company registration purposes.

Source: Understanding the National Industrial Chemicals Notification and Assessment Scheme, accessed 16 July 2008 at http://www.nicnas.gov.au/About_NICNAS/ Reforms/ Review_Of_The_Existing_Chemicals_Program/ EC_understandingNICNAS.pdf.

Managing industrial chemicals for environmental protection

Formal, national assessment of industrial chemicals for human health and environmental concerns has been in place for less than 30 years. The Australian Government established a voluntary notification and assessment scheme in the 1980s. In 1990, with the introduction of the Industrial Chemicals (Notification and Assessment) Act 1989 (the IC Act), the Commonwealth made the assessment process mandatory for new and existing industrial chemicals.

The IC Act introduced a range of measures to enhance the assessment process. All new chemicals must be assessed prior to their importation and/or manufacture in Australia under the National Industrial Chemical Notification and Assessment Scheme (NICNAS). These assessments, which consider public health, occupational health and safety and environmental dimensions of chemical production and use, are

2 A recent review by the Productivity Commission (PC) considered the complexity and regulatory burden of the national arrangements across the four schemes.

typically completed within 90 days. The process for assessing new chemicals has been relatively efficient. Since 1996, NICNAS has averaged 157 assessments per year (that is, issued certificates for new chemicals). This number, however, has fluctuated through time (ranging between 107 and 202 annually). NICNAS has also annually issued permits, which allow conditional use without an assessment, for a further 128 new chemicals.

At the time the Act took effect, over 38 000 existing industrial chemicals were grandfathered and, therefore, exempt from the notification and assessment process. That said, the IC Act established a process for addressing existing chemicals. The program for reviewing priority existing chemicals began in 1992, but progress has been slow. Over last two decades, NICNAS has completed only 30 Priority Existing Chemical (PEC) reports. This rate equates to completing between two and three PEC assessments per year. Over half (17 out of 30) were reviewed with environmental concerns (for example, toxicity to ecosystems, bioaccumulation, etc).

In addition to review of new and existing chemicals, the IC Act established the Australian Inventory of Chemical Substances (AICS). All chemicals used in Australia are listed in AICS. The listing is very general. The chemical's identity is registered (that is, CAS number), but not information about its use and toxicity (that is, potential harmfulness to human health and the environment).

Managing chemicals based on the assessment process — a case of institutional failure

As part of the notification and assessment process, NICNAS includes management recommendations in an assessment report. These management recommendations are designed to provide guidance for crafting national standards to protect occupational health and safety, public health and the environment.

However, to date most environmental management recommendations included in NICNAS' assessment reports have been limited to recommendations regarding disposal of the notified chemical, even where environmental risks associated with the (re)formulation and use of the chemical are potentially significant. Where other types of environmental management recommendations have been put forward, they have lacked clarity and specificity, due to the variability of environmental controls between the States and Territories. For example, they tended to suggest actions such as further research or additional data gathering efforts, but provide little specific guidance which can inform appropriate and more immediate courses of action by the Commonwealth, State and Territory environmental regulators (or industry).[3]

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[3] Key contributing factors are that: (i) environmental controls vary greatly between States and Territories; and (ii) prior to NChEM, DEWHA did not have a mechanism for routinely consulting with State and Territory environmental regulators and other relevant agencies for specific information to tailor the environmental risk management recommendations for

National standard setting bodies exist to act on the NICNAS management recommendations relating to human health and safety. However, to date, an equivalent national standard setting body for the environment does not exist. The Productivity Commission (2008), in reviewing chemical and plastics management in Australia, details the asymmetry of institutional arrangements regarding environmental issues relative to other sectors and policy areas, such as OHS and transport.

This gap also highlights the fact that environmental chemical regulation is currently partitioned and largely undertaken at the state and territory level, with limited national oversight or consistency. On a national level, NICNAS controls the entry and use of new industrial chemicals. While the Department of the Environment, Water, Heritage and the Arts (DEWHA) has responsibility for ensuring that Australian meets international obligations related to environmental issues. The States and Territories have the responsibility and statutory authority for chemical regulation and protection.

NChEM was proposed as a simple, linked and nationally consistent regulatory system for managing the environmental risk of industrial chemicals through the NICNAS assessment process. It would improve the current system by facilitating jurisdictions reviewing the NICNAS management recommendations.[4] This review should overcome past 'recommendations' on environmental management actions being unclear, non-specific or voluntary and lead to jurisdictions consistently implementing recommendations rather than the past ad hoc manner, or not at all.

A case of market failure

If the impact of chemicals on the environment is not, or is inadequately, taken into account when industrial chemicals are produced and used, this may lead to what is known as an externality. Put simply, an externality occurs when a benefit or cost arising from an activity does not accrue to the person or organisation carrying out the activity.

In the case of the environment, an example of a negative externality would be where use of a chemical causes water or air pollution that adversely impacts on the community and the parties whose actions give rise to the pollution do not bear the

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each State and Territory. In the absence of specific information from State and Territories, recommendations were necessarily broad to ensure that all State and Territories could adopt and comply with the recommendations.

4 Currently, an interim policy commitment for national take-up of environment management recommendations has been put in place. As NChEM's development progresses, a formal mechanism is to be developed.

resulting costs. As the full cost of using the chemical is not taken into consideration, the chemical is over used by industry (or alternatively, incorrectly stored and disposed of). At this level of utilisation, the costs — to the wider community — exceed the benefits. In other words, the free market has not arrived at an efficient or optimal level of chemical use.

Externalities are therefore a form of market failure. Market failure is often the justification behind why governments intervene in a particular market. The logic being, (some form of) regulation can arrive at a better outcome and maximise community welfare more than the free market. But of course regulation involves costs — so the challenge is to choose regulatory instruments that address the environmental objectives at least cost, and to have processes that assess the case for regulation in the context of all costs and benefits.

3 Elements of NChEM reforms

NChEM objectives

Rather than replace the existing chemical assessment and regulatory regime with something new, the NChEM reforms supplement and improve the existing regime. Essentially, NChEM puts in place a process for enabling environmental regulators to interact with the existing institutional arrangements in a coordinated fashion.

NChEM responds to three key problems. They are (EPHC 2007):

- gaps in the assessment processes for some groups of chemicals, as evidenced by the large number of existing chemicals that has not been subject to a 'modern' risk assessment;
- absence of appropriate linkages between different levels of government particularly in relation to the management of industrial chemicals; and
- discontinuities in the management of chemicals during their lifecycle.

To develop and oversee NChEM's design and implementation, the EPHC established the Chemicals Working Group (the Working Group) which consists of representatives from the Commonwealth, State and Territory governments.

Their work has led to a Ministerial Agreement, Principles for Better Environmental Management of Chemicals (signed in June 2007), which identifies four broad action areas for NChEM. They are environmental risk assessment, environmental controls, feedback of information and prioritising action.

Table 3.1 summarises the key elements of each action area.

Environmental risk assessment process

Changes affecting the environmental risk assessment process aim to strengthen the process by 'enhancing consultative mechanisms among national chemical assessment agencies and state and territory environment agencies'.[5] DEWHA under a service level agreement with NICNAS, conducts the risk assessments as part of the NICNAS process. Through the NChEM process, NICNAS has agreed to allow DEWHA, in

5 Environment Protection and Heritage Council, 2007, Principles for Better Environmental Management of Chemicals. Ministerial Agreement, June.

3.1 Summary of changes under NChEM

Action area	Objective	Change
Environmental risk assessment	Enhance consultative mechanisms among national chemical assessment agencies and State and Territory environmental regulators	d Through the NChEM process, NICNAS has agreed to allow DEWHA, in undertaking the assessments, to consult directly with the State and Territory environmental regulators d This change allows the environmental regulators to shape the assessment plan and directly feed into and review all stages of the assessment's development – including the shaping of management recommendations d Development of Environmental Risk Assessment Manuals that can be referenced by key stakeholders
Environmental controls	Improve approaches and consistency in environmental regulation and management of chemicals	d Mechanism for mandatory adoption of management recommendations emerging from the assessment process by the jurisdictions d Development of Environmental Control Manuals to support development of management recommendations emerging from the assessment process
Feedback of information	Improve knowledge transfer and sharing of information among environmental regulators and between the environmental regulators and national assessment agencies	d Development of databases covering: data holdings and eventually controls applying to industrial chemicals (for example, listed in AICS)
Prioritising action	Establish process for identifying and dealing with higher concern chemical issues	d Development of a screening process for prioritising chemical issues of concern and contributing to the NICNAS nomination process

Source: CIE.

undertaking the assessments, to consult directly with environmental regulators in the State and Territories. Consequently, they are able to not only shape the assessment plan, but also directly feed into and review all stages of the assessment's development, including the crafting of management recommendations.

Complementing this process is also the development of Environmental Risk Assessment Manuals. These Manuals have been drafted and are currently being reviewed by stakeholders and trialled by risk assessors. The Manuals are publicly available reference documents that can be accessed by industry and community groups, in addition to the environmental regulators. They enhance the understanding and transparency of the assessment process. They should also facilitate the information gathering process that supports PEC nominations and the assessments themselves.

Environmental controls

The second broad action area addresses environmental controls. The aim is to improve approaches and consistency in the environmental regulation and management of industrial chemicals. An essential feature of this action area involves implementing a mechanism for the formal, mandatory adoption of management recommendations leading to national consistency in the management of assessed (new and existing) industrial chemicals.

As part of the NChEM process, an Environmental Control Manual is being developed to provide information about state and territory regulatory powers and controls that are currently available to manage the environmental impact of chemicals. This document will be a 'living document' that will be regularly updated (every three years). The Control Manual will help inform and shape the development of management recommendations emerging from the risk assessment process.

Feedback of information

Activities under the area of feedback of information improve the understanding of chemical impacts and how this information is passed on to the national assessment agencies that go beyond the direct input to specific hazard and risk assessments. The key product of this area will be the development of a National Chemical Monitoring Database. The database will provide a compilation of information (metadata) about national chemical studies and monitoring programs that have been undertaken by Commonwealth, State and Territory governments, universities and private organisations.

Prioritising action

Prioritising action is the last broad area of NChEM. Actions in this area aim to establish an inclusive and transparent process to identify and deal with chemical issues of high concern. A key feature of this area will involve NChEM supporting NICNAS in its process to screen and identify priority chemicals in a more systematic and informed manner. With over 38 000 existing chemicals listed in AICS, the amount of resources (time and money) to fully assess all of them is enormous. This support from NChEM will facilitate the utilisation of appropriate environmental criteria when determining which chemicals are most likely to be of significant environmental concern and, therefore, could be given priority for assessment in the NICNAS nomination process.

4 Approach to assessing the impacts of NChEM

Scope of the benefit-cost analysis

This report focuses on estimating the net social impact that flows from the changes in management recommendations as a result of NChEM. In other words, the benefit-cost analysis focuses on whether the resulting management recommendations, which will require mandatory uptake by the jurisdictions, will deliver positive returns to society. Importantly, the scope of the economic assessment includes impacts to community (environment), industry and government. Implicit in the analysis is that NChEM:

- facilitates better decisions about which chemicals to assess (that is, improving the order in which existing chemicals are reviewed and therefore brings forward benefits); and
- injects better information into the regulatory decision marking process (that is, improving environmental risk assessment and therefore the crafting of meaningful and effective management decisions).

Adopting this relatively narrow scope for identifying changes under NChEM may understate costs and benefits. Greater involvement by jurisdictions in the selection and assessment of chemicals could require additional resources. At the same time, it should deliver a range of intangible, but real benefits in the form of information sharing, synergies, etc. The net impact of these costs and benefits is difficult to estimate. However given the existing regulatory and institutional failures, it is believed that on balance, omitting these elements has the potential to overstate costs, while understating the benefits. The result is a potentially downward biased net estimate.

Changes brought about by NChEM

Understanding the impacts of NChEM requires identifying and determining the difference between two scenarios. The first scenario reflects what would happen without NChEM's reforms. This scenario is typically referred to as the 'business as usual' (BAU) scenario. The second scenario incorporates the changes brought about by NChEM. The impact of NChEM as measured in a benefit-cost analysis is the difference between the two scenarios — that is, the marginal change.

NChEM adopts a holistic approach to reforming how industrial chemicals are managed for environmental concerns. As outlined in the previous chapter, it influences how chemicals are nominated, selected and assessed and, importantly, how chemicals are managed via the management recommendations flowing from those assessments. Defining the BAU and the change scenarios requires mapping how these changes tangibly affect the BAU. For instance:

- the actions taken by environmental regulators differ with respect to environmental management of industrial chemicals (that is, types of regulatory tools that are employed and shifts in the allocation of resources);
- these regulatory actions, in turn, affect the actions taken by industry to mitigate their environmental impacts associated with industrial chemical use; and
- the combination of government and industry decisions produce changes in the actual risk associated with industrial chemicals entering the environment.

Defining the BAU

Prior to NChEM's implementation, environmental regulators had limited — if any — interaction with the NICNAS process regarding the selection of industrial chemicals for hazard and risk assessment, as well as in the assessment process itself and the subsequent development of management recommendations.

NICNAS recommendations for the environment were often viewed as insufficiently specific and were not expressed as actionable or enforceable statements. The recommendations typically did not reflect actual State/Territory chemical management practices and this inconsistency limited the ability of jurisdictions to implement them.

Reinforcing this problem was the lack of any mechanism or national body that required their implementation. This 'gap' in the institutional arrangements meant that each jurisdiction essentially managed industrial chemicals based on its own assessment of priority and risk and resource constraint. Collectively, these dynamics contributed to inconsistent tools and approaches to regulating industrial chemicals across the jurisdictions.

The tools available to environmental regulators

Fundamentally, the costs and benefits of NChEM are driven by the spectrum of tools environmental regulators have available to control the release and/or containment of industrial chemicals into the environment, and how those tools are enacted to effect any change recommendations that may arise from the NChEM process.

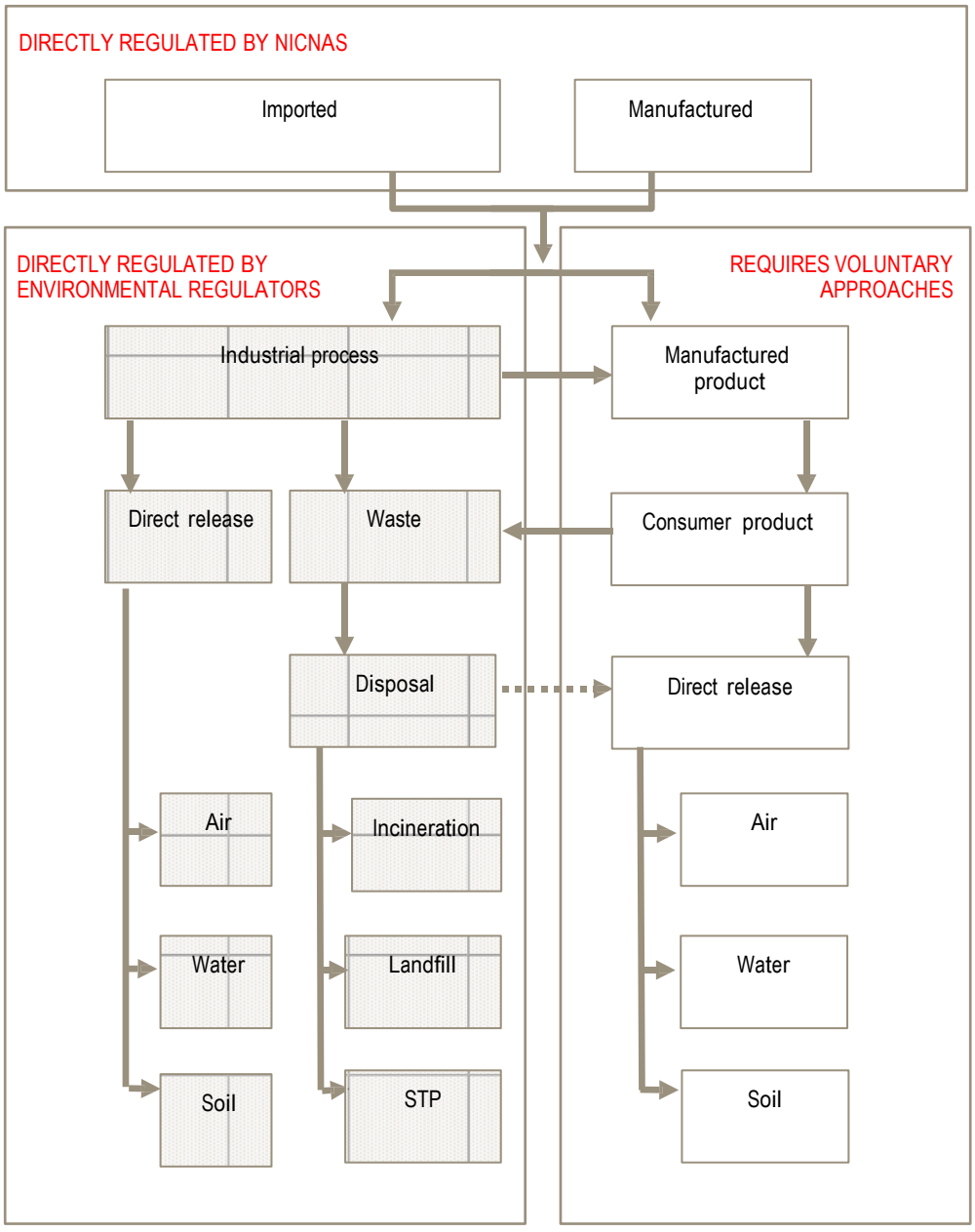
The tools and instruments, as well as the extent, to which an agency can be proactive, vary across jurisdictions. Despite these differences, some commonalities and generalities can be drawn.

- Legislative protection of the environment exists in all jurisdictions. This legislative protection makes most general discharges and releases to the environment, without appropriate permits or licences, illegal. It also establishes a general duty of care for citizens and businesses.
- Environmental regulators rely primarily on environmental licensing regimes to proactively protect the environment and control discharges. Environmental licences apply to medium to large facilities in scheduled activities (often defined by ANZSIC code). The flexibility and ease in which an environmental regulator can alter a licence is jurisdictionally-specific. However, in general, most jurisdictions issue a licence that lasts in perpetuity, with alterations triggered by significant changes to the facility's processes. This limitation restricts the adaptability of licences to respond to NChEM. (Two notable exceptions are NSW and SA which require licences to be renewed.)
- Environmental regulators generally regulate at the point of discharge from industrial processes or at the point of disposal. They have limited leverage over consumers and businesses that represent a large number of small potential dischargers to the environment.
- Most environmental regulators adopt a 'reactive' approach to regulation. In other words, environmental regulators consider the current enforcement and regulatory regimes to be adequate. They generally respond to potential issues associated with industrial chemical use that have been flagged by the community and/or as environmental problems emerge. This approach is largely driven by the complexity and limitations in scientific knowledge and understanding of how industrial chemicals (and other pollutants) interact with the environment.

Chart 4.1 identifies the pathways by which industrial chemicals are introduced to the environment, highlighting where various entities and levels of government regulate. The chart also draws attention to the limited coverage associated with formal command and control strategies available to environmental regulators at the State and Territory level. They often employ a range of non-regulatory and quasi-regulatory tools as a means of increasing their regulatory coverage. These approaches include:

- voluntary agreements, such as codes of conduct and environmental stewardship initiatives, where the environmental regulator works cooperatively with a manufacturer or industry to minimise its environmental impacts;
- market based instruments and incentives to encourage specific behaviour or environmental outcomes;
- education campaigns, which can target consumers or producers; and
- policies and guidelines, which are often stronger than a voluntary agreement in that they provide elaboration and clarification of specific conditions within legislation.

4.1 Pathways for industrial chemicals to enter the environment



Data source: CIE.

4.2 Tools available to environmental regulators

Tool	Description	Likelihood of use
Education programs and information campaigns	d Programs initiated by environmental regulators to highlight regulation, requirements and obligations to industry and community d Coverage is not constrained d Coverage depends on who the program targets d Useful in disseminating information to a wide audience including small scale facilities outside of licensing requirements	d Moderate
Voluntary/cooperative approaches	d Captures a range of approaches from voluntary monitoring and evaluation to product stewardship to incentives d Can be tailored to the specific circumstances of the industry and industrial chemical of concern d Resource requirements and ease of implementation is context specific	d Moderate
Environmental licences	d Environmental licences set out the conditions under which a holder has permission to discharge waste d Issued to medium and large scale industrial facilities and some STP's d Used regularly to control discharge and emissions across most jurisdictions d 16,000 (nationwide) on issue	d High
Chemical Control Orders	d A tool that can restrict or ban a chemicals use or manufacture due to environmental reasons d Targets chemical manufacturing industry and chemicals as an input into production process d Only two jurisdictions have this power and it is rarely used by them d To be most effective would need to be used at a federal level	d Rare
Import Restrictions	d A control method that places limitations on the amount of a chemical that can be brought into the country d Only effective if implemented at the federal level d Most often initiated through international agreements on chemical use	d Rare

Note: The tools available to regulators were defined through stakeholder discussions and external research.

Source: CIE.

Defining the change scenario

NChEM provides a number of avenues for the State and Territory environmental regulators to engage in the NICNAS process.

- Selection of chemicals for assessment. Through NChEM, environmental regulators from the jurisdictions will be able to directly support NICNAS in its process to screen and identify priority chemicals in a more systematic and informed manner. This support should increase the potential for appropriate environmental criteria to be utilised when determining which chemicals are most likely to be of significant environmental concern and, therefore, could be given 'priority' in the NICNAS nomination process. Their engagement will ensure that the NICNAS screening process considers the environmental risks across a wide range of different local environments, providing a more accurate national picture.
- Assessment process. One of the major perceived weaknesses for regulating chemicals, prior to NChEM, is the lack of input from State and Territory environmental regulators into the assessment process. Under the NChEM model, NICNAS maintains its statutory responsibility for the risk assessments. However, NChEM aims to improve the communication linkages between NICNAS and State and Territory environmental regulators which are responsible for the implementation, administration and enforcement of environmental controls for industrial chemicals. This involves DEWHA undertaking the following actions:[6]
  - alerting State and Territory environmental regulators about chemicals assessed to be of high environmental concern;
  - obtaining information from State and Territory environmental regulators to input into the assessment process; and
  - consulting State and Territory environmental regulators on the appropriate scope of assessments.
- Management recommendations. Under NChEM, State and Territory environmental regulators have greater involvement with the formulation of the management recommendations prior to the release of the draft assessment. This involvement allows them to provide direct feedback into the feasibility of recommendations across all jurisdictions.
- Mandatory adoption of recommendations. A mechanism will be put in place mandating the adoption of management recommendations relating to environmental controls that arise from their NICNAS risk assessment. For a chemical of high environmental concern where the NICNAS risk assessment process identifies an unacceptable risk of environmental harm, the management recommendation could include banning, phasing out, or strictly controlling its use. Consequently, NICNAS recommendations on environmental management

6 DEWHA has already completed the development manuals detailing the approach for undertaking risk assessments.

actions would now be consistently implemented in jurisdictions, rather than in an ad hoc manner or not at all.

In aggregate these changes may:

- result in Commonwealth, State and Territory government agencies altering their approach to the management and regulation of particular chemicals;
- gives rise to behavioural change by industry and the community; and
- ensure that the adopted approaches produce better environmental outcomes.

It is worth noting that the changes may not necessarily impose additional burden on regulated entities.

Likely tools to be used under NChEM

With a focus on the feasibility and ease in which management recommendations can be implemented consistently across the jurisdictions, the range and nature of regulatory tools to manage industrial chemical may change. Discussions with environmental regulators suggest that voluntary and cooperative approaches will need to be developed. In addition, greater emphasis will be placed on using tools that are available in all jurisdictions (for example, licences). Table 4.3 identifies these tools and indicates whether they are captured in the change scenario.

A basis for deriving the impacts of NChEM

The costs and benefits flow from how management recommendations impose change to environmental regulators and the industry. These changes in most cases will impose costs – requiring new regulation, alterations to existing regulation or development of cooperative initiatives. They may be able to impose costs on the users or consumers of the chemical if their use is constrained, or if the resulting price increases as a result of the regulated change. In turn, however, benefits will emerge depending upon the effectiveness of these changes, that is, the extent to which new behaviour alters the risk or probability of industrial chemicals imposing environmental harm.

Challenges of estimating impacts

The NICNAS process involves assessment and development of management recommendations each year for a small number of the approximately 38 000 listed grandfathered chemicals and all new chemicals. (The selection from the grandfathered chemicals reflects concerns about public health and OH&S effects as well as environmental consequences of chemical production and use.)

Key characteristics of this process is that the environmental risks of the portfolio of chemicals that are in use (or have been used in the past but may have legacy

4.3 Tools likely to be used under NChEM

Tool	Description	Captured in the BCA?
Education programs and information campaigns	d Aimed at inducing behavioural change (that is, how a particular industrial chemical is used), with programs highlighting regulation, requirements and obligations to industry and community d Useful in disseminating information to a wide audience including small scale facilities outside of licensing requirements	d Yes
Industry-government initiatives	d Emphasis placed on cooperative monitoring and evaluation programs to gather better information and inform future regulatory direction d Involve government and selected facilities working cooperatively to better understand the environmental risks posed by a particular industrial chemical d Able to be tailored and able to cover facilities outside of licensing regimes d Voluntary industry/facility involvement implies information gathered from the M&E program is valuable to all participants	d Yes
Environmental licences	d NChEM management recommendation should provide strong enough trigger for environmental regulators to amend licences, thereby enhancing the effectiveness of this regulatory tool d Applicable tool to medium/large facilities d Limited scope to address chemicals used by commercial sectors and households	d Yes
Chemical phase out/ ban	d Potential to be used more frequently than in the BAU d Provides mechanism across all jurisdictions d Will rely on a range of environmental powers to enforce	d Yes
Import restrictions	d Most likely to be used with respect to new and existing chemicals d For existing chemicals would have to be combined with phase out	d No

Note: The tools available to regulators were defined through stakeholder discussions and external research.
Source: CIE.

consequences, such as past contamination) is to a large degree unknown (except where there have been assessments undertaken overseas). While we can expect that some old existing chemicals with severe environmental effects should have been identified in the past, we cannot be sure that some existing chemicals with significant risks have not been evaluated. Until a chemical is evaluated, we do not have a good understanding of the level of the chemical in the environment, so the risks may not be readily apparent.

This analysis tries to characterise the environmental risk profile of the portfolio of chemicals from which selection is made and the management regime that may emerge from the pre- and post-NChEM processes. This is clearly very hard given that much is unknown. What the analysis has done is to construct five 'representative' cases, with possible environmental risks and management options. It uses these to develop a probability distribution of potential costs and benefits

associated with changing assessment and management recommendations linked to the chemical review processes completed each year.

The differences between the BAU and NChEM scenarios lie in the focus of selection in higher risk chemicals and the adoption of more appropriate management regimes.

Conducting a benefit-cost analysis of NChEM involves overcoming a number of key challenges. They are as follows.

- Developing meaningful cost and benefit estimates must overcome extreme variability given the large number of industrial chemicals in use in Australia.
- The specific chemicals and their key attributes are difficult to forecast and subject to a substantial amount of uncertainty.
- The environmental impacts are chemical specific — meaning that across the large number of chemicals whose use may be affected by NChEM, the environmental impact is highly varied and largely unknown.
- Correspondingly, the value of environmental benefits is context-driven, reflecting the size of the producer, use and location of the product; the benefits are also subject to jurisdictional variability.
- The nature of management recommendations can potentially span a broad spectrum of actions: including do nothing, information campaigns, voluntary and incentive based approaches, quasi regulation and mandatory requirements (for example, command and control).

Data sources for analysis

In light of these challenges, this benefit-cost analysis draws on a range of representative chemicals that act as markers along the spectrum of potential costs and benefits and explicitly incorporates variability. The representative chemicals are based on a number of sources, including:

- PEC assessments[7];
- extensive consultation with environmental regulators in each of the jurisdictions;
- review of literature to understand scope and value of environmental damage in Australia; and
- identification of the key environmental concerns going forward (to account for how past concerns are different from future concerns based on our current understanding of the science).

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7 Golder Associates provided technical review and advice regarding the PEC assessments and how they could be used to establish change scenarios under NChEM. See Case Study Chemical Review for Benefit Cost Analysis: Reforms Proposed under the National Framework for Chemical Environmental Management (2008) prepared for CIE.

Ultimately the analysis constructed scenarios based on the five representative chemicals. Four of the chemicals are based on PEC assessments plus a fifth which acts as an upper bound by not only involving large costs, but also delivering very sizable benefits (as seen through some legacy chemical cases).

Basis for selecting the representative chemicals

The NChEM Working Group provided guidance in the selection of the exemplars or case study chemicals. The objectives of the selection process were to capture a reasonable sample in terms of:

- number of chemicals assessed in any given year;
- diversity of industrial chemical uses (in terms of economic activity);
- range of regulatory approaches in response to the risk assessments; and
- potential probability and threats industrial chemicals pose to the environment and community.

In any given year, only a relatively small share of new and existing chemicals assessed by NICNAS have undergone a detailed environmental risk assessment, and are shown to pose significant environmental concerns (roughly 10 per cent of the new chemicals and 50 per cent of the PECs). This proportion suggests that NChEM could potentially affect the assessment of around 20 industrial chemicals per year. Therefore, four case study chemicals reflect a sample of about 20 per cent of the industrial chemicals that could pose significant environmental concerns in any given year.

Discussions with stakeholders

Numerous discussions were undertaken with State and Territory environmental regulators. These discussions provided information on several fronts, including:

- what tools are available to regulators for environmental control;
- how those tools are implemented;
- who they regulate; and
- how they regulate chemicals for various categories of industrial users.

Additionally, the discussions also uncovered information about how and where NChEM arrangements are expected to have the largest impacts. Finally, likely responses to environmental scenarios were also discussed. This provided a basis for developing change scenarios to determine how costs and benefits would flow to industry, government and community.

The change scenarios determine the potential impacts that flow from the NChEM arrangements. By using the five case studies and implementing 'what if' scenarios to chemical recommendations, the change scenarios provide a mechanism to identify

the marginal changes in costs, benefits and probabilities of environment events. As such, they provide a basis for determining expected values for actions undertaken and the net benefits of the program. An in depth discussion of the change scenarios, including the modelled actions can be found in Appendix A.

External research

Previous environmental injury and the costs associated with its remediation are a good source of costing information. They give an indication of the range of costs and their magnitudes which, in turn, can be extrapolated to potential future events. Relative to other developed nations, Australia has reported few large scale incidences of extreme environmental damage (or costs associated with remediation). Therefore the research canvassed on the experiences of Australia and other developed countries.

Description of the representative chemicals

Five representative chemicals have been used to construct valuations. They reflect:

- a wide spectrum of chemicals used in household products and production systems;
- the fact that chemical users are diverse and disparate; therefore regulation can have differing economic effects; and
- varying degrees of environmental risk with some being relatively inert and readily biodegradable through to those that are persistent, bio accumulative and toxic (PBT).

Four of the representative chemicals draw on specific PEC assessment reports which included recommendations and provide a base against which marginal change can be assessed. Therefore these chemicals are used to:

- highlight important characteristics of chemicals that may be potentially reviewed for environmental risk assessment; and
- construct the BAU and change scenarios to characterise the outcomes of the national chemicals management arrangements prior to NChEM. As such, they are useful in determining marginal costs and benefits. (See Appendices for more detailed discussion of the specific case study chemicals.)

The four chemicals do not provide an upper bound to the costs or benefits. Given this limitation, a fifth representative chemical was constructed. This fifth scenario is a hybrid of several examples. The hypothetical chemical (labelled 'Chemical X') that has the following features:

- representative of a very small share of existing industrial chemicals;

- presents a large, environmental risk on a scale similar to past large clean-up efforts;
- the environmental risk is significant enough to justify an immediate ban on its use; and
- the ban results in high costs to its users as a substitute is not readily available.

Ultimately, the five representative chemicals reflect the:

- type of regulatory tools likely to be employed under NChEM in order to implement a mandatory management recommendation; and
- type of environmental risks posed by (new and existing) industrial chemicals as assessed under NChEM.

Representative chemical 1 — education and information campaign

Stakeholder consultations revealed a growing concern with industrial chemicals falling outside existing State and Territory regulatory structures. More specifically, regulators are concerned about chemicals that are:

- used more broadly in the economy such as those contained in manufactured products like disinfectants and household cleaners; and
- used by facilities not generally subject to formal regulatory oversight by environmental regulators (for example, commercial businesses or smaller manufacturing facilities).

Under these conditions, education and information campaigns may be one of the options that can specifically target and deliver important environmental information to distinct audiences. Another option is a national approach to the regulation of chemicals in some products.

Where a chemical does not pose a significant environmental risk, but users should be informed of their environmental duties, the costs of regulation should be commensurate with the environmental risk. As such, management recommendations are likely to suggest an education or information campaign where the scale of potential environmental damage is small, or the concern is how a large number of small discharges can aggregate in the environment. Emphasis will be on the users self-regulating when discharging a chemical into the environment.

Representative chemical 1 reflects this scenario. The chemical is contained in several consumer cleaning products that are largely used by commercial facilities. The information campaign would emphasise that a 'neutraliser' is available and should be used in conjunction with the cleaner. This information is disseminated to industry through an information sheet and supported by the environmental regulator dedicating resources to field questions from industry in relation to the information received. It is assumed these costs are not indefinite, because the market would naturally deliver an alternative product over time.

Representative chemical 2 — M&E program

Monitoring and evaluation (M&E) programs are developed by a facility to understand and evaluate the quantities and nature of its discharges for a particular chemical (or suite of chemicals). The M&E program can be mandatory or voluntary and does not necessarily need to be initiated by industry.

The case study chemical highlights that in many instances insufficient information exists to understand how much of a particular chemical is entering the environment, particularly where:

- the loads are coming from a wide range of users (for example, households and commercial businesses); and/or
- concern exists about how the chemical could react when mixed with other chemicals in discharges or waste streams.

NChEM management recommendations are likely to suggest that additional information be gathered to overcome these data gaps. Based on such a recommendation, some jurisdictions may pursue a collaborative M&E programs within a single facility, or between a few facilities.

Representative chemical 2 explicitly involves a voluntary (but cooperative) M&E program between selected licensed facilities and an environmental regulator in a few jurisdictions. This scenario highlights the fact that a management recommendation does not necessarily affect all jurisdictions. Although adoption is mandatory, the chemical may be used in an industry that is not present in all jurisdictions. Consequently, when constructing the costs, this representative chemical involves the environmental regulators in four jurisdictions each working with a single facility.

Representative chemical 3 — licence variation

Where an assessed industrial chemical (be it existing or new) is used by a regulated industry, management recommendations are likely to capitalise on the availability of environmental licences to mandate behavioural change. Moreover, discussions with environmental regulators suggest that mandatory adoption of NICNAS management recommendations may be sufficient to trigger licence changes.

Licences are the most common tool for environmental regulators to control chemical discharge into the environment, with some 16 000 issued nationally across the various environmental departments. Through the licence, environmental regulators specify procedures and conditions that permit a licensee to discharge waste.

The scope and nature of environmental licences vary across the jurisdictions. Generally, the licences cover medium to large facilities engaged in manufacturing, industrial processes and waste management. However, the threshold for requiring a licence will vary across jurisdictions, as well the licence conditions and duration. Table 4.4 summarises some of the key differences across the States and Territories.

4.4 Licensing regimes by jurisdiction

	No. of licences	Comments on licensing regime
ACT	576	Requirements specified in Environment Protection Act 1997 d Licence's life is indefinite d Variations require major trigger, for example, new process or activity, serious impact on environment d Legislative change required to allow NChEM management recommendation as trigger for licence condition variation
NSW	3 235	Requirement specified in Protection of the Environment Operations Act 1997 – defined by economic sector (ANZSIC code) and subject to production threshold d Variations allowed at any time but subject to negotiations with the facility d Reviewed every three years d Move towards 'generic licence'
NT	74	Waste Management and Pollution Control Act d No specific environmental licensing regime d Licences are issued for waste water discharge and waste handlers d Licences reviewed on an annual basis; moving towards longer licences with annual monitoring reporting requirements
QLD	9 857	Requirements specified in Environmental Protection Act 1994 d Licence's life is indefinite d Variations require major trigger, for example, new process, national regulation, international obligation d Questionable strength of NChEM management recommendation as trigger for licence condition variation
SA	2 146	Requirements specified in Environment Protection Act 1993 d Provides reasonable flexibility to modify licence conditions — although subject to negotiations with the facility d Sunset clause to all licences (one to two years) — some consideration being given to lengthening the life of a licence
TAS	37	Environmental Management and Pollution Control Act 1994 d No specific environmental licensing program. Environmental control conducted through the planning system d A development application that necessitates environmental controls will have environmental control conditions placed on the application d Controls have no time limit. Conditions are subject to review from time to time and can be triggered by either the regulator or at industry's request
VIC	987	The Environment Protection Act 1970 d Provides reasonable flexibility to modify licence conditions — although subject to negotiations with the facility (conditions can be varied in response to policy changes and new information) d Licence duration is generally indefinite
WA	1013	Environmental Protection Act 1986 d Licence can last for up to five years

Source: CIE.

Correspondingly, the ease in which a regulator can adapt a licence to new information is also variable across jurisdictions. In some, licences are perpetual with limited scope for changing conditions; in other jurisdictions the licence is reviewed periodically allowing changes to be made at the licence's renewal (or with relative ease at the licence administrator's discretion). Regardless of the arrangements, changing licence condition(s) is not generally undertaken unilaterally. Regulators will negotiate with the facility. The amount of resources (by both parties) devoted to the negotiations is typically in line with the significance of the change (that is, cost impost of the variation).

Based on the consultation process, the analysis uses only one representative chemical to reflect licence changes as the key management recommendation. In determining the nature of the licence variation, emphasis was placed on information from the NICNAS risk assessment. It required the assessed environmental risk to be sufficiently significant so as to warrant a mandatory rather than voluntary approach.

In this chemical scenario, the licence variation affects only monitoring and reporting requirements rather than specifying discharge limits and/or process changes. The monitoring and reporting was a first step in determining whether further action would eventually be needed (for example, specifying discharge limits).

Representative chemical 4 — phased-in ban of a chemical

In some cases, the risks associated with the use of a particular chemical can be strong enough to result in a management recommendation that involves its phase out or outright ban. Depending upon the chemical's use profile, this course of action could involve chemical users implementing production process changes. In some cases, this could involve substitution of the NICNAS assessed chemical. In other cases, it could mean re-engineering the production process (for example, purchasing new equipment and retraining). The latter may potentially be an expensive exercise for industry.

Environmental regulators indicated that they like to take a collaborative approach to environmental management with industry, not burdening them with excessive costs. Therefore the most likely scenario to arise through the management recommendations is government imposing a 'phased in' ban on a chemical. A phased-in approach will allow industry to spread the cost of chemical substitution and production changes across a period of time, there by lessening its upfront cost impact.

The representative chemical captures an industry that is already transitioning to a substitute chemical. However, concern is focused on smaller facilities that may not have the resources to identify and track developments regarding their exposure to environmental liability as a result of the particular chemical's use. The ban would be

phased in over a five year period; government would work with small facilities to help this transition.

Representative chemical 5 — immediate ban

Occasions may arise where the risks presented by an industrial chemical are so extensive that they justify an 'immediate' ban of its use. These chemicals would have a high risk of extreme environmental damage which would be costly to rehabilitate.

The hypothetical chemical highlights this point. The chemical is of such high risk that management recommendations immediately ban the chemical with no phase in period. The scenario assumes that the industry does not have a readily available substitute. The ban forces industry to make immediate and expensive changes to the production methods that effectively constrain production. At the same time, environmental regulators would also have to expend sizeable resources in ensuring awareness and compliance with the ban.

This type of management recommendation is considered rare, denoting the upper bound of costs (and benefits). However, examples of such circumstances are documented throughout most developed economies.

5 Costs and benefits of NChEM

This chapter presents estimates of the cost and benefits that arise from the implementation of NChEM in the assessment and regulation of chemicals. The analysis follows several steps. First, costs and benefits are estimated for each of the five representative chemicals. The estimates represent the difference between the BAU and change scenarios, linking back to how the representative chemical exemplifies a particular regulatory tool and change in the risk of environmental injury. Based on these five chemical-specific costs and benefits, the next step involves constructing two probability distributions — one for costs and one for benefits. The probability distribution combines assumptions about the representativeness of the five chemicals and their specific point estimates (for costs and benefits). It is assumed that the costs or benefits for any given industrial chemical affected by NChEM, will fall within the bounds of this probability distribution. This probabilistic approach allows the absolute magnitude of costs and benefits to not necessarily be confined to the five point estimates constructed from the representative chemicals.

What are the costs?

The change scenarios arising from case study chemicals identify a range of costs for industry and government, and as already noted, they relate to the types of environmental controls likely to emerge from NChEM. To estimate their costs, the analysis adopts a direct cost approach where the emphasis is on the initial direct incidence of costs.

Costs are anticipated to generally fall on:[8]

- Environmental regulators — State and Territory governments (as well as the Commonwealth) may have to alter their regulatory approaches to some industrial chemicals. In most cases, the change in their regulatory approach may require additional resources to undertake monitoring and enforcement activities as well as education and or collaboration with industry; and
- Industry — these costs can be further decomposed to distinguish between licensed and unlicensed facilities that use industrial chemical as an input to their production systems or products. In many cases, service-oriented business will account for unlicensed facilities. They may have to undertake additional actions

8 Note that costs may also fall on consumers if prices increase. However, these costs are not considered in this analysis.

(for example, information gathering, substituting products, etc) as a result of informal or mandatory compliance obligations.

The analyses of the representative case study chemicals suggest that in most cases environmental regulators would need to rely on voluntary and quasi-regulatory approaches.

Cooperative and voluntary regulatory tools

The voluntary approaches embedded in the costs reflect:

- working with selected, licensed facilities to undertake monitoring and evaluation programs to better understand the level of discharges and nature of the chemical's environmental impact; and
- developing and administering education materials and programs to raise awareness among industrial chemical users about the necessary steps to minimise and/or neutralise the environmental risks of using a particular industrial chemical.

In most cases, these approaches are 'short term' cost imposts where the efforts last one or two years.

Many industrial chemical assessments would not necessarily lead to additional mandatory regulatory obligations. Where formal regulatory efforts are necessary, costs could take the form of:

- varying environmental licences for existing licensed facilities which would involve: time spent negotiating with licensed facilities on the condition variation; and monitoring and enforcing new environmental conditions. These costs are one- off with the assumption that environmental regulators would not have to renegotiate in the future;
- expanding range of formally regulated facilities;
- addressing problems associated with stockpiles and proper disposal of banned/phased out industrial chemicals; and
- enforcement and prosecution.

The drivers of industry costs follow similar assumptions to that of government. Industry faces compliance costs that are either voluntary or mandatory.

The voluntary approaches embedded in the costs reflect:

- a few licensed facilities in selected jurisdictions undertaking monitoring and evaluation programs to better understand the level of discharges and nature of the chemical's environmental impact; and
- reviewing and altering behaviour to reflect information gained through the environmental regulator's education efforts (for example, purchasing alternative chemicals or products).

These approaches are generally 'short term' cost imposts. Monitoring and evaluation programs may last one or two years. Behavioural changes, such as the purchase of a new product may last roughly five years (after which, it is assumed alternative products or chemicals would come on the market).

Mandatory regulatory tools

Where formal regulatory efforts are necessary, costs could take the form of:

- facing new obligations due to variations in their environmental licences (the lion share being monitoring and reporting requirements);
- previously unlicensed facilities face new compliance obligations or requirements to secure an environmental licence;
- incurring increased disposal costs for banned/phased out industrial chemicals; and
- revenue losses due to chemical substitution where the new chemical is not as effective or is more costly.

Discussions with the environmental regulators and the analysis of the four case study chemicals, suggest that formal regulatory approaches would occur with little frequency. In fact, only one of the four case study chemicals involved mandatory changes to a facility's actions. The hypothetical chemical, however, includes the costs of banning a chemical use in a large industrial sector.

In some cases, changes to how a chemical is environmentally managed can also produce cost savings. For example, improving cross jurisdictional consistency can reduce the regulatory burden imposed on industry through alleviating duplication, overlap and unnecessary variability. This cost offset is also explicitly explored for all of the representative chemicals.

Below is a detailed description of the costs (and savings) estimated for each representative chemical. A detailed breakdown of the cost is included in the Appendix B for further reference.

Chemical 1 — education and information campaigns

The costs of an education program depend on its design (for example, mode of communication, size of the targeted audience and duration of the campaign). It can be large and costly (for example, through a long term, intense media campaign), or small and relatively inexpensive (for example, information packs sent out to a select set of chemical specific users).

Government faces two major cost drivers: (i) staffing requirements in designing the education and information program; and (ii) to a lesser extent, the materials used to convey information to industry.

For industry though, costs are largely driven by time dedicated to processing the information and making decisions about whether the new information justifies changes to its practice(s).

One representative chemical involved an education campaign. Its total cost estimate is roughly $65 000, reflecting direct costs to government and users of the cleaning agent containing the chemical of concern (and including a cost offset, which is described later). This cost estimate is minimal, reflecting the voluntary nature of the approach and the relatively small scale of the education campaign.

The costs to government are estimated to be $12 000 for this chemical.[9] This amount includes resources to draft and distribute information material and to provide on-going information support should it be requested by facilities using the cleaning agent. Additionally there is the cost of the material itself (for example, printing).

For industry, the information is anticipated to require very little time in deciding whether to purchase the cleaning agent (less than a quarter of a day). However, cost to industry (that is, users of the cleaning agent) is estimated to be roughly $57 000.[10] This cost is significantly higher than the costs to government given that large number of facilities receiving the information.

Cost offsets: Cross jurisdictional consistencies

This chemical is the only one that involved savings that offset some of the costs. It is assumed that the chemical users had environmental managers who oversee several facilities across multiple jurisdictions. The savings were quite small, roughly $5000, reflecting the relatively minor time savings enjoyed by not having to separately review the materials in each jurisdiction.[11] Taking into account the cost offset, the net effect is a cost impost is $53 000 to industry and government.

Productivity Commission submissions to the chemical and plastics regulation review indicate that a company, operating across State and Territory borders, could face cost savings of around $14 000 to $30 000 per annum due to streamlined chemical regulations and recommendations brought around by the introduction of a consistent

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9 The figure is reported as a present value, discounted using a 7 per cent real rate over 10 years.

10 The number of facilities that would actually change their purchasing decisions is not estimated. Some, not all of the facilities receiving the information package, are expected to change their behaviour (that is, purchase the 'neutraliser'). Omitting these costs from the BCA potentially understates the cost estimate. However, the cleaning agent already comes with instructions that identify the neutraliser as being a necessary companion product when used. In the baseline, facilities should have already been using the product.

11 It is assumed that this cost saving is only attributable to private healthcare providers since public health care is a service that is provided by state and territory governments, and as such, requires not cross jurisdictional understanding of chemical obligations.

legislative framework.[12] However, this value is likely to be the upper end of estimation as the costing involves a number of components that are not entirely relevant to the change scenario used. As such, it is more likely that any benefits that industry would receive from NChEM would be much smaller.

Chemical 2 — monitoring and evaluation programs

The M&E program involves government working with industry to collect information on the chemical concentration levels in discharges and the extent to which fauna (for example, birds) are exposed to the chemical of concern.

The M&E program would last only one year, with the direct dollar costs amounting to $4 000 per facility. In total, four facilities (one per jurisdictions) develop and implement M&E programs. The overall cost to industry is $16 000.

Government incurs some minimal costs. It is assumed that the review of the data emerging from the M&E program would be examined periodically in conjunction with reviewing any data reported as part of licence obligations. The total cost to government is estimated to be $3400.

Chemical 3 — licensing changes

The magnitude of the costs arising from a licence variation is context specific. At a minimum, it can give rise to costs in the form of:

- time and resources devoted to negotiating changes to the licence. This resource requirement affects both the regulated facility (that is, industry) and the environmental regulator (that is, government). Stakeholder consultations suggested that the negotiation process can take anywhere between a few weeks to two years; and
- incremental increases in compliance costs for the regulated facility as the licensee faces additional requirements, such as monitoring and reporting.

It is possible that the environmental regulator could face additional administration and enforcement costs. However, these are considered unlikely unless the licence variation warrants additional inspection and/or review activities — which were not suggested with any of the representative chemicals.

The representative chemical involved sewage treatment plants (STPs) in major capital cities. Given the chemical's use profile, the STPs were the only point at which the chemical could be effectively treated prior to entering the environment. The STPs would face a new monitoring and reporting obligation which leads them to

12 See Productivity Commission (2008) Report into Chemicals and Plastics Regulation, August 2008 http://www.pc.gov.au/projects/study/chemicalsandplastics/docs/finalreport.

voluntarily take action (that is, negotiating with their customers to pay for the chemical's treatment via their trade waste agreements).

For government, the major cost driver is the time spent renegotiating existing licences with STPs which is estimated to be around $11 000.

Under this scenario, the STP incurs two distinct types of costs: negotiating initial licence variation with the environmental regulator; and subsequently, changing practices to treat the chemical. These costs are estimated to be $2.8 million in present value terms.[13] The major component of this figure are the fees incurred for entering into new trade waste agreements, account for 98 per cent of the total cost, and the costs involved in negotiating licence changes with environmental regulators.

Chemical 4 — phased-in ban of a chemical's use

For industry, the cost of chemical substitution and production changes are modelled to occur in three manufacturing states (NSW, QLD, VIC). As a result, the present value is calculated to be $600 000.

Because government will be working with industry to help in the transition away from harmful chemicals, it incurs costs. The phase in period is assumed to extend over a five year period, after which the ban would be absolute. Staffing resources would be spent liaising with small industry across the three major manufacturing jurisdictions. Therefore the cost associated with government is calculated at $271 000.

Chemical 5 - immediate ban of a chemical's use

A negative impact on a company's overall profits is used to estimate the implications of an immediate ban (of an industrial chemical) of hypothetical 'Chemical X'. The profit loss captures costs associated with the industry's coping strategies (for example, production constraint, process re-engineering). The cost associated with such an action is calculated at $2.35 million.

Government would also incur costs of roughly $173 000. These costs arise from implementing a range of tools to administer and enforce the ban, including licence variations, expanding regulations and adopting additional enforcement activities (for example, inspections).

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13 In this scenario, the management recommendation leads to costs upstream of the STP – that is, it imposes additional costs on some of the STP customers. This cost impost is estimated based on the STP's fees and charges to its customers.

Constructing a cost distribution from the representative chemicals

The estimated costs range from roughly $19 000 to $2.8 million per representative chemical. The estimates are reported in present value terms (that is, the cumulative discounted stream of costs incurred over a ten year time horizon). This range reflects costs to both industry and government, net of any cost offsets accruing to industry (for example, due to cross jurisdictional consistency). In most cases, industry bears the bulk of the costs (ranging from $16 000 to $2.8 million). Government costs range from $3400 to $271 000. Table 5.1 summarises the costs across the different environmental tools as captured by the representative chemicals.

5.1 Summary of estimated costs by representative chemical[a]

Cost impost by environmental tool	No. of representative chemicals	Cost to industry	Cost to government	Total cost estimate
		$	$	$
Education and information[b]	1	53 000	12 000	65 000
Voluntary monitoring & evaluation	1	16 000	3 400	19 000
Licence changes	1	2 842 000	11 000	2 853 000
Phased in ban	1	600 000	271 000	871 000
Immediate ban	1	2 353 000	173 000	2 526 000
Total[c]	5	5 864 000	471 000	6 335 000

[a] All values are reported as present values, based on a ten year time horizon and a real discount rate of 7 per cent. [b] Cost to industry includes a cost offset of $5000 associated with cross jurisdictional consistency. [c] May not sum due to rounding.
Source: CIE.

As noted at the start of this chapter, these costs are not intended to be definitive. Instead they are intended to provide an indication of the range of costs that could be associated with an industrial chemical that is affected by the NChEM process. The range is intended to capture the diversity of cost drivers arising from NChEM altering management decisions and mandating their implementation (for example, employing different regulatory tools across a diverse range of industries).

However, use of this range to estimate the costs (and benefits) of NChEM would be potentially misleading. In any given year, the mix of industrial chemicals that are affected by NChEM will vary substantially — and with this variability, so will the actual costs. The cost distribution should be adjusted to account for this variability.

NChEM is anticipated to not only improve the identification of chemicals with potentially significant environmental risks, but also improve the approaches to regulation across the jurisdictions (via the mandatory adoption of management recommendations put forward by NICNAS).

Better targeting of chemicals should result in an emphasis being placed on chemicals with two defining traits (as captured by our representative chemicals):

- chemicals that are found more broadly in the economy — that is, being used by businesses and households not directly regulated by environmental agencies (for example, through licences); and
- chemicals that exhibit a particular type of environmental risk, such as being persistent, bio accumulative and/or toxic.

These improvements are combined with the costs estimates for the representative chemicals to develop a cost distribution. The magnitude of the costs is probabilistic reflecting some uncertainty and variability. The distribution also provides a reasonable indication of the lower and upper bounds of the magnitude of costs that any single given chemical may impose through the NChEM process. Appendix B provides further discussion and detail on the construction of the cost distribution.

Table 5.2 reports a central estimate plus a lower and upper bounds per chemical. The central estimate is $1.21 million; it is the mean value of the cost distribution. To give an indication of the spread around this central estimate, the values for a 90 per cent confidence interval are $0.53 million and $1.85 million. All figures are in present value terms (discounted over 10 years at 7 per cent).

5.2 Estimated cost per chemical

National estimate of cost per chemical under NChEM	Present value ($)
Central estimate	1 210 000
5th percentile	530 000
95th percentile	1 850 000

Note: The chart represents the potential value range for a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate. Upper and lower bounds represent the 90 per cent confidence interval; all valuations rounded to the nearest thousand

Source: CIE.

The presented estimates are per chemical and aggregated to the national level. They combine cost imposts to industry and government. While a jurisdiction-specific estimate is not constructed, it is reasonable to anticipate that the cost burden would be larger for some jurisdictions (for example, in the more populous states or heavily industrialised states). On average, this figure indicates a per jurisdiction cost impact of around $150 000 per chemical.

What are the benefits?

NChEM is designed to deliver a range of benefits by addressing a number of institutional limitations, particularly with regard to: (i) the timely engagement of State and Territory environmental regulators in the NICNAS assessment process; and (ii) the absence of a national standard setting body or mechanism for ensuring

follow through on the management recommendations that emerge from the assessment process.

Responding to these two limitations enhances the effectiveness of managing the environmental risks posed by industrial chemical use. The involvement of State and Territory environmental regulators is anticipated to improve the identification and nomination of existing chemicals for assessment. It enhances the flow of information that can underpin not only the hazard and risk assessment of industrial chemicals but also improve the feasibility and usefulness of management recommendations to environmental regulators. The material impact of these improvements is the minimisation of environmental damage which delivers benefits to the broader community in the form of healthier environmental assets and reduced risks of adverse human health impacts.

However, the process also provides less tangible benefits such as greater leverage and sharing of existing knowledge and expertise across environmental regulators and greater confidence in the quality of regulatory decisions.

Characterising benefits through the representative chemicals

The characterisation of NChEM benefits draws on the same sources as those that were employed for constructing the scenarios around each representative chemical and conducting the cost analysis. It draws on consultations with stakeholders (for example, State and Territory environmental regulators), existing chemical assessments, and reports about the nature of environmental risks posed by industrial chemicals (for example, identified by international conventions and research).

Gleaned from this diverse body of information is a core set of themes. In the past, large environmental damage occurred due to limitations in our knowledge of a chemical's impact. Looking forward, this dynamic is likely to persist. However, a few differences are anticipated. Firstly, the source of industrial chemical release is more likely to occur from community (that is, household and service sectors) use of products containing chemicals. Secondly, the nature of the environmental damage is likely to be due to:

- the accumulation of industrial chemical(s) in the environment, suggesting a significant lag effect between release and realisation of environmental injury; and/or
- a cocktail of industrial chemicals that interact in the environment.

The scale of the benefits may also be determined by the:

- characteristics of the environmental risk, such as: duration of the effect – that is, acute or chronic; timing of the effect — that is, immediate or cumulative; and toxicity — where toxicity can be measured using a range of tests including reduced growth or reproduction and/or mortality;

- features of the chemical's use, such as volume/quantities, as well as timing and location of a chemical's release; and
- extent to which the improved selection of chemicals for assessment, coupled with the resulting management recommendations lead to actual behaviour change(s) that directly alter the industrial chemical's potential to harm the environment.

This last bullet point directly relates to the scenarios for the representative chemicals and the range of management recommendations that would emerge under NChEM. The representative chemicals revealed the following points.

- Education and information campaigns will have mixed levels of effectiveness. An important feature of NChEM is improved risk assessment and information flows. Information can be provided with several objectives. For example, raising awareness could simply deliver peace of mind or be the first step towards changing behaviour. In general, the effectiveness of this type of approach (as measured by actual behavioural change that leads to change in the probability of environmental harm from a chemical's use) is minimal.
- Monitoring and evaluation (M&E) approaches are used when an assessment raises serious concerns over the potential damage a chemical could do to the environment, but available information is inadequate to estimate how much of that chemical is entering into the environment. M&E alone does not mean a facility or business has to change its practices. The representative chemicals, however, highlight that in some instances M&E leads to no further action, while in others it can lead to voluntary changes that limit a chemical's discharges to the environment.
- Most of the anticipated licensing changes involve greater monitoring and reporting. Similar to M&E, monitoring and reporting does not imply that licensed facilities have to restrict or limit the discharges of particular pollutants. It does provide better information that could lead to changes and ensures that occasional, heavy discharges are identified and addressed.
- Production process changes generally come about through mandatory requirements, potentially imposing some of the largest costs. The representative chemicals suggest that environmental risk correlates with a stronger and more confronting regulatory approach. In other words, where the environmental risk is sufficiently large, so is the required behavioural change. Consequently, this type of requirement modelled to deliver the largest environmental benefits.

Valuing the benefits of NChEM

Based on the above themes and findings, the valuation of benefits is largely derived from:

- a marginal reduction in the probability of environmental injury (based on the likelihood that a chemical will be used and managed differently as a result of NChEM);
- two types of monetary values: (i) estimates of past remediation and restoration efforts; or (ii) non-market values associated with the use of public goods (for example, recreational activities; and
- discounting to reflect the timing of when benefits eventuate.

Remediation and restoration estimates

The community incurs benefits when chemical risk assessments make recommendations that decrease the probability of environmental injury and the allocation of resources necessary to adequately remediate.[14] Environmental damage is modelled to be either acute (short term toxicity effect that has relatively lower cost to remediate) or chronic (long term damage that builds up over a period of years and has significant costs attached to its cleanup).

Table 5.3 summarises the benefit values attributed to avoided environmental damage and remediation activities. In the case of a chronic incident, the community benefit is based upon the avoided cost of undertaking sediment clean up. To characterise lagged environmental risks (as in the case of a bio-accumulative risk), the analysis uses estimates of species rehabilitation. Lastly, in an extreme case where wider ranging and severe environmental damage could occur, the avoided remediation costs are based on overseas and Australian examples. The exact derivations of all figures are discussed further in Appendix C.

5.3 Summary of the values attributed to remediation of environmental damage

	Event horizon	Present value
	years	$
Sediment clean up	20	77 500
Remediate species	10,15	4 440 000
Extreme event	20	25 800 000

Note: Full derivations of the above costs are outlined in the Appendix; the expected present value involves adjusting the benefit estimate to account for the marginal change in environmental risk resulting from NChEM as well as discounting the benefits based on a 7 per cent discount rate. At maximum, the benefit cohort is 20 years.

Source: CIE.

[14] Valuing benefits based on the avoided remediation costs is an imperfect measure of the benefits. It does not reflect the actual utility or welfare benefits that flow from the protection of a resource that is the avoided diminished or lost use. Instead it reflects the monetary outlay to restore a resource to a particular state. The level of restoration is often determined based on ability to pay (by both government and liable parties). That said, the bias associated with using restoration/remediation expenditure could be an under or overstatement of the resources true value.

Nonmarket values for the use of environmental assets

The nature of the environmental benefit can be measured based on the utility an individual (or household) derives from using environmental assets. In such cases, the benefits flow from avoided lost or diminished use of an environmental resource. For example, reducing the probability of an acute fish kill can be valued based on the avoided loss of recreational fishing days.

Reduced activity in the use of environmental assets (which are generally public goods) can arise from a wide spectrum of impacts. For example, a severe impact could involve an industrial accident that contaminates groundwater rendering it unfit. A mild impact could involve short term access restrictions to a waterway that disrupts recreational activities for a few of days. Using the mild case as an example, the avoided loss of recreational activities (such as fishing and boating) is a benefit to community.

The representative chemicals tend to focus on environmental risks to aquatic environments. While a large number of recreational and existence values exist relating to aquatic assets, the benefits analysis relied on recreational fishing days as the leading valuation metric.

Constructing a benefits distribution from the representative chemicals

Based on the representative chemicals, the benefit inputs range from roughly $0 to $4.44 million per chemical. To include an event with a risk of significant environmental damage attached to it (that is, Chemical X), the upper bound of benefits per chemical would be $25.8 million. The estimates are reported in present value terms (that is, the cumulative, discounted stream of benefits). The time horizon for benefits depends upon the nature of the environmental risk. NChEM impacts on management decisions is analysed over a ten year period. Each year establishes a cohort of benefits. Consequently if in year ten, a management recommendation affects a chemical with a 20-year lag effect, the benefits are included but discounted to the present.

Table 5.4 summarises the benefits across the different environmental tools as captured by the representative chemicals.

Similar to the cost analysis, better targeting of chemicals (through NChEM) should result in emphasis on chemicals that pose environmental risks characterised as highly likely to:

- accumulate in the environment, suggesting a significant lag effect between release and realisation of environmental injury; and/or

5.4 Summary of estimated benefits by representative chemical[a]

Benefits by environmental tool	No. of representative chemicals	Benefits
	no	$
Education and information	1	0
Voluntary monitoring & evaluation	1	1 140
Licence changes	1	4 440 000
Phased in ban	1	77 500
Immediate ban	1	25 800 000
Total[b]	5	30 361 000

[a] All values are reported as present values using a real discount rate of 7 per cent. [b] May not sum due to rounding.
Source: CIE.

- have a 'cocktail' effect where the industrial chemical interacts with other chemicals once it enters the environment, thereby increasing its toxicity to environmental assets.

These improvements are combined with the benefit estimates from the representative chemicals (which indicate the effectiveness of the regulatory approach) to develop a benefits distribution. In addition, assumptions about the composition of industrial chemicals that are assessed over time are consistent with the distribution of chemicals that was used to construct the cost distribution.

The magnitude of the benefits is probabilistic reflecting some uncertainty and variability. At the same time, the distribution provides a reasonable indication of the lower and upper bounds of the scale of benefits any single given chemical may impose through NChEM. Appendix C provides further discussion and detail on the construction of the benefits distribution.

Table 5.5 reports a central estimate plus a 90 percent confidence interval around the central estimate. The central estimate is $1.47 million; it is the mean value of the distribution. To give an indication of the spread around this central estimate, the values for a 90 percent confidence interval are $0.27 million and $2.7 million, respectively. All figures are in present value terms (discounted at 7 per cent).

Again, similar to the overall costs of NChEM, the magnitude of this result may initially seem large. However, this is a nationwide figure representing an aggregate benefit across all eight jurisdictions. On average, this figure indicates a per jurisdiction benefit impact of around $185 000 per chemical.

5.5 Estimated benefits per chemical

National estimate of benefits per chemical under NChEM	Present value ($)
Central estimate	1 470 000
5th percentile	269 000
95th percentile	2 660 000

Note: The chart represents the potential value range for a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate; all valuations rounded to the nearest thousand.

Source: CIE.

6 Evaluation of net impacts of NChEM

While useful to know the scale of benefits and costs, the merits of policy action should be assessed based on the net effect to society. The COAG Guidelines (2007) state, 'Public policy makers are expected to make judgements based on what is best for the community as a whole'. In other words, the policy should deliver positive net benefits to the community.

This chapter presents the results of analysing the net effect of NChEM when considering its impacts to government, industry and the community. It also provides the results of a number of sensitivity analyses that give insight into the robustness of the findings.

Net impact of NChEM

Assessing the net impact of NChEM requires aggregating the cost and benefit distributions presented in Chapter 5. The distributions reflect a single industrial chemical. However, in any given year, NChEM will impact on more than one chemical.

On average NICNAS assesses between 150 and 200 new industrial chemicals, plus two or three priority existing chemicals (PECs). Only a small share of those assessed is found to pose a significant environmental risk (roughly 10 per cent of the new chemicals and 50 per cent of the PECs). This suggests that NChEM could potentially affect the assessment of at least 15 industrial chemicals per year.

In order to aggregate from the single chemical to the NChEM reforms more comprehensively, the net impact assessment undertakes a monte carlo simulation. This simulation allows the aggregated net impact to reflect variability in a range of key parameters. They are:

- the number of chemicals assessed based on concerns regarding the environmental risk and therefore the scale of regulatory action required flowing from management recommendations; and
- potential for any given assessed chemical to have different benefit and cost estimates.

On balance, NChEM is anticipated to deliver positive net benefits to society. Table 6.1 presents the results. Over a ten year timeframe, the NChEM process would return net benefits of $38.3 million or just over $5 million annually. These figures are

discounted (at 7 per cent), reflecting the net present value (NPV) of the stream of costs and benefits.[15]

The table also presents a 90 per cent confidence interval around the central estimate, $31.2 to $45.5 million. One way to interpret the confidence interval is that it indicates there is a 10 per cent probability that the net impact could fall outside of this range. Notably, confidence interval suggests that in all likelihood, the net impact should be positive.

6.1 Overall net impact of NChEM: a ten-year time horizon

	NPV ($)	Annualised NPV ($)
Central estimate	38 303 000	5 096 000
5th percentile	31 244 000	4 157 000
95th percentile	45 500 000	6 054 000

Note: The chart represents the potential net benefit value range for the NChEM process, selecting, on average, 20 chemicals a year over a 10 year time horizon. Monetary figures are in present value terms, using a 7 per cent discount rate. Upper and lower bounds represent the 90 per cent confidence interval around the mean; all valuations rounded to the nearest thousand.
Source: CIE.

When thinking about the magnitude of the net impact, it is worth bearing in mind that:

- the program's NPV (as opposed to the annualised NPV) is calculated over a ten-year time horizon, implying that the absolute magnitude is partially a function the number of years; and
- the figures are a nationwide aggregate; the distribution of the net benefits across the jurisdictions would not be uniform.

Sensitivity analysis

Although the reported upper and lower bounds of NChEM's NPV suggest that the findings are fairly robust, a series of sensitivity analyses are conducted. These analyses specifically focus on the implications of change of some key inputs to the economic modelling.

Sensitivity one: alternative discount rates

The results of any analysis that involves a stream of costs and/or benefits over time will be sensitive to the applied discount rate. The estimates provided in the previous chapters represent central estimates that have been discounted using a 7 per cent real rate. In this sensitivity analysis, we relax this assumption and calculate costs, benefits and net impacts using three alternative discount rates (3, 5 and 10 per cent).

15 For a detailed discussion on the assumptions underpinning this exercise please refer to the Appendix D on net impacts.

Comparison of the benefit cost ratios (or whether the estimated net impact remains positive) gives a strong indication of the robustness of the findings.

The rationale for choosing the above discount rates is as follows.

- 3 per cent is often applied to analyses involving long term time horizons, such as those involving intergenerational effects.
- 5 per cent represents the current return on ten year government bonds. This discount rate tends to be more aligned with discount rates applied to BCAs conducted by the States and Territories.
- 10 per cent represents more aggressive discounting that is associated with investment profiles that have a short term horizon and/or subject to a high level of uncertainty or risk.

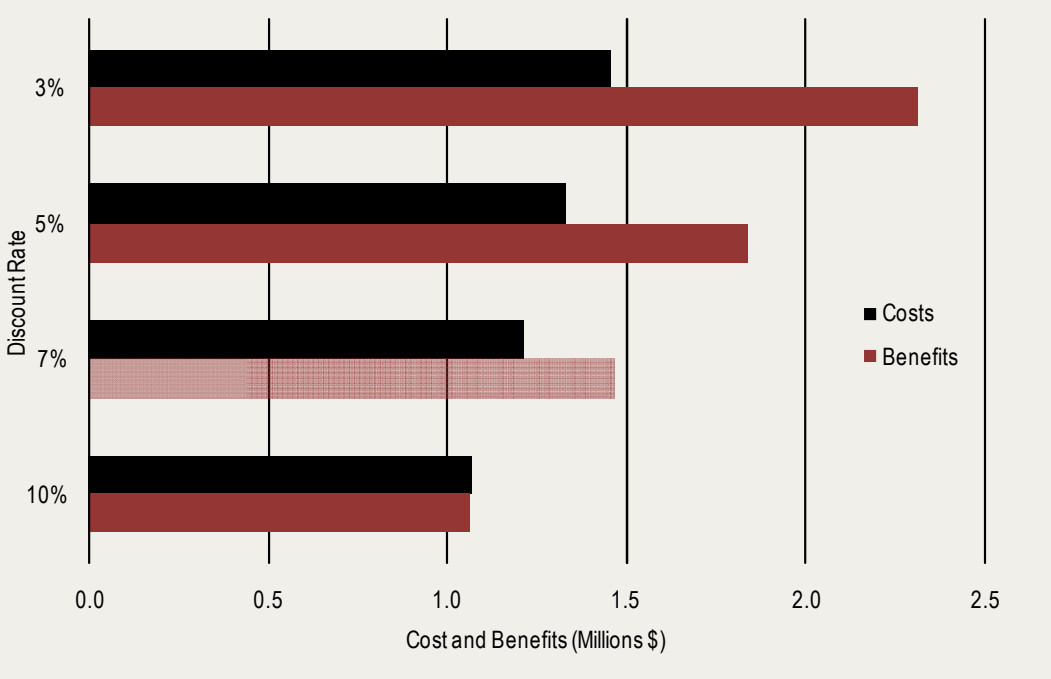
In general, benefits are assumed to accrue to the community further into the future, whereas costs are assumed to occur in the present. Therefore higher discount rates tend to reduce the present value of benefits while a lower discount rate will increase the present value of benefits.

Chart 6.2 illustrates how key measures of the net impact change with the application of different discount rates. It essentially provides a graphical representation of how average costs for a single chemical behave under differing assumptions about the discount rate. Under a 10 per cent discount rate the net impact becomes negative. Costs outweigh benefits. However, the difference is quite small. Under the central estimate (7 per cent discount rate) one dollar of costs produces 1.15 dollars of benefits. This benefit cost ratio falls to 0.94 when a 10 per cent discount rate is applied.

As pointed out earlier in the report, the NChEM process is not confined to a single year, nor does it assess just one chemical. The analysis uses a ten year time horizon to estimate the aggregate net impact of NChEM. During this period, an average of 20 chemicals, with particular environmental concerns, would be affected per year. Based on this average, this would result in a total of 200 chemicals being affected by possible environmental management recommendations over a ten year period. Chart 6.3 shows the same directional changes as seen with the single chemical case. As the discount rate increases, the net benefits of the program decrease. With a 10 per cent discount rate, the net impact is negative, but marginally so.

In summary, costs, benefits and net benefits behave as expected with the change in the discount rate. As the discount rate increases the costs, benefits and net benefits of the NChEM process decrease. This change is driven by the benefits being incurred further into the future relative to costs and is more heavily discounted as the rate increases.

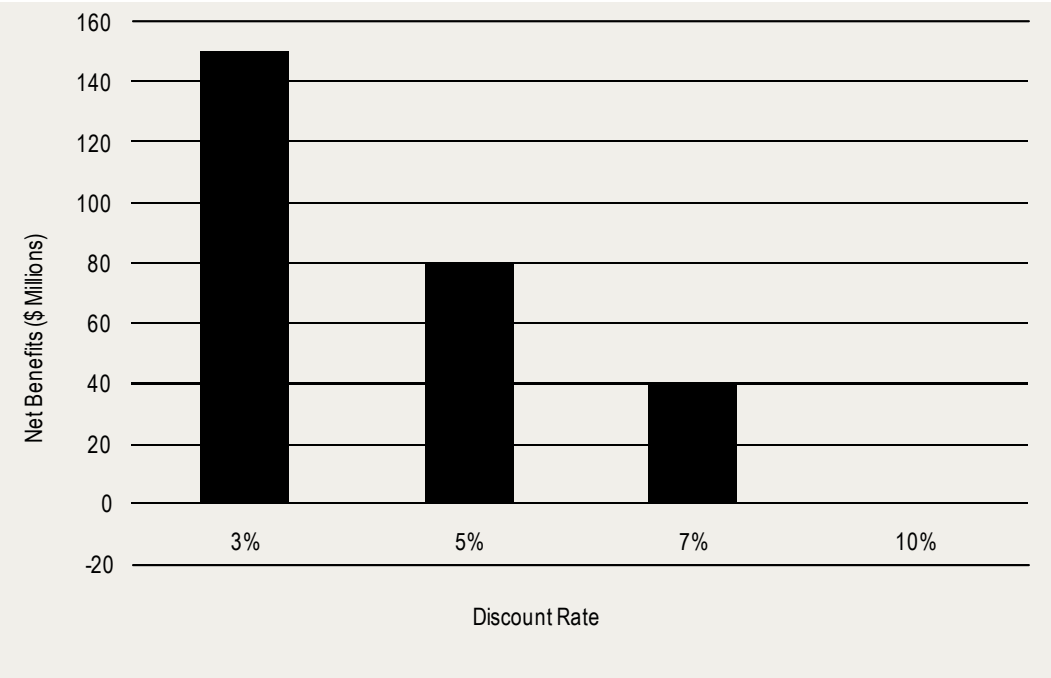
6.2 Average costs and benefits at differing discount rates



Note: Graph represents the average cost, under differing discount rate assumptions, for a single chemical that is assessed under the NChEM arrangements; 7 per cent represents the original discounting rate used in the main analysis and is provided as a basis of comparison.

Data source: CIE.

6.3 Total net benefits of NChEM over a ten-year horizon



Note: Graph represents the average net benefit of the NChEM arrangements, selecting on average 20 chemicals, over 10 years, with differing discounts rate; 7 per cent represents the original discounting rate used in the main analysis and is provided as a basis of comparison.

Data source: CIE.

Sensitivity two: assuming different levels of improvement in the identification and selection of chemicals of concern

As previously noted, the main assumption underpinning the shape of both the cost and benefits distributions is the extent to which NChEM results in a better selection of industrial chemicals for environmental assessment. In other words, the assessments focus on industrial chemicals that actually pose reasonably significant environmental risks that can be affected by the management recommendations.

In the following sensitivity tests, we explore how the estimated net benefits of NChEM could change under three differing assumptions about how industrial chemicals are targeted for assessment. The three alternatives are described as follows.

- Alternative 1 - end point targeting. The chemical selection process focuses on chemicals that are only effectively regulated at end points, such as STPs. As such, those chemicals that are used widely would be targeted for risk assessment. Those chemicals that exhibit such a characteristic (that is, chemical 1 and 3) will be picked up for assessment much more frequently, with those chemicals assumed to be assessed 40 percent of the time. The so called 'Chemical X' is assessed 1 in every 1000 with the remaining split equally amongst the other case study chemicals.
- Alternative 2 — production process targeting. The selection of chemicals focuses on chemicals that are inputs to production processes covered by environmental licences. Those chemicals that exhibit that characteristic (that is, chemical 2 and chemical 4) will be picked up for assessment much more frequently and assumed to be assessed with a probability of 40 per cent. The so called 'Chemical X' is assessed 1 in every 1000 with the remaining split equally amongst the other case study chemicals.
- Alternative 3 — no specific targeting. Under this alternative, the selection process arising from NChEM does not result in better targeting of high risk chemicals. Chemicals exhibiting characteristics similar to 'Chemical X' are selected for assessment 1 in every 1000. The remaining probability selection is apportioned equally among the four remaining chemicals, which represents the probability of all chemicals, regardless of characteristics, being picked equally.

Table 6.4 summarises the likelihood of particular scenarios and chemicals comprising the set of chemicals assessed in any given year. Chart 6.5 shows that, in all but one scenario, the benefits of the arrangements are greater than the costs. In other words, the BCR is greater than one. Under Alternative 3 (no specific targeting) both the costs and the benefits are less that under the initial analysis in the main report. This is expected as the NChEM program would be targeting relatively low cost, low benefit chemicals with a higher probability. A more comprehensive breakdown of the figures is presented in Appendix D However, another interesting point is revealed from the results. If the program were to target chemicals that were easily regulated, the costs of such a regime would be greater than the benefits incurred. This result is

driven largely by the fact that any benefits that accrue will accrue many years in the future, so the benefits are small. However, regulating such chemicals can be a high cost event for industry (for example, chemical substitution), which are costs that must be met upfront.

6.4 Alternative scenarios for the composition of assessed chemicals

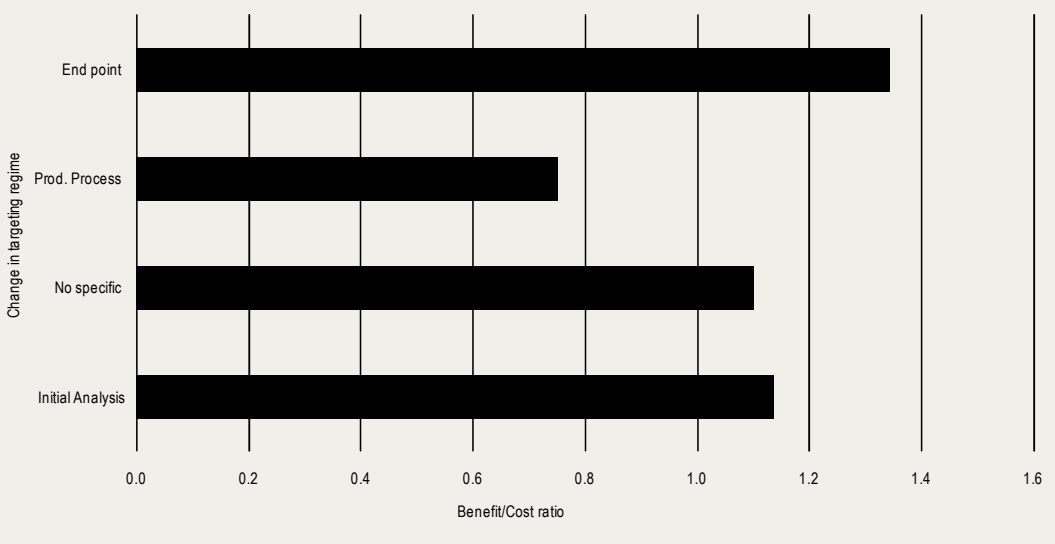
Chemical scenario	Key trait of the chemical	Relative share chemicals assessed in any given year[a]			
		Central	Alt1	Alt 2	Alt 3
Chemical 1 – education and information campaign	Industrial chemicals with little environmental risks	17%	40%	10%	25%
Chemical 2 – M&E program	Industrial chemicals used by a particular industry as an input to their production process	17%	10%	40%	25%
Chemical 3 – licence variation	Chemicals widely used in the economy - by service-oriented businesses or embedded in consumer products	33%	40%	10%	25%
Chemical 4 – phased-in ban	Chemicals that exhibit some potential for environmental harm by being persistent, bio accumulative and/or toxic in the long-term	33%	10%	40%	25%
Chemical 5 – immediate ban	A chemical posing significant, persistent and cumulative environmental risks going unrealised	0.05%	0.01%	0.01%	0.01%

[a] Does not sum to 100 per cent due to rounding.

Note: Alt 1 refers to a selection process focused on chemicals effectively regulated at the endpoint. Alt 2 refers to the selection of chemicals based on production processes covered by environmental licences. Alt 3 refers to a selection process that does not result in better targeting of harmful chemicals.

Source: CIE.

6.5 Average cost benefit ratio with differing targeting regimes



Note: Graph represents the average BCR, under differing target probability assumptions, for a single chemical that is assessed under the NChEM arrangements; Figures presented are a ratio of average benefits to average cost; Initial analysis results are presented as a point of comparison.

Data source: CIE.

Appendices

A Description of the scenarios constructed around the representative chemicals

As described in the main body of the report, assessing the potential costs and benefits of NChEM is developed through five representative chemicals. This Appendix provides a detailed description of the representative chemicals.[16] The discussion around each chemical covers the following points:

- characterisation of the environmental risk associated with the industrial chemical;
- identification of the chemical's user(s);
- description of the tools available to the environmental regulator based on the traits of the chemical's user(s) under the BAU and change scenarios; and
- commentary on the assumed effectiveness of regulatory approaches and its impact on government, industry and community/environment.

Representative chemical 1 — education and information

Representative chemical 1 is based on the priority existing chemical (PEC) assessment conducted for glutaraldehyde which is found mainly in disinfectants used by commercial and service-oriented industries, such as health care (for example, hospitals).[17] Table A.1 provides a summary of representative chemical 1. Its user base is diffuse and found widely in the community. As such, it is not well covered by environmental licensing and/or trade waste agreements with STPs.

Duty of care obligations, as well as product disclosure/use instructions, highlight that this chemical should be neutralised prior to disposal (that is, flushed to sewer systems). Despite the availability of the neutraliser, the chemical is thought to be mostly directly disposed in wastewater without any treatment.

NICNAS completed its assessment on glutaraldehyde in 1994. It was supported by a reasonable set of environmental data. Its nomination for assessment was partially motivated by its associated significant human health risks. It is also classified as very

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[16] Golder Associates provided technical review and advice regarding the PEC assessments and how they could be used to establish change scenarios under NChEM. See Case Study Chemical Review for Benefit Cost Analysis: Reforms Proposed under the National Framework for Chemical Environmental Management (2008) prepared for CIE.

[17] NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC3.asp.

A.1 Representative chemical 1 — summary table

	Description
Data source	Based on glutaraldehyde
	d NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC3.asp
Environmental risk	Very limited
	d Toxic but rapidly breaks down, giving it low to no potential for accumulation
	d Significant human health risks but addressed through OH&S
Chemical use & user(s)	Contained in product used by service sector / households
	d Used as a disinfectant mostly at hospitals
Pathway to the environment	d Only able to be addressed / intercepted at the point of disposal (for example, to waste water systems)
	d Some discharge to air but thought to be very small
Pre-NChEM management approach	No direct environmental regulation
	d Users not captured by licensing regime
	d STP provides only point at which the chemical can be regulated to control its entry into the environment
	d STPs licences do not address this chemical
	d STP could address the chemical through trade waste agreements (but do not)
Post-NChEM management approach	Education and information campaign for chemical users
	d Environmental risk minimal given short life in waste streams
	d User profile most effectively addressed through non-mandatory regulatory tools

Source: CIE.

toxic to aquatic life. However, when taking into account how it can enter the environment, the chemical's potential to harm is minimal. Its user profile suggested that it is most likely to enter the environment through the sewage system. The PEC assessment found that it is most likely to breakdown prior to leaving an STP. Moreover, the chemical's potential for chronic toxicity is minimal, since it rapidly biogrades and has low potential for bioaccumulation.

This chemical highlights two analytic premises about NChEM. Firstly, industrial chemicals with similar environmental risks are less likely to be selected for assessment. Instead, NChEM is likely to lead to selecting chemicals for assessment that pose significant threat to the environment, such as targeting PBT chemicals. Secondly, environmental management recommendations emerging from NChEM will most likely cover the spectrum of regulatory tools from voluntary to mandatory. In many instances, especially as environmental concern focuses on chemicals widely used in the community, voluntary approaches such as information and education campaigns, will play an increasingly important role.

In constructing this exemplar, it is assumed that, had the chemical undergone a PEC assessment under NChEM, the management recommendations could have involved environmental regulators developing information sheets for users of products that contain this chemical.

Because the product already comes with advice that a 'neutralising' agent should be used when disposing of the cleaner, it is assumed that most product users would need to alter their current practices. The effect of the information sheets is that some hospitals would have modified purchasing decisions to include the neutraliser.[18] In turn, the quantities of glutaraldehyde entering sewer systems would decrease. However, decreasing quantities of the chemical entering STPs is not assumed to have any measurable impact on the potential for this chemical to adversely harm the environment. (The PEC assessment suggested that the chemical breaks down before leaving the STP.) Consequently, it imposes a small cost on government with no quantifiable environmental benefits.

Representative chemical 2 — monitoring and evaluation

Representative chemical 2 is largely constructed from the PEC assessment for sodium ethyl xanthate (SEtX).[19] Table A.2 provides a summary of representative chemical 2. SEtX is used by the mining industry as a flotation agent for the collection of sulphide minerals and metallic elements (copper, nickel, silver, gold, lead). As such, it has a narrowly defined, clearly identified user base that is highly regulated with regard to its environmental impacts.

While environmental regulators do not generally mandate standards specific to the chemical (for example, concentration limits, monitoring and reporting), SEtX is disposed in an environmentally sensitive manner. It is discharged to tailings dams, where standards for the dams take into account factors such as proximity to water bodies, potential for leaching, etc. Consequently, by default, it is assumed to be adequately addressed.

NICNAS completed the PEC assessment on SEtX in 1995 when environmental data was limited. A second assessment was completed in 2000 as further information became available. The chemical was found to be highly toxic to aquatic organisms but biodegradeable, with a half life of four to eight days. While it has an extremely low risk of bioaccumulation, exposure to SEtX may have some long-term effects to human health.

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18 The purchase of the neutralising agent is a 'new cost' to those hospitals that follow the information sheet. The additional cost, however, is not included in the benefit-cost analysis because it is a cost the hospitals should have been incurring prior to NChEM had they followed the product instructions.

19 NICNAS Assessment Report: 1995: www.nicnas.gov.au/Publications/CAR/PEC/PEC5s.asp; 2000: www.nicnas.gov.au/Publications/CAR/PEC/PEC5s.asp

Hence as a representative chemical, it highlights several characteristics:

- the chemical is not widely used in the community;
- its user base is well-regulated, with adequate coverage through environmental licensing and/or planning arrangements;
- it is initially, acutely toxic to aquatic life but rapidly biodegradable; and
- it poses minimal, if any, long term environmental risks as it is has an extremely low risk of bioaccumulation.

A.2 Representative chemical 2 — summary table

	Description
Data source	Based on sodium ethyl xanthate (SEtX)
	- NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC5s.asp
Environmental risk	Limited
	- Acute, highly toxic
	- Not bio-accumulative, but with some potential for secondary impacts
Chemical use & user(s)	- Used in a single industry that is highly regulated by environmental regulators
Pathway to the environment	- Low probability of direct discharge to the environment (for example, water bodies)
	- Fauna exposure possible (for example, birds)
Pre-NChEM management approach	Formal regulatory approaches available
	- Environmental regulators have tools available to address most users (that is, controls could be addressed through existing regulatory mechanisms, for example, environmental licences)
Post-NChEM management approach	Voluntary monitoring and evaluation program
	- Environmental risk minimal given propensity to biodegrade quickly. low risk of bioaccumulation and existing regulatory requirements associated with the waste stream containing the chemical
	- User profile already effectively regulated through licensing and planning requirements
	- Management recommendation looks to enhance understanding while minimising costs impost to industry and government

Source: CIE.

Had the PEC assessment been affected by NChEM, several issues would have been brought to the forefront: (i) the recommended concentration limit for discharges to tailing dams would have been lower; and (ii) further monitoring and assessment would have been required to understand the adequacy of applying current tailing dam standards (building and management standards reflecting leading indicator chemicals, such as heavy metals) to SEtX.

The change scenario assumes that only jurisdictions with the bulk of Australia's minerals mining activity would act upon a management recommendation. As such,

NT, QLD, TAS and WA would each work with a mining facility in their jurisdiction to undertake a voluntary monitoring and evaluation program for one year.

While these measures will lead to better understanding, especially in the area of chemical interaction at discharge points, it is not expected to result in any significant changes in requirements for the mining industry. In reviewing environmental plans that accompany the application for new mineral processing sites, environmental regulators will look for information addressing SEthX (regarding construction standards and location of tailing dams). That said, most environmental regulators would already look to limit the location of a tailing dam in environmentally sensitive areas (for example close to ground or surface water), its potential to contaminate adjourning properties, or its potential exposure to fauna (for example, birds). Consequently, NChEM is not expected to change the actual location or construction costs of tailing dams and subsequently environmental benefits. Instead, the NChEM management recommendation would provide environmental regulators with better information upon which to base decisions.

Representative chemical 3 — licence variation

PEC assessment for para-dichlorobenzene (p-DCB)[20] forms the basis for constructing representative chemical 3. Table A.3 provides a summary of representative chemical 3. p-DCB is an example of an industrial chemical found in consumer products, and, therefore, its release into the environment is fairly diffuse and potentially significant when aggregated. Significantly, it also represents an industrial chemical that poses an environmental risk largely due to its potential interaction with other chemicals (for example, much like endocrine disruptors). Its environmental risks must take into account not only the chemical's own toxicity but also its potential to create a damaging 'cocktail'.

p-DCB is primarily used in the cleaning industry as a toilet bowl deodoriser; it has some minor uses in agriculture and pharmaceuticals (for example, moth repellent). Because of its use, it is difficult for environmental regulators to regulate. It is found in a consumer product that allows it to directly enter the sewer systems. Any single facility or user is unlikely to release a significant amount, but it has potential to aggregate at the STP. Consequently, STPs do not face any regulatory requirements to monitor or limit the concentration of p-DCB in its discharges, nor do STPs address p-DCB in their tradewaste agreements.

NICNAS completed the PEC assessment in 2000. When assessed in isolation, the chemical is considered to be very toxic to aquatic life but appears to biodegrade quickly. At the same time, it has the potential to be absorbed in sediment, allowing it to persist for decades. As already noted, the chemical has the potential to interact

[20] NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC13.asp

with other chemical compounds (such as hormones) at discharge points, effectively reactivating those compounds. On discharge those chemical compounds can interfere with the reproductive system of aquatic species essentially sending them sterile.

NChEM would have altered the management recommendations that emerged from the PEC assessment. STPs in urban areas across all eight jurisdictions would be required to monitor and report on the chemical.[21] Monitoring and reporting does not necessarily lead to environmental improvements. However, environmental improvements are factored into the change scenario. Monitoring and reporting should provide sufficient impetus for STPs to take action should sufficiently high levels of the industrial chemical be found. It is assumed that STPs would try to identify the key sources of the chemical and either negotiate changes to tradewaste agreements (that limit the quantities of the chemical entering the sewage system) or take steps to treat the chemical at the STP.

A.3 Representative chemical 3 — summary table

	Description
Data source	Based on para-dichlorobenzene (p-DCB)
	d NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC13.asp
Environmental risk	Unknown but thought to be potentially significant
	d Interaction with other chemicals not understood and likely to be a problem (for example, similar to endocrine disruptors)
	d Highly biodegradable
	d Some potential for secondary impacts (that is, potential to accumulate in sediment)
Chemical use & user(s)	d Contained in product used by businesses / facilities that are not formally regulated by environmental regulators
Pathway to the environment	d Only able to be addressed / intercepted at the point of disposal (for example, to waste water systems)
Pre-NChEM management approach	Formal regulatory tools exist but not at the initial point of release
	d Users not captured by licensing regime
	d STP provides only point at which the chemical can be regulated to control its entry into the environment
	d STPs licences do not address this chemical
	d STP could address the chemical through trade waste agreements
Post-NChEM management approach	Formal regulatory change via variation to licence conditions
	d STPs with licences issued by the environmental regulator are required to monitor and report on the chemical
	d Monitoring and reporting provides information necessary for STPs to develop strategies to manage the chemical (for example, through trade waste agreements)

Source: CIE.

[21] The NChEM management recommendation is assumed to not extend to council-run STPs.

Representative chemical 4 — phased-in ban

Representative chemical 4 involves an industrial chemical that is increasingly a concern for environmental regulators. It is persistent, bio accumulative and toxic (PBT). Internationally, scientific evidence is strong enough to warrant many countries moving in the direction of banning the chemical. Additionally, many of the larger companies and facilities have, on their own accord, begun phasing out their use of the industrial chemical.

The NICNAS assessment of short chain chlorinated paraffins (SCCPs)[22] forms the basis for constructing this representative chemical. Table A.4 provides a summary of representative chemical 4. SCCPs are regarded as dangerous for the environment. They are very toxic to aquatic life and have the potential for chronic effects. They are not inherently biodegradeable. Some studies indicate that they have rapid and high potential for bioaccumulation.

SCCPs are not manufactured in Australia, instead formulated into other products (for example, lubricants). They are largely used as metal working fluids, and can be found in a range of building industry products (for example, fillers, adhesives and coating materials). The PEC assessment noted that SCCPs can affect water, air and soil quality. Their major disposal point is to landfill. However, some disposal to sewer systems is assumed especially by smaller metal working facilities.

At the time that NICNAS assessed SCCPs in 2001, the EU had already recommended a complete phase out of these chemicals. Despite international trends, the PEC assessment acknowledged the ban but did not recommend it. The rationale was based on the fact that many industrial users have already started substituting away from SCCPs to medium and long chain chlorinated paraffins. However, the environmental regulators have noted that: (i) the environmental risks of medium and long chain chlorinated paraffins are not well understood; and (ii) smaller facilities are not likely to have begun the process of substituting away from SCCPs.

None of the environmental regulators address SCCPs directly in their environmental controls. Moreover, the licensing regime would cover only medium to large facilities. Many of the metal working facilities are thought to be small and therefore not covered by licensing.

Under NChEM, the PEC assessment would have most likely adopted a different recommendation, involving a ban of the chemical that is phased in over five years. To achieve the phased-in ban, environmental regulators would:

- introduce a variation to all relevant environmental licences to specifically address SCCPs;

[22] NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC16.asp.

- prepare information sheets and run an education campaign about the environmental impacts of SCCPs and the availability of substitute chemicals. The program would target all metal working facilities, but with particular efforts concentrated on small and medium facilities in urban environments; and
- two of the largest jurisdictions would engage in a collaborative effort with industry to explore the environmental implications of medium and long chain chlorinated paraffins.

This change scenario is expected to result in a metal working facilities voluntarily substituting away from SCCPs and affect only some of the jurisdictions (for example, NSW, QLD, SA and VIC). It would also facilitate coordinated efforts to better understand PBTs. As a result, environmental benefits are associated with the change scenarios. Benefits reflect the reduced probability of a large scale remediation effort in three jurisdictions (that is, the expected value of avoiding the costs of clean-up and restoration).

Table A.4 provides a summary of representative chemical 4.

A.4 Representative chemical 4 — summary table

	Description
Data source	Based on short chain chlorinated paraffins (SCCPs) - NICNAS Assessment Report: www.nicnas.gov.au/Publications/CAR/PEC/PEC16.asp; Follow up report: ww.nicnas.gov.au/Publications/CAR/Other/SCCP_Environ_Exposure_Assessment_PDF.pdf
Environmental risk	High - Persistent - Highly toxic (acute and chronic) - Bio-accumulative
Chemical use & user(s)	- Used in industry made up of large and small facilities with small facilities not being formally regulated by environmental regulators
Pathway to the environment	- Reasonable probability of direct discharge to the environment depending upon scale of the facility
Pre-NChEM management approach	Formal regulatory approaches available, but with limited coverage - Environmental regulators have existing regulatory tools available, however, lion share of users are not likely to be captured by the tool (for example, environmental licences)
Post-NChEM management approach	Formal regulatory change via variation to licence conditions plus active targeting of a particular industry to capture smaller facilities - Environmental regulators vary existing environmental licences - Active, targeted campaign by environmental regulators to promote awareness and compliance with the ban - Monitoring and evaluation of environmental impacts associated with substitute chemicals

Source: CIE.

Representative chemical 5 — immediate ban

The analysis of costs and benefits reflect five representative chemicals. Representative chemicals one through four are based on actual PECs. These four, while insightful, do not provide an adequate indication of the upper bound to benefits or costs. Given this limitation, the analysis constructed a fifth, hypothetical chemical. It is assumed that the likelihood of this chemical existing and being picked for assessment through NChEM is extremely small. At the same time, NChEM should result in better identification and assessment of industrial chemicals that pose significant environmental risks (such as represented by this hypothetical chemical).

Representative chemical 5's key features are summarised in Table A.5. The environmental risk of the chemical is clearly established by scientific data. The potential damage associated with the chemical is of a scale similar to many legacy chemical clean ups experienced in Australia (for example, ORICA groundwater contamination clean-up of Botany, Sydney).

In the base case, this chemical would not have been identified or assessed. Moreover, it is not specifically addressed by environmental regulators through any of their formal regulatory tools.

Under the change scenario, this chemical is nominated and undergoes the PEC assessment process. Given the scientific data, NChEM would result in a management recommendation that calls for an immediate ban of the chemical's importation and manufacture. The costs of complying with the ban would be very high, because the chemical has no ready substitute. Affected industries would face compliance costs that are measured by foregone revenue. This foregone revenue reflects: (i) production constraints given the chemical ban; and/or (ii) high capital investments necessary to redesign production systems.

Government would incur significant costs through an active campaign to enforce the ban of the chemical's use. The campaign would concentrate on large industrial sectors characterised comprising many licensed facilities. Enforcement activities would entail licence changes, inspections, and efforts to identify and clean up potential stockpiles of the chemical (to ensure their proper disposal).

The benefits of the management action would reflect the reduced probability of a major, future, environmental clean-up.

A.5 Representative chemical 5 — summary table

	Description
Data source	d Examples of legacy chemical clean-ups in Australia and other developed countries
Environmental risk	High
	d Persistent
	d Highly toxic (acute and chronic)
	d Bio-accumulative
Chemical use & user(s)	d Several industries currently captured by environmental licence regimes
Pathway to the environment	d Via direct discharges to air and water
Pre-NChEM management approach	This chemical would not have been identified and assessed as a PEC
	Formal regulatory approaches available, but with limited coverage
	d Environmental regulators have existing regulatory tools available, however, regulatory instruments do not specifically address the chemical
Post-NChEM management approach	Formal regulatory change requiring the immediate ban on the chemical's importation and manufacture
	d Environmental regulators vary existing environmental licences
	d Active, targeted campaign by environmental regulators to address stockpiles and disposal of the chemical

Source: CIE.

B Modelling the costs of NChEM

This Appendix describes the basis for estimating industry and government costs. It provides a more in depth understanding into the calculation of the costs used, assumptions underpinning those costs and how the assumptions feed into the formation of the overall cost distribution. The Appendix closely follows the structure of the main report. It first details the cost estimates associated with each of the representative chemicals. The Appendix then details how the cost estimates from the representative chemicals are used to construct a cost distribution that characterises the magnitude and likelihood of costs associated with any given industrial chemical.

What are the costs?

The change scenarios arising from the case study chemicals identify a range of costs for industry and government, and as already noted, they relate to the types of environmental controls likely to emerge from NChEM. To estimate their costs, the analysis adopts a direct cost approach where the emphasis is on the initial direct incidence of costs.

Costs are anticipated to generally fall on:[23]

- Environmental regulators — State and Territory governments (as well as the Commonwealth) may have to alter their regulatory approaches to some industrial chemicals. In most cases, the change in their regulatory approach requires additional resources to undertake monitoring and enforcement activities as well as education and or collaboration with industry; and
- Industry — these costs can be further decomposed to distinguish between licensed and unlicensed facilities that use industrial chemicals as an input to their production systems or products. In many cases, service-oriented business may account for unlicensed facilities. They may have to undertake additional actions (for example, information gathering, substituting products, etc) as a result of informal or mandatory compliance obligations.

The analyses of the representative case study chemicals suggest that in most cases environmental regulators would need to rely on voluntary and quasi-regulatory approaches.

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[23] Note that costs may also fall on consumers if prices increase. However, these costs are not considered in this analysis.

Cooperative and voluntary regulatory tools

The voluntary approaches embedded in the costs reflect:

- working with selected, licensed facilities to undertake monitoring and evaluation programs to better understand the level of discharges and nature of the chemical's environmental impact; and
- developing and administering education materials and programs to raise awareness among industrial chemical users about the necessary steps to minimise and/or neutralise the environmental risks of using a particular industrial chemical.

In most cases, these approaches are 'short term' cost imposts, where the efforts last one or two years.

Many industrial chemicals would not necessarily lead to additional mandatory obligations. Where formal regulatory efforts are necessary, costs could take the form of:

- varying environmental licences which would involve: time spent negotiating with licensed facilities on the condition variation; and monitoring and enforcing new environmental conditions. These costs are one-off with the assumption that environmental regulators would not have to renegotiate in the future;
- expanding the range of formally regulated facilities;
- addressing problems associated with stockpiles and proper disposal of banned/phased out industrial chemicals; and
- enforcement and prosecution.

The drivers of industry costs follow similar assumptions to that of government. Industry faces compliance costs that are either voluntary or mandatory, with most costs being voluntary.

The voluntary approaches embedded in the costs reflect:

- a few licensed facilities in selected jurisdictions undertaking monitoring and evaluation programs to better understand the level of discharges and nature of the chemical's environmental impact; and
- reviewing and altering behaviour to reflect information gained through the environmental regulator's education efforts (for example, purchasing alternative chemicals or products).

These approaches are generally 'short term' cost imposts. Monitoring and evaluation programs would last one or two years. Behavioural changes, such as the purchase of a new product would last roughly five years (after which, it is assumed alternative products or chemicals would come on the market).

Mandatory regulatory tools

Where formal regulatory efforts are necessary, costs could take the form of:

- facing new obligations due to variations in their environmental licences (the lion share being monitoring and reporting requirements);
- previously unlicensed facilities either facing new compliance obligations or requirements to secure an environmental licence;
- incurring increased disposal costs for banned/phased out industrial chemicals; and
- revenue losses due to chemical substitution where the new chemical is not as effective or is more costly.

Discussions with the environmental regulators and the analysis of the four case study chemicals suggest that formal regulatory approaches would occur with little frequency. In fact, only one of the four case study chemicals involved mandatory changes to a facility's actions. The hypothetical chemical, however, includes the costs of banning a chemical use in a large industrial sector.

In some cases, changes to how a chemical is environmentally managed can also produce cost savings. For example, improving cross jurisdictional consistency can reduce the regulatory burden imposed on industry through alleviating duplication, overlap and unnecessary variability. This cost offset is also explicitly explored for all of the representative chemicals.

Estimating costs for each representative chemical

Table B.1 provides a summary of the constructed cost estimates to industry and government for each of the representative chemicals. The following sections provide a detailed discussion and breakdown of the elements feeding into the cost estimates.

B.1 Summary of estimated costs by representative chemical[a]

Cost impost by environmental tool	No. of representative chemicals	Cost to industry	Cost to government	Total cost estimate
		$	$	$
Education and information[b]	1	53 000	12 000	65 000
Voluntary monitoring & evaluation	1	16 000	3 400	19 000
Licence changes	1	2 842 000	11 000	2 853 000
Phased in ban	1	600 000	271 000	871 000
Immediate ban	1	2 353 000	173 000	2 526 000
Total[c]	5	5 864 000	471 000	6 335 000

[a] All values are reported as present values, based on a ten year time horizon and a real discount rate of 7 per cent. [b] Cost to industry includes a cost offset of $5000 associated with cross jurisdictional consistency. [c] May not sum due to rounding.
Source: CIE.

Representative chemical 1 — education and information

The change scenario for representative chemical 1 is based on gluteraldehyde. In the change scenario, users of the chemical are advised that a neutraliser is available, and it is a requirement to discharge the chemical in conjunction with the neutraliser. This is disseminated to industry through an information sheet.

As detailed in the report, two groups bear the costs information dissemination and education: government and industry. The main costs drivers for government are in the form of disseminating information and providing ongoing support for queries relating to changes. It is assumed these costs are incurred for ten years, after which time, a substitute is found.

Gluteraldehyde is primarily used in the healthcare industry, hence the information sheet is sent to all 750 public hospitals (AIHW 2001) and the 66 companies (estimated) that own the 557 private hospitals that are nationwide (ABS 2008). The cost of the information sheet is $2 each. In addition, a one off salary cost is included in the calculation. The calculation takes into account the preparation, production and distribution of information sheets to industry. This is calculated at a rate of one week of a full-time equivalent (FTE). This time allocation is valued using an annual salary of $65 000. This information underpins a cost estimate for government of $8000.

The present value of the estimated ongoing administration costs is $4000. This estimate is calculated based on the following assumptions:

- a quarter of a day of an FTE is spent doing the task;
- the FTE resource is valued based on an annual salary of $65 000;
- the action is attributed to all eight jurisdictions over a ten year period; and
- discounted at 7 per cent over 10 years.

Table B.2 summarises the inputs for estimating the costs to government for representative chemical 1.

For industry, the major cost involves understanding the information sheet. The figure is calculated on the assumption is takes one-quarter of an FTE's day to review the document, calculated on the salary rate of $65 000 per annum. The cost is one-off and incurred by all 750 public hospitals and 66 private health care providers. A summary of the industry cost inputs is provided in Table B.3.

B.2 Representative chemical 1 — government costs

Information Sheet	
Cost of information sheet	$2
Time to prepare and send information sheet	1 week
FTE salary (per annum)	$65 000
No. of receivers of information sheet	750 (public hospitals); 66 (private health care providers)
Estimated cost of information sheet	$8000
Ongoing Administration Costs	
Jurisdictions	8
Time use	quarter of a FTE day
FTE Salary	$65 000
Number of years action undertaken	10
Estimated costs administration costs	$4000
Total government costs	$12 000

Note: All figures are in present value terms, using a 7 per cent real discount rate, and rounded to the nearest thousand.
Source: CIE.

B.3 Representative chemical 1 – industry costs

Time use to process information	quarter of a FTE day
FTE Salary	$65 000
No. of receivers of information sheet	750 (public hospitals); 66 (Private health care providers)
Total industry costs[a]	$57 000

[a] Note that industry is also anticipated to experience a cost offset of $5000 associated with cross jurisdictional consistency. This cost offset would reduce the total costs to industry to $53 000.

Note: All figures are in present value terms, using a 7 per cent real discount rate, and rounded to the nearest thousand.
Source: CIE.

Representative chemical 2 — monitoring and evaluation

The monitoring and evaluation (M&E) program involves government working with industry to collect information on the chemical concentration levels in discharges and the extent to which fauna (for example, birds) are exposed to the chemical of concern. The management recommendation would be relevant to only four jurisdictions (NT, QLD, TAS and WA). Each participating jurisdiction would work with one minerals processing facility.

The M&E program would cost industry a total of $16 000. In developing this estimate, the following assumptions are made.

- Four facilities would participate.
- Each participating facility would collect samples of the chemical as part of their regular monitoring and reporting requirements.

- Analysis of the samples would cost $1000 annually per facility.
- The M&E program would last only one year.

Government incurs some minimal costs. It is assumed that the review of the data emerging from the M&E program would be examined periodically in conjunction with reviewing any data reported as part of licence obligations. The time impost of reviewing the data is estimated to be an additional four hours per annum per jurisdiction. Valuing this time based on an annual salary of $65 000, the total costs to government is estimated to be $3400.

Representative chemical 3 — licensing changes

For government, the major cost driver is the time spent renegotiating existing licences with STPs which is estimated to be around $11 000. All eight jurisdictions would incur this cost as environmental regulators would vary licences for STPs located in major urban areas (that is, capital cities). It is assumed that negotiating the licence variation would be a one-off cost that is incurred in the first year only. To value the resource impost, it is assumed that on average, negotiating the variation would equate to one week of a full time employee's time. This time requirement is valued using an annual salary of $65 000.

Under this scenario, the STP incurs two distinct types of costs: negotiating initial licence variation with the environmental regulator; and subsequently, changing practices to treat the chemical. These costs to industry are estimated to be $2.8 million in present value terms.[24] The major component of this figure are the fees incurred for entering into new trade waste agreements, account for 98 per cent of the total cost, and the costs involved in negotiating licence changes with environmental regulators.

The costs of negotiation for industry are accounted for in a similar fashion to previous examples. In total, 308 STPs must negotiate with environmental regulators regarding the proposed licence variations. Negotiation costs for industry therefore equate to $22 000 and are incurred in the first year only.

Based on the monitoring and reporting data provided to the environmental regulators, the STPs find high concentrations of representative chemical 3. As a result, they initiative (on their own accord) measures to reduce the concentration of the chemical in their effluent. These treatment costs start in year two and continue into the future. Because STP charges and fees are regulated so as to allow STPs appropriate cost recovery, the treatment costs are based on fees and charges applied to entities that have trade waste agreements. New application fees and new trade waste agreements are estimated to be, on average, $2000 per year for a single

[24] In this scenario, the management recommendation leads to costs upstream of the STP — that is, it imposes additional costs on some of the STP customers. This cost impost is estimated based on the STP's fees and charges to its customers.

organisation. The application fee is only payable in year two, while the fees are incurred from year two to year ten. Given these assumptions, the cost to industry reflected by this specific change scenario equates to $2.85 million (in present value terms using a 7 per cent discount rate).

Representative chemical 4 — phased-in ban

The estimated cost of compliance with a phased-in ban for industry is $600 000. It reflects compliance costs that affect industry in three major manufacturing states (NSW, QLD, VIC). To arrive at this figure, the analysis draw on information provided by submissions to the Productivity Commission (2008) in its review of chemical and plastics regulation. The submissions suggested that the impact of a chemical ban or forced substitution would be $150 000. The analysis assumes this estimate applies per affected jurisdiction.

Additionally, because government will be working with industry to help in the transition away from the banned chemical, government incurs costs associated with this action. As noted in the report, the ban is gradually introduced over a five-year period. During this time, the affected environmental regulators will annually allocate a quarter of an FTE to liaising with small industry. Valuing this resource allocation using an average annual salary of $65 000, the cost impost to government is $271 000.

Table B.4 summarises the cost of inputs to government and industry when there is a phased-in ban for a chemical.

B.4 Representative chemical 4 — summary of cost inputs

Government	
Time spent liaising with industry on licences	One third of an FTE per year
FTE salary (per annum)	$65 000
Jurisdictions	3
Time period of action	5
Total cost to government	$271 000
Industry	
Cost of substitution	$150 000 per jurisdiction
Jurisdictions	4
Total cost to industry	600 000

Note: All figures are in present value terms, using a 7 per cent real discount rate, and rounded to the nearest thousand.
Source: CIE.

Representative chemical 5 — immediate ban

It is assumed that a government employee spends a quarter of a year on new regulations designed in the control of 'Chemical X's' use. All jurisdictions incur costs associated with enforcing the NChEM management recommendation. In particular, government costs involve environmental regulators in each jurisdiction annually allocating one-quarter of a full-time equivalent employee to administering and enforcing the ban. Given these assumptions the value of expanded regulation is calculated at $130 000.

Additionally for costs associated in dealing with the hypothetical 'Chemical X' that one month of an FTE is spent associated with negotiating licensing requirement with industry. The same salary assumptions apply as above providing a valuation of $43 000. Combined with the cost of expanded regulation, the total cost to government is estimated to be around $173 000.

The immediate ban of 'Chemical X' would impose potentially substantial costs on industry. By being given limited time to adjust, industry participants could face negative impacts on their overall profit as they would be forced to substitute (that is, use a more costly alternative, re-tool production systems or constrain production). To characterise the potential industry loss, it is assumed that 10 per cent of licensed facilities would lose 0.001 per cent of their average turnover. Drawing on figures reported in the ABS Australian Business Register Survey. The industry could face looses of nearly $2.35 million over five years.

B.5 Representative chemical 5 — summary of cost inputs

Inputs to estimated industry costs	
Licensed facilities	16 000
10 per cent of licensed facilities	1600
Average turnover	$300 000
Marginal reduction in turnover	0.001per cent
Time period of action	5 years
Present value cost to industry turnover	$2 350 000

Note: All figures are in present value terms, using a 7 per cent real discount rate, and rounded to the nearest thousand.
Source: CIE.

The cost distribution

The actually distribution of costs (imposed by NChEM for any given affected chemical) is unknown.[25] The figures presented in the previous section provide a

[25] The estimated costs for each representative chemical (that is, point estimate) provide an indication of the range of costs that could arise from an industrial chemical affected by NChEM. The construction of a cost distribution requires marrying each of the five

basis to develop the cost distribution — that is the likely range within compliance, enforcement and administration costs could fall. Essentially, these figures provide estimated points along the unknown distribution of costs; these 'cost points' are indicative. To construct the distribution they are combined with the following assumptions about the targeting regime of chemical risk assessment:

- widely use chemicals in the economy — that is by service-oriented businesses or embedded in consumer products — will account for nearly one-third of all assessed industrial chemicals over the next 20 years (Case Study — pDCB);
- chemicals that exhibit some potential for environmental harm by being persistent, bio accumulative and/or toxic in the long term will be assessed one-third of the time, or 33 per cent (Case Study — SCCPs);
- industrial chemicals used by a particular industry as an input to their production process will occur with less frequency, just under 17 per cent of the time (Case Study — SEtX);
- industrial chemicals with little environmental risks will also be selected with less frequency, accounting for just under 17 per cent of the time (Case Study — Gluteraldehyde); and
- a chemical posing significant, persistent and cumulative environmental risks going unrealised, will be assessed 0.05 per cent of the chemicals that are assessed (Case Study — 'Chemical X').

Using the above probability information and the valuation point estimates, the costs distribution is constructed by bootstrapping (sampling) 20 000 times a set of values, around those point estimates, to form the basis of a fitted cost distribution.

After the sampling exercise, the chart indicates that the mean cost is $1.21 million with a lower and upper bound, respectively, of $530 000 and $1.85 million. These values represent the 90 per cent confidence intervals around the mean. Chart B.6 graphically represents this information within the fitted distribution of the net cost assessment, which is based on the assumptions about the composition of industrial chemicals that are assessed over time.

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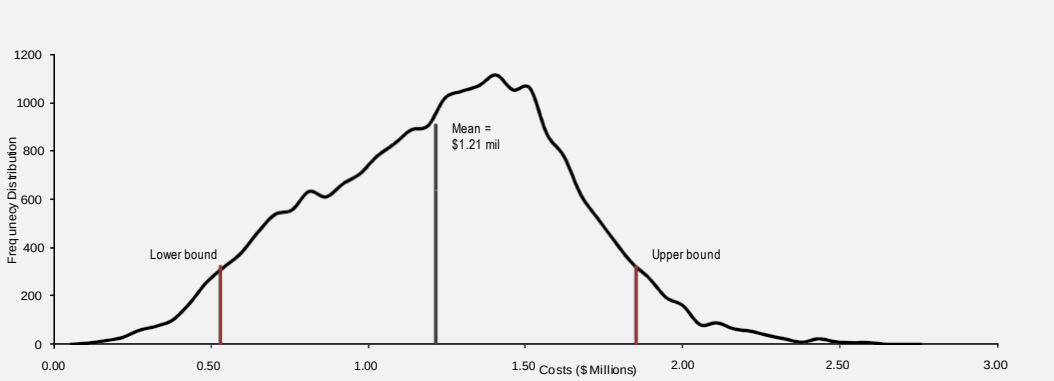
estimated costs with a probability. The probability indicates the likelihood or frequency in which a particular cost could occur.

B.6 Distribution of potential total cost per chemical



[a] Distribution represents the potential value range for a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate. Lower and upper bound represents the 90 per cent confidence interval around the mean.
Data source: CIE.

Initially the magnitude of this result may seem large; however there are two components at work that make up the cost figures. Firstly, the cost valuation is an aggregate figure that represents an average cost a single chemical may impact on both industry and government over at least ten years. Secondly, the overall cost is a nationwide figure. That is, it represents the total costs at a national level. The cost burden on some jurisdictions would be larger (for example, in the more populous states, larger industrial states). On average, the per jurisdiction cost impact could be around $150 000.

The chart indicates that the overall distribution of potential costs has a positive skew; the right hand tail of the graph is long with the mass of the distribution concentrated to the left of the chart. In other words, there are relatively few high cost values with costs 'bunched' around the low value end.

C Modelling the benefits of NChEM

This Appendix details the basis for valuing community/environment benefits of NChEM by providing information and references supporting the estimates. The Appendix closely follows the structure of the main report aligning community benefits to the representative case study chemicals and their associated changes. It discusses how benefits are developed for each representative chemical, combined to construct a benefits distribution and finally aggregated to estimate the total benefits.

What are the benefits?

NChEM is designed to deliver a range of benefits that flow from addressing institutional limitations. In particular, NChEM enables the timely engagement of State and Territory environmental regulators in the NICNAS assessment process. Moreover, it effectively addresses the problems arising from the absence of a national standard setting body or mechanism by for ensuring follow through on the environmental management recommendations that emerge from the assessment process.

Responding to these two limitations enhances the effectiveness of managing the environmental risks posed by industrial chemical use. The involvement of State and Territory environmental regulators is anticipated to improve the identification and nomination of existing chemicals for assessment. It also enhances the flow of information that can underpin not only the hazard and risk assessment of industrial chemicals but improve the feasibility and usefulness of management recommendations to environmental regulators. The material impact of these improvements is the minimisation of environmental damage which delivers benefits to the broader community in the form of healthier environmental assets and reduced risks of adverse human health impacts.

While the quantitative analysis of NChEM's impacts draw mainly on valuing the change in environmental risk, it is important to note that NChEM gives rise to a number of other benefits. These include: more effective leveraging of resources among environmental regulators; better information flows supporting management and regulatory decisions; increased certainty regarding the efficiency and effectiveness of management strategies; improved certainty and consistency for users of industrial chemicals; and greater community confidence in regulatory structures

and approaches. These additional benefits, although potentially substantial, are not captured in this analysis.

Approach to estimating benefits

Ideally, the valuation of benefits is context specific. In other words, the valuation would adopt a multi-step process. Firstly, the direct environmental effects would be characterised and quantified so as to reflect the specific environmental conditions of the site(s) potentially affected by a specific industrial chemical (taking into account the timing of environmental effects eventuating). Secondly, this information would, in turn, be used to identify and quantify the extent to which ecoservices and anthropogenic uses are affected. Lastly, the disruption or loss of ecoservices and human uses are valued reflecting measures of welfare.

This described approach is resource intensive and difficult to undertake (especially given the ex ante nature of this benefit-cost analysis). It requires knowing the specific industrial chemicals that would be affected by NChEM over the study's analytic period.

Given the uncertainty of the specific industrial chemicals that will be affected and the study's resource constraints, the benefits valuation employs a more generic approach. Estimated benefits to the community mainly stem avoided environmental damage (that is, the reduced likelihood of diminished or lost environmental resources) and the subsequent avoided costs of remediating and/or restoring the environmental resource(s) to an acceptable level. The analysis uses estimates of past remediation and restoration efforts to characterise the potential scale and magnitude of benefits flowing from NChEM. Implicit in these values is that the resources devoted to remediation/restoration activities are at least equal to collectively addressing specific impacts (for example, human health, productive uses, amenity values, etc).

The potential directional bias of this approach is unknown but is reasonable as they match the nature of environmental risks captured by some of the representative chemicals.

Estimating benefits of each representative chemical

Table C.1 summarises the key inputs to estimating benefits for each of the representative chemicals.

C.1 Summary of estimated benefits by representative chemical[a]

Environmental tool	Basis of the benefits	No. of representative chemicals	Estimated benefits ($)
			$
Education and information[b]	Not applicable	1	0
Voluntary monitoring & evaluation	Public good use	1	1140
Licence changes	Species restoration	1	4 440 000
Phased in ban	Sediment clean up	1	77 500
Immediate ban	Large scale clean-up & restoration	1	25 800 000
Total[c]		5	30 631 000

[a] All values are reported as present values, based on a ten year time horizon and a real discount rate of 7 per cent. [b] No environmental benefits are modelled since the management action is not anticipated to change the likelihood of environmental assets being exposed to the chemical.[c] May not sum due to rounding.
Source: CIE.

Representative chemical 2 — monitoring and evaluation

A characteristic of representative chemical 2 is that it is toxic to aquatic life. However, its toxicity is acute; the chemical is biodegradable and has few lasting effects. Under NChEM, the QLD, NT, TAS and WA environmental regulators would each cooperatively work with a single minerals processing facility in their respective jurisdictions to monitor and collect information about the chemical.

It is assumed that implementation of the NChEM management recommendation leads to better information about acceptable concentration levels of the chemical in discharges to tailing dams; it does not, however, lead to changes in the chemical being discharged to tailing dams or where the dams are sited. As a result, the probability of an environmental asset being exposed to the chemical is slightly reduced. CIE quantifies the change in the probability of an event based on Salguerio et al (2008), which suggest that the probability of a tailing breach is 0.1 per cent.

The benefit estimate combines the change in the probability of an event with values associated with avoiding disruption to recreational fishing (assuming that a waterway is the most likely environmental assets exposed to the chemical leaching). The analysis values the potential benefits based on a temporary disruption to recreational fishing. The NSW Department of Primary Industries reported that after accounting for capital expenditure, fishermen in the state spent $228 million dollars per annum on their activity. With an estimated 1 million fishermen in NSW, the average fisherman spends $228 per year. Based on this figure, the average monthly spend per fisherman may be calculated at $19 per month.

This is the main figure combined with the following assumptions are used to estimate the benefits of Representative chemical 2:

- any incident would close a waterway for one month while the jurisdiction undertook testing to ensure that the chemical has fully dissipated (that is, the area is deemed safe once again); and
- an incident would occur (in the BAU) only once during the ten year analytic period.

CIE estimates that 2 000 fishermen would be affected with an event occurring once in three of the four affected mining states (WA, TAS and QLD).

Drawing these pieces together, the benefits arising under this scenario is calculated to be $1 140. A summary is provided in Table C.2.

C.2 Representative chemical 2 – benefit estimates

	Estimate
Annual total spend by recreational anglers (NSW)	$228 000 000
Total no. of fishermen (NSW)	1 000 000
Average yearly spend per angler (NSW)	$228
Average monthly spend (NSW)	$19
No. of anglers affected (WA, TAS, QLD)	2000
No. of states affected (WA, TA, QLD)	3
Sub total	$152 000
Probability of an event	0.1 per cent
Present value of total benefits for representative chemical 2[a]	$1140

[a] For simplicity, the analysis assumes that the benefits would occur in year one. This assumption will overstate the benefits.
Source: CIE.

Representative chemical 3 — licensing changes

Representative chemical 3 captures environmental benefits flowing from better management of chemicals that have increased potential to harm given how they interact with other chemicals — much like endocrine disruptors. In constructing benefits, it is assumed that this chemical interacts with other compounds to consequently affect aquatic species on discharge. As such, it would be an example of a medium term incident (a specific example would be the case of endocrine disruptors).[26]

To value the potential benefit of avoiding such an incident, the analysis draws on estimates associated with the restoration of an aquatic species. Specifically, the

[26] Endocrine disruptors interact with other compounds, such as hormones, in STP's by reactivating them. On discharge, these reactivated compounds have the ability to change the sex of aquatic species, affecting their reproductive cycle and effectively making them sterile.

benefits estimate uses a report by Koehn and Rylah (2004) which suggested that the cost associated with re-establishing the Murray cod species in the Goulburn River was estimated at $1.7 million.[27] This figure was used to value the benefit of avoiding such actions as a result of reducing the likelihood of representative chemical 3 entering the environment.

It is assumed, in the absence of recommendations over the ten year time frame of this analysis, at least two incidences of aquatic species remediation would occur. The first would be in ten year's time, with this event forcing scientists to investigate potential effects on other aquatic species. At that point another example of an affected species would be discovered in year 15. [28]

The value was attributed across the three most populous states (NSW, VIC and QLD) that the Murray River flows through, giving a total value of $5.1 million at each event.

Given that any remediation would take place in year ten and year 15, these figures need to be discounted at a rate of 7 per cent. Hence the present value benefit is $4.44 million. A detailed breakdown is presented in Table C.3.

C.3 Representative chemical 3 – benefit estimates

Jurisdiction	Cost (Year 10)	Cost (Year 15)
NSW	$1 700 000	$1 700 000
VIC	$1 700 000	$1 700 000
QLD	$1 700 000	$1 700 000
Sub Total	$5 100 000	$5 100 000
Present value (discounted at 7 per cent)	$2 590 000	$1 849 000

Source: CIE.

Representative chemical 4 — phased-in ban

Representative chemical 4 characterises benefits that arise from chemicals that are persistent, bio accumulative and toxic. As stated previously, although larger metal manufacturers have moved away from using the chemical, a number of smaller manufacturers still use the chemical. Additionally, smaller facilities are less likely to be engaged in trade waste agreements or be required to have an environmental

[27] Application of this estimate is not intended to suggest that the Murray cod, specifically, would be affected. Instead, it is used to characterise the potential magnitude of the resources required to re-establish a particular, highly-valued native species.

[28] Recall that the analytic period considers benefits that flow from 10 years of NChEM's operation. In this example, a lag exists between when an environmental asset is exposed to a chemical and when adverse impacts of that exposure eventuate. Consequently, the time horizon for benefits can extend well beyond 10 years.

licence. The change scenario for this particular chemical suggested that State and Territory environmental regulators would work with existing firms to reduce their use and discharge of the chemical.

The phased out use of representative chemical 4 confers benefits to the community through reducing the likelihood of the chemical harming the environment. To characterise the monetary magnitude of this benefit, the analysis uses the following assumptions.

- The chemical represents a PBT.
- Given that the chemical mostly used in manufacturing activities, a large-scale remediation initiative is avoided in three densely populated capital cities located in large manufacturing jurisdictions (NSW, VIC, and QLD).
- The probability of the event (that is contamination) is 0.05 per cent which is based on a UNEP report (1997).
- This avoided remediation activity is assumed to occur in the future (that is, 20 years out) so as to reflect the lag effect potentially associated with PBTs.
- The avoided monetary outlay by government for the remediation is roughly $20 million per site (loosely based on the NSW Government's contribution to remediation costs at a contaminated site in Homebush Bay, Sydney — see Box C.4 for more detail).

Given these inputs, the present value of benefits from representative chemical 4 is $77 500 (in present value terms using a 7 per cent discount rate). A summary is provided below in Table C.5.

C.4 Australian example — remediation at Homebush Bay, Sydney

Homebush Bay and adjacent land (Rhodes Peninsula) in Sydney, NSW experienced dioxin contamination between 1949 and 1976. The source of the contamination is thought to be primarily from the production of herbicides and other chemicals, as well as the storage of waste materials.

In early 2009, the cost of remediating the contaminated sites of dioxins and heavy metals was estimated to be $140 million. The NSW government along with the private sector are financing this effort. The cost to the NSW government for the remediation is over $20 million.[29]

[29] NSW State of the Environment Report, 2006, Chapt 4 Land - www.environment.nsw.gov.au/ soe/soe2006/chapter4/chp_4.6.htm#4.6.33; with updated costings provided by the NSW Department of Environment and Climate Change (pers. comm. 2009).

C.5 Representative chemical 4 — benefit estimates

	Estimate
Remediation costs per jurisdiction	$20 000 000
Affected jurisdictions	NSW, VIC, QLD
Timing of clean up	20 yrs in the future
Probability of an event	0.5 per cent
Discount rate	7 per cent
Present value	$77 500

Source: CIE.

Representative chemical 5 — immediate ban

The so called 'Chemical X' captures the extreme event of a high cost environmental accident. This representative chemical is used to establish an upper bound to the potential benefits attributed to NChEM that would flow from new management recommendations affecting a single industrial chemical. Similar to representative chemical 4, benefits reflect the avoided resource requirements of a single, extensive, large-scale, remediation and restoration effort.

For this chemical, the avoided remediation costs are estimated to be $100 million dollars. Assuming a 20 year lag and discounted at 7 per cent, the present value is $25.8 million. This estimate is largely based on several examples from both overseas and domestically. Application of this estimate is potentially conservative. For example, the Aznalcollar tailing breach in Spain, cost in excess of €700 million to remediate (Ginige 2002); Botany Bay in Sydney, NSW the clean up of groundwater cost approximately $167 million. (See box C.6 for a description of the Botany Bay example.)

Constructing the benefits distribution

These values provide a basis to develop the benefits distribution. Essentially, what these figures do is provide point estimates in an unknown distribution of overall benefits.

The main assumption underpinning the shape of the distribution is the same as that underpinning the costs of the NChEM arrangements. That is, the distribution includes assumptions about the possible composition of industrial chemicals. As such it assumes that:

- widely used chemicals in the economy - that is by service-oriented businesses or embedded in consumer products — will account for nearly one-third of all assessed industrial chemicals over the next 20 years;

C.6 Australian example — ORICA groundwater contamination

Australia has some experience with large scale clean-ups associated with long-term contamination. For example, Botany Bay in Sydney's southeast experienced groundwater contamination from environmental and waste disposal practices in past decades at a former ICI Australia manufacturing site. The remediation costs associated the clean-up in this area is estimated to be $167 million plus ongoing annual operating costs. Financed entirely by ORICA, this figure includes the cost of investigation, testing and remedial activities.

The Botany groundwater cleanup project is one of a number of Botany Transformation Projects being run by ORICA (who now own the site) to address chemical legacy issues. The main remedial program focuses on containment of significant plumes present in the groundwater via a 'pump and treat' system incorporating an after burner for destruction of extracted chlorinated compounds. The contaminants of concern are no longer manufactured at the site.

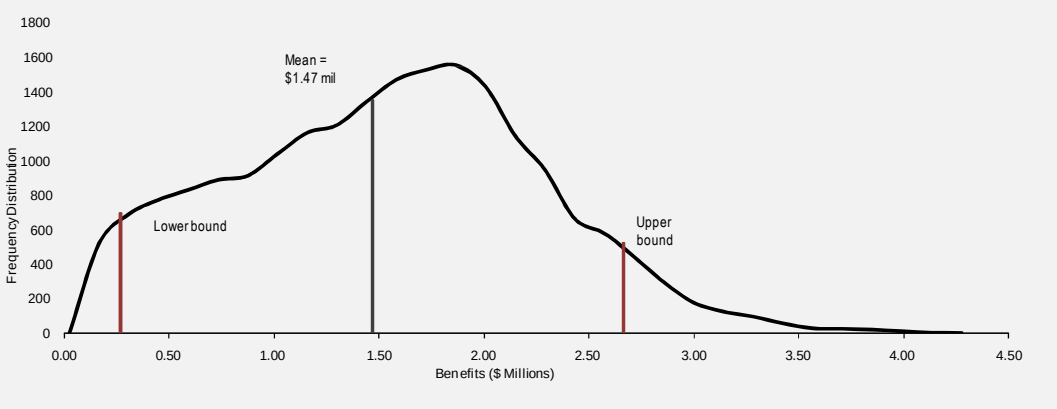
- chemicals that exhibit some potential for environmental harm by being persistent, bio accumulative and/or toxic in the long term will be assessed one-third of the time, or 33 per cent;
- industrial chemicals used by a particular industry as an input to their production process will occur with less frequency, just under 17 per cent of the time;
- industrial chemicals with little environmental risks will also be selected with less frequency, accounting for just under 17 per cent of the time; and
- a chemical posing significant, persistent and cumulative environmental risks going unrealised, will be assessed 0.05 per cent of the chemicals that are assessed.

Importantly, some flexibility in the frequency in which a particular case study feeds into the construction of the benefits distribution is allowed.

Using the above information and the valuation point estimates, the benefits distribution is constructed by bootstrapping (sampling) 20 000 times a set of values, around those point estimates, to form the basis of a fitted distribution. Chart C.7 represents that fitted distribution of the net impact assessment, plus assumptions about the composition of industrial chemicals that are assessed over time.

After the sampling exercise, the chart indicates that the mean benefit is $1.47 million, with a lower and upper bound, respectively, of $269 000 and $2.66 million. These values represent the 90 per cent confidence intervals around the mean.

C.7 Distribution of potential overall benefits



[a] Distribution represents the potential value range for a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate. Lower and upper bounds represent 9 per cent confidence intervals around the mean.

Data source: CIE.

Although the magnitude of this result may initially seem large; some caution in interpreting this figure is required. The distribution of benefits represents the gains to community of a single chemical going through the risk assessment at a national level. That is, the figure is a nationwide value.

Constructing the distribution highlights that benefits would not accrue equally across all the jurisdictions; on average, this figure roughly equates to a per jurisdictional benefit of $185 000.

The chart also indicates that the right hand tail of the distribution is long with the mass of the distribution concentrated to the left of the chart. In other words, there are relatively few high value benefits with a vast majority of the benefits being 'bunched' around the lower value end (but still positive).

D Estimating the net impact and sensitivity analyses

Since NChEM is an on-going process and is likely to assess at least 15 chemicals a year (this may include PECs and any new chemicals that have particular environmental concerns), it is also important to investigate the lifetime net benefits of the arrangements over a longer time period. The net impact, therefore, needs to build up from the individual representative chemicals. This appendix outlines how an aggregate, net impact estimate is developed from the give representative chemicals.

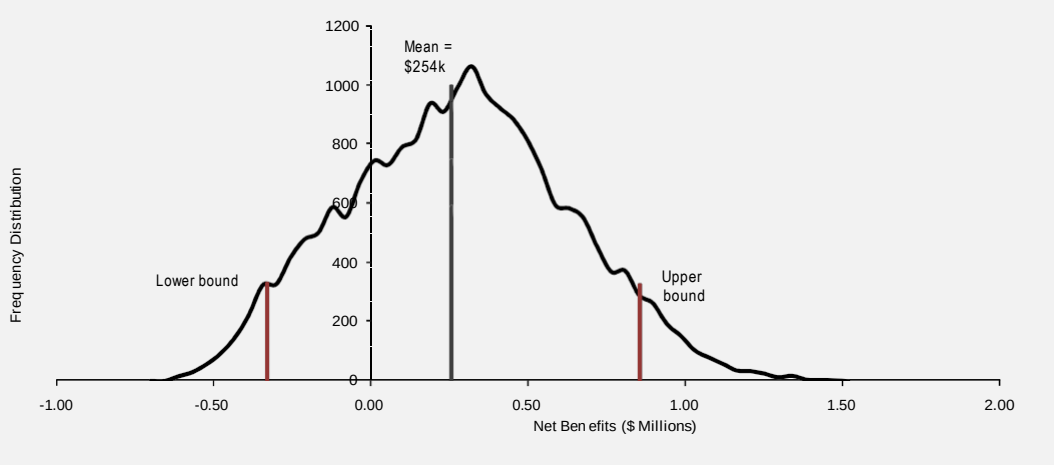
Net impacts of a single chemical in any given year

Several important points should be made about the net impact of NChEM. First, the net impact is described as benefits less costs associated with a policy or program. As such, the net benefit of the NChEM arrangements are constructed from the cost and benefit curves, which are detailed in full in their respective appendices. Second, when the net benefit valuation is constructed, the sampling technique draws from both the distribution of costs and the distribution of benefits with equal probability. Finally, the distribution of net benefits is constructed by sampling from both the cost and the benefits distribution 20 000 times. This technique, known as a Monte Carlo simulation, provides us with the results to be presented below.

The full results are shown in Chart D.1. The results indicate that on average the net benefit of a single chemical going through the NChEM process equates to $254 000. This is a nationwide figure. Similar to the costs and benefits, the net benefits are likely to be apportioned differently across the jurisdictions. However, on average, this equates to a net benefit per jurisdiction of $31 750 per chemical in any given year. The upper and lower bounds represent the 90 per cent confidence intervals.

The graph also indicates that the shape of the curve is a bell shaped centred on the mean result.

D.1 Distribution of net benefits of the NChEM arrangements



[a] Distribution represents the potential value range for a net benefit of a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate. Lower and upper bound represents the 90 per cent confidence interval around the mean.

Data source: CIE.

D.2 Mean net benefit results and confidence intervals

Result	$
Mean	254 000
Upper Bound	853 000
Lower Bound	-330 000

[a] Represents the potential value range for a net benefit of a single industrial chemical. Monetary figures are in present value terms, using a 7 per cent discount rate. Lower and upper bound represents the 90% confidence interval around the mean; all values rounded to the nearest thousand.

Data source: CIE.

Lifetime net impact of NChEM: ten year horizon

The NChEM arrangements are not a one off program, nor does it assess only one chemical annually, therefore it is important to construct a picture of the net impact's magnitude over a period which is reflective of its operational time frame. The analysis does not assume NChEM would last in perpetuity. Following best practice, NChEM will presumably be reviewed at some point in the future. Regulatory frameworks and arrangements are not static, rather they evolve and respond to new conditions.

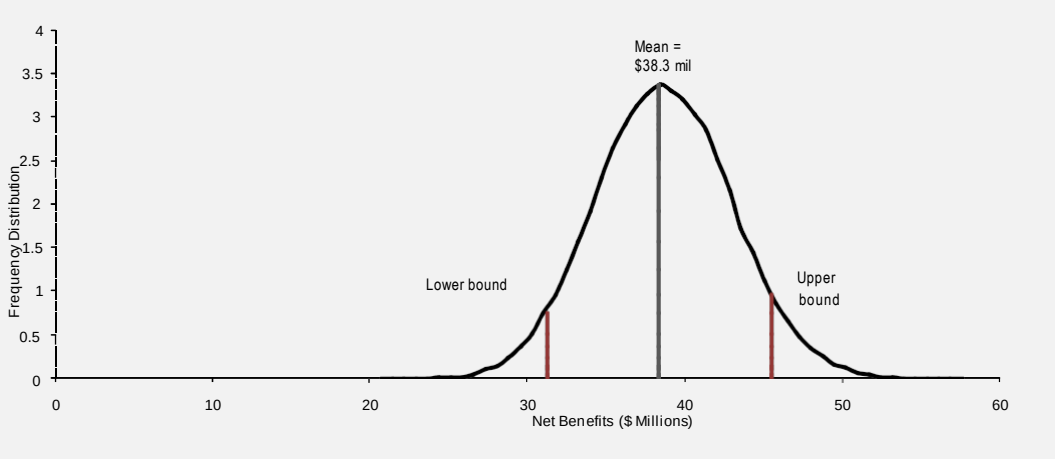
Estimating the lifetime net impact relies on several key assumptions. They are:

- in each year the NChEM process will assess between 15 to 25 chemicals. The actual figure is a random variable that is built into the modelling, but constrained to be within these two values (inclusive);
- the net benefit of each chemical assessed in a given year is drawn from the cost and benefits distribution;

- the total net benefit in a given year is the summation of the net benefit of each of the 15 to 25 chemicals assessed in that same year;
- where applicable, the total net benefit is discounted using a rate of 7 per cent;
- the lifetime net benefits are assessed over a ten year timeframe and are the summation of the total net benefits in each of the 10 years. In other words, it is the summation of the discounted future expected net benefits; and
- finally, the process explained above is conducted 100 000 times to construct the distribution of lifetime net benefits.

The graphical representation of the distribution of lifetime net benefits is presented in Chart D.3.

D.3 Distribution of lifetime net benefits of the NChEM arrangements



[a] Distribution represents the potential value range for lifetime net benefits of the NChEM arrangements; Monetary figures are in present value terms, using a 7 per cent discount rate; Lower and upper bound represents the 90% confidence interval around the mean.

Data source: CIE.

Chart D.4 indicates that the life time net benefits of NChEM are $38.3 million. The upper and lower bounds represent the 90 per cent confidence interval. Although the magnitude of this result may initially seem large; it reflects a number of aspects. The figure represents:

- the net benefits of the program over a ten year time horizon;
- the aggregate net benefit of 20 chemicals a year being assessed for the 10 year period (that is, 200 chemicals on average); and
- a nationwide aggregate.

Sensitivity analysis

As previously mentioned in the main report, a number of uncertainties surround the assumptions that underpin the main analysis. These uncertainties may affect results differently. A way to better understand how cost, benefits and net benefits behave

D.4 Mean lifetime net benefit results and confidence intervals

Result	$
Mean	38 300 000
Upper Bound	45 502 000
Lower Bound	31 244 000

[a] Represents the potential value range for the lifetime net benefits of the NChEM arrangements; Monetary figures are in present value terms, using a 7 per cent discount rate. Lower and upper bound represents the 90% confidence interval around the mean; all values rounded to the nearest thousand.

Data source: CIE.

given changes in critical assumptions, is to conduct sensitivity analyses. In this section several sensitivity analyses are conducted which can be categorised into two areas: discount rate and probability of assessment. Each category is discussed in turn.

Discount rate

The discount rate is one of the fundamental assumptions underpinning the analysis. Discounting plays a significant role in estimating the net impact of NChEM given the sizeable lags between changes in chemical regulation (for example, costs) and the realisation of impacts to environmental assets (for example, benefits). The discount rate is an adjustment that allows benefits and costs in different time periods to be reported in present value terms. It takes into account the opportunity costs resources as well as risk and time preference.

The choice of discount rate can be critical in driving many of the net benefits results presented. This exercise applies several discount rates to obtain a better picture of how cost, benefits and net benefits change. The rates are changes to 3, 5 and 10 per cent representing two discounting rate below and one above our original discount rate of 7 per cent.

The rationales for choosing the above discount rates are described below.

- 5 per cent represents the current return on ten year government bonds. This rate is chosen since it represents a rate of return across a significant time horizon, mimicking the time profile of several costs in the analysis, but it is also generally taken as an indication of the risk free rate of return on an alternative investment.
- 3 per cent represents a discounting rate that simulates a longer time period usually associated with intergenerational effects, and better reflects the discounting of cash flows over much longer time frame. It is used as some of our benefits have 20 year time horizons and therefore may have intergenerational impacts. Since benefits accrue much further in the future it is common practice to discount these at a much lower rate to reflect the fact that the benefit can accrue across multiple generations.

10 per cent provides a discount rate that is above our initial assumption. It represents more aggressive discounting that is associated with investment profiles that have a short term horizon.

The choice of discount rate can affect the results in two ways. Recall from the respective cost and benefit appendices that any costs or benefits that accrue in the future are discounted back to present values. Therefore the choice of the discount rate affects the single chemical case. Additionally, recall above that the valuation of the NChEM arrangements over ten years are the summation of the present value of expect net benefits over that ten year period. Therefore the discount rate impacts on the program valuation too.

The results of these changes are presented in Table D.5. The table presents the results for both the single chemical case and the entire program over a ten year period, since the discount rate affects both.

D.5 Sensitivity Analysis 1: alternative discount rates

	Mean Value ($)	Upper Bound ($)	Lower Bound ($)
3 per cent discounting			
Single Chemical			
Costs	1 456 000	2 289 000	601 000
Benefits	2 318 000	4 211 000	385 000
Net benefit	694 000	1 963 000	-240 000
BCR	1.48	1.91	0.62
Ten year horizon			
Net benefit	149 879 000	168 486 000	131 645 000
Annualised net benefit	17 058 000	19 176 000	14 983 000
5 per cent discounting			
Single Chemical			
Costs	1 331 000	2 048 000	570 000
Benefits	1 840 000	3 333 000	317 000
Net benefit	508 000	1 322 000	-293 000
BCR	1.29	1.69	0.53
Ten year horizon			
Net benefit	82 455 000	94 207 000	70 954 000
Annualised net benefit	10 170 000	11 619 000	8 751 000

(Continued on next page)

D.5 Sensitivity Analysis 1: alternative discount rates (continued)

	Mean Value ($)	Upper Bound ($)	Lower Bound ($)
10 per cent discounting			
Single Chemical			
Costs	1 071 000	1 593 000	511 000
Benefits	1 066 336	1 918 000	203 000
Net benefit	-5 000	376 000	-383 000
BCR	0.94	1.27	0.39
Ten year horizon			
Net benefit	-681 000	3 004 000	-4 731 000
Annualised net benefit	-100 000	444 000	-646 000

Note: The chart represents the potential value range for a single industrial chemical and for the entire program over a ten year time horizon; BCR refers to the Benefit cost ratio representing the dollar benefit of a dollar cost; Monetary figures are in present value terms, using the respective discount rate; Annualised net benefit is the annual return needed to return a 10 year net benefit; All figures have been rounded to the nearest thousand; all over assumptions underpinning the construction of the results remain the same.

Source: CIE.

At this point it is worth noting that in these sensitivity runs, the discount rate is the only assumption that has changed. All other assumptions and sampling techniques outlined previously remain the same.

In general, the results reflect that under more aggressive discounting of costs and benefits, the overall net benefits of the program, both in a single year and over a ten year time horizon, fall. This is primarily driven by the benefits which are more heavily discounted since they are assumed to accrue further in the future where as costs are incurred upfront, and therefore are not discounted as heavily. The BCR of 0.94:1 for 10 per cent discounting provides evidence of this.

Additionally, as the discounting assumption is relaxed and costs and benefits are not as heavily discounted, the net benefits of the program increases. This is true for both the single chemical case and the entire program costs. The reasoning is that benefits, which have a longer time period, are not as heavily discounted as in the previous sensitivity test. This is evidenced by the fact that the BCR's of 1.48:1 and 1.29:1 and for the two discounts rates of 3 and 5 per cent, respectively, are larger than that reported in the main section of the report.

Probability of risk assessment

The other key assumption underpinning the analysis is that of the probability of a chemical being picked for environmental risk assessment. Probabilities were assigned to certain case study chemicals based on stakeholder discussions and external risk assessment reports of those chemicals. To recap those probabilities were:

- widely used chemicals in the economy, that is by service-oriented businesses or embedded in consumer products will account for nearly one-third of all assessed industrial chemicals over the next 20 years (Case Study — pDCB);
- chemicals that exhibit some potential for environmental harm by being persistent, bio accumulative and/or toxic in the long term will be assessed one-third of the time, or 33 per cent (Case Study — SCCPs);
- industrial chemicals used by a particular industry as an input to their production process will occur with less frequency, just under 17 per cent of the time (Case Study — SEtX);
- industrial chemicals with little environmental risks will also be selected with less frequency, accounting for just under 17 per cent of the time (Case Study — Gluteraldehyde); and
- a chemical posing significant, persistent and cumulative environmental risks going unrealised, will be assessed 0.05 per cent of the chemicals that are assessed (Case Study — 'Chemical X').

However, the NChEM process may change focus, targeting different types of chemicals, ones which reflect different characteristics and different cost and benefit structures. As such, a change in focus invariability affects the probability associated with the representative chemicals are selected. In turn, the types of costs and benefits incurred will change. We construct three alternative scenarios that vary the probabilities associated with each representative chemical to glean insight into the sensitivity of the estimated positive net impact of NChEM.

The alternative scenarios are:

- NChEM targets those chemicals that are in wide use and distribution, and which are difficult to regulate except at end points (end point targeting);
- NChEM targets those chemicals which are specific inputs in a production process (production process targeting); and
- NChEM becomes no better at targeting specific chemicals (no better case).

Each will be discussed in turn with detailed results presented in Table D.6.

End point targeting

In the first scenario, NChEM may be concerned about the environmental impact of chemicals that are only effectively regulated at end points, such as STP's. As such, those chemicals that are used widely would be targeted for risk assessment. Those chemicals that exhibit such a characteristic (that is, pDCB and Gluteraldehyde) will be picked up for assessment much more frequently, with those chemicals assumed to be assessed 40 percent of the time. The so called 'Chemical X' is assessed 1 in every 1000 with the remaining split equally amongst the other case study chemicals.

D.6 Sensitivity Analysis 2: alternative probabilities of risk assessment

	Mean Value ($)	Upper Bound ($)	Lower Bound ($)
End point targeting			
Costs	1 232 000	2 090 000	351 000
Benefits	1 735 000	3 107 000	289 000
Net benefit	502 000	1 036 000	-65 000
BCR	1.34	1.52	0.81
Ten year horizon			
Net benefit	75 485 000	84 220 000	66 891 000
Annualised net benefit	10 044 000	11 206 000	8 900 000
Production process targeting			
Costs	669 995	1 102 000	300 000
Benefits	525 000	1 171 000	84 000
Net benefit	-144 000	243 000	-468 000
BCR	0.75	1.35	0.20
Ten year horizon			
Net benefit	-21 727 000	-17 431 000	-26 040 000
Annualised net benefit	-2 891 000	-2 319 000	-3 465 000
No specific targeting			
Costs	951 000	1 588 000	366 000
Benefits	1 131 000	2 179 000	167 000
Net benefit	179 000		
BCR	1.10	1.47	0.42
Ten year horizon			
Net benefit	26 966 000	32 514 000	21 570 000
Annualised net benefit	3 588 000	4 326 000	2 870 000

Note: The chart represents the potential value range for a single industrial chemical and for the entire program over a ten year time horizon; BCR refers to the Benefit Cost Ratio representing the dollar benefit of a dollar cost; Monetary figures are in present value terms, using the respective discount rate; Annualised net benefit is the annual return needed to return a ten year net benefit; All figures have been rounded to the nearest thousand; all over assumptions underpinning the construction of the results remain the same.

Source: CIE.

Production process targeting

The second scenario, NChEM may be concerned about the environmental impacts of industry specific chemicals; chemicals that act as an input in a production process. As such, those chemicals that act as inputs into a specific production process may be targeted for risk assessment. Those chemicals that exhibit that characteristic (that is, SEtX and SCCP's) will be picked up for assessment much more frequently and assumed to be assessed with a probability of 40 per cent. The so called 'Chemical X'

is assessed 1 in every 1000 with the remaining split equally amongst the other case study chemicals.

No specific targeting

The third and final scenario assumes that no specific chemical targeting takes place. Chemicals exhibiting characteristics similar to 'Chemical X' are selected for assessment 1 in every 1000. The remaining probability selection is apportioned equally among the four remaining chemicals, which represents the probability of all chemicals, regardless of characteristics, being picked equally. All other assumptions and sampling techniques outlined in previous sections and appendices remain the same. For a recap on key assumption on costs, benefits and net benefits please consult the relevant appendices.

Table D.6 presents results for the single chemical case and the lifetime net benefits of the program. Both are affected by the changes in this particular assumption since the single chemical case provides the basis for sampling of 20 chemicals in a year.

The results indicate that, in all but one case, the benefits of the arrangements are greater than the costs. Under this scenario where NChEM does not result in better identification of industrial chemicals posing significant environmental threat (that is, 'no specific targeting'), both the costs and the benefits are less that under the initial analysis in the main report. This is expected as the NChEM program would be targeting relatively low cost, low benefit chemicals with a higher probability.

In general, the results reflect that a positive BCR is returned in all but one case, both in a single year and over a ten year time horizon. However in the sensitivity scenario where NChEM focuses on industrial chemicals that are readily identified by their role in production processes (that is, 'production process targeting'), the result is negative. In other words, for every dollar of costs incurred by NChEM recommendations the benefits received are less than a dollar as confirmed by the average BCR of 0.75:1.

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