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Chemical Security: Toxic Chemicals of Security Concern

Decision Regulation Impact Statement

Attorney-General's Department

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Executive summary

Background and problem

PricewaterhouseCoopers Australia (PwC) has been engaged by Attorney-General's Department (AGD) to prepare this Decision Regulatory Impact Statement (RIS) examining the proposed measures to enhance chemical security in relation to 84 toxic chemicals of security concern. These include a variety of industrial and agricultural/veterinary chemicals.

These chemicals are able to be exploited for an attack through a variety of exposure scenarios, including inhalation, ingestion or contact with skin. For example, some of these chemicals can be used in splash attacks, to contaminate the water supply or the air circulation systems of, for example, indoor shopping malls.

Existing controls on these chemicals are often focused on managing the risks posed by chemicals to human health, including occupational health and safety and environmental health. Or, more specifically, the risks posed by the accidental or negligent misuse of chemicals, rather than intentional misuse. Some existing controls do seek to manage security risks but these only cover some of the toxic chemicals of security concern that are the focus of this RIS.

Gaps exist in the capacity of businesses to manage the security risks associated with the legitimate or illegal access to toxic chemicals of security concern. Risk assessments undertaken by AGD identified vulnerabilities in the ability of businesses to deter, prevent and detect the theft and diversion of these chemicals, and to facilitate law enforcement through effective information provision.

There are no known examples of terrorist use of the toxic industrial or agricultural and veterinary (agvet) chemicals in Australia. However, they have been associated with criminal activity including attempted and actual poisonings, murders and suicides. Twenty-three people have been convicted of terrorism offences under the Criminal Code, one of which involved sulphuric acid.

In response to advice from Australian Security Intelligence Organisation (ASIO), and following consultations with State and Territory governments, on 12 September 2014 the Australian Prime Minister, the Hon. Tony Abbott MP, announced an increase to Australia's National Terrorism Public Alert Level from 'Medium' to 'High'. A Public Alert Level of 'High' means that a terrorist attack in Australia is likely. In his statement, the Prime Minister pointed out that this decision was not based on knowledge of a specific attack plan, but rather a body of evidence that points to the increased likelihood of a terrorist attack in Australia.

Terrorist and subversive literature primarily references precursor chemicals to homemade explosives (HME) for malicious attacks, rather than toxic chemicals. For example, several issues of Inspire magazine, published by Al-Qa'ida in the Arabian Peninsula, have included calls for jihadists with scientific backgrounds to assist in the acquisition and dissemination of toxic industrial chemicals.[1]

Furthermore, Jordanian authorities disrupted an Al-Qa'ida affiliated terrorist plot in 2004 that involved dispersing a range of toxic industrial chemicals including cyanide salts, pesticides and sulphuric acid into vehicle borne explosive devices. Although authorities claimed that the attack was unlikely to have succeeded in causing mass casualties, it did reveal an interest by terrorist groups in using toxic industrial chemicals.[2]

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1 Memri- Jihad and Terrorism Threat Monitor (2010), http://www.memrijttm.org/aqap-inspire-magazines-open-source-jihad-section-use-a-pickup-truck-to-mow-down-the-enemies-of-allah-a-random-lunch-hour-shooting-at-a-crowded-washington-dc-restaurant-might-end-up-knocking-out-a-few-government-employees-targeting-such-employees-is-paramo, accessed 4 July 2014.

2 John Vause, Hencry Schuster and David Ensor (2004), Jordan says major al Qaeda plot disrupted', *CNN*, http://edition.cnn.com/2004/WORLD/meast/04/26/jordan.terror/, accessed 4 July 2014.

Options

There are a number of options available to governments in relation to risks associated with toxic chemicals of security concern:

- continuing with the *status quo*
- options to encourage those handling toxic chemicals of security concern to voluntarily adopt measures contained in the National Code of Practice for Chemicals of Security Concern (the Code). These options are summarised below.
- other, less feasible options that are not the focus of this RIS.

Option 1- A targeted awareness campaign

Option 1 would involve governments encouraging the take-up of the proposed security measures by building on Phase One and Phase Two of the Chemicals of Security Concern awareness campaign and launching Phase Three. The purpose of this additional phase would be to inform and educate relevant businesses about 'best practice' approaches to managing the security risks associated with the toxic chemicals. The proposed security measures would form the basis of governments' message about what constitutes 'best practice' in managing security risks.

Option 2: Extending the current Code to the 84 toxic chemicals of security concern

This option would involve adding the further 84 toxic chemicals to the existing voluntary National Code of Practice for Chemicals of Security Concern (the Code), which applies to 11 chemicals that are precursors to home made explosives. Under this option, government would be responsible for developing and maintaining the Code, although the Code would continue to be voluntary and non-binding on industry participants.

Option 3: extending the current Code to the 4 highest risk toxic chemicals of security concern.

While all 84 chemicals involve varying levels of security concern, completed chemical security risk assessments and updated information provided by police and intelligence agencies indicate that four toxic chemicals (sodium cyanide, potassium cyanide, chlorine (gas) and aluminium phosphide) pose a risk that warrants government intervention. This option would therefore involve the extension of the Code to include these four chemicals, as opposed to the full 84.

While this option was not presented in the Consultation RIS (hence the absence of specific feedback from stakeholders), it reflects broad stakeholder concerns about extending the Code to particular chemicals, and a desire to target measures at the highest risk.

Option 3 would also involve leveraging existing training courses offered by by agvet registered training organisations (RTOs). Core material (1-2 A4 pages) developed by government would be distributed to RTOs with a request that they informally integrate basic chemical security messaging into their existing training programs relevant to end-users of aluminium phosphide. Furthemore, a more detailed training package would be provided to businesses that use or handle one of the three toxic industrial high risk chemicals.

Analysis of the *status quo*

By its very nature, maintaining the *status quo* would not result in any additional costs for industry or government. However, it would leave unaddressed the identified vulnerabilities in the capacity of industry to contribute to the management of security risks associated with the legitimate and illegal access of toxic chemicals of security concern. As a consequence, the current risk posed by individuals and groups using toxic chemicals of security concern for terrorist and criminal purposes – as well as associated costs to industry, governments and society should those risks lead to an attack – would remain unchanged.

It is also important to note that:

- terrorism (and mass-casualty violence in general) is seen as a moral wrong in Australia
- due in part to this societal norm, there is a strong community expectation that government will take all reasonable steps to reduce the risk of terrorism.

As the then Commissioner of the Australian Federal Police stated in 2003:

> *The 11 September 2001 attacks, and then more recently and tragically for Australia, the Bali bombings of 12 October 2002, have dramatically altered Government and community expectations in respect of terrorism. There is now a strong government and community expectation to not only monitor terrorist activity, but to disrupt it.*[3]

Persisting with the *status quo* is unlikely to address these societal expectations.

Most submissions to the Consultation RIS favoured some form of action over and above the *status quo* to manage the risks associated with toxic chemicals of security concern. That said, a minority felt that:

- industry already faces extensive regulation and that expanding the Code is an unnecessary red tape burden, since the risks posed by toxic chemicals of security concern are already very low and that security is already being managed in a very robust manner without an expanded Code
- further regulation will not achieve improved safety or security outcomes
- the costs of adopting an extended voluntary Code are disproportionate to the threat posed by toxic chemicals of security concern
- the Code could in future be made mandatory through legislation if uptake is not as great as anticipated.

Analysis of options to encourage voluntary adoption of the National Code of Practice by those handling toxic chemicals of security concern

The benefits from encouraging adoption of the Code by those handling toxic chemicals of security concern are uncertain (even once stakeholder submissions to the Consultation RIS are taken into account). It is not possible to indicate the size of the benefits either quantitatively or qualitatively from reduced harmful incidents associated with criminal use of toxic chemicals. As a result, it is possible that the costs could outweigh the benefits in the case of these options, in which case the *status quo* would be preferred.

That said, respondents to PwC's online survey of industry who use or handle precursor chemicals were asked to what extent they believe that the security measures they have implemented have generated benefits surrounding:

- reduced reputational risk
- reduced stock loss, enhanced inventory management
- enhanced staff quality (through improved screening).

The majority of respondents (60 per cent) believed that the security measures generated at least some benefits, with some indicating that there had been benefits 'to a great extent' Similarly, most respondents who use or handle toxic chemicals of security concern (but who do not use or handle the precursor chemicals and so have not adopted any of the measures to date) expected that the security measures would generate at least some benefits, with some indicating that there would be benefits 'to a great extent'.

Furthermore, during telephone consultations with stakeholders it was noted that all of those consulted that had or would adopt the security measures believed the benefits from doing so – both to their business and to society as a whole – outweighed the cost.

A number of stakeholders questioned whether Option 1, being the targeted awareness campaign (as a standalone option) would be a sustainable or 'long term' approach to managing chemical security risks, and believe it will not change the security risk profile in relation to the 84 chemicals of security concern. Stakeholders generally saw greater value in an awareness campaign if delivered alongside the extension of the Code. According to one stakeholder, it is unlikely that an awareness campaign alone would be sufficient incentive for an organisation to invest in additional controls.

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3 Keelty, Mick (2003), 'Closing the circle: The AFP's capacity to fight terrorism', Platypus Magazine, no. 78, pp.4-10.

This is consistent with the findings from the previous RIS on the National Code of Practice (in relation to precursors to HMEs).

While most stakeholders supported extending the Code (Option 2 and Option 3), a number of stakeholders raised issues with its extension to particular chemicals or nodes/stakeholders:

- Some suggested applying exemptions to particular industry groups/sectors (e.g. laboratories that hold and use small amounts of the 84 chemicals).[4]
- AgForce Queensland suggested that the Code is more applicable to the supply chain nodes of wholesalers and retailers, whereas end-user producers and transport logistics are better served by industry codes and best practice.[5]
- A number of those consulted (particularly in the telephone interviews) suggested that the risks from some of these chemicals are so low that they would not do anything in response to the Code's extension.
- A number of the 84 chemicals are, in effect, no longer in use in Australia.
- Agvet and Chemicals Weapons Convention chemicals are already subject to relatively stringent controls.

As stated above, quantifying the benefits associated with the options is difficult. The key drivers of these benefits – i.e. the volume of toxic chemicals that have been stolen/diverted in Australia, the level of probability that an individual or group will use the chemicals for criminal purposes in Australia and the likely consequences of such use – cannot be reliably identified and calculated on the basis of publicly available information.

Moreover, quantifying the level of risk reduction associated with each of the options is difficult, given that:

- there has not been a successful terrorist attack in Australia using toxic chemicals of security concern and therefore 'reduction' is not possible, and
- it is difficult/impossible to measure the success of deterrent measures.

Due to the difficulties of quantifying risk reduction, we have used break-even analysis to provide a basis on which the benefits of the options can be compared. Break-even analysis is, in the words of Mueller and Stewart, 'a standard procedure for getting around the difficulties of estimating the likelihood and consequences of an undesirable event'.[6]

Responses to our telephone consultations suggest that adopting businesses will tend to spend more in relation to 'Security Awareness' and 'Theft and Diversion Procedures' (the two measures with the highest costs) if the Code applies to the four chemicals versus the 84. This is not surprising, given that the four chemicals are of higher risk. Using existing training and modules serves to decrease the per business benefits required for Option 3 to break even. In effect, it means that the breakeven point is most easily reached if the Code extends to four chemicals as opposed to the 84. Specifically, Option 3 requires fewer terrorist attacks than Options 1 and 2 to be prevented over 2014-23 in order to break-even.

Table 1 provides a summary of the costs and impacts associated with the options.

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4 Universities Australia submission.

5 AgForce Queensland submission.

6 Mueller, J. and Stewart, M.G. (2011), Terror, Security, and Money: Balancing the risks, benefits and costs of homeland security, Oxford University Press, New York. See also: Latourrette, Tom and Henry H. Willis (2007), 'Using Probabilistic Terrorism Risk Modelling For Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative Implemented in the Land Environment', Working Paper, RAND, Santa Monica; and OECD (2008), 'Introductory handbook for undertaking regulatory impact analysis', http://www.oecd.org/dataoecd/48/14/44789472.pdf.

Table 1: Summary of costs associated with each option

	Option 1 Awareness raising on the 84 chemicals	Option 2 Extend National Code of Practice to the 84 chemicals	Option 3 Extend National Code of Practice to 4 chemicals and use existing training
Adoption Costs ($million NPV over 2014-23)	$298.72	$373.40	$90.48
Awareness Costs ($million NPV over 2014-23)	$5.56	$6.94	$2.55
Cost to RTOs ($million NPV over 2014-23)	$0	$0	$0.10
Total Cost ($million NPV over 2014-23)	**$304.27**	**$380.34**	**$93.13**
Number of terrorist attacks the option would need to prevent to breakeven (over 2014-23)	**0.1 – 0.32**	**0.13 – 0.41**	**0.03 – 0.1**
Affected Population	**186,299**	**186,299**	**54,054**

Source: PwC

As shown in Table 1, the cost of Option 3 is much lower than the cost of the other options. Consequently, the number of terrorist attacks required for the option to breakeven is lower. It should be noted that this estimate does not provide an indication of the likely effectiveness of the options (i.e. how many terrorist attacks are expected to be prevented). Rather, it provides a basis on which to determine the reasonableness of whether the costs of the options are likely to be outweighed by their benefits – when the nature and extent of these benefits cannot be reliably estimated or quantified.

In light of the risks assessments, the views of stakeholders, the lower cost/smaller benefits for Option 3 to break even, and the ALARP notion, the preferred option for the purpose of this RIS is Option 3 – extending the Code to the four chemicals identified as posing the highest risk and drawing on existing industry training as much as possible.

Contents

Abbreviations

Abbreviation	Description
AGD	Attorney-General's Department
Agvet	agricultural and veterinary
ALARP	as low as reasonably practical
APVMA	Australian Pesticides and Veterinary Medicines Authority
ASIO	Australian Security Intelligence Organisation
ASNO	Australian Safeguards and Non-Proliferation Office
CAS	Chemical Abstracts Service
COAG	Council of Australian Governments
Code	National Code of Practice for Chemicals of Security Concern
CSCU	Chemical Security Coordination Unit
CSRA	Chemical Security Risk Assessment
CSRAM	Chemical Security Risk Assessment Methodology
CSRAU	Chemical Security Risk Assessment Unit
CWC	Chemical Weapons Convention, which is the abbreviated title of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction.
HME	homemade explosives
IGA	Intergovernmental Agreement on National Arrangements for the Management of Security Risks Associated with Chemicals
NGAG	National Government Advisory Group for chemical security
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NIRG	National Industry Reference Group for chemical security
OBPR	Office of Best Practice Regulation
PwC	PricewaterhouseCoopers
RIS	Regulation Impact Statement
RTO	Registered Training Organisation
TIC	toxic industrial chemical

1 About this regulation impact statement

This Decision RIS examines proposed measures to enhance chemical security in relation to toxic chemicals of security concern.

The regulation impact assessment process (as stipulated by the *Council of Australian Governments (COAG) Best Practice Regulation guidelines (the Guidelines)* for regulatory proposals made by Ministerial Councils and National Standards) involves three key stages:

- The development of a Consultation Regulation Impact Statement – the purpose of this document is 'to canvass the regulatory options under consideration, in order to determine the relative costs and benefits of those options'.
- A public consultation period, where members of the public have an opportunity to comment on the Consultation RIS. The Consultation RIS for Toxic Chemicals of Security Concern was released for public consultation from 16 July 2014 to 27 August 2014.
- The development of a Decision RIS – the purpose of which is to incorporate public feedback and, as a consequence, 'to draw conclusions on whether 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 Decision RIS follows *the Guidelines* for regulatory proposals made by Ministerial Councils and National Standard Setting Bodies. This Decision RIS:

- establishes the problem that governments are seeking to address
- identifies a set of policy options to address the identified problem
- assesses the costs and benefits of these options, and the effectiveness of each option in addressing the problem
- on the basis of the analysis, establishes a preferred option for action.

Furthermore, this Decision RIS canvases both regulatory and non-regulatory approaches, and include a *status quo* or 'no change' option (recognising that not all problems have a cost effective solution through government action).

This Decision RIS is structured as follows:

- **Chapter 2** provides policy context for the 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 RIS
- **Chapter 6** assesses the costs and benefits of each option
- **Chapter 7** outlines the approach to consultation
- **Chapter 8** summaries the anticipated findings
- **Chapter 9** details implementation, monitoring and review options for the preferred option.

2 Background

In December 2002, COAG agreed to a national review of the regulation, reporting and security surrounding the storage, sale and handling of hazardous materials. The aim of the review was to assist counter-terrorism efforts by limiting opportunities for, and enhancing the detection of, the illegal/unauthorised use of hazardous materials. The work of the review was divided into four parts: *ammonium nitrate; radiological sources; harmful biological materials*; and *hazardous chemicals* (chemicals of security concern).

The December 2002 review was driven primarily by the events of 12 October 2002, where Jemaah Islamiah detonated a series of bombs in the tourist district of Kuta on the Indonesian island of Bali. Eighty-eight Australians were among the 202 people killed. These bombings remain the deadliest terrorist attack on Australians.

In 2004 and 2007, COAG considered the outcomes of the review for security sensitive ammonium nitrate, radiological sources and harmful biological materials. In 2008, COAG considered, and agreed to the recommendations of, the *Report on Chemicals of Security Concern* – the fourth and final component of the review. Key amongst the Report's recommendations include:

- a set of six overarching principles to guide the development of strategies to manage chemicals of security concern
- the establishment of a Chemical Security Management Framework
- the development of a methodology to assess the risks of chemicals of security concern
- the prioritised application of this risk assessment methodology to chemicals of security concern that are precursors to homemade explosives (HMEs).

The following sections provide greater detail about the chemicals of security concern, community and government expectations surrounding the management of terrorism risks, and international regulatory developments in relation to chemicals of security concern.

2.1 Chemicals of security concern

As part of the review of hazardous materials, COAG undertook a preliminary assessment of chemicals to identify those that could potentially be accessed by terrorists in the Australian context. This process identified 96 chemicals of security concern. The *Report on Chemicals of Security Concern* recommended that these 96 chemicals be subject to a comprehensive risk assessment process to ensure governments and industry have the required information to identify and implement appropriate capability and control measures to manage risk. The *Report* also recommended that the risk assessments of the 96 chemicals should be prioritised, addressing the highest risk chemicals first.

2.1.1 Precursors to homemade explosives

To formulate an HME, an individual or group requires access to chemicals that are precursors to HMEs. A precursor chemical is an ingredient, which may be used along with other substances in a mixture or reaction, to manufacture a secondary substance (for example, HMEs, synthetic drugs or toxic devices). The Chemical Security Risk Assessment Unit (CSRAU) within AGD conducted risk assessments on the 11 highest risk precursor chemicals to HMEs in 2010. The risk assessments were conducted in accordance with the Chemical Security Risk Assessment Methodology (CSRAM), assessing four components of each chemical, as set out in Figure 1.

Figure 1: Chemical Security Risk Assessment Methodology

Source: AGD

The risk assessments were then used by the Chemical Security Coordination Unit (CSCU) to develop a set of proposed security measures to enhance security in relation to these chemicals. These measures were intended to assist security and law enforcement agencies in preventing terrorist attacks whilst not impeding the legitimate use of chemicals. Section 6.2 provides further detail on the proposed security measures and their intended benefits.

The proposed security measures were then subjected to extensive industry consultation as part of a Regulation Impact Statement (RIS) conducted in 2012.[7] The RIS undertook in-depth analysis of a series of regulatory and non-regulatory options to encourage uptake of the security measures, specifically:

- a targeted awareness campaign
- an industry code or codes
- a government code of practice
- regulation.

The RIS concluded that a government National Code of Practice was the preferred approach. A voluntary government-led National Code of Practice was perceived to be the most feasible to implement and reduced the risk associated with these chemicals whilst not imposing significant costs on businesses. Regulation was not seen as feasible, as the perceived risk was deemed insufficient to justify the high cost to industry.

Following the RIS, the National Code of Practice for Chemicals of Security Concern (the Code) was subsequently released.

7 PwC, *Chemical Security: Precursors to homemade explosives (Decision Regulation Impact Statement)*, Australian Government, 2012. All references to the 'previous RIS' in this document refer to this RIS.

2.1.2 Security sensitive ammonium nitrate

COAG (with the assistance of NGAG) has set out guidelines to address the security risks of security sensitive ammonium nitrate. Currently, regulation over the access to this chemical is inconsistent across the Australian states and territories. Australian governments are currently in the process of developing a uniform regulatory framework at a Commonwealth level, containing strict licencing and reporting requirements for the use of this chemical.[8] Security sensitive ammonium nitrate is outside the scope of this RIS.

2.1.3 Toxic chemicals of security concern

The remaining 84 chemicals of security concern are included because of their toxicity or their potential use in the production of toxic chemicals or devices. Most of the toxic chemicals are available in technically pure form and so can be used without any treatment, with the exception of 20 industrial chemicals that are considered to be precursors to more toxic compounds, thus requiring further manipulation before they can be deployed as a weapon.

The 84 toxic chemicals of security concern comprise 55 *toxic industrial* chemicals (TICs), and 29 *agricultural and veterinary chemicals* (Agvets), with distinct supply chains. For the purposes of this RIS, the 84 chemicals will collectively be referred to as toxic chemicals of security concern. The supply chain for these toxic chemicals has been defined in terms of six nodes, detailed in Table 2.

Table 2: Description of supply chain nodes

Supply chain node	Description
Introducer	The first point in the supply chain. Introducers either import the chemical or manufacture the chemical at a facility in Australia.
Processor	Processors reformulate or repackage the chemical. The chemical and/or reformulated product will then be on-sold to wholesalers, retailers and/or end users.
Wholesaler	Sell primarily to businesses and institutions and do not repackage or reformulate the chemical.
Retailer	Sell primarily to individuals and do not repackage or reformulate the chemical.
End-user	Consume the chemical in their business/industrial/institutional processes. Do not on-sell the chemical or any products that contain the chemical. Does not apply to domestic/home use.
Transport/logistics	Multiple points in the supply chain, includes transport and storage of chemicals.

Source: AGD

Table 3 shows the number of businesses across each node of the Australian supply chain that are estimated to use or handle toxic chemicals of security concern. Most of those using or handling these chemicals are end-users, particularly in various types of farming, pest control and cleaning services. These estimates are significantly higher than those contained in the Consultation RIS. Stakeholder feedback indicated that a variety of end users should be included (such as grain, cattle, and livestock farmers), which increased the number of end users by approximately 120,000.

Many businesses operate across multiple nodes of the supply chain. For example, in the mining industry a chemical business supplier acts as a large manufacturer (Introducer), transports the chemical to the relevant mine site (Transport/Logistics), stores the chemical at a secure storage-

8 Attorney-General's Department.

owned facility (Wholesaler) and uses the chemical to manufacture explosives for blasting purposes (End-user). On the other hand, in the agriculture sector, a large rural chemical supplier imports the chemical (Introducer), transports the chemical (i.e. herbicide) to distributors (Transport/Logistics), reformulates the chemical into smaller package sizes (Processor) and on-sells the chemical across the broader rural network (Wholesaler). To avoid double counting, the population statistics have been reduced for overlap. This is detailed in Appendix A, along with a full breakdown of the assumptions and sources used to generate the population statistics in Table 3.

Table 3: Number of organisations that use or handle any of the 84 toxic chemicals of security concern (adjusted for overlap)

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Introducers	258	242	166	48	96	12	2	2	**826**
Processors	162	151	104	30	60	8	1	1	**516**
Wholesalers	181	150	94	35	57	8	1	3	**529**
Retailers	145	127	96	36	52	12	4	6	**478**
End-users	57,650	39,033	37,832	18,670	20,043	3,794	1,011	1,029	**179,062**
Transport/ Logistics	1,612	1,318	950	346	532	68	24	38	**4,888**
Total	**60,007**	**41,021**	**39,242**	**19,165**	**20,840**	**3,902**	**1,043**	**1,079**	**186,299**

Source: PwC

In terms of the risk associated with particular nodes:

- The risk assessments generally found that the end-user node posed the greatest risk due to the number of businesses involved (end-users represent 96.1 per cent of the population). End-users also tend to be smaller businesses, such as farms, and therefore were found to have fewer mitigating controls than businesses in other nodes, which were generally larger and had more robust security practices in place.
- Several stakeholders, particularly in the end-user node, believed that retailers pose the highest risk due to the relative ease by which members of the general public can purchase many of these goods over the counter. This is further discussed in section 3.3.

2.2 Contextual factors

2.2.1 Expectations and collaboration

As the then Commissioner of the Australian Federal Police stated in 2003:

> *The 11 September 2001 attacks, and then more recently and tragically for Australia, the Bali bombings of 12 October 2002, have dramatically altered Government and community expectations in respect of terrorism. There is now a strong government and community expectation to not only monitor terrorist activity, but to disrupt it.*[9]

More recently. in 2010, the then Deputy Commissioner of National Security, Peter Drennan stated that:

9 Keelty, Mick (2003), 'Closing the circle: The AFP's capacity to fight terrorism', Platypus Magazine, no. 78, pp.4-10.

> *Since 2002, Australian authorities have charged 38 people with terrorism offences. Of those charged, 20 were born in Australia. The threat of a home grown terrorist attack is real, and we need to remain vigilant.*[10]

The Commonwealth and State and Territory governments signed the *Intergovernmental Agreement on Australia's National Arrangements for the Management of Security Risks Associated with Chemicals* (IGA) in October 2008. The objective of the IGA is to establish an effective, coordinated and collaborative national approach to the management of chemical security that seeks to prevent the use of chemicals for terrorist purposes. The policy intent is to assist security and law enforcement agencies in preventing terrorist attacks involving chemicals while not impeding the legitimate use of chemicals.

2.2.2 International arrangements

International regulation of toxic chemicals of security concern tends to focus on protection against negligent and accidental misuse, rather than intentional misuse (although there are incidental security benefits that arise from these measures). This section discusses those controls that are in place relating to intentional misuse of toxic chemicals of security concern.

The United States Government has adopted a targeted regulatory approach, for example by focusing on high-risk chemical facilities. Under its Chemical Facility Anti-Terrorism Standards, the Department of Homeland Security requires all chemical facilities that possess 'chemicals of interest' (of which there are approximately 300) at prescribed threshold levels to prepare a Security Vulnerability Assessment. Those facilities that are subsequently deemed to be high risk are required to develop and implement a Site Security Plan, which includes measures to satisfy the risk-based performance standards outlined in the Chemical Facility Anti-Terrorism Standards.[11]

The United Kingdom has adopted a non-regulatory approach. It generally attempts to improve how legitimate users and handlers of chemicals manage security risks through public awareness campaigns. The National Counter Terrorism Security Office has sought to promote awareness of a variety of chemicals posing security risks, and the circumstances in which users and handlers should be suspicious. It encourages businesses to be aware of their customer and visitor profiles, and to report suspicious activities.[12]

Canada's approach to toxic chemicals from a national security perspective also appears to be generally non-regulatory. The Canadian Emergency Management College is responsible for conducting national training and awareness-raising on the management of dangerous chemical, biological, radiological and nuclear materials. This training includes the identification of and response to potential threats.[13]

INTERPOL seeks to foster cooperation amongst member state governments so as to deter and to disrupt chemical use by terrorist and other criminal organisations.[14] Regarding information and intelligence, INTERPOL undertakes activities such as:

- capacity building through collecting and disseminating information about chemical materials
- analysing the methodology of terrorist groups

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[10] Peter Drennan, Deputy Commissioner of National Security (2010), 'National security: implications for law enforcement' speech, *Australian Federal Police*, April 30, 2010.

[11] Department of Homeland Security, 'Chemical Facility Anti-Terrorism Standards', <http://www.dhs.gov/chemical-facility-anti-terrorism-standards>, accessed 21 May 2014.

[12] National Counter Terrorism Security Office (2014), 'Hazardous Materials', <http://www.nactso.gov.uk/hazardous-materials>, accessed 21 May 2014.

[13] Department of Prime Minister and Cabinet (2008), 'Report on the Control of Chemicals of Security Concern'.

[14] Interpol (2014), 'Chemical and Explosives Terrorism', <http://www.interpol.int/Crime-areas/Terrorism/CBRNE/Chemical-and-explosives-terrorism>, accessed 28 May 2014.

- identifying potential threats
- producing the INTERPOL Chemical, Biological, Radiological, Nuclear and Explosives Digest
- producing analytical reports for member state governments.

Such activities take place considering a range of chemicals, including toxic industrial chemicals.[15] INTERPOL manages education and awareness programs targeted at government authorities, as well as the chemicals industry. Such programs concern domestic chemical security, and also prevention measures regarding illegal transport of chemicals (including industrial chemicals).

The box below provides some examples of particular controls applying to certain chemicals. As was discussed above, these have a focus on accidental misuse and the associated impact on human health and the environment.

In the United Kingdom, the handling and storage of chlorine is subject to a number of regulations. The Health and Safety at Work Act 1974 requires that employers be responsible for the safety and welfare of employees, as much as is reasonably practicable.[16] Employers must also, as far as is reasonable, ensure that persons besides employees are not exposed to health and safety risks.[17]

The UK's Control of Major Accident Hazards Regulations 1999 requires that notice be given by a site operator to the Health and Safety Executive and Environment Agency (or the Scottish Environment Protection Agency, in Scotland) when construction work commences involving prescribed chemicals, including chlorine, above the prescribed quantity. [18]

Under the UK's Planning (Hazardous Substances) Regulations 1992, chlorine is a prescribed toxic substance in quantities of ten tonnes or above.[19] Consent must be given by a local hazardous substance authority for prescribed toxic substances to be stored on a property.[20]

The storage and handling of cyanide is governed by (amongst other things) a voluntary code, the International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold (Cyanide Code). This was developed under guidance from the United Nations Environmental Program and what was then the International Council on Metals and the Environment.[21] Adoption of the Cyanide Code is not a substitute for existing regulations. Major companies that produce and transport cyanide, as well as gold mining companies, are signatories to the Cyanide Code.[22] The Code is managed by the International Cyanide Management Institute, based in Washington DC.[23]

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15 Ibid

16 *Health and Safety at Work Act 1974* (UK), s 2.

17 *Health and Safety at Work Act 1974* (UK), s 3.

18 *Control of Major Accident Hazards Regulations 1999* (UK), s 6.

19 *Planning (Hazardous Substances) Regulations 1992* (UK), schedule 1.

20 *Planning (Hazardous Substances) Regulations 1992* (UK), s 5.

21 International Cyanide Management Code for the Gold Mining Industry, <cyanidecode.org> accessed 8 September 2014.

22 International Cyanide Management Code for the Gold Mining Industry, 'Directory of Signatory Companies' <http://www.cyanidecode.org/signatory-companies/directory-of-signatory-companies> accessed 8 September 2014.

23 International Cyanide Management Code for the Gold Mining Industry, 'About the Cyanide Code', <http://www.cyanidecode.org/about-cyanide-code/faq> accessed 8 September 2014.

The Cyanide Code outlines standards of practice in the following areas: production, transportation, handling and storage, operations, decommissioning, worker safety, emergency responses, training and stakeholder dialogue.[24]

Requirements include developing emergency response plans with site personnel and stakeholders, and periodically reviewing emergency response plans. Clear lines of responsibility for security and emergencies must be established across producers, distributors and transporters.[25]

Although the Cyanide Code is voluntary, it has influenced the development of regulations regarding how cyanide is transported and stored. The influence of the Cyanide Code is especially felt in the EU. Recommendations from the Cyanide Code have been incorporated into directives and regulations, particularly in the areas of trade, transport, packaging and labelling, as well as health and safety. [26] The Mining Waste Directive provides a framework for the management of chemical waste, including cyanide. [27] Rules regarding the storage and transport of cyanide have been principally developed for the purpose of protecting public health and safety, and preventing environmental degradation.[28]

Regarding aluminium phosphide, the Health and Safety Executive in the UK provides guidelines for safe storage and transport, as well as responding to emergencies.[29]

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24 International Cyanide Management Code for the Gold Mining Industry, 'The Cyanide Code', <http://www.cyanidecode.org/about-cyanide-code/cyanide-code> accessed 8 September 2014.

25 Ibid.

26 Bio Intelligence Service, 'Impacts of Gold Extraction in the EU', April 2010, <http://ec.europa.eu/environment/waste/mining/pdf/IH_2010-001.pdf> p 10-11, accessed 9 September 2014.

27 Directive 2006/21 of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries.

28 European Commission, 'Management of waste from extractive industries', <http://europa.eu/legislation_summaries/environment/waste_management/l28134_en.htm> accessed 9 September 2014.

29 Health and Safety Executive (UK), 'Gassing of rabbits and vertebrate pests', <http://www.hse.gov.uk/pubns/ais22.pdf> accessed 9 September 2014.

3 Statement of the problem

In order to make a case for government action, a Decision RIS must first establish the problem to be addressed. This problem forms the basis for further analysis in the Decision RIS – the objective for government action and policy options should align closely with the description of the problem set out in this chapter.

In accordance with *the Guidelines*, this chapter:

- presents evidence on the magnitude (scale and scope) of the problem
- documents existing regulation at all levels of government and demonstrates why this regulation is not effectively addressing the problem
- identifies the relevant risks and explains why it may be appropriate for governments to act to reduce them
- presents a clear case for considering that additional government action may be warranted, taking account of existing regulation and any risk issues.[30]

3.1 Problem summary

Available evidence suggests that individuals and groups have an ongoing interest in using toxic chemicals of security concern for criminal purposes – particularly terrorism and organised crime. Many of these chemicals are widely available, either through legitimate purchase or illegal access (e.g. theft), and can be obtained in sufficient concentrations and volumes sufficient for a terrorist attack. Examples throughout this chapter further illustrate the problem, particularly the ease with which terrorists or criminals could legitimately access toxic chemicals of security concern under the *status quo*.

This Decision RIS has identified key gaps in how the security risks associated with the legitimate or illegal access to toxic chemicals of security concern are currently managed:

- Existing controls are generally focused on managing the risks posed by chemicals to human health and environmental health. Or, more specifically, the risks posed by the accidental or negligent misuse of chemicals, rather than intentional misuse.
- Some controls do seek to manage security risks but these only cover some of the toxic chemicals of security concern that are the focus of this RIS:
  - 17 of the chemicals are subject to the Chemical Weapons Convention, which imposes controls on production facilities as well as importers and exporters of the chemicals, but not the entire supply chain for those chemicals.
  - The National Code of Practice for Chemicals of Security Concern sets out voluntary security measures in relation to the 11 highest risk precursor chemicals to HMEs – some organisations that implement the Code may also handle toxic chemicals of security concern and potentially implement security measures that effectively cover toxic chemicals as well.
- Gaps exist in the capacity of businesses to manage the security risks associated with the legitimate or illegal access to toxic chemicals of security concern. Risk assessments undertaken by AGD identified vulnerabilities in the ability of businesses to deter, prevent and detect the theft and diversion of these chemicals, and to facilitate law enforcement through effective information provision.

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[30] COAG (2007), *Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies*, Canberra. RISs developed under the COAG guidelines are reviewed by the Office of Best Practice Regulation (see http://www.obpr.gov.au).

There is therefore a *prima facie* case for governments to intervene to address gaps in industry capacity, based on the market failure of imperfect information. More specifically, businesses lack sufficient information to make fully informed decisions about the security risks associated with toxic chemicals of security concern.

The proposed security measures have been designed to address gaps in industry capacity to contribute to the objective of minimising, as low as reasonably practicable, the incidence and associated impacts of terrorist attacks using toxic chemicals of security concern that threaten the health and safety of the Australian public.

3.2 Chemicals of security concern – ongoing interest and potential costs

The chemical industry in Australia is extensive. There are an estimated 40,000 chemicals approved for use in Australia, which are formulated into over 400,000 trademarked products.[31]

Some chemicals that have a wide range of legitimate and productive uses in Australia can also be misused to threaten the health and safety of the Australian public. Such misuse can be accidental or the result of negligence. For instance, poorly labelled containers could lead employees to use a different chemical (or the same chemical at a different concentration) in a particular application, causing an unintended and harmful reaction. Australia's system of occupational health and safety, public health and transport safety regulation is designed, in part, to prevent and mitigate the consequences of accidental and negligent misuse of chemicals.

The misuse of chemicals can also be intentional. Possible forms of intentional misuse can include the formulation of illicit synthetic drugs, HMEs, poisons and other toxic weapons.

In the wake of the 2002 Bali bombings, Australian governments have been concerned about the risks posed by individuals and groups using chemicals of security concern for use in terrorist attacks.

3.2.1 Terrorism[32]

The threat to Australia from terrorism remains real. In particular, the Australian Government is deeply concerned about Australians involved in Syria and Iraq and the domestic ramifications. Recent Operations Boulton, Appleby and Hohensalzburg ,as well as the attack on police officers in Victoria on 23 September 2014, serve as a sober reminder of the challenges facing Australia in this space.

For this reason, the Government announced it is providing a further $630 million over the next four years to give Australia's security agencies the resources, technical skills and legislative powers they need to combat home grown terrorism and to prevent Australians committing terrorist acts abroad.

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31 COAG (2008), *Report on the Control of Chemicals of Security Concern*, Canberra.

32 It is difficult to paint a comprehensive picture of the extent to which individuals and groups are seeking to use toxic chemicals of security concern for criminal purposes. Public information on this topic is limited, due to:

- The clandestine nature of criminal activity – individuals or groups with an interest in using toxic chemicals of security concern for criminal purposes (whether terrorism or otherwise) generally do not advertise this interest or those instances where they have been successful in securing access to the necessary precursor chemicals.
- Intelligence constraints – Australia's various law enforcement and intelligence agencies have greater awareness of individuals and groups that may be seeking to use toxic chemicals of security concern for criminal purposes. These agencies are constrained, however, from publicly detailing the extent of their awareness, as doing so could compromise ongoing and future intelligence arrangements.

Given these constraints, this Decision RIS is unable to rely on empirical evidence to determine the extent to which individuals and groups have an interest in using toxic chemicals of security concern for criminal purposes. As an alternative, this Decision RIS draws on a range of anecdotal evidence –from government documents and the academic literature – and a number of recent court cases to highlight trends in historic and likely future use.

These new measures will:

- increase intelligence collection and assessment to better understand the onshore and offshore threat
- enhance border protection measures to prevent terrorists leaving Australia and identify those wanting to return
- improve the technical capabilities of our agencies,
- provide adequate resources to engage those at risk of radicalisation.

Since the Bali bombings in 2000, terrorist attacks have claimed the lives of 111 Australians.[33] While all of these attacks occurred overseas, there has been significant terrorist-related activity in Australia. Twenty three people have been convicted of terrorism offences under Australia's the Criminal Code (one of which involved sulphuric acid) and 40 Australian passports were cancelled due to terrorism related offences in 2013-14.

Recently, a Victorian man who attacked two police officials was alleged to have been following orders from the international terror group Islamic State. Police believe the plan was to 'behead the officers, cover the bodies in the [Islamic State] flag and then take photos to post via internet'[34]

In an interview with the ABC on 9 September 2014, the then Director-General of Security, David Irvine, stated:

> *I certainly believe that terrorism is continuing to be a serious problem affecting many parts of the world, including countries of the West. There are terrorist attacks taking place in many parts of the Middle East, in Africa, in parts of Asia and we are certainly aware of people wanting to conduct terrorist attacks in the West and in Australia.*[35]

Director-General Irvine went on to say:

> *Here in Australia we've been, I think, very lucky in that we have avoided an attack on Australian soil - although, of course, we have lost over 100 Australians killed in terrorist incidents overseas. But we've also had to stop terrorist attacks occurring here in Australia, which we've done. And we are now, I think, having gone through a period where the threat has actually been building here in Australia over the last, certainly over the last year or so and I'm actually a lot more concerned.*[36]

In response to advice from ASIO, and following consultations with state and territory governments, on 12 September 2014 the Australian Prime Minister, the Hon. Tony Abbott MP, announced an increase to Australia's National Terrorism Public Alert Level from 'Medium' to 'High'. In outlining advice from security and intelligence agencies that led to the increase to the threat level, the Prime Minister stated:

> *The advice is not based on knowledge of a specific attack plan but rather a body of evidence that points to the increased likelihood of a terrorist attack in Australia. Security and intelligence agencies are concerned about the increasing number of Australians working with, connected to, or inspired by terrorist groups such as ISIL, Jabhat al-Nusrah, and al-Qaeda. The threat they pose has been increasing for more than a year. The first priority of the*

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33 Australian Government (2010), Counter-Terrorism White Paper: Securing Australia, protecting our community, Department of the Prime Minister and Cabinet, Canberra. Based on 2010 data. However, Australian casualties from terrorist attacks since have been very few.

34 The Age, 'Melbourne terror shooting: Numan Haider 'planned to behead Victoria Police officers, drape bodies in IS flag', < http://www.theage.com.au/victoria/melbourne-terror-shooting-numan-haider-planned-to-behead-victoria-police-officers-drape-bodies-in-is-flag-20140924-10lb4i.html>, September 24, 2014.

35 http://www.abc.net.au/7.30/content/2014/s4084420.htm

36 Ibid

> *Government is to ensure the safety and security of its citizens. Raising the alert level to High is designed to increase vigilance and raise awareness in the community.*[37]

A Public Alert Level of 'High' means that a terrorist attack in Australia is likely. Under the previous 'Medium' Alert Level, it was considered that an attack could happen. In announcing the elevation of the Alert Level, Prime Minister Abbott noted:

> *Raising the alert level to High is designed to increase vigilance and raise awareness in the community. While it is important the public are aware of the increased threat, Australians should continue to go about their lives. Strong arrangements are in place to detect, prevent and respond to terrorism.*[38]

The Prime Minister's comments highlight the important contribution that industry and the community can make in assisting the authorities to deter, detect and prevent terrorist attacks. Businesses that have regular access to chemicals are in a unique position to identify and report suspicious behaviour involving chemicals.

This RIS concludes that government intervention is required to ensure that businesses are better equipped to manage security risks associated with chemicals and to facilitate timely reporting of suspicious incidents to the authorities (refer section 3.3.5 for further discussion).

It is important to note that the deliberate use of toxic chemicals of security concern for criminal activity is not limited to terrorism. Individuals or groups may have an interest in using toxic chemicals of security concern to cause damage, but not necessarily for politically motivated purposes. Rather, they may be driven by the pursuit of monetary gain, or a host of emotional and/or psychological factors.

Examples of terrorist attacks or intent

Recent examples involving toxic chemicals of security concern include:

- Over the recent decades there have been a small number of incidents involving the terrorist use of both ammonia gas and aqueous ammonia. The Revolutionary Armed Forces of Colombia and Chechen rebels are thought to have used ammonia in gas attacks against military and police targets.[39]
- There is a significant amount of reporting on the use of corrosive materials (hydrochloric acid) in splash attacks. Most of these attacks have been carried out for malicious reasons, and in recent years there have been a number of incidents that are of concern. In the majority of cases the actual corrosive material used has not been identified however hydrochloric or muriatic acid has occasionally been mentioned.[40]
- Sulphuric or battery acid (30% v/v sulphuric acid) has been mentioned in a number of incidents involving malicious splash attacks. In 2010, an incident occurred in Switzerland in which several parcels containing concentrated sulphuric acid were sent to a number of bankers and a number of people were injured on opening the parcel.[41] In 2008, in Afghanistan there was a corrosive

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37 http://www.pm.gov.au/media/2014-09-12/national-terrorism-public-alert-level-raised-high

38 http://www.pm.gov.au/media/2014-09-12/national-terrorism-public-alert-level-raised-high

39 For example, Hydrocarbons Colombia (2012), 'Offensive continues against the FARC in Catatumbo' <http://www.hydrocarbonscolombia.com/security-1/offensive-continues-against-the-farc-in-the-catatumbo> accessed 20 May 2014; Makarovsky, Igor, Markel, Gal, Dushnitsky, Tsvika and Arik Eisenkraft (2008), 'Toxic Chemical Compounds', Israel Medical Association Journal, 10: 537 – 543, 537.

40 For example, BBC News (2010), 'Hong Kong acid attack leads to arrest' <http://news.bbc.co.uk/2/hi/asia-pacific/8450440.stm> accessed 20 May 2014.

41 Expatica.com (2010), 'Swiss bankers alarmed as "acid" parcels cause injuries' <http://www.expatica.com/ch/news/swiss-news/swiss-bankers-alarmed-as-acid--parcels-cause-injuries_92262.html> accessed 20 May 2014.

splash attack on school girls in the city of Kandahar. Battery acid was used in a spraying device resulting in injury to 11 students and four teachers.[42]

- There is continuing terrorist interest in the use of cyanide as a weapon. This was recently reiterated in a May 2009 media article about a USA based Al-Qa'ida terrorist who was researching, amongst other toxic agents, the use of various cyanide compounds for malicious use.[43] Phosgene was used extensively during World War I as a choking (pulmonary) agent or lung-damaging agent.[44] Phosgene is mentioned widely in a variety of terrorist and anarchist manuals. Phosgene was allegedly maliciously used by Aum Shinrikyo in an assassination attempt against a Japanese reporter in 1994.[45]

While some of the examples given above (e.g. splash attacks) may only directly affect a small number of people, it is important to acknowledge the potential for larger groups of people to be affected, for example some of the chemicals could be used to contaminate the water supply, or affect the air distributed in an indoor shopping centre.

One of the most notorious cases involving toxic chemicals of security concern is the 1978 Jonestown mass suicide in Guyana. This event saw more than 900 people killed in an event termed 'revolutionary suicide' commanded by a religious cult leader, Jim Jones, who poisoned grape flavoured Flavour-Aid with several toxic chemicals including potassium cyanide. It was said to have taken each person several minutes to die.[46] The potassium cyanide had been stockpiled by Jones in the Jonestown camp since 1976, prior to the arrival of most of his followers, suggesting that the event was plotted much earlier.[47]

Criminal activity using toxic chemicals of security concern in Australia

There have been no known examples of terrorist use of the toxic industrial or agvet chemicals in Australia, however, they have been associated with criminal activity including attempted and actual poisonings, murder and suicides. Some examples involving the toxic chemicals are as follows:

- Four women were charged with murder in the late 1940s and early 1950s in NSW for intentionally poisoning the food of their victims with thallium sulphate. The most notorious of these cases involved a woman who administered the poison in baked goods or cups of tea and served it to members of her family.
- In 2000, a Queensland man was charged with contaminating headache tablets with strychnine, causing four people to be poisoned, including his wife.[48]
- A teenage girl was charged with poisoning three people in Queensland in 2010 by adding methomyl to the food of her victims.[49] Methomyl is an insecticide used to control insects on

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42 Dexter Filkins (2009), 'Afghan Girls, Scarred by Acid, Defy Terror, Embracing School' *New York Times* <http://www.nytimes.com/2009/01/14/world/asia/14kandahar.html?pagewanted=all&_r=0> accessed 20 May 2014.

43 Pamela Hess (2009), 'Al-Qaida Used Hotmail, Public Phones In Planning', *The World Post*, http://www.huffingtonpost.com/2009/05/01/alqaida-used-hotmail-publ_n_194953.html, accessed 27 May 2014.

44 Center for Disease Control and Prevention (2013), 'Facts About Phosgene' <http://www.bt.cdc.gov/agent/phosgene/basics/facts.asp> accessed 20 May 2014.

45 Julian Ryall (2005), 'Japan: Dissent threatens sect's return' *Al-Jazeera* <http://www.aljazeera.com/archive/2005/11/200849152028676769.html> accessed 20 May 2014.

46 Steel, Fiona, 'Jonestown Massacre: A 'Reason' to Die', Crime Library, http://www.crimelibrary.com/notorious_murders/mass/jonestown/index_1.html, accessed 4 July 2014

47 Polk, Jim (2008), 'Jones plotted cyanide deaths years before Jonestown', *CNN*, http://edition.cnn.com/2008/US/11/12/jonestown.cyanide/index.html?iref=24hours, accessed 4 July 2014.

48 Townsend, Ian (2000), 'Man charged over paracetamol extortion case', *ABC*, <http://www.abc.net.au/pm/stories/s225830.htm>, accessed 3 July 2014.

49 'Girl allegedly poisons parents with insecticide', *Campus Daily*, http://www.campusdaily.com.au/read_university_news.php?title=girl_allegedly_poisons_parents_with_insecticide_6021.

crops, and can cause blurred vision, nausea, muscle tremors and decreased pulse if ingested by humans.

- In October 2012, a man was assaulted at the University of New South Wales by another man who threw sulphuric acid in his face. The victim suffered severe burns and was induced into a coma.[50]

Terrorist and subversive literature primarily references precursor chemicals to HMEs for malicious attacks rather than toxic chemicals. For example, several issues of Inspire magazine, published by Al-Qa'ida in the Arabian Peninsula, have included calls for jihadists with scientific backgrounds to assist in the acquisition and dissemination of toxic industrial chemicals.[51]

Furthermore, Jordanian authorities disrupted an Al-Qa'ida affiliated terrorist plot in 2004 that involved dispersing a range of toxic industrial chemicals including cyanide salts, pesticides and sulphuric acid into vehicle borne explosive devices. Although authorities claimed that the attack was unlikely to have succeeded in causing mass casualties, it did reveal an interest by terrorist groups in using toxic industrial chemicals.[52]

Terrorism intent to attack Australians more generally can also be evidenced through the Operation Pendennis investigation, from which five men were found guilty of 'conspiracy to do acts in preparation for a terrorist act or acts'. [53] Evidence collected from the investigation revealed that two of the men were involved in the order and collection of various chemicals with the intention of creating large scale explosive devices. In particular, the group had intended to use several of the precursor chemicals, including security sensitive ammonium nitrate and hydrogen peroxide, as well as sulphuric acid, which is one of the toxic chemicals of security concern.[54]

3.2.2 The costs of an attack using chemicals of security concern

The consequences of a terrorist attack using chemicals of security concern are likely to be substantial particularly given the trend toward the increased lethality of terrorist incidents.[55] Such an event would have both direct and indirect costs. The former involves the 'immediate losses associated with a terrorist attack' and may include 'damaged goods, the value of lives lost, the costs associated with injuries (including lost wages), destroyed structures, damaged infrastructure and reduced short-term commerce'.[56] In addition to these economic costs, the use of chemicals of security concern in a terrorist attack is likely to have direct social costs, in terms of heightened anxiety, 'grief and mourning', and reduced life satisfaction.[57]

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50 Gardiner, Stephanie (2012), 'Sulphuric acid thrown in student's face in University of New South Wales lab fight: police, *Sydney Morning Herald*, <http://www.smh.com.au/nsw/sulphuric-acid-thrown-in-students-face-in-university-of-new-south-wales-lab-fight-police-20121012-27ggi.html>, accessed 3 July 2014.

51 Memri- Jihad and Terrorism Threat Monitor (2010), http://www.memrijttm.org/aqap-inspire-magazines-open-source-jihad-section-use-a-pickup-truck-to-mow-down-the-enemies-of-allah-a-random-lunch-hour-shooting-at-a-crowded-washington-dc-restaurant-might-end-up-knocking-out-a-few-government-employees-targeting-such-employees-is-paramo, accessed 4 July 2014.

52 John Vause, Hencry Schuster and David Ensor (2004), Jordan says major al Qaeda plot disrupted', *CNN*, http://edition.cnn.com/2004/WORLD/meast/04/26/jordan.terror/, accessed 4 July 2014.

53 Regina (Cth) v Elomar & Ors [2010] NSWSC 10.

54 Ibid

55 A number of statistical studies have observed that, over the past two decades, 'the casualty rate of individual terrorist attacks has increased.' See: Hoffman, Bruce (1999), 'Terrorism trends and prospects', in Ian O. Lesser, et al. (eds), Countering the New Terrorism, Rand Corporation, Santa Monica; and Piazza, James A. (2009), 'Is Islamist terrorism more dangerous?: An empirical study of group ideology, organization, and goal structure', Terrorism and Political Violence, 21(1):62-88.

56 Sandler, Todd and Walter Enders (2008), 'Economic consequences of terrorism in developed and developing countries: An overview', in Terrorism, Economic Development and Openness, eds. Phillip Keefer and Norman Loayza, Cambridge University Press, Cambridge, pp.17-47.

57 Frey, Bruno S., Simon Luechinger and Alois Stutzer (2009), 'The life satisfaction approach to valuing public goods: The case of terrorism', Public Choice, 138(317-45).

The indirect costs of a terrorist attack using chemicals of security concern generally concern 'attack-related subsequent losses, such as raised insurance premiums, increased security costs, greater compensation to those at high-risk locations, and costs tied to attack-induced long-run changes in commerce'.[58] The last of these could take the form of reductions in tourism spending, retail spending and business investment (particularly foreign direct investment).

Estimating the value of costs likely to be associated with a terrorist attack using chemicals of security concern in Australia is difficult, as the damage caused and the nature of the target are highly variable. Academic literature provides some guidance, in the form of estimates of the costs of historic terrorist attacks. One such estimate is discussed in greater detail in Chapter 6.

3.3 Accessing toxic chemicals of security concern

Chemicals of security concern can be legitimately purchased from relevant nodes in the supply chain at concentrations and volumes that, in many cases, are sufficient to kill and injure a large number of people. Legitimate purchase does depend to some degree on the type of chemical. For example, hydrochloric acid can be purchased in a highly concentrated state from hardware stores in volumes ranging from 500mL to 20L. Similarly, methiocarb can be purchased from garden centres as snail/slug repellent bait as well as a bird and snail/slug spray.

Detecting the licit purchase of these toxic chemicals of security concern where the purchaser has malicious intent is difficult, as there is often little or no difference between the physical act of licit purchase with criminal intent and licit purchase with innocent intent. Furthermore, since the amount of chemical required for illicit purposes may be small, the licit purchase of such chemicals with criminal intent will not necessarily stand out amongst innocent purchases.

Toxic chemicals of security concern can also be illegitimately obtained from various nodes in the existing supply chain – e.g. through theft, providing false information to the seller, or through infiltrating a supply node and taking advantage to facilitate the supply or theft of chemicals. However, licit purchase is likely to be an easier means of accessing toxic chemicals of security concern for criminal purposes.

While there are a number of options for individuals and groups to access toxic chemicals of security concern (either legitimately or illegitimately), obtaining such chemicals is not a risk-free activity. There are a number of barriers in place that individuals and groups would first need to overcome. These barriers may not be considerable, but it is important that this Decision RIS recognises that these barriers exist. The barriers include:

- general industry practices
- existing controls to manage security risks
- awareness raising campaigns relating to chemical security
- existing controls to manage health and safety risks
- ongoing efforts by law enforcement agencies.

These barriers are discussed in turn below.

3.3.1 General industry practices

General industry practices are likely to pose challenges to individuals and groups wanting to steal or divert toxic chemicals of security concern. For instance, businesses will generally have some security arrangements in place, since the theft of stock – high risk chemicals or otherwise – represents a

[58] Sandler, Todd and Walter Enders (2008), 'Economic consequences of terrorism in developed and developing countries: An overview', in Terrorism, Economic Development and Openness, eds. Phillip Keefer and Norman Loayza, Cambridge University Press, Cambridge, pp.17-47. See also: Krugman, Paul (2004), 'The costs of terrorism: What do we know?', December, http://www.l20.org/publications/9_7Q_wmd_krugman.pdf. Accessed on: 2 August 2011.

direct loss to their bottom line. Likewise, there are commercial incentives for businesses to maintain some form of inventory control to ensure stock is being adequately utilised. Existing controls, however, are not well suited to detecting stock losses quickly (e.g. stocktakes are usually on an annual basis) or to detecting minor stock losses. Existing controls are unlikely to facilitate the policy objectives of timely information provision to law enforcement agencies to the extent that:

- organisations are unable to detect that their chemicals have been stolen
- organisations are able to detect that their chemicals have been stolen but then do not know where to report that information.

3.3.2 Existing controls to manage security risks

National Code of Practice

In response to the risk assessments conducted in 2010 on HME precursor chemicals, Australian governments implemented a National Code of Practice for Chemicals of Security Concern in 2013 with the purpose of:

- protecting against the diversion of chemicals for terrorist purposes
- encouraging cooperation on chemical security matters between law enforcement agencies and businesses and organisations that handle chemicals
- educating and training staff to be alert to warning signs and report suspicious behaviours.

This Code currently applies to the 11 HME precursors and not to the remaining 84 toxic chemicals of security concern (ammonium nitrate is subject to regulation). However, the percentage of businesses visited by CSRAU who handle at least one of the 11 HME precursors and at least one of the 84 toxics was at 37 per cent (reflecting 493 businesses visited as at May 2014).[59] It seems likely that some businesses handling both types of chemicals that adopt the Code for HME precursors may – in doing so - effectively also cover some or all of the toxics that they handle as well.

Chemical Weapons Convention (CWC)

The Chemical Weapons Convention (CWC) is an international treaty that bans the development, production, possession or use of chemical weapons, and requires the destruction of existing weapons. Of the 84 chemicals analysed in this RIS, 17 are listed under Schedule 3 of the *Annex on Chemicals* to the *Chemical Weapons Convention*. These chemicals (with Chemical Abstracts Service (CAS) numbers in parentheses) are:

- phosgene (75 – 44 – 5)
- cyanogen chloride (506 – 77 – 4)
- hydrogen cyanide (74 – 90 – 8)
- chloropicrin (76 – 06 – 2)
- phosphorus oxychloride (10025 – 87 – 3)
- phosphorous trichloride (7719 – 12 – 2)
- phosphorus pentachloride (10026 – 13 – 8)
- trimethyl phosphite (121 – 45 – 9)
- triethyl phosphite (122 – 52 – 1)

[59] Figure provided by AGD.

- dimethyl phospite (868 – 85 – 9)
- diethyl phosphite (762 – 04 – 9)
- sulphur monochloride (10025 – 67 – 9)
- sulphur dichloride (10545 – 99 – 0)
- thionyl chloride (7719 – 09 – 7)
- ethyldiethanolamine (139 – 87 – 7)
- methyldiethanolamine (105 – 59 – 9)
- triethanolamine (102 – 71 – 6).

CWC Scheduled chemicals are legislated in Australia under the *Chemical Weapons (Prohibition) Act 1994* (the Act). Under the Act, facilities require a permit to produce more than 30 tonnes of any chemical listed under Schedule 3 of the *Annex on Chemicals* to the CWC. A condition of permit is the bi-annual reporting of chemical production to the Australian Safeguards and Non-Proliferation Office (ASNO).[60] Those facilities that produce more than 200 tonnes of a CWC Schedule 3 chemical are subject to routine inspections by the Organisation for the Prohibition of Chemical Weapons.[61] In addition, permits are required for all importers and exporters of CWC Schedule 3 chemicals (above 10 per cent concentration) in Australia.

More specifically, the CWC requires all producers, importers or exporters of CWC Schedule 3 chemicals to complete a security measures advice form outlining the measures that have been taken to prevent unauthorised access to or theft of chemicals controlled under the business' permit.[62] ASNO also promotes counter-terrorism measures aimed at reducing the possibility of chemical terrorism, such as reporting of thefts and suspicious incidents to the National Security Hotline and local authorities, as well as adequate chemical security and stock auditing and checking the bona fides of those involved in the import process.

3.3.3 Awareness raising campaigns in relation to chemical security

Following the signing of the IGA, AGD launched Phase One of the Chemicals of Security Concern campaign. This was aimed at raising general awareness within the community and industry about the potential for everyday household chemicals to be misused by terrorists, and encouraging people to report suspicious activity to the National Security Hotline. AGD began Phase Two of the Chemicals of Security Concern campaign in 2013, including targeted messages about security risks to different segments across the relevant chemical supply chains.

3.3.4 Existing controls to manage health and safety risks

Chemicals, and the businesses that use/handle chemicals, are subject to a complex framework of Commonwealth, state and territory legislation that provides a suite of controls for the safe and efficacious use of a range of potentially dangerous chemicals. These controls primarily focus on managing the risks posed by chemicals to human health and safety and the environment. Section 4.3 of the previous RIS that was prepared in relation to the 11 HME precursors provides an overview of existing controls.

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60 Australian Safeguards and Non-Proliferation Office (ASNO), in the Department of Foreign Affairs and Trade, is the National Authority responsible for implementation of the CWC in Australia.

61 The Organisation for the Prohibition of Chemical Weapons is the international implementing body of the CWC.

62 Australian Safeguards and Non-Proliferation Office (2009), 'The Chemical Weapons Convention- Information for Importers of Chemicals', *Department of Foreign Affairs and Trade*, June 2009.

Self-regulation

Numerous forms of self-regulation exist across all chemical sectors and all elements of the supply chain. These include 'stewardship programs, codes of practice and training and accreditation programs'.[63] Examples of self-regulation include:

- Fertilizer Australia has a Code of Conduct that members must abide by that involves training and accreditation focused on safety and regulatory obligations. That Code of Conduct forms part of relevant training courses delivered by Agsafe.
- The Australian Logistics Council maintains the Retail Logistics Supply Chain Code of Conduct – it is designed to ensure that all participants are aware of their responsibilities in the supply chain when they control or influence the safe and legal carriage of freight.
- Nursery and Garden Industry Australia runs the Nursery Industry Accreditation Scheme for businesses that operate in accordance with a set of national 'best practice' guidelines.
- The Fertcare program, a joint initiative between Fertilizer Australia and the Australian Fertiliser Services Association (AFSA), offers training, quality assurance, certification and accreditation that covers environment, food safety and WHS issues.

Regulation

Controls vary between jurisdictions and are covered by a variety of regulatory bodies that deal with different aspects of regulation, such as occupational health and safety, the environment, and public health. Examples of regulation include:

- Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, new industrial chemicals must be assessed by NICNAS before being supplied in Australia. NICNAS's legislative role focuses on the assessment of risks to public health, WHS and the environment. The assessment is of the chemical used rather than the product in which it is contained. NICNAS also has a program for reviewing the safety of existing chemicals (chemicals listed in the Australian Inventory of Chemical Substances).
- The APVMA is established under the *Agricultural and Veterinary Chemicals (Administration) Act 1992* (Administration Act). The Administration Act sets out the APVMA's role, as an independent statutory authority, for undertaking the responsibilities conferred on it by the states and territories under the National Registration Scheme for Agricultural and Veterinary Chemicals. APVMA functions and powers are conferred by the Administration Act, the *Agricultural and Veterinary Chemicals Code Act 1994* (Agvet Code Act) and the Agricultural and Veterinary Chemicals Code (Agvet Code). The Agvet Code makes provision for the evaluation, registration and review of agricultural chemicals and veterinary medicines and related matters, and the Agricultural and Veterinary Chemicals Code Regulations 1995 (Agvet Regulations) contain the statutory rules made under the Agvet Code.
- The Standard for the Uniform Scheduling of Medicines and Poisons contains the decisions of the Secretary of the Department of Health (or their delegate) on the classification of chemicals and medicines for inclusion in relevant legislation and the model provisions regarding containers and labels, and recommendations about other controls on medicines and chemicals. Its purpose is to promote uniformity in the scheduling of substances and in labelling and packaging requirements throughout Australia. Under the Commonwealth *Therapeutic Goods Act 1989* scheduling considerations include the intrinsic hazards (toxicity) of the chemical substance, safety in use, the need for the substance and its potential for abuse. Scheduling decisions are implemented through State and Territory legislation and sometimes this means that enforcement differs between jurisdictions.

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63 COAG (2008), Report on the Control of Chemicals of Security Concern, Canberra.

- The land transport of dangerous goods is regulated under State and Territory legislation that reflect the Australian Dangerous Goods Code Road and Rail (ADGC) that provides that consistent technical requirements for the land transport of dangerous goods across Australia. The ADGC and associated model legislation is maintained by the National Transport Commission.
- All states and territories have an occupational health and safety act that codifies the duties of care under common law. These are supported by detailed requirements set out in regulations. Under these regulations, chemicals that pose a physical hazard to people or property (e.g. flammable liquids or corrosive substances) are regulated as hazardous chemicals. Such goods are generally required to be stored in a secure manner and the workplace secured from unauthorised access.

The vast majority of existing controls provide a framework that is designed to protect the community from harm arising from accidental or negligent misuse of chemicals. Existing regulatory controls do not directly address security risks arising from the intentional misuse of chemicals for criminal purposes by groups or individuals. The options outlined in this Decision RIS are designed to address this shortcoming by delivering a range of measures aimed at minimising, as low as reasonably practicable, legitimate and illegal access to toxic chemicals of security concern by individuals and groups seeking to cause harm in relation to terrorist and criminal activities.

3.3.5 Ongoing efforts by law enforcement agencies

Given the real and enduring risk of terrorism in Australia, governments continue to maintain a strong national security architecture (comprising strategies, plans, and Commonwealth and state and territory arrangements) aimed at preventing terrorist incidents and disrupting terrorist activity.

As noted in the previous section, owing to concerns about the domestic ramifications of Australians involved in the Syria and Iraq conflict, the Australian Government is undertaking a comprehensive reform agenda to strengthen national security and counter-terrorism legislation. In addition to this package of reforms, the Government has announced a review of Australia's counter-terrorism coordinating machinery that will report by the end of 2014.

The ongoing counter-terrorism efforts by law enforcement agencies (including publicised arrests) are likely to act as a deterrent for some individuals or groups wanting to access toxic chemicals of security concern for use in terrorist or other criminal activity.

That said, law enforcement agencies alone cannot eliminate the threat. These agencies rely on industry to direct them to areas of potential risk and report suspicious behaviour.

Like general efforts aimed at combating crime, counter-terrorism is dependent on information provided by the public. As the *Counter-Terrorism White Paper* states:

> *Australia's national counter-terrorism effort also requires strong partnerships between relevant agencies and the public. Information from the public has been vital in assisting our agencies to conduct successful investigations into terrorist activities in the past. Knowledge and information about potential threats needs to flow between all sections of the community and our law enforcement and security agencies.*[64]

The importance of intelligence gleaned from the public is also well supported in the broader academic literature. As Kitson famously articulated in the early-1970s: 'If it is accepted that the problem of defeating the enemy consists very largely of finding him, it is easy to recognize the paramount importance of good information'.[65]

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64 Australian Government (2010), Counter-Terrorism White Paper: Securing Australia, protecting our community, Department of the Prime Minister and Cabinet, Canberra. See also: Australian Government (2008), National Counter-Terrorism Plan, Canberra.

65 Kitson, Frank (1973), Low Intensity Operations: Subversion, insurgency, peacekeeping, Faber, London.

However, consultations with stakeholders during the previous RIS (prior to the implementation of the Code) raised the prospect that industry's capacity to provide information to the relevant authorities – and thus facilitate effective law enforcement – is limited. Specific areas of concern include the ability of industry to:

- identify potentially suspicious behaviour relating to chemicals (beyond actual theft and diversion)
- report information relating to the potential misuse of chemicals to the relevant authorities in a timely manner
- maintain meaningful records of purchases of chemicals to facilitate potential future investigations.

3.4 Areas of regulatory concern

The CSRAU recently completed comprehensive risk assessments of the 84 agricultural/veterinary chemicals and toxic industrial chemicals. In line with the agreed methodology, the CSRAU considered four data inputs to analyse the chemicals: impact, employability, level of security concern and vulnerability.

The data for each input was derived from three main sources, the Australian Federal Police, Australian intelligence agencies and Australian industry. The four quadrants were given equal weighting and, combined, produced an overall quantitative security risk rating for each chemical.

The Australian Federal Police and Australian intelligence agencies provided data on:

- impact – the potential impact of the chemical if it was successfully deployed as a weapon
- employability – how easy it is to use the chemical as a weapon
- level of security concern – the level of known terrorist interest in a chemical.

Australian industry provided information vulnerability – how easily the chemical could be diverted from the legitimate supply chain.

The chemical security risk assessments provide an indicative analysis of the potential for a chemical to be diverted from the legitimate supply chain for use in a terrorist attack. In general terms, the higher the security risk rating, the greater the level of security concern posed by that chemical. Readers should note that the risk assessment results are indicative only and are considered by NGAG alongside other sources of qualitative information when discussing relative risk and proportionate approaches to risk mitigation. For example, in generating the new preferred option (discussed later), consideration was given to qualitative information focusing on the general national security environment as well as more detailed analysis on the availability and concentration of chemicals in the supply chain.

The tables in the sections below outline the high-level results of the risk assessment process for the agricultural/veterinary chemicals and chemicals stored and/or transported in bulk.

Table 4 and Table 5 use these classifications:

- Very low: 0 – 1.9
- Low: 2.0 – 3.9
- Medium: 4.0 – 5.9
- High 1: 6 – 6.6
- High 2: 6.7 – 7.3
- High 3: 7.4 – 7.9
- Very high: 8.0 – 10.0.

3.4.1 Industrial chemicals

Table 4: Risk ratings of industrial chemicals by supply chain node[66]

Chemical	Introducer	Transport/ Logistics	Processor	Wholesaler	Retailer	End User
Ammonia (Anhydrous) (gas) – bulk*	Medium	Medium	Medium	n/a	Medium	Medium
Ammonia (Anhydrous) (gas)	Low	Medium	Medium	Medium	Low	Medium
Arsenic pentoxide	High 1	High 2	High 2	High 2	n/a	High 2
Arsenic trioxide	High 1	High 1	High 1	High 1	n/a	High 1
Arsine (gas)	Medium	Medium	n/a	n/a	n/a	Medium
Beryllium sulphate	Medium	Medium	Medium	Medium	n/a	Medium
Bromine (liquid/gas)	Medium	Medium	Medium	Medium	n/a	Medium
Calcium cyanide	High 1	High 2	High 2	High 2	n/a	High 2
Carbon disulphide	Low	Low	Low	Low	n/a	Low
Carbon monoxide (gas)	Medium	Medium	n/a	Medium	n/a	Medium
Chlorine (gas) – bulk*	Medium	High 1	n/a	n/a	n/a	High 1
Chlorine (gas)	High 2	High 3	n/a	High 2	High 1	High 3
Chloropicrin	Medium	Medium	High 1	High1	n/a	High 1
Cyanide chloride	Medium	Medium	High 1	High1	n/a	High 1
Cyanogen bromide	Medium	Medium	Medium	Medium	n/a	High1
Diethyl phospite	Medium	Medium	High 1	High1	n/a	High 1
Dimethyl mercury	High 1	High 1	High 1	High 1	n/a	High 1
Dimethyl phosphite	Medium	Medium	High 1	High1	n/a	High 1
Dimethyl sulphate	Medium	Medium	Medium	High1	n/a	High 1
Ethyl mercury chloride	Medium	Medium	Medium	Medium	n/a	Medium
Ethyldiethanolamine	High 2	High 2	High 3	High 3	n/a	High 3
Fluorine (gas)	Medium	Medium	n/a	n/a	n/a	Medium
Fluoroacetic acid	Medium	Medium	Medium	High1	n/a	High 1
Fluoroethyl alcohol	Medium	Medium	Medium	High1	n/a	High 1
Fluoroethyl fluoroacetate	Medium	Medium	Medium	High1	n/a	High 1
Hydrochloric acid (liquid/gas) – bulk*	Medium	Medium	Medium	Medium	Medium	Medium
Hydrochloric acid (liquid/gas)	High 2	High 2	High 2	High 2	High 2	High 2
Hydrogen chloride (gas)	Medium	Medium	n/a	n/a	n/a	Medium
Hydrogen cyanide (gas)	High 2	Medium	n/a	High 2	n/a	High 2
Hydrogen sulphide (gas)	Medium	Medium	Medium	Medium	n/a	Medium
Mercuric chloride	High 2	High 2	High 2	High 2	n/a	High 2
Mercuric nitrate	High 1	High 1	High 1	High 1	n/a	High 1
Mercuric oxide	High 1	High 1	High 1	High 1	n/a	High 1

66 NGAG has adopted the 'As Low As Reasonably Practical' (ALARP) approach to risk treatment. The ALARP approach embraces the concept that risk tolerance should be graduated. The ALARP approach provides flexibility for risks that fall in a middle range of the risk gradient and acknowledges the need for costs and benefits to be considered before risk treatment decisions are made. In line with the ALARP approach, all chemicals/nodes that received a security risk rating of medium or above are subject to further analysis about the suitability of possible treatment measures. Those chemicals/nodes that received a security risk rating of low or very low were deemed to be broadly acceptable and not requiring further treatment measures.

Chemical	Introducer	Transport/ Logistics	Processor	Wholesaler	Retailer	End User
Mercurous nitrate	Medium	Medium	Medium	Medium	n/a	Medium
Mercury cyanide	High 1	High 2	High 2	High 2	n/a	High 2
Methyl fluoroacetate	Medium	Medium	Medium	High1	n/a	High 1
Methylediethanolamine	High 2	High 2	High 2	High 2	n/a	High 3
Nitric oxide (gas)	Medium	Medium	Medium	Medium	n/a	High 1
Osmium tetroxide	Medium	Medium	Medium	Medium	n/a	High 1
Perchloric acid	Medium	Medium	Medium	Medium	n/a	Medium
Phosgene (gas)	High 1	High 2	n/a	High 2	n/a	High 2
Phosphine (gas)	Medium	Medium	Medium	Medium	n/a	Medium
Phosphorous	Medium	High 1	High 1	High 1	n/a	High 2
Phosphorous oxychloride	Medium	Medium	High 1	High 1	n/a	High 1
Phosphorous pentachloride	Medium	Medium	High 1	High 1	n/a	High 1
Phosphorous trichloride	Medium	Medium	High 1	High 1	n/a	High 1
Potassium cyanide	High 2	High 2	High 2	High 2	n/a	High 3
Sodium cyanide	High 3	High 3	High 3	Very High	n/a	Very High
Sulphur dichloride	High 2	High 2	High 3	High 3	n/a	High 3
Sulphur monochloride	High 2	High 2	High 3	High 3	n/a	High 3
Sulphuric acid (liquid) – bulk*	Medium	Medium	Medium	Medium	Medium	Medium
Sulphuric acid (liquid)	Medium	Medium	Medium	Medium	Medium	Medium
Thallium sulphate	High 1	High 1	High 1	High 2	n/a	High 2
Thionyl chloride	Medium	Medium	High 1	High1	n/a	High 1
Thiophosphoryl chloride	Medium	Medium	High 1	High 1	n/a	High 2
Triethanolamine	High 2	High 2	High 3	High 3	n/a	High 3
Triethyl phosphite	Medium	Medium	High 1	High 1	n/a	High 1
Trimethyl phosphite	Medium	Medium	High 1	High 1	n/a	High 1
Zinc cyanide	High 1	High 2	High 2	High 2	n/a	High 2

* Four of the chemicals are transported/stored in bulk (defined as 5,000L or more) within the Australian supply chain. These chemicals were therefore assessed both in a bulk and non-bulk state. In some cases, the non-bulk state produced a higher risk rating within certain nodes, as transport and storage of lower volumes operates under reduced protocols and oversight.

Source: AGD

3.4.2 Agricultural/veterinary chemicals

Table 5: Risk ratings of agricultural/veterinary chemicals by supply chain node[67]

Chemical	Introducer	Transport/ Logistics	Processor	Wholesaler	Retailer	End User
Aldicarb	High 1	High 2	High 1	High 2	High 2	High 2
Aluminium phosphide	High 1	High 2	High 1	High 1	High 2	High 2
Azinphos methyl	Medium	High 1	Medium	High 1	High 1	High 1
Bendiocarb	Medium	Medium	Medium	Medium	Medium	Medium
Cadusafos	Medium	Medium	Medium	Medium	Medium	High 1
Carbofuran	Medium	High 1	Medium	High 1	High 1	High 1
Chlorfenvinphos	Medium	Medium	Medium	High 1	High 1	High 1
Diazinon	Medium	Medium	Medium	High 1	High 1	High 1
Dichlorvos	Medium	Medium	Medium	Medium	Medium	High 1
Disulfoton	Medium	High 1	Medium	High 1	High 1	High 1
Endosulfan	Medium	Medium	Medium	Medium	Medium	Medium
Ethion	Medium	Medium	Medium	Medium	Medium	Medium
Fenamiphos	Medium	High 1	Medium	High 1	High 1	High 1
Magnesium phosphide	Medium	Medium	Medium	Medium	High 1	High 1
Methamidophos	Medium	Medium	Medium	Medium	Medium	High 1
Methidathion	Medium	Medium	Medium	Medium	Medium	High 1
Methiocarb	Medium	Medium	Medium	Medium	Medium	High 1
Methomyl	Medium	High 1	Medium	High 1	High 1	High 1
Mevinphos	Medium	High 1	Medium	High 1	High 1	High 1
Omethoate	Medium	Medium	Medium	Medium	Medium	Medium
Oxamyl	Medium	Medium	Medium	Medium	Medium	High 1
Paraquat	Medium	Medium	Medium	Medium	Medium	Medium
Parathion methyl	Medium	High 1	Medium	High 1	High 1	High 1
Phorate	Medium	High 1	Medium	High 1	High 1	High 1
Propoxur	Medium	Medium	Medium	Medium	Medium	Medium
Sodium Fluoroacetate	High 2	High 2	High 2	High 2	High 2	High 3
Strychnine	High 2	High 2	High 2	High 2	High 2	High 3
Terbufos	Medium	High 1	Medium	High 1	High 1	High 1
Zinc phosphide	High 1	High 1	High 1	High 1	High 1	High 2

Source: AGD

As per advice from the APVMA, several of the agvet chemicals listed in Table 5 have no current active constituent approvals or product registrations and not contained in any registered products

[67] NGAG has adopted the 'As Low As Reasonably Practical' (ALARP) approach to risk treatment. The ALARP approach embraces the concept that risk tolerance should be graduated. The ALARP approach provides flexibility for risks that fall in a middle range of the risk gradient and acknowledges the need for costs and benefits to be considered before risk treatment decisions are made. In line with the ALARP approach, all chemicals/nodes that received a security risk rating of medium or above are subject to further analysis about the suitability of possible treatment measures. Those chemicals/nodes that received a security risk rating of low or very low were deemed to be broadly acceptable and not requiring further treatment measures.

in Australia. Several other chemicals listed in Table 5 are currently under or nominated for chemical review.[68] These chemicals are outlined in Table 6.

Table 6: APVMA toxic agvet chemicals

No current active constituent approvals or product registrations.	Currently under chemical review	Nominated for chemical review
Disulfoton	Azinphos methyl	Aluminium phosphide
Aldicarb	Diazinon	Carbofuran
Endosulfan	Fenamiphos	Phorate
Methamidophos	Methidathion	Terbufos
Parathion methyl	Methiocarb	
	Omethoate	
	Paraquat	

Source: AGD

3.5 Rationale for government intervention

There are three vulnerabilities in how industry currently manages the security risks associated with the potential misuse of toxic chemicals of security concern. These relate to the capacity of industry to:

- **Deter and prevent the theft and diversion of toxic chemicals of security concern** – The previous RIS identified concerns that:
  - not all businesses have thorough processes in place to assess employee suitability to access/handle toxic chemicals
  - nearly a quarter of businesses did not have procedures in place to assess security risks and address identified risks
  - more than half of businesses either had limited or moderate physical and personnel access controls in place (which can reduce the likelihood of unauthorised access of precursor chemicals)
  - more than two thirds of businesses had limited or moderate order processing/customer validation procedures in place (which can reduce the likelihood of chemicals being sold to persons for unauthorised use)
  - a third of participating businesses indicated they had limited or informal physical access controls during transit (which can reduce the likelihood of precursor chemicals being stolen)
  - nearly half of participating businesses indicated they did not provide any information to their staff about the vulnerabilities associated with precursor chemicals and potential security risks.
- **Identify the theft and diversion of toxic chemicals of security concern in a timely** manner - The previous RIS identified concerns that:

[68] This information is current as at the date of this Decision RIS.

  - Approximately 80 per cent of businesses indicated they had limited or moderate inventory control measures in place to enable the effect monitoring and accounting of chemicals.

  - Approximately 40 per cent of businesses indicated they had moderate consignment controls measures in place to enable effective monitoring and accounting of chemicals during transit.

- **Facilitate law enforcement through effective information provision** - The previous RIS identified specific areas of concern including the ability of industry to:
  - Identify potentially suspicious behaviour relating to chemicals (beyond actual theft and diversion).

  - Report information relating to the potential misuse of chemicals to the relevant authorities in a timely manner.

  - Maintain meaningful records of purchases of chemicals to facilitate potential future investigations.

The key question for this Decision RIS is whether there is a need for governments to intervene to address these vulnerabilities in relation to toxic chemicals of security concern. Generally speaking, governments intervene to change behaviour in social or market transactions, believing that 'unregulated behaviour would lead to inferior outcomes'.[69]

On the one hand, businesses across the various supply chains experience a range of incentives to prevent the theft or diversion of toxic chemicals of security concern for use in terrorism activity, and to provide law enforcement with valuable and timely information. These incentives include:

- **Potential cost of reputational damage** – the reputation of a business is likely to be damaged if it was linked to a terrorist attack that used such chemicals. Such reputational damage may limit the business's future competitiveness (including its ability to expand operations) and/or encourage greater regulatory or law enforcement oversight of its actions.
- **Potential cost of legal action** – being linked to a terrorist attack that used such chemicals may also expose businesses to punitive damages, as victims and relatives of victims may seek to pursue claims against the relevant businesses in the civil courts.
- **Potential cost of lost stock** – as noted above, the theft of stock (whether it be toxic chemicals of security concern or otherwise) represents a direct loss to the bottom line of businesses.
- **Societal norms against terrorism** – terrorism (and mass-casualty violence in general) is seen as morally wrong in Australia. The existence of these societal norms is likely to encourage members of the public to participate in counter-terrorism efforts where they know how to do so.

Feedback from stakeholders during the consultation process for the previous RIS[70] suggests, however, that these private incentives are unlikely to be strong for all businesses. Stakeholders noted in particular that, because large volumes of chemicals are not required to undertake terrorist or criminal acts, individuals or groups may only seek to steal/divert relatively small quantities of chemicals. Consequently, instances of theft/diversion may fall within a business's accepted tolerance for stock loss – especially if the business lacks awareness that the chemicals in question could be used in such ways.

Furthermore, market failures exist that suggest private incentives, by themselves, are insufficient to ensure businesses will manage the security risks associated with toxic chemicals of security concern

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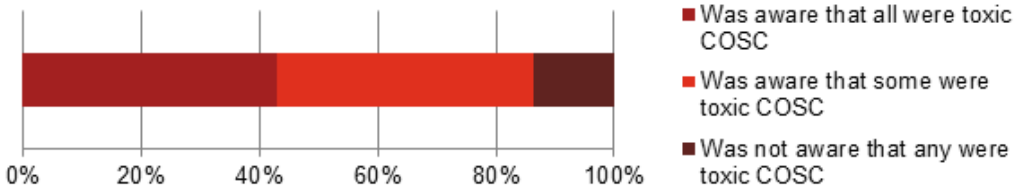
[69] Victorian Competition and Efficiency Commission (2010), *Improving the performance of regulators: Annual report 2009–10*, September, Melbourne.

[70] The previous RIS did not further identify the particular industries of these stakeholders or what proportion of those consulted they represented.

in line with community and government expectations. More specifically, businesses may lack sufficient information to make fully informed decisions about the security risks associated with such chemicals.

PwC conducted an online survey of industry across all nodes of the supply chain for toxic chemicals of security concern. Some 57 per cent of respondents were either not aware that any of the 84 chemicals considered in this RIS were toxic chemicals of security concern or were only aware that some were toxic chemicals of security concern (Refer to Figure 2).

Figure 2: Business awareness of the toxic chemicals of security concern (n=161)



Source: PwC survey of industry

Some businesses may also be unaware of the extent to which individuals or groups are interested in accessing toxic chemicals of security concern, or the various ways in which such individuals or groups may attempt to access the chemicals (e.g. through a 'trusted insider' or the establishment of a 'false flag' company). This unawareness may arise because:

- most businesses lack the technical knowledge and expertise (relating to the operational/tactical capabilities and methods of terrorists) to interpret available information
- the cost of obtaining additional information may be prohibitive for some businesses (particularly small-to-medium enterprises). That said, one submission to the Consultation RIS noted that 'awareness in this area is largely obtained from government campaigns, the lack of awareness may be seen as a failing of government rather than industry'.[71]

[71] PACIA submission to the Consultation RIS.

4 Objectives

A Decision 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.

The purpose of the statement of objectives in a Decision RIS is to provide a clear and succinct goal (or set of goals) for the policy options to address. The Decision RIS will assess the effectiveness of the options against this objective, or set of objectives.

We have identified three objectives of government action: an ultimate objective and two intermediate objectives (the latter of which contributes to the former). The ultimate objective is to minimise, as low as reasonably practicable, the incidence and associated impacts of terrorist attacks using toxic chemicals of security concern to threaten the health and safety of the Australian public.

The intermediate objectives are:

1 To minimise legitimate and illegitimate access to toxic chemicals of security concern by individuals and groups for criminal purposes.

2 To increase the provision of useable intelligence (relating to the legitimate and illegitimate access of toxic chemicals of security concern for criminal use) to Australian law enforcement and security agencies.

These intermediate objectives are aligned with the stated objective of the 2008 intergovernmental *Agreement on Australia's National Arrangements for the Management of Security Risks Associated with Chemicals* – specifically, to establish an effective, coordinated and collaborative national approach to the management of chemical security that seeks to prevent the use of chemicals for terrorist purposes.

5 Statement of options

This Decision RIS must identify a range of viable options to achieve (in whole or in part) the objectives set out in the previous chapter. The following sections detail the proposed security measures that governments have developed to address identified vulnerabilities in the supply chains for the 84 toxic chemicals of security concern, as well as the range of options that could be used to encourage the take-up of the proposed measures.

5.1 Proposed security measures

The Chemical Security Coordination Unit, in consultation with industry and government representatives, has drafted a range of security measures to address the vulnerabilities identified through the risk assessment process. In particular, the security measures are designed to enhance the capability of industry to contribute to the security of chemicals. Table 7 summarises the objective of each of the measures and the nodes of the supply chain to which they apply.

Table 7: Summary of proposed security measures

Measure	Objective	Applicable supply chain nodes
Employee and contracting checking	Limit terrorist access to toxic chemicals of security concern by acquisition through a trusted insider.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User
Personnel security awareness	Reinforce the efficacy of other proposed measures by ensuring that personnel are appropriately aware of the security risk profile of the business or organisation in relation to toxic chemicals of security concern.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User
Inventory control measures	Businesses or organisations will be able to determine whether chemicals of security concern have been stolen, misplaced or otherwise diverted.	Introducer, Processor, Wholesaler, Retailer, End User
Receipt of chemical	Businesses and organisations can detect if chemicals of security concern have been stolen or otherwise diverted prior to receiving the product, and, if so, that relevant information is reported to a relevant authority as soon as possible.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User
Theft and diversion procedures	Businesses and organisations consider the individual risk of chemicals of security concern being stolen or otherwise diverted and plan steps to reduce the likelihood of these events occurring.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User
Physical access	Businesses and organisations will restrict physical access to chemicals of security concern commensurate with the risk profile of the business or organisation in order to reduce the likelihood of these chemicals being stolen or otherwise diverted.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User
Personnel access	Businesses and organisations will limit access to chemicals of security concern only to persons who have a legitimate need to access the chemicals in order to reduce the likelihood these chemicals being stolen or otherwise diverted.	Introducer, Processor, Wholesaler, Retailer, End User
Point of sale procedures	Businesses will adopt responsible practices designed to limit the capacity of terrorists or their associates to acquire chemicals of security concern through direct purchase from the business.	Introducer, Processor, Wholesaler, Retailer
Sale and distribution procedures	Businesses will ensure that delivery of orders will be made to persons who have legitimately purchased the chemical in order to reduce the likelihood of the chemical being diverted to terrorists or their associates.	Introducer, Processor, Wholesaler, Retailer

Measure	Objective	Applicable supply chain nodes
Transporting chemicals of security concern procedures	Businesses and organisations will institute effective physical security and inventory control processes to reduce the likelihood of chemicals of security concern being accidentally or deliberately delivered to or stolen by terrorists or their associates during transport.	Introducer, Processor, Transport/Logistics, Wholesaler, Retailer, End User

Source: AGD

5.2 Options

There are a number of options available to governments:

- continuing with the *status quo*
- launching a targeted awareness campaign (Option 1)
- extending the National Code of Practice for Chemicals of Security Concern(that applies to the 11 precursors to HMEs) to toxic chemicals of security concern (Option 2 and Option 3)
- other, less feasible options that are not the focus of this RIS but which are discussed briefly (regulation, industry codes, enhanced enforcement and increased penalties, action at the state/territory level).

Each option is outlined below.

5.2.1 The status quo

The '*status quo*' provides a base case against which options under assessment can be compared. The *status quo* option represents what would occur in the absence of any specific action by governments to address the problems identified in Chapter 3.

Readers should note that the National Terrorism Public Alert Level is currently at 'medium', which means that authorities believe an attack could occur. When considering the *status quo* in relation to the proposed options, it is important to remember that this Decision RIS does not quantify the likelihood of a terrorist attack under the current environment. Therefore, additional government action (over and above the *status quo*) to minimise the security risks associated with toxic chemicals of security concern is unlikely to lead to a change in the National Terrorism Public Alert Level.

However, this Decision RIS does assume that the options – to varying degrees – contribute to the objective of minimising, as low as reasonably practicable, the incidence and associated impacts of terrorist attacks using toxic chemicals of security concern that threaten the health and safety of the Australian public.

For this Decision RIS, the *status quo* is the continuation of the current arrangements to manage the *security risks* of the toxic chemicals of security concern. The current arrangements include:

- A continuation of current controls (both regulatory and self-regulatory) that provide either a direct or incidental security benefit.
- A continuation of other measures to improve how businesses manage the security risks associated with the toxic chemicals (e.g. AGD's Chemicals of Security Concern awareness campaign).
- Ongoing efforts by Australian law enforcement and intelligence agencies to detect, disrupt and prevent individuals and groups from accessing toxic chemicals and using HMEs for criminal purposes.

5.2.2 Option 1 – A targeted awareness campaign

Governments could encourage take-up of the proposed security measures by building on Phase One and Phase Two of the Chemicals of Security Concern awareness campaign and launching Phase

Three. The purpose of this additional phase would be to inform and educate relevant businesses about 'best practice' approaches to managing the security risks associated with the toxic chemicals. The proposed security measures would form the basis of governments' message about what constitutes 'best practice' in managing security risks.

Such a targeted awareness campaign could involve:

- a press release from relevant Ministers to announce the measures, as appropriate
- production of promotional material and/or support tools
- advertising in industry publications and negotiating editorial pieces which could include targeted advertisements for businesses that are likely to be more at risk
- utilising the Chemical Security website <Australia.gov.au/chemicalsecurity> to provide detailed information and resources.

As with Phase One and Phase Two of the Chemicals of Security Concern awareness campaign, it is assumed that Commonwealth and state and territory NGAG members would share equally the responsibility for administering Phase Three.

5.2.2 *Option 2 – Extending the National Code of Practice for Chemicals of Security Concern to the 84 toxic chemicals of security concern*

This option would involve adding the further 84 chemicals to the existing voluntary National Code of Practice for Chemicals of Security Concern, which applies to the 11 precursor chemicals. This existing security risk management Code informs businesses about what constitutes 'best practice' in managing the security risks associated with chemicals of security concern.

Under this option, government is responsible for developing and maintaining the Code, although the Code would continue to be voluntary and non-binding on industry participants.

As per the existing Code for the 11 precursor chemicals, security measures form the basis of the Code, which includes schedules that provide specific advice to different industries and/or nodes in the supply chain.

As shown in

Table 8, 4,275 organisations currently adopt the Code in relation to the 11 precursor chemicals.[72] As per PwC's online survey of industry, approximately 17 per cent of organisations using or handling precursor chemicals currently adopt the Code.

[72] It should be acknowledged that the current estimations of the population of businesses that adopt the Code using PwC's online survey of industry are generally below those estimated in the previous RIS. As a result, this RIS uses lower adoption rates in the cost calculations.

Table 8: Estimated population of businesses that currently adopt Code

Node	Population of users of precursor chemicals	Proportion of businesses that adopt (from survey)	Population currently adopting Code
Introducer	68	24%	16
Processor	398	13%	50
Wholesaler	33	17%	6
Retailer	4,906	25%	1,227
End-user	17,268	15%	2,657
Transport/logistics	2,135	15%	320
TOTAL	**24,808**	**17%**	**4,275**

Source: PwC survey of industry and previous RIS

The existing Code was designed to be a flexible piece of risk management guidance. It allows individual businesses to consider their current circumstances and implement any or all of the risk treatment measures to reduce their identified risks. The Code helps industry understand how to put good chemical security practices in place that are flexible and can be applied to any of the chemicals of security concern. Because it is voluntary, a business can choose to stop adopting any of the measures from the Code at any time.

The Code accounts for differences in processes at each point in the supply chain by applying only the relevant security measures to each node.

The Code improves industry's capacity identify potentially suspicious behaviour relating to chemicals (beyond actual theft and diversion) by raising awareness of the security risks associated with certain chemicals. The aim is to educate and train staff to be alert to warning signs and report suspicious behaviour. It also improves industry's capacity to report information relating to the potential misuse of chemicals to the relevant authorities in a timely manner by providing information about the national security hotline. Finally, it encourages businesses to maintain meaningful records of purchases of chemicals to facilitate potential future investigations (so that, for example, certain customers can be traced).

Stakeholders have raised a number of issues about the effectiveness of extending the Code to the 84 chemicals (discussed later).

Given the role it currently plays in the Chemical Security Management Framework and the development of the Code for the 11 precursor chemicals, it is reasonable to expect that AGD would be the lead agency for coordinating efforts adding the additional toxic chemicals of security concern to the existing Code. Under Option 2, the Code would be revised to include a further 84 chemicals to those outlined on page 6 of the Code.[73] Minor changes to the introductory parts of the Code would be required to note the Code covers toxic chemicals as well as HME precursors. Commonwealth and state and territory NGAG members would share equally the responsibility for promoting the revised Code, drawing on the assistance of NIRG to help raise awareness about the existence and purpose of the Code amongst industry.

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73 Australian Government, *National Code of Practice for Chemicals of Security Concern*, page 6, <http://www.chemicalsecurity.gov.au/Governments/DevelopingaNationalCodeofPractice/Documents/Code%20of%20practice.PDF, accessed 3 November 2014

5.2.3 Option 3 – Extending the National Code of Practice for Chemicals of Security Concern to the four highest risk chemicals and using industry training

The 2008 COAG Report on Chemicals of Security Concern outlined six overarching principles to guide the development of strategies to manage chemicals of security concern. The first of these principles is 'control measures should be proportionate to the assessed risk of the use of chemicals for terrorist purposes'.

That is, it is not feasible to reduce national security risks to zero – this would require excessive investment and is not appropriate particularly in the current deregulation climate. Therefore a risk based approach should be adopted to place the most focus on the chemicals of highest risk.

Based on the results of the chemical security risk assessments for the 84 toxic chemicals and updated intelligence and policing information, four of the 84 assessed chemicals are considered to require risk treatment to reduce potential national security risks to a broadly acceptable level (consistent with the ALARP principle). These are:

- Sodium cyanide (TIC)
- Potassium cyanide (TIC)
- Chlorine (gas) (TIC)
- Aluminium phosphide (Agvet).

In finalising this list, the Australian Government considered TICs which received a chemical security risk rating (SRR) of HIGH 3 or above, have a high inherent hazard and are widely available in the Australian supply chain in significant volumes. HIGH 3 chemicals that do not fit this description are not recommended for risk treatment under the current environment.

TICs which received SRRs of HIGH 2 or lower were deemed not to require risk treatment in the current environment. One chemical, aluminium phosphide (SRR HIGH 2) is the exception to this due to its form and widespread availability. Hydrochloric and sulphuric acids were considered but not included because they are used as a reagent in HMEs, not as precursor chemicals, and their inherent low toxicity.

A number of stakeholders during consultations raised concerns that the risks posed by some or all of the 84 toxic chemicals of security concern were not sufficient to justify organisations implementing security treatment measures. These views are discussed further in the cost benefit analysis.

To ensure this regulation impact assessment is aligned with the principle of proportionality and takes account of the stakeholder feedback above, this Decision RIS considers this option whereby four of the highest risk toxic chemicals are added to the existing voluntary Code. Under Option 3, the Code would be revised to include a further four chemicals to those outlined on page 6 of the Code.[74] Minor changes to the introductory parts of the Code would be required to note the Code covers toxic chemicals as well as HME precursors. Further, this option could potentially involve leveraging existing commercial training providers to undertake security awareness raising as a part of existing training programs (rather than businesses undertaking the awareness raising themselves, as implied by the Code), again as suggested by stakeholders.

Awareness raising is important to addressing the information asymmetry identified in the problem chapter. During consultations, several stakeholders who handled agvet chemicals pointed to existing organisations that provide accredited training targeted at people that handle hazardous chemicals (consistent with the Australian Qualifications Framework). In response to this, Option 3 includes delivering core chemical security messaging in existing training courses currently offered by agvet registered training organisations (RTOs). Core material (1-2 A4 pages) developed by government

74 Ibid.

would be distributed to RTOs with a request that they informally integrate basic chemical security messaging into their existing training programs relevant to end-users of aluminium phosphide. This basic messaging would not become a formal component of accredited coursework.

A more detailed training package, developed by NGAG and made available on the chemical security website, would be provided to businesses that use or handle one of the three toxic industrial high risk chemicals. The training package comprises five short modules, removes the need for these businesses to form their own security awareness training program, and standardises (and generally reduces) the time required for these businesses to implement the training. These training programs would not be implemented by RTOs.

As a result, security awareness would generally be raised through existing training, or organisations drawing on the modules rather than developing and implementing their own awareness raising initiatives.

5.2.4 Options not considered in further detail

Amendment for each jurisdiction's criminal code

A regulatory option is for the Australian Government (in collaboration with the States and Territories) to develop a model amendment for each jurisdictions' criminal code. This amendment would create a new criminal offence relating to the negligent possession or supply of toxic chemicals of security concern. In addition to the model amendment, the Australian Government would publish the proposed security measures as a Code (similar to Option 2). The intention is to enable police to charge an individual or business for failing to comply with the Code.

Businesses charged with negligent possession or supply could point to their adoption of the government Code as a reasonable defence in any court proceedings. All jurisdictions (including the Australian Government) would draw on the model amendment in amending their criminal codes. This option would also include a variation to the *Intergovernmental Agreement on Australia's National Arrangements for the Management of Security Risks associated with Chemicals* (in line with Clause 9 of that agreement) to establish the agreed governance arrangements, scope and outcomes of the model amendment.

This option however was considered in relation to the higher risk 11 precursor chemicals in the 2011 RIS, where it was found not to be the most beneficial option (particularly in light of the costs involved, more than $5 billion NPV over ten years). Given that the remaining 84 chemicals considered in this RIS are of lesser risk, there is no reason why a similar regulatory option would be the preferred option in this case. Further assessment of such an option has therefore not been undertaken in this RIS.

Industry codes of practice

Industry associates covering businesses that use or handle the toxic chemicals of security concern could encourage take-up of the proposed treatment measure by developing new (or expanding existing) security risk management codes of practice. These codes of practice would inform businesses about what constitutes 'best practice' in managing the security risks associated with the toxic chemicals of security concern. The proposed security measures would form the basis of the industry codes, though industry associations would only include those measures that are relevant to their members.

This would involve a range of industry associations developing an equal number of security risk management codes of practice. These associations would develop codes of practice that would be representatives of 'groupings' within the chemical industry.

Industry associations would be free to promulgate the code of practice that is most relevant to their membership. There would be no universal mechanism of enforcement. Rather, industry associations would utilise their existing approaches or framework.

This approach however was considered as part of the previous RIS into precursor chemicals where it was concluded that:

- There would be greater adoption of a government code of practice compared to an industry code of practice, leading to greater benefits for the government code of practice.
- A government code of practice would be more practicable and manageable – one body would be responsible for develop and promulgating a code of practice, compared to a number of industry associations.
- Under an industry code of practice, it would be more difficult to encourage organisations that are not members of industry associations to adopt the measures.
- It is more appropriate for governments to develop a code of practice (rather than industry), given that national security is primarily the responsibility of governments.

In this instance, it was considered that the findings from the previous RIS would still apply, and hence further assessment of such an option would therefore not been undertaken in this RIS.

Increased enforcement of—and penalties attached to—existing laws/enhanced monitoring of terrorists

One option to address the identified problem would involve increasing the penalties that attach to existing regulatory requirements, and increasing the level of intelligence/law enforcement surveillance and policing. This would involve, for example, enhanced monitoring of terrorists.

These measures are not assessed as having the potential to meaningfully address the problem since:

- as stated elsewhere, existing regulatory controls generally seek to manage health and safety risks as opposed to risks association with theft and diversion for criminal/terrorist use
- the underlying goal of the security measures is (amongst other things) to encourage business to be the 'eyes and ears' of the intelligence/law enforcement community.

Other options suggested by stakeholders

The Toll Holdings submission to the Consultation RIS argued that creation of a national government accreditation scheme would provide stronger commercial incentives for businesses across the chemical supply chain to adopt security measures. Although this option would be likely to deliver greater levels of uptake of the security measures, it would require development of legislation to implement the option in a consistent and coordinated way across all states and territories. Developing national standards applicable to very diverse chemicals supply chain would be a complex exercise, as would an accreditation assessment and monitoring process.

The majority of submissions received in relation to the Consultation RIS did not support formal regulation of the supply chain. A regulatory option was considered in relation to the higher risk 11 precursor chemicals to HMEs in the 2011 RIS, where it was found not to be the most beneficial option, particularly in light of the costs involved. Given that the remaining 84 chemicals considered in this RIS are of lesser risk, there is no reason why a regulatory option would be the preferred option in this case.

6 Impact analysis

The purpose of this chapter is to provide stakeholders with an indication of the likely impacts that would arise from implementing each of the options outlined in Chapter 5, as well as the relative cost effectiveness of each option in addressing the identified problem. This chapter seeks to achieve this goal by identifying (and quantifying, where possible) the costs and benefits of each option, and comparing these costs and benefits against the *status quo*.

This chapter will first outline the assumptions for the *status quo*, before discussing the extent to which the option being assessed will result in a net benefit or net cost compared with the *status quo*.

6.1 The status quo

The '*status quo*' provides a base case against which options under assessment can be compared. The *status quo* option represents what would occur in the absence of any specific action by governments to address the problems identified in Chapter 3.

For this Decision RIS, the *status quo* is the continuation of the current arrangements to manage the security risks of toxic chemicals of security concern, as discussed in Section 5.2.1.

By its very nature, maintaining the *status quo* would not result in any additional implementation costs for industry. However, it would leave unaddressed the identified vulnerabilities in the capacity of industry to contribute to the management of security risks associated with the legitimate and illegal access of toxic chemicals of security concern. As a consequence, the current risk posed by individuals and groups using toxic chemicals of security concern for terrorist and criminal purposes – as well as associated costs and benefits to industry, governments and society – would remain unchanged.

An important issue for this Decision RIS is determining to what extent the options under consideration represent an improvement in how the security risks of toxic chemicals of security concern are managed relative to the *status quo*. It is also important to note that:

- terrorism (and mass-casualty violence in general) is not only a crime but it is also seen as a moral wrong in Australia
- due in part to this societal norm, there is a strong community expectation that government will take all reasonable steps to reduce the risk of terrorism.

As the then Commissioner of the Australian Federal Police stated in 2003:

> *The 11 September 2001 attacks, and then more recently and tragically for Australia, the Bali bombings of 12 October 2002, have dramatically altered Government and community expectations in respect of terrorism. There is now a strong government and community expectation to not only monitor terrorist activity, but to disrupt it.*[75]

Persisting with the *status quo* is unlikely to address these societal expectations.

6.2 The proposed security measures

The goal of each of the options is to encourage relevant organisations to adopt the proposed security measures. This Decision RIS assumes that, for individual organisations, the *types* of costs and benefits of adopting the proposed security measures will be the same across the options. For

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75 Keelty, Mick (2003), 'Closing the circle: The AFP's capacity to fight terrorism', Platypus Magazine, no. 78, pp.4-10.

example, if Option 1 was implemented, a business that adopted the measures under this option would incur the same type of costs as it would if, for example, Option 2 was the implemented option. This is because the security measures are assumed to be the same across each option.

This Decision RIS does assume, however, that the *total* costs and benefits of adopting each option will vary from option-to-option, driven by different expectations about the number of businesses that have not already adopted the proposed security measures, but are likely to do so upon implementation.

Given these assumptions, this section first summarises the generic costs and benefits of adopting the proposed security measures and which underpin each of the options. Section 6.3 then details the specific costs and benefits associated with each of the options.

6.2.1 Security measure costs

Businesses are likely to incur a range of additional costs as a result of adopting the proposed security measures. These costs include:

- Procedural – for instance, under 'Employee and Contractor Checking' some businesses would devote additional staff resources to verifying the identity and trustworthiness of new employees, and re-verifying the identity of relevant existing employees. Likewise, 'Theft and Diversion Procedures' would see some businesses devote additional staff resources to undertaking risk assessments and developing a concordant theft and diversion plan.
- Purchasing – some of the measures will encourage businesses to purchase additional goods and services. 'Consignment Control', for example, could lead some businesses to install global positioning system units in their vehicles and modify their vehicles so they are capable of storing chemicals under lock and key. Similarly, 'Personnel Access Controls' could mean that some businesses – depending on the outcome of the risk assessment undertaken as part of 'Theft and Diversion Procedures' –install a range of physical access controls, including security lighting, an electronic access system and closed-circuit television.
- Record-keeping – some of the measures will encourage businesses to maintain records of staff and transactions. 'Point of Sale', for example, encourages/requires businesses to keep a record of a customer's identification if they purchase a chemical of security concern. 'Employee and Contractor Checking', meanwhile, asks businesses to maintain contact details of all employees working with, or could work with, chemicals of security concern.
- Education – businesses would be encouraged to devote effort to understanding the proposed security measures. In addition, 'Security Awareness' involves businesses providing -information to their staff to ensure they are appropriately aware of the security risk profile of the business in relation to chemicals of security concern.
- Other – costs could include:
  - Increased product development and associated costs – introducers and processors could seek to avoid taking any security measures by reformulating existing products. Reformulation could impose a range of costs on businesses, including product development and testing.
  - Business disruption – reconciliations are a major undertaking, requiring significant planning, the diversion of personnel from other tasks, and a temporary suspension of normal business operations. The suggested reconciliations on a regular basis could hinder the ability of some businesses to supply customers with certain chemicals within acceptable timeframes.
  - Increased health and safety risks – as a whole, the proposed security measures are likely to require staff at affected businesses to handle chemicals of security concern more frequently. This increases the risk of accidental or negligent misuse leading to physical harm.
  - Staff discomfort – 'Point of Sale' encourages staff to adopt a relatively accusatory posture with customers who are attempting to purchase chemicals of security concern. These requirements could increase staff discomfort (particularly with younger staff in transactions with older customers).
  - Costs associated with reading and understanding the security measures.

Appendix B provides greater detail of the costs associated with each of the proposed treatment measures, which were gathered through telephone consultations with affected businesses. It is important to note that:

- Industry stakeholders during the telephone consultations did not provide estimates of the costs likely to be associated with 'Sales and Distribution' and 'Consignment Control'. This was primarily because stakeholders saw the checking of orders at distribution as standard business practice (driven by commercial incentives to ensure orders are aligned with legitimate payment) and thus unlikely to impose additional costs With reference to 'Consignment Control', most transport businesses handling the toxic chemicals already handle a range of dangerous goods, and are already subject to various dangerous goods legislation and codes.
- Introducers and Processors interviewed during the telephone consultations also did not provide estimates of the costs likely to be associated with 'Point of Sale' as they tended to deal with only a few commercial customers that they had existing contracts. The measures were therefore deemed unnecessary for these two nodes.
- This Decision RIS has not quantified the costs associated with 'Physical Access Controls' and 'Personnel Access Controls'. While both measures have the potential to impose a range of additional costs on industry, the extent of these costs will ultimately be determined by each business's risk assessment and theft and diversion plan. As a consequence, the costs associated with 'Physical Access Controls' and 'Personnel Access Controls' cannot be reliably quantified.
- This Decision RIS is not able to quantify the full range of costs associated with 'Inventory Control'. This was firstly due to most businesses regarding the tracking of inventory as standard business practice driven by commercial incentives to reduce theft and stock loss. Secondly, businesses were unable to provide a degree of certainty on their ability to introduce new inventory control systems without further information on the likely costs.

Table 9 details our estimates of the quantifiable costs of the treatment measures for the average business that uses/handles the toxic chemicals of security concern, by relevant node in the supply chain. The analysis showed that the highest per business cost areas were 'Theft and Diversion Procedures' for Wholesalers, and 'Security Awareness' for Processors and Wholesalers. Average cost estimates were obtained during the telephone consultations and combined with uptake information obtained through the telephone consultations and PwC's online survey of industry. Where possible, we relied on node-specific assumptions to calculate our estimates (e.g. we used estimates provided by processors to calculate average processor costs). Where this was not possible, we relied on assumptions from other nodes (e.g. for 'Receipt of Chemical', we based our estimates for all other nodes on retailer data). Appendix B provides greater detail of how this Decision RIS has estimated the costs of the treatment measures.

Table 9: The costs of adopting the security measures for the average business that uses/handles precursor chemicals (NPV over 10 years)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Employee and Contractor Checking	$615*	$615*	$733	$733	$635	$360
Security Awareness	$3,755	$5,595	$4,206	$11,299	$2,532	$5,587
Inventory Control	-	-	-	-	-	n/a
Receipt of Chemical	$318**	$318**	$318**	$318	$318**	$318**
Theft and Diversion Procedures	$976	$976	$34,048	$12,856	$6,138	$1,588

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Physical Access Controls	-	-	-	-	-	-
Personnel Access Controls	-	-	-	-	-	-
Point of Sale	$0	$0	$115	$400	n/a	n/a
Sales and Distribution	$0	$0	$0	$0	n/a	n/a
Consignment Control	$0	$0	$0	$0	$0	$0

* No cost estimates for Introducer and Processors were provided by stakeholders through telephone consultations, therefore an average of estimates provided for 'Employee and Contractor Checking' for the remaining nodes was used.
** No cost estimates for Introducer, Processor, Wholesaler, End-user and Transport/logistics were provided by stakeholders through telephone consultations, therefore an average of estimates provided for 'Receipt of Chemical' for the remaining node (Retail) was used.
Source: PwC telephone consultations and analysis

6.2.2 *Security measure benefits*

As noted in Section 4.4, there are three key areas of vulnerability in how businesses currently manage security risks associated with the chemicals. These relate to the capacity of industry to:

- deter and prevent the theft and diversion of chemicals
- identify the theft and diversion in a timely manner
- facilitate law enforcement through effective information provision.

The treatment measures were developed by government (in consultation with industry through the NIRG process) to address these vulnerabilities (or, more specifically, the precise areas of concern identified through the risk assessment process).

All stakeholders participating in telephone interviews for this RIS that said they either had, or would, adopt the treatment measures as a result of the Code, indicated that they did so because they perceived that they associated benefits to their organisation and/or society outweighed the cost to them of doing so.

Table 10 outlines how the measures relate to the three key areas of vulnerability, and the security benefits that each measure is expected to generate.

Table 10: The expected security benefits of the treatment measures

Treatment measures	Key areas of vulnerability addressed	Expected security benefits
Employee and contracting checking	The capacity of industry to deter and prevent the theft and diversion of chemicals. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective of this measure is to limit terrorist access to chemicals of security concern by acquisition through a trusted insider. To achieve this objective, the measure aims to ensure businesses satisfy themselves that an employee who has access to chemicals of security concern has: • provided their true and correct identity, and • is trustworthy to employ in the business or organisation. The measure also aims to ensure that businesses report any suspicious behaviour to the relevant authorities (e.g. though the National Security Hotline).

Treatment measures	Key areas of vulnerability addressed	Expected security benefits
Personnel security awareness	The capacity of industry to deter and prevent the theft and diversion of chemicals. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective of this measure is to reinforce the efficacy of other proposed measures by ensuring that personnel are appropriately aware of the security risk profile of the business or organisation in relation to chemicals of security concern and are better equipped to identify suspicious behaviour, report it, and maintain appropriate records. In order to assist businesses and organisations with this objective, this measure aims to provide the topics that staff should be made aware of in the conduct of normal business operations.
Inventory control measures	The capacity of industry to identify the theft and diversion in a timely manner. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective that this proposed measure seeks to achieve is that businesses or organisations will be able to determine whether chemicals of security concern have been stolen, misplaced or otherwise diverted. In order to assist businesses and organisations in achieving this objective, the proposed measure outlines minimum requirements for inventory control processes/systems, reconciliation periods and reporting protocols.
Receipt of chemical	The capacity of industry to identify the theft and diversion in a timely manner. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective of the proposed measure is that businesses and organisations can detect if chemicals of security concern have been stolen or otherwise diverted prior to receiving the product, and, if so, that relevant information is reported to a relevant authority as soon as possible.
Theft and diversion procedures	The capacity of industry to deter and prevent the theft and diversion of chemicals.	The security objective of the proposed measure is that businesses and organisations consider the individual risk of chemicals of security concern being stolen or otherwise diverted and plan steps to reduce the likelihood of these events occurring. In order to assist businesses and organisations to achieve this objective, the proposed measure outlines the minimum requirements for risk assessments and provides guidance on what should be included in a theft and diversion plan.
Physical access	The capacity of industry to deter and prevent the theft and diversion of chemicals.	The security objective that this proposed measure seeks to achieve is that businesses and organisations will restrict physical access to chemicals of security concern commensurate with the risk profile of the business or organisation in order to reduce the likelihood of these chemicals being stolen or otherwise diverted. The extent of benefits associated with this measure would ultimately be driven by 'Theft and Diversion Procedures' at the individual business level.
Personnel access	The capacity of industry to deter and prevent the theft and diversion of chemicals.	The security objective that this proposed measure seeks to achieve is that businesses and organisations will limit access to chemicals of security concern only to persons who have a legitimate need to access the chemicals in order to reduce the likelihood of these chemicals being stolen or otherwise diverted. The extent of benefits associated with this measure would ultimately be driven by 'Theft and Diversion Procedures' at the individual business level.

Treatment measures	Key areas of vulnerability addressed	Expected security benefits
Point of sale procedures	The capacity of industry to deter and prevent the theft and diversion of chemicals. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective that this proposed measure seeks to achieve is that businesses will adopt responsible practices designed to limit the capacity of terrorists or their associates to acquire chemicals of security concern through direct purchase from the business. In order to assist businesses in achieving this objective, the proposed measure contemplates that: • the sale of chemicals of security concern aligns with certain security protocols (the exact nature of which is dependent on where the business sits in the chemical supply chain), and • suspicions transactions of chemicals of security concern are reported to the authorities (e.g. through the National Security Hotline).
Sale and distribution procedures	The capacity of industry to deter and prevent the theft and diversion of precursor chemicals. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective that this proposed measure seeks to achieve is that businesses will ensure that delivery of orders will be made to persons who have legitimately purchased the chemical in order to reduce the likelihood of the chemical being diverted to terrorists or their associates.
Transporting chemicals of security concern procedures	The capacity of industry to deter and prevent the theft and diversion of precursor chemicals. The capacity of industry to facilitate law enforcement through effective information provision.	The security objective that this proposed measure seeks to achieve is that businesses and organisations will institute effective physical security and inventory control processes to reduce the likelihood of chemicals of security concern being accidentally or deliberately delivered to or stolen by terrorists or their associates during transport.

Source: PwC and AGD

Previous stakeholder feedback

The previous RIS found that 'Theft and Diversion Procedures' and 'Security Awareness' are likely to improve the capacity of some businesses to deter, prevent and detect the theft and diversion of precursor chemicals. The latter will help ensure staff are aware about what security risks exist, what they should look out for, and what should they do if they identify suspicious activity. 'Security Awareness' however, could be counterproductive if inadequate support is provided by governments to help businesses in developing messages and communication strategies to engage with their staff.

Nonetheless, while 'Theft and Diversion Procedures' and 'Security Awareness' are likely to have some effect on business capacity to deter, prevent and detect theft and diversion, industry stakeholders did not believe the security measures as a whole would be overly effective in reducing the theft and diversion of precursor chemicals from their business.

Other stakeholders noted that such measures as 'Security Awareness' and 'Theft and Diversion Procedures' are likely to help build a security culture amongst Australian businesses – in the sense that businesses would begin taking national security issues into consideration as part of their day-to-day operational practices (in relation to precursor chemicals and other products of security concern).

'Point of Sale' could improve the quality of information provided by industry to law enforcement and intelligence agencies. Ideally, businesses would not only report suspicious activity, but also be able to provide the relevant authorities with information to allow them to track and identify the alleged source of the suspicious activity. By encouraging/requiring the recording of a purchaser's identification and greater use of cashless transactions, 'Point of Sale' procedures will increase the likelihood that businesses can provide law enforcement and intelligence agencies with traceable information.

Stakeholders previously questioned whether some measures would produce significant benefits, in particular:

- **'Inventory Control'** - there are a number of reasons why volumes of chemicals and chemical products can vary over a reconciliation period – such as differences in temperature and poor

record keeping – that are not related to criminal activity. As a result, businesses would generally find it difficult to determine whether a discrepancy in stock records was suspicious in the absence of a physical break-in or identified suspicious behaviour.

- **'Employee and Contractor Checking'** - according to stakeholders, terrorists generally prefer to use people with no prior history of criminal or unusual behaviour during operations. Businesses would unlikely be able to detect such 'cleanskins' using the methods outlined under 'Employee and Contractor Checking' (which focus on checking photo identification, scrutinising CVs and contacting referees).
- **'Consignment Control'** - while the measure may make it harder for individuals or groups to steal precursor chemicals during transit, it would not eliminate the risk – and potentially could shift the risk of theft away from 'individual goods' to entire vehicles. Stakeholders also maintained that the measures would unlikely increase the capacity of transport/logistics companies to detect the theft/diversion of precursor chemicals, given current use of tamper seals.

Some stakeholders questioned whether it would be necessary to apply the security measures to all users of chemicals. For instance, it was noted that some users already had to meet stringent character and competency requirements (e.g. persons who are permitted to handle explosives). There may be thus little benefit in requiring these users to adopt the proposed security measures.

One of the key objectives of the proposed security measures is to reduce the risk of individuals and groups using chemicals of security concern for terrorist or similar criminal purposes. A number of stakeholders questioned whether the measures would be effective in achieving this objective.[76] They noted that:

- Chemicals have a myriad of legitimate uses in Australia – ranging from industrial to consumer applications. This wide use provides individuals and groups with a large number of potential access points, and makes it more difficult for regulators and law enforcement agencies to exert control over who accesses to chemicals.
- Not only are chemicals widely used and available in Australia, but individuals and groups only need access to relatively small volumes of precursor chemicals (between five and 50 kilograms) to formulate HMEs capable of causing significant harm.[77] This means that, in the absence of severely curtailing the use of precursor chemicals in Australia, security controls are likely to remain relatively porous. As one stakeholder noted, '[w]hen such large quantities are being stored, handled, moved around, and spilt (written off) no one notices a few tens of kilos going missing'.[78]
- Intelligence suggests that terrorist networks are becoming increasingly sophisticated in their planning and operations. As a result, some stakeholders felt that most terrorists would be able to circumvent the security measures and still be able to access precursor chemicals without triggering the attention of law enforcement and intelligence agencies.

Other stakeholders maintained, however, that the proposed security measures, by enhancing the capacity of businesses to deter, prevent and detect theft and diversion, and increasing the quality of information businesses could provide law enforcement and intelligence agencies, would add an extra barrier that individuals and groups would need to overcome to access precursor chemicals. This extra barrier would, in turn, increase the effort individuals and groups must expend to access precursor chemicals, as well as the chances that they would be detected as they attempted to do so.

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[76] The previous RIS did not further identify the particular industries of these stakeholders or what proportion of those consulted they represented.

[77] This observation underpins recent European Commission efforts to regulate precursor chemicals. See: European Commission (2010), 'Regulation of the European Parliament and the Council on the marketing and use of explosive precursors', Brussels, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0473:FIN:EN:PDF , accessed on: 29 September 2011.

[78] Private correspondence submitted to PwC.

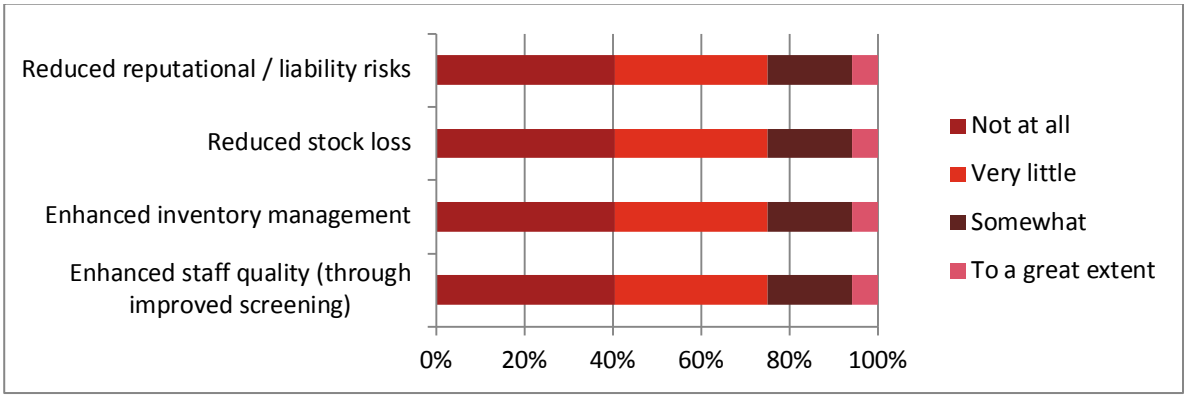
PwC survey of industry

Respondents to PwC's online survey of industry who use or handle precursor chemicals were asked to what extent they believe that the security measures they have implemented for these chemicals have generated benefits surrounding:

- reduced reputational risk
- reduced stock loss
- enhanced inventory management
- enhanced staff quality (through improved screening).

The results, provided in Figure 3, show that most respondents believed that the security measures have generated at least some benefits in practice, with some indicating that there had been benefits 'to a great extent'.

Figure 3: Summary results of PwC's survey of industry (n=73)

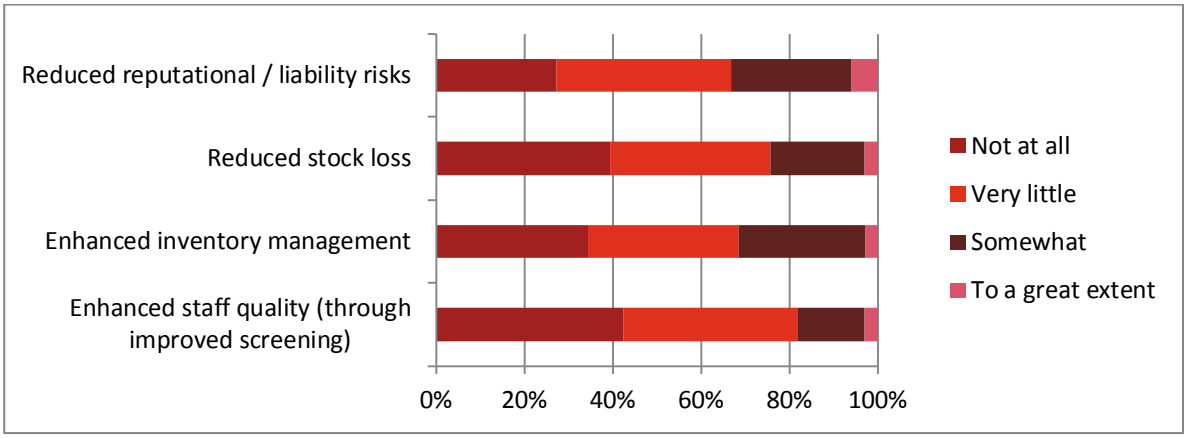


Source: PwC online survey of industry

Respondents to PwC's online survey of industry who use or handle toxic chemicals of security concern (but who did not use or handle the precursor chemicals and so have not adopted any of the measures to date) were asked to what extent they believed the proposed security measures would generate the benefits outlined above.

The results are provided in Figure 4. Again, most respondents expected that the security measures would generate at least some benefits, with some indicating that there would be benefits 'to a great extent'.

Figure 4: Summary results of PwC's survey of industry (n=35)



Source: PwC online survey of industry

Furthermore, during telephone consultations with stakeholders it was noted that all of those consulted that had or would adopt the security measures believed the benefits from doing so – both to their business and to society as a whole – outweighed the cost.

In September 2014, a phase one evaluation of industry awareness of the Code was completed to collect baseline quantitative data to be used in a phase two evaluation in 2015-16. The phase two evaluation will assess the effectiveness of the chemicals of security concern programme against the phase one benchmarks. In the absence of this data, we have been unable to further quantify how effective the current Code has been in improving the handling of the precursor chemicals .

The RIS and its options have not been updated to specifically address the previous concerns (outlined above) in light of this more recent feedback from stakeholders about actual and expected benefits. The main way in which current stakeholder concerns have been incorporated into the RIS and its options is through the consideration of an additional option that only applies the Code to four highest risk toxic chemicals of security concern.

ASIO consultation

In comments provided to AGD and PwC about the proposed security measures, ASIO noted that:

- 'Any improvements in the timeliness and quality of information reported to the [National Security Hotline], either by industry or the general public, would be a good outcome of AGD's chemical security work program'.
- '[B]roadly speaking, any risk treatment measure that makes it more difficult for terrorists or criminals to legitimately, or otherwise, obtain precursor chemicals for malicious purposes is a positive outcome'.
- 'ASIO's view is that if AGD can successfully create a 'culture of security awareness' across chemical supply chains it will become inherently more difficult for terrorists and criminals to access precursor chemicals to carry out their malicious intent'.
- 'ASIO and [the Australian Federal Police] share the view that security measures which have a strong deterrent effect are effective in changing terrorist behaviour such that it reduces the risk to the community. For example, more stringent point-of-sale procedures where retailers request identification details from the purchaser and create an auditable trail of transaction records will have a deterrent effect and thereby reduce the risk of acquisition of precursor chemicals for malicious purposes'.
- 'Any risk treatment measure which requires the production of photo identification to purchase precursor chemicals is likely to have a deterrent effect at little or no cost to business. It may also improve the quality of information that could be made available to authorities relating to any incidents'.[79]

On balance, the available evidence suggests that the proposed security measures are likely to reduce the risk of individuals and groups using chemicals of security concern for criminal purposes – though the extent of this reduction is unlikely to be large.

6.3 Costs and benefits of the options

This section details the total costs and benefits associated with each of the options. It is important to note that the options are essentially voluntary. Under these options, businesses would be encouraged, *not* compelled, to adopt the proposed security measures. Some of the statistics provided in this section are sourced from PwC's online survey of industry. Refer to section 7.2 for more information about the online survey.

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79 Feedback from ASIO.

6.3.1 Option 1 – A targeted awareness campaign

Costs

Option 1 will impose two broad costs on the Australian community: adoption costs and administrative costs. Adoption costs are the costs borne by industry from adopting the security measures. The quantum of uptake costs associated with Option 1 is a function of two factors:

- the additional costs to businesses of the security measures relative to the *status quo*
- the number of businesses that do not already adopt the proposed security measures, but are likely to adopt them as a result of the targeted awareness campaign (the expected level of adoption).

The expected level of adoption under Option 1 is likely to be low (reflecting the voluntary nature of the targeted awareness campaign) but not insignificant. During the industry focus groups for the previous RIS, stakeholders repeatedly noted that businesses wanted to do the 'right thing' in terms of managing chemical security risks, but lacked adequate information about how to do so. Furthermore, as noted earlier, businesses face a range of private incentives to manage chemical security risks – including the potential cost of reputational damage, the potential cost of legal action and societal norms against terrorism. It is therefore reasonable to expect that a targeted awareness campaign could encourage some businesses to alter their behaviour and adopt some of the proposed security measures.

Conversely, feedback from stakeholders suggests that some measures – 'Consignment Control' and 'Inventory Control' in particular – are likely to impose significant additional costs on industry. Given the scale of these costs, as well as the vehemence that characterised industry comments about these measures in earlier focus group meetings, it is assumed in this analysis that no businesses will adopt 'Consignment Control' and 'Inventory Control' under Option 1. Additional feedback suggests that wholesalers, retailers and end-users may be less likely to adopt the proposed security measures under a voluntary approach – given that businesses across these nodes are more likely to be small-to-medium enterprises and thus face a range of capacity constraints.

Under Option 1, it is assumed that NGAG members will collaborate in developing and implementing the targeted awareness campaign (including outreach efforts), and that the campaign will run for a period of three years. It is possible that various industry associations will also dedicate staff resources to assist with the targeted awareness campaign. The level of this additional staff effort, however, is uncertain and, consequently, is not included in our estimates.

The cost estimates to industry associated with Option 1 have been split into adoption costs and awareness costs.

Adoption costs

This Decision RIS estimates total adoption cost using three main inputs:

- the average cost incurred per affected business for each security measure (denoted in Table 9),
- the total population of businesses that use or handle one or more of the 84 chemicals of security concern (denoted in Table 3 and detailed in Appendix A),
- the proportion of businesses that are likely to adopt the proposed security measures under Option 1 (detailed in Appendix A)

Under Option 1, the estimated adoption across all affected businesses under Option 1 (in NPV terms) is $297 million over 2014-23. As Table 11 outlines, this is primarily driven by end-users (95 per cent of the cost), particularly in relation to 'Theft and Diversion' and 'Security Awareness' procedures.

Table 11: Estimated adoption costs under Option 1, NPV over 10 years (millions)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Employee and Contractor Checking	$0.10	$0.06	$0.06	$0.08	$17.82	$0.38	**$18.49**
Security Awareness	$0.50	$0.42	$0.45	$0.98	$59.85	$4.72	**$66.91**
Inventory Control	-	-	-	-	-	n/a	**-**
Receipt of Chemical	$0.03	$0.02	$0.02	$0.02	$8.44	$0.20	**$8.75**
Theft and Diversion Procedures	$0.12	$0.07	$2.40	$1.34	$199.41	$1.17	**$204.52**
Physical Access Controls	-	-	-	-	-	-	**-**
Personnel Access Controls	-	-	-	-	-	-	**-**
Point of Sale	$0	$0-	$0.01	$0.04	n/a	n/a	**$0.05**
Sales and Distribution	$0	$0	$0	$0	n/a	n/a	**$0**
Consignment Control	$0	$0	$0	$0	$0	$0	**$0**
NPV over 10 years (millions)	**$0.75**	**$0.57**	**$2.93**	**$2.47**	**$285.52**	**$6.48**	**$298.72**

Note that numbers may not sum due to rounding.
Source: PwC

It should be noted that the estimates outlined in Table 11 do not represent all the costs associated with the security measures, as the Decision RIS was unable to quantify costs associated with 'Physical Access Controls', 'Personnel Access Controls' and 'Inventory Control'. Therefore, the costs of Option 1 are likely to be higher than estimated in Table 11.

Awareness costs

There would be costs associated with businesses digesting and assessing whether or not they voluntarily adopt the security measures outlined in a government led targeted awareness campaign. For Option 1, we have estimated this cost to be $5.5 million, which is a one-off cost to be borne in the first year. Appendix B provides greater detail on the calculation of this figure.

The total cost associated with Option 1 is therefore estimated to be (in NPV terms) $304.3 million over 2014-23.

Table 12: Estimated total costs for Option 1, NPV over 10 years (millions)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Adoption Costs	$0.74	$0.56	$2.93	$2.47	$285.52	$6.48	**$298.72**
Awareness Costs	$0.04	$0.03	$0.02	$0.02	$5.19	$0.26	**$5.56**
Total Cost (NPV over 10 years (millions))	**$0.79**	**$0.60**	**$2.95**	**$2.49**	**$290.71**	**$6.74**	**$304.27**

Note that numbers may not sum due to rounding.
Source: PwC

Benefits

Option 1 received support from six submissions as a standalone option and several more in combination with the extension of the Code. Reasons given by stakeholders for supporting Option 1 as a standalone option include:

- A targeted public awareness campaign will 'trigger individuals to consider risks and implement voluntary procedures to minimise terrorist risk.'[80]
- An enhanced education program raising awareness of potential areas of concern and how existing measures can assist would be a 'far more effective investment' than expanding the existing Code.[81]
- In some sectors it is unlikely that businesses would voluntarily adopt a code of practice although in many cases they are already undertaking the practices outlined in the Code – 'an enhancement of existing programs supported by an effective grower engagement strategy would better manage [the chemical security] issue.'[82]

Other stakeholders saw greater value in an awareness campaign if delivered alongside the extension of the Code. A targeted awareness campaign is considered by UNSW as a fundamental risk management strategy which can result in 'real cultural change if coupled with changes to the Code.'[83]

Some stakeholders questioned whether Option 1 (as a standalone option) would be a sustainable or 'long term' approach to managing chemical security risks, and believe it will not change the security risk profile in relation to the 84 chemicals of security concern[84]. Feedback from Griffith University was that it is 'unlikely that an awareness campaign alone would be sufficient incentive for an organisation to invest in additional controls.'[85]

Quantifying the benefits associated with the options is difficult. The key drivers of these benefits – i.e. the volume of toxic chemicals that have been stolen/diverted in Australia, the level of probability that an individual or group will use the chemicals for criminal purposes in Australia and the likely consequences of such use – cannot be reliably identified and calculated on the basis of publicly available information.

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80 AgForce Queensland submission.

81 See GrowCom submission; Department of Agriculture submission.

82 GrowCom submission.

83 UNSW submission.

84 CropLife submission.

85 Griffith University submission.

Moreover, quantifying the level of risk reduction associated with each of the options is difficult, given that:

- there has not been a successful terrorist attack in Australia using toxic chemicals of security concern and therefore 'reduction' is not possible, and
- it is difficult/impossible to measure the success of deterrent measures.

Due to the difficulties of quantifying risk reduction, we have used break-even analysis to provide a basis on which the benefits of the options can be compared. Break-even analysis is, in the words of Mueller and Stewart, 'a standard procedure for getting around the difficulties of estimating the likelihood and consequences of an undesirable event'.[86]

To undertake break-even analysis, we needed an estimate of the costs of an 'average' terrorist attack using toxic chemicals. In the absence of reliable on the data on the cost of an attack using toxic chemicals, as well as the high degree of variability in the potential cost, we have instead relied on the estimates surrounding the 2005 mass transit bombings in London, which was used in the previous RIS. These attacks were responsible for the deaths of 52 people. The 2005 London bombings thus provide an approximation of the likely costs associated with a terrorist attack in Australia. It is important to note, however, the limitations of applying the cost estimates of the 2005 London bombings in the Australian context:

- due to Australia's lack of a subway system, individuals or groups could not exactly replicate the 2005 London bombings in Australia (though a number of Australian cities have partial underground mass transit systems), and
- the cost estimates of the 2005 London bombings are driven, in part, by the indirect cost of reduced tourism. Tourism accounts for a greater share of Gross Domestic Product in the United Kingdom than it does in Australia.[87]

Based on recent data compiled by Mueller and Stewart, the total costs of the 2005 London bombings are estimated to have been £2.4 billion, or 0.19 per cent of British GDP (Table 13). Applying this percentage to Australian GDP in 2010-11, a London-style attack in Australia would cause an estimated $2.5 billion in costs.

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[86] Mueller, J. and Stewart, M.G. (2011), Terror, Security, and Money: Balancing the risks, benefits and costs of homeland security, Oxford University Press, New York. See also: Latourrette, Tom and Henry H. Willis (2007), 'Using Probabilistic Terrorism Risk Modelling For Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative Implemented in the Land Environment', Working Paper, RAND, Santa Monica; and OECD (2008), 'Introductory handbook for undertaking regulatory impact analysis', http://www.oecd.org/dataoecd/48/14/44789472.pdf.

[87] According to Deloitte, tourism was worth £115.4bn to the UK economy in 2009, or 8.9 per cent of GDP. In Australia, tourism was worth $34 billion to the domestic economy in 2009-10, or 2.6 per cent of GDP. See: Deloitte (2010), 'The economic contribution of the Visitor Economy', prepared for Visit Britain, http://www.visitbritain.org/Images/Economic%20case%20for%20the%20Visitor%20Economy%20-%20Phase%202%20-%2026%20July%202010%20-%20FINAL_tcm29-14561.pdf. Accessed on: 16 October 2010; Department of Resources, Energy and Tourism (2010), 'Tourism Satellite Account 2009-10: A summary of results', http://www.ret.gov.au/tourism/Documents/Tourism%20Statistics/2009-10%20TSA%20summary%20of%20key%20results%20web%20factsheet.pdf. Accessed on: 16 October 2010.

Table 13: Cost estimates of the 2005 London bombings[88]

Description	Estimate
Loss of lives (52 people)	£220 million[89]
Repair costs – London Underground and London Buses	£63 million
Lost revenue:	
• **London Underground**	£11 million
• **Restaurants**	£40 million
• **Tourism**	£450 million
• **Retailers**	£1,600 million
Total costs	£2,385 million
Total costs as a proportion of UK GDP (2005)	0.19%
Estimated cost of a London-style attack in Australia (using 2013-14 GDP)	$2,982 million[90]

Source: Mueller and Stewart, PwC

In their 2008 study, Ungerer et al. presented a case study that investigated the economic effects of a successful terrorist attack on Australian soil similar in scope 'to the July 2005 suicide bombings in London'.[91] Using their analysis, the total costs of such an event would equal 0.11 per cent of GDP, or $1.5 billion in 2010-11 dollars (Table 14). It is important to note that Ungerer et al. maintain their 'estimate is likely to be an underestimate', given assumptions used in other studies about the economic impact of terrorism and natural disasters.[92]

88 Mueller, J. and Stewart, M.G. (2011), Terror, Security, and Money: Balancing the risks, benefits and costs of homeland security, Oxford University Press, New York. See also: Latourrette, Tom and Henry H. Willis (2007), 'Using Probabilistic Terrorism Risk Modelling For Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative Implemented in the Land Environment', Working Paper, RAND, Santa Monica; and OECD (2008), 'Introductory handbook for undertaking regulatory impact analysis', http://www.oecd.org/dataoecd/48/14/44789472.pdf. Accessed on: 28 October 2011.

89 This estimate is based on the assumption that the value of a statistical life is $6.5 million. It is important to note that the Office of Best Practice Regulation advises that the value of a statistical life to be used in RISs is $3.5 million. Using the OBPR estimate, the human costs in Table 13 would decrease from £220 million to approximately £120 million. See: OBPR (2008), 'Best practice regulation guidance note: Value of statistical life', <www.finance.gov.au/obpr/docs/ValuingStatisticalLife.rtf>

90 ABS (2014), 'Key Economic Indicators', Cat 1345.0 <http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/1345.0?opendocument?opendocument#NationalAccounts>, accessed 3 November 2014

91 Ungerer, Carl, Henry Ergas, Scott Hook and Mark Stewart (2008), 'Risky business: Measuring the costs and benefits of counter-terrorism Spending', ASPI Special Report, no.18.

92 Ibid.

Table 14: Estimated costs of a terrorist attack in Australia similar in scope to the 2005 London bombings[93]

Description	Estimate
Human cost	$140 million[94]
Capital cost	$70 million
Post event response and investigation	$100 million
Economic losses to business	$1,046 million
Total costs (2006-07 dollars)	$1,356 million
Total costs as a proportion of GDP (2006-07)	0.11%
Total costs (2013-14 dollars)	$1,726 million

Source: PwC analysis based on Mueller and Stewart

Based on the estimates outlined in Table 13 and Table 14, we assume that the costs of a London-style terrorist attack in Australia would range between $1.7 billion and $3 billion.

Using this range, and different assumptions about when the attacks would occur (to account for discounting), Option 1 would need to prevent between 0.10 and 0.32 terrorist attacks using HMEs over 2014-23 to cover the costs associated with the measures (Table 12).

Table 15: Number of terrorist attacks required to be prevented over 2012-2021 for Option 1 to break-even[95]

Assumed total costs of attack	If attack occurred in 2014	If attack occurred in 2023
Lower bound - $1,726 million	0.18	0.32
Upper bound - $2,982 million	0.10	0.19

Source: PwC

Limitations to break-even analysis

There are a number of factors that should be considered when interpreting the results outlined in Table 15. Key amongst these is that Table 15 does not provide an indication of the likely effectiveness of Option 1 (i.e. how many terrorist attacks are expected to be prevented). Rather, it provides a basis on which to determine the reasonableness of whether the costs of Option 1 are likely to be outweighed by its benefits – when the nature and extent of these benefits cannot be reliably estimated or quantified.

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93 Ibid.

94 This estimate is based on the assumption that the attack would kill 50 people and injure 500. Ungerer et al. also assume that the cost of a human fatality is $1.9 million (in line with estimates used by the Bureau of Regional and Transport Economics) and the cost of an injury ranges from $16,000 to $400,000 per person. It is important to note that the Office of Best Practice Regulation advises that the value of a statistical life to be used in RISs is $3.5 million. Using the OBPR estimate, the human costs in Table 14 would increase from $140 million to $220 million. See: OBPR (2008), 'Best practice regulation guidance note: Value of statistical life', www.finance.gov.au/obpr/docs/ValuingStatisticalLife.rtf

95 In undertaking the break-even analysis, we first calculated a 2014 NPV and a 2023 NPV for our lower and upper bound estimates of the costs of a terrorist attack (using a 7 per cent discount rate). We did this to account for the time value of money and to recognise that a terrorist attack today would have a greater present value than a terrorist attack in 10 years. Second, we then divided the estimated total cost of Option 1 (as outlined in Table 12) by the 2014 NPV and 2023 NPV for our lower bound estimate and the 2014 NPV and 2023 NPV for our upper bound estimate. For example, our estimated total cost of Option 1 is $304.27 million. Dividing this figure by $1,726 million (the 2014 NPV) for our lower bound estimate) equals 0.18.

Table 15, therefore, does not predict that Option 1 would prevent between 0.10 and 0.32 terrorist attacks over 2014-23, but instead, poses the question: how reasonable is it to expect that Option 1 would be able to prevent such a rate of terrorist attacks?

Other limitations that should be noted include:

- The estimates for the costs of a London-style terrorist attack outlined in Table 13 and Table 14 include both direct (i.e. loss of lives) and indirect economic impacts (i.e. the impact of fear on tourism). In estimating the costs of the options, however, this Decision RIS has only focused on direct impacts (e.g. the costs to industry of adopting the measures); the indirect flow-on impacts of the options to the economy have not been calculated. We believe this is appropriate because the economy wide impacts of the voluntary options are likely to be marginal (given the relative quantum of direct impacts involved).
- The principle focus of Options 1-3 is to reduce the risks of terrorist use of chemicals. While the scale of the 2005 London bombings is taken to be reasonably representative of a successful terrorist attack using toxic chemicals, not all illegitimate misuse of toxic chemicals will impose the same level of costs as a terrorist attack.
- Denotation of a bomb is likely to cause more damage to infrastructure than a toxic attack – on the other hand toxic chemicals could affect an entire population if they were added to the relevant water supply.

6.3.2 *Option 2 – Extending the National Code of Practice for Chemicals of Security Concern to the 84 toxic chemicals of security concern*

Costs

Option 2 is expected to impose the same type of adoption costs as Option 1, but the total of these costs will be higher, due to a greater expected level of uptake. Respondents to PwC's online survey of industry indicated that approximately 29 per cent of them (n=133) would alter their practices in some way if the voluntary Code was extended to the 84 toxic chemicals of security concern. This proportion would be higher than that under Option 1 based on responses to both the survey for this RIS and the previous RIS, which indicated that they believed that businesses in their industry would be more likely to adopt the proposed security measures if they were encouraged to do so by governments through a standard or code of practice as opposed to through a targeted education campaign.

Under Option 2, industry (primarily through the relevant industry associations) and the State and Territory governments are also likely to dedicate staff time to developing and promulgating the extension of the Code. However, based on stakeholder feedback, it is assumed additional staff time at the State and Territory government and industry levels will be marginal. Consequently, this additional staff time has not been quantified.

The cost estimates to industry associated with Option 2 have been split into adoption costs and awareness costs.

Adoption costs

The estimated adoption costs across all affected businesses under Option 2 (in NPV terms) is $371.28 million over 2014-23. As Table 26 outlines, this is primarily driven by end-users (95 per cent of the cost), particularly in relation to 'Theft and Diversion' and 'Security Awareness' procedures.

Table 16: Estimated adoption costs under Option 2, NPV over 10 years (millions)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Employee and Contractor Checking	$0.12	$0.07	$0.07	$0.10	$22.28	$0.05	**$23.11**
Security Awareness	$0.62	$0.52	$0.56	$1.23	$74.81	$5.91	**$83.64**
Inventory Control	-	-	-	-	-	n/a	**-**
Receipt of Chemical	$0.04	$0.03	$0.02	$0.04	$10.55	$0.25	**$10.94**
Theft and Diversion Procedures	$0.14	$0.09	$3.00	$1.68	$249.27	$1.47	**$255.65**
Physical Access Controls	-	-	-	-	-	-	**-**
Personnel Access Controls	-	-	-	-	-	-	**-**
Point of Sale	$0	$0	$0.01	$0.05	n/a	n/a	**$0.06**
Sales and Distribution	$0	$0	$0	$0	n/a	n/a	**$0**
Consignment Control	$0	$0	$0	$0	$0	$0	**$0**
NPV over 10 years (millions)	**$0.93**	**$0.71**	**$3.67**	**$3.09**	**$356.90**	**$8.10**	**$373.40**

Note that numbers may not sum due to rounding.
Source: PwC

It should be noted that the estimates outlined in Table 16 do not represent all the costs associated with the security measures, as the Decision RIS was unable to quantify costs associated with 'Physical Access Controls', 'Personnel Access Controls' and 'Inventory Control'. Therefore, the costs of Option 2 are likely to be higher than estimated in Table 16.

Awareness costs

There would be costs associated with businesses digesting and assessing whether or not they voluntarily adopt the Code. Respondents to PwC's online survey of industry indicated that this is likely to take an average of 77.2 minutes per business (n=48)[96] with a total one-off cost across the supply chain estimated to be $6.9 million, which is a one-off cost to be borne in the first year.

The total cost associated with Option 2 is therefore estimated to be (in NPV terms) $378.2 million over 2014-23.

[96] Note that this figure has been weighted based on supply chain node. Refer to Appendix B for detailed calculations.

Table 17: Estimated total costs for Option 2

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Adoption Costs	$0.93	$0.71	$3.67	$3.09	$356.90	$8.10	**$373.40**
Administrative Costs	$0.05	$0.03	$0.02	$0.02	$6.49	$0.33	**$6.94**
Total Cost (NPV over 10 years (millions))	**$0.98**	**$0.74**	**$3.69**	**$3.11**	**$363.39**	**$8.43**	**$380.34**

Note that numbers may not sum due to rounding.
Source: PwC

Benefits

Of the proposed options, Option 2 received support from the greatest number of submissions (13 in total) – either as a standalone option or in combination with Option 1 (a targeted awareness campaign). Reasons for this support include:

- The addition of the 84 chemicals 'seems a logical step and in theory should be easily transferrable' from the 11 precursors.[97]
- Option 2 is likely to achieve the best outcome in managing chemical security risks and appears to be reasonable, practical, and avoid regulation and penalties that would be detrimental to industry.[98]
- Extending the Code would ensure that measures to combat the threat posed by toxic chemicals of security concern would be nationally coordinated and consistent'.[99]
- Extending the Code is likely to achieve the best outcome and be the most cost effective as the Code 'outlines a risk based approach which acknowledges the different risks, operating procedures and needs of the multitude of different companies that will have access to and use these substances'.[100]

On the other hand, some stakeholders argued that the risks posed by toxic chemicals of security concern are already very low and as such there is no need to extend the Code, especially given existing controls in place.

Using the same underlying assumptions of the break-even analysis outlined in Option 1, we estimate that Option 2 would need to prevent between 0.13 and 0.41 terrorist attacks over 2014 to 23 to cover the costs associated with the measures, shown in Table 18.

97 Universities Australia submission.

98 Griffith University submission.

99 CropLife submission.

100 PACIA submission.

Table 18: Number of terrorist attacks required to be prevented over 2012-2021 for Option 2 to break-even

Assumed total costs of attack	If attack occurred in 2014	If attack occurred in 2023
Lower bound - $1,726 million	0.22	0.41
Upper bound - $2,982 million	0.13	0.23

Source: PwC

Option 2 would therefore need to prevent slightly more terrorist attacks to break-even than Option 1 in order to cover its higher costs.

6.3.3 Option 3 –Extending the National Code of Practice for Chemicals of Security Concern to the four highest risk chemicals and using industry training

Costs

Option 3 is expected to impose the same type of adoption costs as Options 1 and 2, but the total of these costs will be lower, due to application to fewer chemicals and the use of more efficient mechanisms to raise awareness.

Respondents to PwC's online survey of industry that used one or more of the four highest risk chemicals indicated that approximately 29 per cent of them (n= 51) would alter their practices in some way if the voluntary Code was extended. While adoption rates are broadly similar regardless of whether the Code is extended to four or 84 chemicals, the adoption rate for end users is lower for the four chemicals (potentially reflecting an acknowledgement that enhanced measures may already apply in some organisations to these chemicals).

Under Option 3, industry (primarily through the relevant industry associations) and the State and Territory governments are also likely to dedicate staff time to developing and promulgating the extension of the Code. However, based on stakeholder feedback, it is assumed additional staff time at the State and Territory government and industry levels will be marginal. Consequently, this additional staff time has not been quantified.

Adoption costs

Under Option 3, the extension of the Code will affect a smaller population of businesses than in Option 1 and 2, due to coverage over fewer toxic chemicals. Table 19 shows the estimated population of businesses that use/handle one or more of the four highest risk chemicals outlined in Section 5.2.4. Further detail on the assumptions and calculations behind these population statistics can be found in Appendix A.

Table 19: Population of businesses that use/handle the four highest risk chemicals by supply chain node

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Introducers	129	121	83	24	48	6	1	1	**413**
Processors	81	76	52	15	30	4	1	1	**258**
Wholesalers	91	75	47	18	29	4	1	2	**265**
Retailers	73	64	48	18	26	6	2	3	**239**
End-users	16,640	11,174	8,004	6,002	7,284	687	300	344	**50,435**
Transport/ Logistics	806	659	475	173	266	34	12	19	**2,444**
Total	**17,819**	**12,168**	**8,709**	**6,250**	**7,683**	**741**	**316**	**369**	**54,054**

Source: PwC analysis of IBISWorld and ABS data

Table 20 shows the estimated adoption costs under this option. Aside from the smaller population, adoption costs are lower than under Option 2 because the training modules use of existing training mechanisms are expected to decrease the time required from employees when undertaking the annual awareness training. For aluminium phosphide users, no additional 'Security Awareness' cost has been attributed to the undergoing of training as it is assumed to be assimilated into existing RTO training structures and programs. For users of sodium cyanide, potassium cyanide and chlorine (gas), the cost of training has been standardised according to expected time taken to complete the modules.

Full calculations and further detail on assumptions can be found in Appendix A.

Table 20: Estimated adoption costs under Option 3, NPV over 10 years (millions)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Employee and Contractor Checking	$0.07	$0.05	$0.05	$0.07	$5.83	$0.40	**$6.47**
Security Awareness	$0.34	$0.27	$0.05	$0.07	$4.57	0.33	**$5.72**
Inventory Control	-	-	-	-	-	n/a	**-**
Receipt of Chemical	$0.02	$0.02	$0.02	$0.03	$2.55	$0.19	**$2.84**
Theft and Diversion Procedures	$0.10	$0.08	$2.25	$1.23	$70.49	$1.36	**$75.51**
Physical Access Controls	-	-	-	-	-	-	**-**
Personnel Access Controls	-	-	-	-	-	-	**-**
Point of Sale	$0	$0	$0.01	$0.04	n/a	n/a	**$0.04**
Sales and Distribution	$0	$0	$0	$0	$0	n/a	**$0**

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Consignment Control	$0	$0	$0	$0	$0	$0	**$0**
NPV over 10 years (millions)	**$0.53**	**$0.42**	**$2.37**	**$1.43**	**$83.45**	**$2.28**	**$90.58**

Note that numbers may not sum due to rounding.
Source: PwC

It should be noted that the estimates outlined do not represent all the costs associated with the security measures, as the Decision RIS was unable to quantify costs associated with 'Physical Access Controls', 'Personnel Access Controls' and 'Inventory Control'. Therefore, the costs of Option 3 are likely to be higher than estimated here.

Awareness costs

As with Option 2, there would be costs associated with businesses digesting and assessing whether or not they voluntarily adopt the Code. Respondents to PwC's online survey of industry indicated that this is likely to take an average of 77.2 minutes per business (n=48),[101] which is a one-off cost to be borne in the first year. Appendix B provides greater detail on the calculation of this figure.

Costs to RTOs

There would be costs to some RTO trainers in understanding and integrating the core awareness raising messaging into their existing training courses.

Table 21: Estimated total costs for Option 3

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	TOTAL
Adoption Costs	**$0.53**	**$0.42**	**$2.37**	**$1.43**	**$83.45**	**$2.28**	**$90.48**
Awareness Costs	$0.03	$0.02	$0.01	$0.01	$2.26	$0.20	**$2.55**
Costs to RTOs							**$0.10**
Total Cost (NPV over 10 years (millions))	**$0.57**	**$0.44**	**$2.38**	**$1.44**	**$85.71**	**$2.48**	**$93.13**

Note that numbers may not sum due to rounding.
Source: PwC

Benefits

Option 3 more tightly focusses on the highest risk chemicals. The lower uptake rate may be a reflection of the fact that organisations already recognise these four chemicals as posing particular risks, and the steps already taken to minimise those risks. The option also avoids most of the specific issues raised by stakeholders about extending the Code to the 84 chemicals, and – by using more efficient mechanisms to raise awareness – better responds to stakeholder feedback on that point.

[101] Note that this figure has been weighted based on supply chain node. Refer to Appendix B for detailed calculations.

Using the same underlying assumptions of the break-even analysis as outlined for Options 1 and 2, we estimate that Option 3 would need to prevent between 0.03 and 0.10 terrorist attacks over 2014 to 23 to cover the costs associated with the measures, shown in Table 22.

Table 22: Number of terrorist attacks required to be prevented over 2012-2021 for Option 2 to break-even

Assumed total costs of attack	If attack occurred in 2014	If attack occurred in 2023
Lower bound - $1,726 million	0.05	0.10
Upper bound - $2,982 million	0.03	0.06

Source: PwC

Option 3 would therefore need to prevent fewer terrorist attacks to break-even than Options 1 and 2. In the previous RIS, it did not appear reasonable, based on feedback received from stakeholders, that delivery of the proposed treatment measures through regulation would be able to prevent between 2.20 and 6.77 additional terrorist attacks using HMEs over a 10-year period (the level required to justify the costs of regulation). The other options examined had similar breakeven points. In this case, the costs (and therefore the breakeven points) are much lower, and the lowest breakeven point is associated with extending the Code to only the four highest risk chemicals.

7 Consultation

In developing the Decision RIS, PwC undertook consultation with key stakeholders in industry and government. The approach to consultation consists of:

- Consultation with the National Government Advisory Group (NGAG) and the National Industry Reference Group (NIRG).
- An online survey of industry.
- Five days of teleconference consultations with key stakeholders across different sectors of the supply chain.
- Review of public submission made by a range of stakeholders.

7.1 NGAG and NIRG consultations

NGAG and NIRG will provide direction and input to the analysis and feedback on version of the RIS. Collectively these represent the key stakeholders for the analysis and provided valuable input to the previous RIS.

7.2 Online survey of industry participants

The industries likely to be affected by the proposed RIS options are relatively large in number and located across Australia. Recognising this breadth, an online survey has been used to achieve widespread engagement with the chemical industry.

The online survey sought to gauge the extent of uptake of the Code, and broad costs of adopting the Code. It was sent to industry through peak industry bodies, including members of NIRG.

This was based on the expectation that some or many of those responding would already handle one or more of the 11 chemicals already covered by the Code and would not be affected by any extension.

The survey covered a sample size of approximately 200 businesses, spanning the whole supply chain. The sample also incorporated businesses from different jurisdictions within the country and different industries, including: agriculture, education, retail and manufacturing.

7.3 Telephone interviews

The purpose of these consultations is to gain a greater insight into the adoption costs of the proposed options for businesses and industry across different parts of the supply chain. Consultations will be held via teleconference.

We will consult a mix of those consulted with during the previous RIS (to verify cost estimates of adopting the Code and uptake in practice) and those affected for the first time by options in the current RIS to determine whether the previous cost estimates are applicable and also confirm our understanding of likely uptake of different measures. An important consideration will be determining the marginal impact on those already adopting the Code that also handle one or more of the 84 chemicals.

7.4 Public comment

Additionally, the Consultation RIS was released for public comment for a number of weeks (July to August 2014). Stakeholders were given the opportunity to provide feedback regarding the impact analysis and preferred option through providing submissions to AGD. A total of 30 stakeholders submitted a response to the Consultation RIS.

7.4.1 Summary of feedback

The sections below summarise the feedback provided by stakeholders about the Consultation RIS with particular respect to the proposed options:

- maintain the *status quo*.
- Option 1 – a targeted awareness campaign.
- Option 2 - extending the National Code of Practice for Chemicals of Security Concern to toxic chemicals of security concern *(preferred option for the purpose of the Consultation RIS)*.
- other options not considered (e.g. amendments to criminal codes, increased enforcement of existing laws).

In general, some stakeholders appeared to not fully understand how the Code operates, which may have affected views. Some said either the risks are too low to implement measures, the quantities of chemicals businesses hold are minute or diluted, some measures are too costly, or that existing risk treatment measures are sufficient.

Option 2 – Extending the National Code of Practice for Chemicals of Security Concern to toxic chemicals of security concern

Of the proposed options, Option 2 received support from the greatest number of submissions (13 in total) – either as a standalone option or in combination with Option 1 (a targeted awareness campaign). Reasons for this support include:

- The addition of the 84 chemicals 'seems a logical step and in theory should be easily transferrable' from the 11 precursors'.[102]
- Option 2 is likely to achieve the best outcome in managing chemical security risks and appears to be reasonable, practical, and avoid regulation and penalties that would be detrimental to industry.[103]
- 'Extending the Code would ensure that measures to combat the threat posed by toxic chemicals of security concern would be nationally coordinated and consistent'.[104]
- Extending the Code is likely to achieve the best outcome and be the most cost effective as the Code 'outlines a risk based approach which acknowledges the different risks, operating procedures and needs of the multitude of different companies that will have access to and use these substances'.[105]

A number of stakeholders suggested applying exemptions to particular industry groups/sectors (e.g. laboratories that hold and use small amounts of the 84 chemicals).[106] AgForce Queensland suggested that the Code is more applicable to the supply chain nodes of wholesalers and retailers, whereas end-user producers and transport logistics are better served by industry codes and best practice.[107]

In supporting Option 2, a number of stakeholders emphasised the need for a targeted awareness program (option 1) in addition to the extension of the Code to the 84 toxic chemicals, to support and

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[102] Universities Australia submission.

[103] Griffith University submission.

[104] CropLife submission.

[105] PACIA submission.

[106] Universities Australia submission.

[107] AgForce Queensland submission.

encourage the take up of the proposed treatment measures[108]. According to GPA, 'Targeted awareness processes that assist growers to identify measures already undertaken in the business as being compliant with the Code will reduce the regulatory costs associated with the management of the 84 chemicals of security concern through the Code'.[109]

Option 1 – Targeted awareness campaign

Option 1 received support from six submissions as a standalone option and several more in combination with the extension of the Code. Reasons given by stakeholders for supporting Option 1 as a standalone option include:

- A targeted public awareness campaign will 'trigger individuals to consider risks and implement voluntary procedures to minimise terrorist risk'.[110]
- An enhanced education program raising awareness of potential areas of concern and how existing measures can assist would be a 'far more effective investment' than expanding the existing Code.[111]
- In some sectors it is unlikely that businesses would voluntarily adopt a code of practice although in many cases they are already undertaking the practices outlined in the Code– 'an enhancement of existing programs supported by an effective grower engagement strategy would better manage [the chemical security] issue'.[112]

Other stakeholders saw greater value in an awareness campaign if delivered alongside the extension of the Code. A targeted awareness campaign is considered by UNSW as a fundamental risk management strategy which can result in 'real cultural change if coupled with changes to the Code'.[113]

Some stakeholders questioned whether Option 1 (as a standalone option) would be a sustainable or 'long term' approach to managing chemical security risks, and believe it will not change the security risk profile in relation to the 84 chemicals of security concern.[114] Feedback from Griffith University was that it is 'unlikely that an awareness campaign alone would be sufficient incentive for an organisation to invest in additional controls'.[115]

Maintaining the status quo

Maintaining the *status quo* was supported by a number of stakeholders, primarily on the basis that industry already faces extensive regulation in the form of state legislation and other national standards and codes, and expanding the Code adds an additional unnecessary red tape burden.[116] Added regulation is expected to result in higher costs for industry and some stakeholders claim that the Code offers no guarantee of improved security outcomes.[117]

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[108] Griffith University submission, PACIA submission, GPA submission.

[109] GPA Submission

[110] AgForce Queensland submission.

[111] GrowCom submission; Department of Agriculture submission.

[112] GrowCom submission.

[113] UNSW submission.

[114] CropLife submission.

[115] Griffith University submission.

[116] AGent Sales submission, PGA WA submission, Goat Veterinary Consultancies submission, Department of Agriculture submission.

[117] Department of Agriculture submission, AGent submission, Kwinana Industries Council submission, PGA WA submission.

Various stakeholders also argued that the risks posed by toxic chemicals of security concern are already very low and as such there is no need to extend the Code. Kwinana Industries Council claims that security is already being managed in a very robust manner within business without an expanded Code, and so the addition of further regulation will not achieve improved safety or security outcomes.[118]

Other stakeholders view the costs of adopting an extended voluntary Code being disproportionate to the threat posed by toxic chemicals of security concern. The Australian Lot Feeders' Association is concerned that the proposed option of extending the Code would come with 'unnecessary compliance costs for industry given a history of low misuse of these chemicals'.[119] AGent Sales and the Pastoralists and Graziers Association of WA argue that there is already a low likelihood of the use of toxic chemicals in a security event, negating the need for the Code to be extended.[120]

[118] Kwinana Industries Council submission.

[119] ALFA submission, PGA WA submission.

[120] AGent submission.

8 Evaluation and conclusion

In line with *the Guidelines*, this Decision RIS is required to identify a preferred option that generates the greatest net benefit for the Australian community.

Existing controls on toxic chemicals of security concern are often focused on managing the risks posed by chemicals to human health, including occupational health and safety and environmental health. Or, more specifically, the risks posed by the accidental or negligent misuse of chemicals, rather than intentional misuse. Some existing controls do seek to manage security risks but these only cover some of the toxic chemicals of security concern that are the focus of this RIS.

Gaps exist in the capacity of businesses to manage the security risks associated with the legitimate or illegal access to toxic chemicals of security concern. Risk assessments undertaken by AGD identified vulnerabilities in the ability of businesses to deter, prevent and detect the theft and diversion of these chemicals, and to facilitate law enforcement through effective information provision.

There are no known examples of terrorist use of the toxic industrial or agvet chemicals in Australia. However, they have been associated with criminal activity including attempted and actual poisonings, murders and suicides.

The Chemical Security Coordination Unit (CSCU), in consultation with industry and government representatives, has drafted a range of security measures to address the vulnerabilities identified through the risk assessment process. The measures are contained in the Code and currently apply to 11 HME precursors. The measures are suitable to apply to all chemicals of security concern.

There are a number of options available to governments in relation to risks associated with toxic chemicals of security concern:

- continuing with the *status quo*
- options to encourage those handling toxic chemicals of security concern to voluntarily adopt measures contained in the Code, such as:
  - launching a targeted awareness campaign
  - expanding the Code to cover:
    - the 84 toxic chemicals of security concern
    - the four highest risk toxic chemicals of security concern
- other, less feasible options that are not the focus of this RIS, in particular: regulation, industry codes, enhanced enforcement of – and increased penalties attached to - existing laws/increased monitoring of potential terrorists, action at the state/territory level, and an option suggested by one stakeholder in a submission to the Consultation RIS.

The status quo

By its very nature, maintaining the *status quo* would not result in any additional costs for industry or government. However, it would leave unaddressed the identified vulnerabilities in the capacity of industry to contribute to the management of security risks associated with the legitimate and illegal access of toxic chemicals of security concern. As a consequence, the current risk posed by individuals and groups using toxic chemicals of security concern for terrorist and criminal purposes – as well as associated costs to industry, governments and society should those risks lead to an attack – would remain unchanged.

It is also important to note that:

- terrorism (and mass-casualty violence in general) is generally seen as a moral wrong in Australia

- due in part to this societal norm, there is a strong community expectation that government will take all reasonable steps to reduce the risk of terrorism.

As the then Commissioner of the Australian Federal Police stated in 2003:

> *The 11 September 2001 attacks, and then more recently and tragically for Australia, the Bali bombings of 12 October 2002, have dramatically altered Government and community expectations in respect of terrorism. There is now a strong government and community expectation to not only monitor terrorist activity, but to disrupt it.*[121]

Persisting with the *status quo* is unlikely to address these societal expectations.

Most submissions to the Consultation RIS favoured some form of action over and above the *status quo* to manage the risks associated with toxic chemicals of security concern. That said, a minority felt that:

- industry already faces extensive regulation and that expanding the Code is an unnecessary red tape burden, since the risks posed by toxic chemicals of security concern are already very low and that security is already being managed in a very robust manner without an expanded Code
- further regulation will not achieve improved safety or security outcomes
- the costs of adopting an extended voluntary Code are disproportionate to the threat posed by toxic chemicals of security concern
- the Code could in future be made mandatory through legislation if uptake is not as great as anticipated.

Options to encourage voluntary adoption of the National Code of Practice for Chemicals of Security Concern by those handling toxic chemicals of security concern

The benefits from encouraging adoption of the Code by those handling toxic chemicals of security concern are uncertain (even once stakeholder submissions to the Consultation RIS are taken into account). It is not possible to indicate the size of the benefits either quantitatively or qualitatively from reduced harmful incidents associated with criminal use of toxic chemicals. As a result, it is possible that the costs could outweigh the benefits in the case of these options, in which case the *status quo* would be preferred.

That said, respondents to PwC's online survey of industry who use or handle precursor chemicals were asked to what extent they believe that the security measures they have implemented have generated benefits surrounding:

- reduced reputational risk
- reduced stock loss, enhanced inventory management
- enhanced staff quality (through improved screening).

The majority of respondents (60 per cent) believed that the security measures generated at least some benefits, with some indicating that there had been benefits 'to a great extent' Similarly, most respondents who use or handle toxic chemicals of security concern (but who do not use or handle the precursor chemicals and so have not adopted any of the measures to date) expected that the security measures would generate at least some benefits, with some indicating that there would be benefits 'to a great extent'.

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[121] Keelty, Mick (2003), 'Closing the circle: The AFP's capacity to fight terrorism', Platypus Magazine, no. 78, pp.4-10.

Furthermore, during telephone consultations with stakeholders it was noted that all of those consulted that had or would adopt the security measures believed the benefits from doing so - both to their business and to society as a whole – outweighed the cost.

A number of stakeholders questioned whether Option 1 (as a standalone option) would be a sustainable or 'long term' approach to managing chemical security risks, and believe it will not change the security risk profile in relation to the 84 chemicals of security concern. Stakeholders generally saw greater value in an awareness campaign if delivered alongside the extension of the Code. According to one stakeholder, it is unlikely that an awareness campaign alone would be sufficient incentive for an organisation to invest in additional controls. This is consistent with the findings from the previous RIS on the Code (in relation to precursors to HMEs).

The risk assessments highlight that the four chemicals are the highest risk. This appears to be supported by data collected for this analysis. More of those handling the four chemicals would read the Code (compared to those handling the 84), however on the other hand fewer of those handling the four would take steps to implement measures in the Code. This may be a reflection of the higher risk posed by those four chemicals (and awareness of those risks by those handling these chemicals) and the steps already taken to manage risks associated with them.

While most stakeholders supported extending the Code, a number of stakeholders raised issues with its extension to particular chemicals or nodes/stakeholders:

- Some suggested applying exemptions to particular industry groups/sectors (e.g. laboratories that hold and use small amounts of the 84 chemicals).[122]
- AgForce Queensland suggested that the Code is more applicable to the supply chain nodes of wholesalers and retailers, whereas end-user producers and transport logistics are better served by industry codes and best practice.[123]
- A number of those consulted (particularly in the telephone interviews) suggested that the risks from some of these chemicals are so low that they would not do anything in response to the Code's extension.
- A number of the 84 chemicals are, in effect, no longer in use in Australia.
- Agvet chemicals are already subject to relatively stringent controls.

As stated above, quantifying the benefits associated with the options is difficult. The key drivers of these benefits (i.e. the volume of toxic chemicals that have been stolen/diverted in Australia, the level of probability that an individual or group will use the chemicals for criminal purposes in Australia and the likely consequences of such use) cannot be reliably identified and calculated on the basis of publicly available information.

Moreover, quantifying the level of risk reduction associated with each of the options is difficult, given that:

- there has not been a successful terrorist attack in Australia using toxic chemicals of security concern and therefore 'reduction' is not possible, and
- it is difficult/impossible to measure the success of deterrent measures.

Due to the difficulties of quantifying risk reduction, we have used break-even analysis to provide a basis on which the benefits of the options can be compared. Break-even analysis is, in the words of Mueller and Stewart, 'a standard procedure for getting around the difficulties of estimating the likelihood and consequences of an undesirable event'.[124]

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[122] Universities Australia submission.

[123] AgForce Queensland submission.

[124] Mueller, J. and Stewart, M.G. (2011), Terror, Security, and Money: Balancing the risks, benefits and costs of homeland security, Oxford University Press, New York. See also: Latourrette, Tom and Henry H. Willis (2007), 'Using Probabilistic Terrorism Risk Modelling For

The benefits of the options come from businesses adopting the measures in the Code. As stated above, adopting businesses view these benefits as outweighing the associated costs to them. On one level, the more businesses adopting the measures the higher the net benefits, which would suggest the best option is one that captures 84 chemicals. One the other hand, for an option to have net benefits overall, the gains from businesses adopting the measures need to cover not only the costs of businesses understanding the Code and adopting measures, but also:

- costs associated with other businesses that spend time reading the Code but not taking any further action
- costs to government in extending the Code and raising awareness (which are admittedly negligible).

Responses to our telephone consultations suggest that adopting businesses will tend to spend more in relation to 'Security Awareness' and 'Theft and Diversion Procedures' (the two measures with the highest costs) if the Code applies to the four chemicals versus the 84. This is not surprising, given that the four chemicals are of higher risk. Using existing training and modules serves to decrease the per business benefits required for Option 3 to break even. In effect, it means that the breakeven point is most easily reached if the Code extends to four chemicals as opposed to the 84. Specifically, Option 3 requires fewer terrorist attacks than Options 1 and 2 to be prevented over 2014-23 in order to break-even.

Table 23: Summary of costs associated with each option

	Option 1 Awareness raising on the 84 chemicals	Option 2 Extend National Code of Practice to the 84 chemicals	Option 3 Extend National Code of Practice to 4 chemicals and use existing training
Adoption Costs ($million NPV over 2014-23)	$298.72	$373.40	$90.48
Awareness Costs ($million NPV over 2014-23)	$5.56	$6.94	$2.55
Cost to RTOs ($million NPV over 2014-23)	$0	$0	$0.10
Total Cost ($million NPV over 2014-23)	**$304.27**	**$380.34**	**$93.13**
Number of terrorist attacks the option would need to prevent to breakeven (over 2014-23)	**0.1 – 0.32**	**0.13 – 0.41**	**0.03 – 0.1**
Affected Population	**186,299**	**186,299**	**54,054**

Source: PwC

As shown in Table 23, the cost of Option 3 is much lower than the cost of the other options. Consequently, the number of terrorist attacks required for the option to breakeven is lower. It should be noted that this estimate does not provide an indication of the likely effectiveness of the options (i.e. how many terrorist attacks are expected to be prevented). Rather, it provides a basis on which to determine the reasonableness of whether the costs of the options are likely to be outweighed by their benefits – when the nature and extent of these benefits cannot be reliably estimated or quantified.

In light of the risks assessments, the views of stakeholders, the smaller benefits for Option 3 to break even, and the ALARP notion, the preferred option for the purpose of this RIS is Option 3 – extending the Code to the four chemicals and using more efficient mechanisms to raise awareness.

Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative Implemented in the Land Environment', Working Paper, RAND, Santa Monica; and OECD (2008), 'Introductory handbook for undertaking regulatory impact analysis', http://www.oecd.org/dataoecd/48/14/44789472.pdf.

9 Implementation and review

AGD, as the lead Australian Government agency for the chemicals of security concern program, will take responsibility for developing and promulgating the National Code of Practice for Chemicals of Security Concern on behalf of COAG.

In terms of reviewing the effectiveness of the extension of the Code, the following considerations are relevant:

- enhanced business capacity to prevent, detect and deter illegitimate and legitimate access to toxic chemicals of security concern by individuals and groups
- increased business and community contribution to intelligence and law enforcement
- increased harmonisation and uniformity of outcomes across the Commonwealth, states and territories
- increased number of suspicious transactions identified and reported
- increased number of incidents involving toxic chemicals of security concern detected and prevented
- increased number of retailers and other supply chain stakeholders reached through awareness-raising campaigns, education and training, etc.
- monitoring and evaluation could make use of reports made to the National Security Hotline.

Appendix A Population of businesses that use/handle toxic chemicals of security concern

The chemical industry in Australia is extensive. There are an estimated 40,000 chemicals approved for use in Australia, which are formulated into over 400,000 trademarked products.[125]

While there is a reasonable understanding about the aggregate size of the chemical industry in Australia, there is little available information about market characteristics for particular chemicals. To overcome this lack of data, we adopted the following approach.

First, in line with the framework the CSRAM developed to assess security risks associated with chemicals of security concern, we conceptualised the supply chain for toxic chemicals of security concern according to six nodes (Table 24).

Table 24: Supply chain nodes

Node	Description
Introducer	First point in the supply chain and either import or manufacture the chemical
Processor	Reformulate or repackage the chemical and on sell to wholesalers, retailers or end users
Wholesaler	Sell primarily to businesses and institutions and do not repackage or reformulate
Retailer	Sell primarily to individuals and do not repackage or reformulate the chemical
End-user (business)	Consume the chemical in their business/institutional processes
Transport/logistics	Multiple points in the supply chain and includes transport and storage of chemicals

Source: AGD

Second, we used ABS and IBISWorld statistics to identify populations of businesses that could *potentially* use or handle the 84 toxic chemicals of security concern. We then assessed what the proportion of each of the populations would handle one or more of the 84 toxic chemicals of security concern. This was conducted through determining how prevalent the toxic chemicals were across each population and then applying a standardised proportion, as indicated in Table 25.

[125] COAG (2008), Report on the Control of Chemicals of Security Concern, Canberra.

Table 25: Proportions applied to population data based on assessment of prevalence

Assessed prevalence level across ABS category	Proportion of ABS population applied
Very High	95 % of population
High	80% of population
Medium	50% of population
Low	20% of population
Very Low	5% of population

Source: PwC

Population Statistics for Option 1 and 2

In order to derive the population of businesses that use or handle one or more of the 84 toxic chemicals of security concern, we initially split into industrial and agvet chemicals, as a different set of assumptions and source data was required for each type. The assumptions for the industrial chemicals are shown in Table 26. The summary by jurisdiction and node is shown in Table 27.

Table 26: Breakdown of population figures and assumptions for toxic industrial chemicals

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
Introducers	**2,404**	**Low (20%)**	**481**	Using ABS statistics, we identified the total number of businesses across Australia that are classified as 'Basic Chemical and Chemical Product Manufacturing' (ANZSIC Subdivision 18). The proportion was assessed as 'Low' due to the broad nature of the categories. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Processors	**2,404**	**Very Low (5%)**	**119**	The population data used for Introducers is also relevant for processors, as it includes businesses that receive the chemicals in concentrated form and re-process them into active products at lower concentration levels. The proportion was assessed as 'Very Low' per advice from the AGD on the number of processors of toxic industrial chemicals in Australia. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
Wholesalers	**2,465**	**Low (20%)**	**493**	Using IBISWorld industry reports, we identified the number of 'Industrial and agricultural chemical product wholesalers' in Australia. The proportion was assessed as 'Low' as the toxic industrial chemicals represent only a small subset of the total chemicals wholesaled in Australia. *Source: IBISWorld (2013), 'Industry Report F3323, 'Industrial and Agricultural Chemical Product Wholesaling in Australia'*
Retailers	**5,863**	**Very Low (5%)**	**295**	Using ABS statistics, we identified the total number of businesses across Australia that are classified as 'Hardware and Building Supplies Retailing' (ANZIC Code 4231). The proportion was assessed as 'Very Low' on the basis of advice from AGD that only four of the chemicals have a retail sector within Australia. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
End-user (business)				We identified a range of end-users that use toxic industrial chemicals of security concern. As per risk analysis undertaken by AGD, 44 out of these 55 chemicals are only used in laboratories and research purposes, while the remaining eleven are used more extensively across industry. This split is provided below:
	744	Very High (95%)	744	Research laboratories - Using IBISWorld industry reports, we identified the number of scientific research laboratories in Australia to be 3,250. Of this, IBISWorld outlined that 22.9 per cent are categorised as 'Biological science' and 'Chemical, physical and mathematical science', which we have assumed to handle at least one of the toxic industrial chemicals of security concern. The proportion was assessed as 'Very High' as the category has already been largely disaggregated. *Source: IBISWorld (2013), 'Industry Report M6910, Scientific Research Services in Australia'.*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	39	Very High (95%)	39	Universities - There are 39 universities in Australia. We assumed that a 'Very High' proportion of universities use or handle at least one of the toxic industrial chemicals of security concern as many of them are very common in research. *Source: Department of Education and Workplace Relations (2012), Students, Selected Higher Educations Statistics,*
	851	Very High (95%)	808	High schools - Using ABS statistics, we identified the number of secondary schools in Australia (ANZIC Group 802 minus Code 8021- Primary Education). We assumed that a 'Very High' proportion of high schools use or handle at least one of the toxic industrial chemicals of security concern as many of them are very common in school science labs (such as hydrochloric acid). *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	1,175	Low (20%)	235	Hospitals - Using ABS statistics, we identified the number of hospitals in Australia (ANZIC Code 8401). The proportion was assessed as 'Low' due to the limited use of such chemicals in hospitals. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Subtotal End-users (44 of 55 toxic industrial COSC)			**1,789**	

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	36,084	Low (20%)	7,217	Manufacturing- Using ABS statistics, we identified the number of manufacturing businesses across Australia that may handle one or more of the toxic industrial chemicals of security concern. They were classified as: – 'Food Product Manufacturing' (ANZIC Subdivision 11) – 'Textile Manufacturing' (ANZIC Group 131) – 'Textile Product Manufacturing' (ANZIC Group 133) – 'Petroleum and Coal Product Manufacturing' (ANZIC Subdivision 17) – 'Basic Chemical and Chemical Product Manufacturing' (ANZIC Subdivision 18- also counted as introducers) – 'Adhesive Manufacturing' (ANZIC Code 1915), – 'Primary Metal and Metal Product Manufacturing' (ANZIC Subdivision 21) – 'Fabricated Metal Product Manufacturing' (ANZIC Subdivision 22) – 'Automotive Electrical Component Manufacturing' (ANZIC Code 2313) – 'Other Electrical Equipment Manufacturing' (ANZIC Code 2429 – 'Electrical Equipment Manufacturing' (ANZIC Group 243) The proportion was assessed as 'Low' due to the broad nature of the categories. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	7,293	Low (20%)	1,459	Mining - Using ABS statistics, we identified the number of mining businesses across Australia that may handle one or more of the toxic industrial chemicals of security concern. They were classified as: – 'Coal Mining (ANZIC Subdivision 6) – 'Oil and Gas Extraction' (ANZIC Subdivision 7) – 'Other Non-Metallic Mineral Mining and Quarrying' (ANZIC Group 99) – 'Exploration and Other Mining Support Services' (ANZIC Subdivision 10) The proportion was assessed as 'Low' due to the broad nature of the categories. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	27,500	High (80%)	22,000	Cleaners - Using IBISWorld industry reports, we identified the number of commercial cleaning services in Australia. The proportion was assessed as 'High' as chemicals such as 'Chlorine' are very prevalent in the industry. *Source: IBISWorld (2013), 'Industry Report N7311, Commercial Cleaning Services in Australia'.*
	20,328	High (80%)	16,264	Hairdressers - Using ABS statistics, we identified the number of businesses across Australia that are classified as 'Hairdressing and Beauty Services' (ANZIC Code 9511). The proportion was assessed as 'High' as several of the toxic industrial chemicals are quite prevalent across the industry. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	76	Very High (95%)	76	Water Treatment – Using IBISWorld Industry reports, we identified the number of water treatment facilities in Australia. The proportion was assessed as 'Very High' as chemicals such as 'Chlorine' are very prevalent in the industry. *Source: IBISWorld (2013), 'Industry Report OD5422, Water Treatment Services in Australia'.*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	553	Very High (95%)	525	Local councils- Using Australian Government local council directories, we identified the number of local councils existed in Australia. Local councils use the toxic chemicals of security concern for public swimming pools or sporting grounds. The proportion was assessed as 'Very High' as almost all local councils in Australia would have public swimming pools or sporting grounds within their jurisdictions. *Source: Australian Government <australia.gov.au>*
	34,293	High (80%)	27,434	Grain Farming- Using ABS statistics, we identified the number of businesses classified as 'Grain-Sheep or Grain-Beef Cattle Farming' (ANZIC Code 0145), Rice Growing (ANZIC Code 0146) and 'Other Grain Growing' (ANZIC Code 0149). The proportion was assessed as 'High' as several of the toxic industrial chemicals are commonly used for fumigating grain. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	17,039	Medium (50%)	8,520	Hospitality - Using ABS statistics, we identified the number of businesses classified as 'Accommodation' (ANZIC Subdivision 44) and 'Catering Services' (ANZIC Code 4513). The proportion was assessed as 'Medium' as some of the toxic industrial chemicals are used in the hospitality industry for cleaning. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Total End-users			**85,277**	
Transport/ logistics				On the basis of advice provided by AGD, we identified two types of transport that handle toxic industrial chemicals of security concern:

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	42,942	Very Low (5%)	2,148	Commercial - Using IBISWorld industry reports, we identified the number of transport organisations involved in shipping freight by road in Australia. The proportion was assessed as 'Very Low' given that only very few would be involved in the collection and/or delivery of toxic industrial chemicals. *Source: IBISWorld (2013), 'Industry Report I4610, Road Freight Transport in Australia'.*
	13,845	Very Low (5%)	692	Courier - Using IBISWorld industry reports, we identified the number of courier transport organisations involved in the collection and delivery service of products in Australia. The proportion was assessed as 'Very Low' given that only very few would be involved in the collection and/or delivery of toxic industrial chemicals. *Source: IBISWorld (2012), 'Industry Report 15102, Courier Pick-up and Delivery Services in Australia'.*
Total Transport			**2,840**	

Source: PwC analysis of ABS and IBISWorld data and AGD

Table 27: Summary of population by jurisdiction and supply chain node for toxic industrial chemicals

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
Introducer	150	141	97	28	56	7	1	1	**481**
Processor	37	35	24	7	14	2	0	0	**119**
Wholesaler	169	140	87	32	54	7	1	2	**493**
Retailer	90	75	63	23	32	7	2	3	**295**
End-user (total)	28,308	19,570	14,658	8,891	11,162	1,397	534	757	**85,277**
Transport/ logistics	937	766	552	201	309	39	14	22	**2,840**
TOTAL	**29,691**	**20,727**	**15,481**	**9,182**	**11,627**	**1,459**	**552**	**785**	**89,505**

Source: Source: PwC analysis of ABS and IBISWorld data and AGD

The final step we took was to account for overlap of businesses between nodes (e.g. businesses that may operate as introducers and as wholesalers) and between toxic agvet and toxic industrial chemicals (i.e. businesses that handle chemicals in both categories). Analysis

provided by AGD from the previous RIS suggests that approximately 14 per cent of businesses that use or handle precursor chemicals can be classified as spanning two or more supply chain nodes.[126] As per advice from AGD, we have adjusted the population figures here by this amount. Table 28 provides the final population estimates of the number of businesses that use or handle the toxic industrial chemicals of security concern.

Table 28: Summary of population by jurisdiction and supply chain node for toxic industrial chemicals after accounting for overlap

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
Introducer	129	121	83	24	48	6	1	1	**413**
Processor	32	30	21	6	12	2	0	0	**103**
Wholesaler	145	120	75	28	46	6	1	2	**423**
Retailer	77	65	54	20	28	6	2	3	**255**
End-user (total)	24,345	16,830	12,606	7,646	9,599	1,201	459	651	**73,337**
Transport/ logistics	806	659	475	173	266	34	12	19	**2,444**
TOTAL	**25,534**	**17,825**	**13,314**	**7,897**	**9,999**	**1,255**	**475**	**676**	**76,975**

Source: PwC analysis of ABS and IBISWorld data and AGD.

The same process was undertaken for the toxic agvet chemicals of security concern. Refer to Table 29 for the assumptions used for the toxic agvet chemicals of security concern population by supply chain node. The summary by jurisdiction and node is shown in Table 30.

Table 29: Breakdown of population figures and assumptions for toxic agvet chemicals

Node	Total Population	Assessed proportion handling toxic agvet chemicals	Estimated Population	Source and assumptions
Introducers	**2,404**	**Low (20%)**	**481**	Using ABS statistics, we identified the total number of businesses across Australia that are classified as 'Basic Chemical and Chemical Product Manufacturing' (ANZSIC Subdivision 18). The proportion was assessed as 'Low' due to the broad nature of the categories. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*

[126] As part of the CSRA process for the 11 precursor chemicals, the CSRAU surveyed and conducted site visits of 187 businesses. Of these 187 businesses, 24 operated across two supply chain nodes, while three operated across three supply chain nodes.

Node	Total Population	Assessed proportion handling toxic agvet chemicals	Estimated Population	Source and assumptions
Processors	**2,404**	**Low (20%)**	**481**	The population data used for Introducers is also relevant for processors, as it includes businesses that receive the chemicals in concentrated form and re-process them into active products at lower concentration levels. The proportion was assessed as 'Low' per advice from AGD on the number of processors of toxic agvet chemicals in Australia. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Wholesalers	**2,465**	**Very Low (20%)**	**123**	Using IBISWorld industry reports, we identified the number of 'Industrial and agricultural chemical product wholesalers' in Australia. The proportion was assessed as 'Very Low' as the toxic agvet chemicals represent only a very small subset of the total chemicals wholesaled in Australia. *Source: IBISWorld (2013), 'Industry Report F3323, 'Industrial and Agricultural Chemical Product Wholesaling in Australia'*
Retailers	**5,171**	**Very Low (5%)**	**259**	Using ABS statistics, we identified the total number of businesses across Australia that are classified as 'Garden Supplies Retailing' (ANZIC Code 4232) and 'Flower Retailing' (ANZIC Code 4274). The proportion was assessed as 'Very Low' on the basis of advice from AGD that the agvet chemical retail sector is very small. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
End-user (business)				On the basis of advice provided by AGD, we identified a range of end-users that use toxic agvet chemicals of security concern:

Node	Total Population	Assessed proportion handling toxic agvet chemicals	Estimated Population	Source and assumptions
	151,983	High (80%)	110,283	Farming- Using ABS statistics, we identified the number of businesses across Australia that are classified as: - 'Nursery and Floriculture Production' (ANZIC Group 011) - 'Mushroom and Vegetable Growing' (ANZIC Group 012) - 'Fruit and Tree Nut Growing' (ANZIC Group 013) - 'Sheep, Beef Cattle and Grain Farming' (ANZIC Group 014), - 'Sugar Cane Growing (ANZIC Code 0151) - 'Dairy Cattle Farming (ANZIC Group 016) - Other Livestock Farming n.e.c. (ANZIC Code 0199). The proportion was assessed as 'High' as stakeholder feedback indicated that the toxic agvet chemicals were very prevalent across these industries. 'Very High' was not used as the categories are still broad in some cases. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	874	Very High (95%)	831	Research - Using IBISWorld industry reports, we identified the number of scientific research laboratories in Australia to be 3,250. Of this, IBISWorld outlined that 26.9 per cent handle agvet chemicals, therefore this proportion was assumed to handle at least one of the toxic agvet chemicals of security concern. The proportion was assessed as 'Very High' as the category has already been largely disaggregated. *Source: IBISWorld (2013), 'Industry Report M6910, Scientific Research Services in Australia'.*

Node	Total Population	Assessed proportion handling toxic agvet chemicals	Estimated Population	Source and assumptions
	14,778	High (80%)	11,822	Pest control and gardening – Using ABS statistics, we identified the number of businesses across Australia that are classified as 'Building Pest Control Services' (ANZIC Code 7312) and 'Gardening Services' (ANZIC Code 7313). The proportion was assessed as 'High' as several of the toxic agvet chemicals are commonly used as pesticides. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Total End-users			**122,936**	
Transport/ logistics				On the basis of advice provided by AGD, we identified two types of transport that handle toxic agvet chemicals of security concern:
	42,942	Very Low (5%)	2,148	Commercial - Using IBISWorld industry reports, we identified the number of transport organisations involved in shipping freight by road in Australia. The proportion was assessed as 'Very Low' given that only very few would be involved in the collection and/or delivery of toxic agvet chemicals. *Source: IBISWorld (2013), 'Industry Report I4610, Road Freight Transport in Australia'.*
	13,845	Very Low (5%)	692	Courier - Using IBISWorld industry reports, we identified the number of courier transport organisations involved in the collection and delivery service of products in Australia. The proportion was assessed as 'Very Low' given that only very few would be involved in the collection and/or delivery of toxic agvet chemicals. *Source: IBISWorld (2012), 'Industry Report 15102, Courier Pick-up and Delivery Services in Australia'.*
Total Transport			**2,840**	

Source: PwC analysis of ABS and IBISWorld data and AGD

Table 30: Summary of population by jurisdiction and supply chain node for toxic agvet chemicals

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
Introducer	150	141	97	28	56	7	1	1	**481**
Processor	150	141	97	28	56	7	1	1	**481**
Wholesaler	42	35	22	8	13	2	0	1	**123**
Retailer	79	72	49	19	28	7	2	3	**259**
End-user	38,728	25,818	29,332	12,819	12,144	3,015	642	439	**122,936**
Transport/ logistics	937	766	552	201	309	39	14	22	**2,840**
TOTAL	**40,085**	**26,973**	**30,149**	**13,103**	**12,606**	**3,077**	**660**	**467**	**127,120**

Source: PwC analysis of ABS and IBISWorld data and AGD

Using the same overlap assumptions as with the toxic industrial chemicals (i.e. which effectively reduces the population by 14 per cent), the final estimate of the population of businesses using or handling the toxic agvet chemicals of security concern is outlined in Table 31.

Table 31: Summary of population by jurisdiction and supply chain node for toxic industrial chemicals after accounting for overlap

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
Introducer	129	121	83	24	48	6	1	1	**413**
Processor	129	121	83	24	48	6	1	1	**413**
Wholesaler	36	30	19	7	11	2	0	1	**106**
Retailer	68	62	42	16	24	6	2	3	**223**
End-user	33,305	22,203	25,226	11,024	10,444	2,593	552	378	**105,725**
Transport/ logistics	806	659	475	173	266	34	12	19	**2,444**
TOTAL	**34,473**	**23,196**	**25,928**	**11,268**	**10,841**	**2,647**	**568**	**403**	**109,324**

Source: PwC analysis of ABS and IBISWorld data and AGD.

Summing the population of businesses that use or handle toxic industrial chemicals with the population of businesses that use or handle the toxic agvet chemicals generates the total population of businesses that use or handle one or more of the 84 toxic chemicals of security concern. This is provided in Table 32.

Table 32: Number of organisations that use or handle any of the 84 toxic chemicals of security concern

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Introducers	258	242	166	48	96	12	2	2	**826**
Processors	162	151	104	30	60	8	1	1	**516**
Wholesalers	181	150	94	35	57	8	1	3	**529**
Retailers	145	127	96	36	52	12	4	6	**478**
End-users	57,650	39,033	37,832	18,670	20,043	3,794	1,011	1,029	**179,062**
Transport/ Logistics	1,612	1,318	950	346	532	68	24	38	**4,888**
Total	**60,007**	**41,021**	**39,242**	**19,165**	**20,840**	**3,902**	**1,043**	**1,079**	**186,299**

Source: PwC analysis of ABS and IBISWorld data and AGD

Population Statistics for Option 3

As Option 3 only applies to four chemicals, the population statistics were revised to cover only those businesses that use or handle one of the four highest risk chemicals of security concern (Aluminium phosphide, Chlorine, Potassium cyanide and Sodium cyanide). The same approach as that outlined for the 84 was taken, although the base populations were taken from the population of businesses that handle one of the 84 chemicals, rather than the total population in each category. For example, the total population of Mining businesses according to ABS data is 7,293. In terms of the population statistics for businesses that use or handle one or more of the 84 toxic chemicals, we applied a 20 per cent proportion to this number, which was 1,459. For the four highest risk chemicals covered in this section, a proportion is applied on the 1,459 (population using one of the 84 toxic chemicals) rather than the 7,293 (total population). The reason for this was to ensure that overlap was accounted for.

The assumptions used for the population of the four highest risk chemicals are provided in Table 33. The summary by jurisdiction and node is shown in Table 34.

Table 33: Breakdown of population figures and assumptions for four highest risk chemicals

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
Introducers	**826**	**Medium (50%)**	**413**	We assumed that a medium proportion of introducers handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Processors	**516**	**Medium (50%)**	**258**	We assumed that a medium proportion of processors handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Wholesalers	**529**	**Medium (50%)**	**265**	We assumed that a medium proportion of wholesalers handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: IBISWorld (2013), 'Industry Report F3323, 'Industrial and Agricultural Chemical Product Wholesaling in Australia'*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
Retailers	**478**	**Low (20%)**	**293**	We assumed that a low proportion of retailers handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the fact that .only two of the four have a retail sector. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
End-user (business)				On the basis of advice provided by AGD, we identified a range of end-users that use toxic agvet chemicals of security concern:
	27,434	All (100%)	27,434	Grain Farming- As per AGD and industry advice, we assumed that all of the businesses that handle one or more of the toxic agvet chemicals will handle aluminium phosphide. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	2,619	Medium (50%)	1,310	Research - We assumed that a medium proportion of wholesalers handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: IBISWorld (2013), 'Industry Report M6910, Scientific Research Services in Australia'.*
	526	All (100%)	500	Local Councils – We assume that all local councils using one or more of the toxic industrial chemicals would be using chlorine, due to the fact that these councils are likely to contain a public swimming pool, and/or use the chemical for cleaning public areas. *Source: Australian Government <australia.gov.au>*
	72	All (100%)	72	Water Treatment- We assume that all businesses using one or more of the toxic industrial chemicals would be using chlorine, as this is the main chemical used in water treatment. *Source: IBISWorld (2013), 'Industry Report OD5422, Water Treatment Services in Australia'.*

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
	6,683	Medium (50%)	3,342	Accommodation (subset of 'Hospitality', containing 'Accommodation' (ANZIC Subdivision 44)) - We assumed that a medium proportion of wholesalers handling one or more of the toxic industrial chemicals would handle chlorine as a cleaning agent. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	22,000	All (100%)	22,000	Cleaning Services- We assume that all businesses using one or more of the toxic industrial chemicals would be using chlorine, as this is one of the main chemical used in cleaning services. *Source: IBISWorld (2013), 'Industry Report N7311, Commercial Cleaning Services in Australia'.*
	3,509	High (80%)	2,808	Metal Finishing/Processing (subset of 'Manufacturing', containing 'Primary Metal and Metal Product Manufacturing (ANZIC Subdivision 21) and 'Fabricated Metal Product Manufacturing' (ANZIC Subdivision 22))- We assumed that a high proportion of the businesses handling one or more of the toxic agvet chemicals would handle potassium cyanide, due to its high prevalence in the industry. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
	1,464	High (80%)	1,171	Mining - We assumed that a high proportion of the businesses handling one or more of the toxic agvet chemicals would handle sodium cyanide, due to its high prevalence in the industry. *Source: ABS (2012), 'Counts of Australian businesses, including entries and exits', Cat. 8165.0.*
Subtotal End-users			***58,637***	As we have used proportions of populations prior to applying the 14% overlap reduction for duplication between nodes and between agvet and industrial chemicals, this has been applied now.
Total End-users (after accounting for overlap)			**50,435**	

Node	Total Population	Assessed proportion handling toxic industrial chemicals	Estimated Population	Source and assumptions
Transport/ logistics	4,888	Medium (50%)	2,444	We assumed that a medium proportion of transporters handling one or more of the 84 chemicals would handle one or more of the four highest risk chemicals. This was based on the lack of strong evidence to justify either a 'High' or 'Low' proportion. *Source: IBISWorld (2013), 'Industry Report I4610, Road Freight Transport in Australia' and Source: IBISWorld (2012), 'Industry Report 15102, Courier Pick-up and Delivery Services in Australia'.*

Source: PwC analysis of ABS and IBISWorld data and AGD

Table 34: Number of organisations that use or handle any of the four highest risk toxic chemicals of security concern

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
Introducers	129	121	83	24	48	6	1	1	**413**
Processors	81	76	52	15	30	4	1	1	**258**
Wholesalers	91	75	47	18	29	4	1	2	**265**
Retailers	73	64	48	18	26	6	2	3	**239**
End-users	16,640	11,174	8,004	6,002	7,284	687	300	344	**50,435**
Transport/ Logistics	806	659	475	173	266	34	12	19	**2,444**
Total	**17,819**	**12,168**	**8,709**	**6,250**	**7,683**	**741**	**316**	**369**	**54,054**

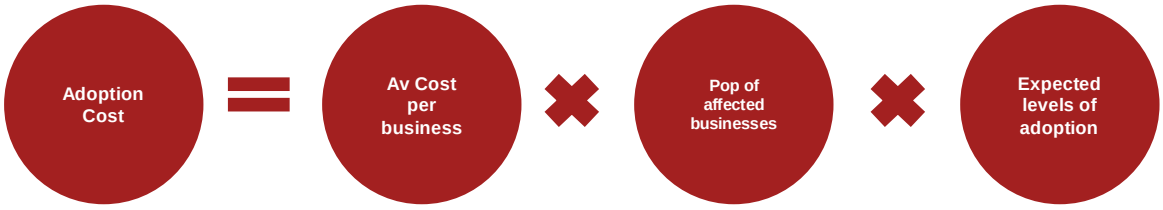
Source: PwC analysis of ABS and IBISWorld data and AGD

Appendix B Cost benefit analysis assumptions and inputs

Adoption costs

The total cost to affected businesses under each option has been broadly calculated in line with Figure 5/

Figure 5: Method for calculating adoption costs



Average Costs per business

The data used to determine the average costs per node and per security measure calculations was obtained from telephone consultations. As part of the consultations, businesses were asked about any one-off and ongoing costs they are likely to incur in implementing each measure. In total, 43 businesses were surveyed. The distribution of businesses across supply chain nodes is denoted in Table 35. Note that several businesses span across multiple nodes.

Table 35: Distribution of responses from telephone consultations by node

Node	No. of responses
Introducers	7
Processors	8
Wholesalers	9
Retailers	8
End-users	24
Transport/Logistics	8

Source: PwC telephone consultations

The following general assumptions were also used in the estimations:

Table 36: General assumptions for cost estimations

Estimate	Amount	Source and/or justification
Hourly employee cost	$76.52	ABS Catalogue 6302.0- Average Weekly Earnings, Australia (Dollars) – Trend, Earnings; Persons; Full Time; Adult; Total Earnings. The figure was multiplied by 1.75 in line with to account for on costs and overheads and then converted into an hourly rate.[127]
Inflation rate	2.5%	Australian Government CPI target
Timeframe for analysis	10 years (2014-23)	Default duration of regulatory change, as per DPMC Interim RIS Process Guidance Note.[128]
Discount rate (used for all NPV calculations)	7%	In line with OBPR guidance on Cost-Benefit Analyses[129]
Cash flows for NPV calculations	Start of year	Initial costs are likely to occur close to the beginning of year one.
Ongoing costs	Denoted as average annual over 10 years	In line with OBPR Regulatory Burden Measure approach

Source: PwC assumptions as denoted in table

In addition, several of the costs associated with 'Employee and contractor checking' and 'Security Awareness' were denoted on a per employee basis. For these costs, we obtained the number of employees for each population group, as per the sources inAppendix A. We then divided the total number of employees by the total population within each node to obtain the average number of employees per business in each node. This is summarised in Table 37. These averages were applied to each 'per employee' cost to convert them into 'per business' costs.

Table 37: Average number of employees per business by node

Node	Average no of employees
Introducers	39.92
Processors	39.92
Wholesalers	5.23
Retailers	85.23
End-users	11.15
Transport/Logistics	3.91

Source: PwC analysis using ABS and IBISWorld data

[127] Oncosts and overheads figure sourced from: Department of Prime Minister and Cabinet (2014), 'Interim Regulation Impact Statement Guidance Note', p34

[128] Department of Prime Minister and Cabinet (2014), 'Interim Regulation Impact Statement Guidance Note', p18

[129] Department of Prime Minister and Cabinet, <https://www.dpmc.gov.au/deregulation/obpr/rbm/index.cfm> accessed 29 October 2014

Employee and contractor checking

Business costs associated with 'Employee and contractor checking' are on both a per business (non-employee dependent, e.g. assimilating background checks into normal business practice) or a per employee basis (e.g. conducting background checks for each employee).

The average non-employee dependent and per employee costs obtained from the telephone consultations are summarised in Table 38 and Table 39 respectively.

Table 38: Average per business costs associated with 'Employee and contractor checking' (non-employee dependent)

Node	One-off		Ongoing	
	Hrs. (per business)	$ (per business)	Hrs. (per business)	$ (per business, average annual over 10 years)
Introducers	-	-	-	-
Processors	-	-	-	-
Wholesalers	-	-	-	-
Retailers	-	-	-	-
End-users			1	86
Transport/ Logistics	2.8	210	-	-

Source: PwC telephone consultations

Table 39: Average per employee costs associated with 'Employee and contractor checking'

Node	One-off		Ongoing	
	Hrs. (per employee)	$ (per employee)	Hrs. (per employee)	$ (per employee, average annual over 10 years)
Introducers	-	-	-	-
Processors	-	-	-	-
Wholesalers	1	77	0.1	9
Retailers	1	77	0.1	9
End-users	-	-	-	-
Transport/ Logistics	1	77	-	-

Source: PwC telephone consultations

Through our telephone consultations, we were unable to obtain cost estimates for the Introducer and Processor nodes. However, stakeholder feedback through the PwC online survey of industry indicated that there would be a cost associated with these nodes. Hence, we have applied an average from the other four nodes to use as the per business cost input for both Introducer and Processor. The total per business NPV costs are denoted in Table 40.

Table 40: Average per business costs associated with 'Employee and contractor checking' (total)

Node	One-off ($ per business)	Ongoing ($ per business)	Total NPV ($ per business)
Introducers	290	44	**615**
Processors	290	44	**615**
Wholesalers	400	45	**733**
Retailers	400	45	**733**
End-users	-	86	**635**
Transport/ Logistics	360	-	**360**

Source: PwC telephone consultations

Security awareness

Business costs associated with 'Security awareness' are on both a per business (non-employee dependent, e.g. creating a training program or communication forum) or a per employee basis (e.g. requiring that each employee undergo security training).

The average non-employee dependent and per employee costs obtained from the telephone consultations are summarised in Table 41 and Table 42 respectively. The total per business NPV costs are denoted in Table 43.

Table 41: Average per business costs associated with 'Security awareness' (non-employee dependent)

Node	One-off		Ongoing	
	Hrs. (per business)	$ (per business)	Hrs. (per business)	$ (per business, average annual over 10 years)
Introducers	0.3	26	2.7	229
Processors	-	-	4	343
Wholesalers	0.3	19	2	171
Retailers	-	-	-	-
End-users	-	-	-	-
Transport/ Logistics	-	-	-	-

Source: PwC telephone consultations

Table 42: Average per employee costs associated with 'Security awareness'

Node	One-off		Ongoing	
	Hrs. (per employee)	$ (per employee)	Hrs. (per employee)	$ (per employee, average annual over 10 years)
Introducers	0.7	51	-	-
Processors	1	77	-	-
Wholesalers	0.4	33	0.9	71
Retailers	-	-	3.8	291
End-users	0.4	29	0.4	27
Transport/ Logistics	-	-	2.5	193

Source: PwC telephone consultations.

Table 43: Average per business costs associated with 'Security awareness'

Node	One-off ($ per business)	Ongoing ($ per business)	Total NPV ($ per business)
Introducers	2,062	229	**3,755**
Processors	3,055	343	**5,595**
Wholesalers	194	542	**4,206**
Retailers	-	1,525	**11,299**
End-users	320	299	**2,533**
Transport/ Logistics	-	754	**5,587**

Source: PwC telephone consultations

Receipt of chemical

Business costs associated with 'Receipt of chemical' incorporated the reporting of suspicious matters in relation to the chemical receipt to the National Security Hotline. Through our telephone consultations, we were unable to obtain cost estimates for the Introducer, Processor, Wholesaler, End-user and Transporter nodes. However, stakeholder feedback through the PwC online survey of industry indicated that there would be a cost associated with these nodes. Hence, we have applied an average from the retail nodes to use as the per business cost input for these five nodes. The total per business NPV costs are denoted in Table 44.

Table 44: Average per business costs associated with 'Receipt of chemical'

Node	One-off		Ongoing		Total
	Hrs. (per business)	$ (per business)	Hrs. (per business)	$ (per business, average annual over 10 years)	NPV ($ per business)
Introducers	-	-	0.5	43	**318**
Processors	-	-	0.5	43	**318**
Wholesalers	-	-	0.5	43	**318**
Retailers	-	-	0.5	43	**318**
End-users	-	-	0.5	43	**318**
Transport/ Logistics	-	-	0.5	43	**318**

Source: PwC telephone consultations

Theft and diversion procedures

Business costs associated with 'Theft and diversion procedures' predominately incorporate the conducting of risk assessments over the chemicals of security concern and implementing theft and diversion or crisis management plans. The total per business NPV costs are denoted in Table 45.

Table 45: Average per business costs associated with 'Theft and diversion procedures'

Node	One-off		Ongoing		Total
	Hrs. (per business)	$ (per business)	Hrs. (per business)	$ (per business, average annual over 10 years)	NPV ($ per business)
Introducers	12.8	976	-	-	**976**
Processors	12.8	976	-	-	**976**
Wholesalers	30	2,296	50	4,286	**34,048**
Retailers	10.3	791	19	1,629	**12,856**
End-users	0.3	26	9.7	825	**6,138**
Transport/ Logistics	-	-	2.5	214	**1,588**

Source: PwC telephone consultations

Point of sale

Business costs associated with 'Point of sale' predominately incorporate the implementation of policies such as requiring End User Declarations and proof of identity for the toxic chemicals of security concern. These costs were only relevant for the Wholesale and Retail nodes. The total per business NPV costs are denoted in Table 46.

Table 46: Average per business costs associated with 'Point of sale'

Node	One-off		Ongoing		Total
	Hrs. (per business)	$ (per business)	Hrs. (per business)	$ (per business, average annual over 10 years)	NPV ($ per business)
Introducers	-	-	-	-	**-**
Processors	-	-	-	-	**-**
Wholesalers	1.5	115	-	-	**115**
Retailers	1.1	83	0.5	43	**400**
End-users	-	-	-	-	**-**
Transport/ Logistics	-	-	-	-	**-**

Source: PwC telephone consultations

Table 47 shows a summary of the average per business costs across each security measures by node.

Table 47: The costs of adopting the security measures for the average business that uses/handles precursor chemicals (NPV over 10 years)

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics	
Employee and Contractor Checking	$615*	$615*	$733	$733	$635	$360	
Security Awareness	$3,755	$5,595	$4,206	$11,299	$2,532	$5,587	
Inventory Control	-	-	-	-	-	n/a	
Receipt of Chemical	$318**	$318**	$318**	$318	$318**	$318**	
Theft and Diversion Procedures	$976	$976	$34,048	$12,856	$6,138	$1,588	
Physical Access Controls	-	-	-	-	-	-	
Personnel Access Controls	-	-	-	-	-	-	
Point of Sale	$0	$0	$115	$400	n/a	n/a	
Sales and Distribution	$0	$0	$0	$0	n/a	n/a	
Consignment Control	$0	$0	$0	$0	$0	$0	$0

* No cost estimates for Introducer and Processors were provided by stakeholders through telephone consultations, therefore an average of estimates provided for 'Employee and Contractor Checking' for the remaining nodes was used.
** No cost estimates for Introducer, Processor, Wholesaler, End-user and Transport/logistics were provided by stakeholders through telephone consultations, therefore an average of estimates provided for 'Receipt of Chemical' for the remaining node (Retail) was used.
Source: PwC telephone consultations and analysis

Population of affected businesses

Refer to Appendix A.

Expected levels of uptake

Adoption costs are borne only by businesses that choose to implement the proposed security measures.

As such, drawing on the results of PwC's online survey of industry as well as feedback received through our telephone consultations, we have estimated the proportion of businesses that are likely to adopt the proposed security measures under each option. Table 48 shows the proportion of businesses that do not already adopt the security measures, but are likely to under Option 1. PwC's online survey of industry did not explicitly collect data on these figures. From the previous RIS, it was noted that the expected level of uptake under a targeted awareness campaign was approximately 80 per cent that of a national code of practice. We have assumed this proportion to hold for this RIS and have therefore applied it to the expected adoption rates for the Code (outlined in Table 49).

Table 48: Proportion of businesses that do not already adopt the security measures but are likely to under Option 1

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Employee and Contractor Checking	19%	18%	16%	22%	16%	22%
Security Awareness	16%	14%	20%	18%	13%	17%
Inventory Control	-	-	-	-	-	n/a
Receipt of Chemical	13%	13%	11%	22%	15%	13%
Theft and Diversion Procedures	14%	14%	13%	22%	18%	15%
Physical Access Controls	-	-	-	-	-	-
Personnel Access Controls	-	-	-	-	-	-
Point of Sale	0%	0%	13%	22%	n/a	n/a
Sales and Distribution	0%	0%	0%	0%	n/a	n/a
Consignment Control	0%	0%	0%	0%	0%	0%

Source: PwC online survey of industry, telephone consultations and previous RIS

Table 49 outlines the proportion of businesses that do not already adopt the security measures, but are likely to if the Code was extended to include the 84 toxic chemicals of security concern.

Table 49: Proportion of businesses that do not already adopt the security measures but are likely to under Option 2

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Employee and Contractor Checking	24%	22%	19%	27%	20%	27%
Security Awareness	20%	18%	25%	23%	16%	22%
Inventory Control	-	-	-	-	-	n/a
Receipt of Chemical	16%	16%	14%	27%	19%	16%
Theft and Diversion Procedures	18%	18%	17%	27%	23%	16%

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Physical Access Controls	-	-	-	-	-	-
Personnel Access Controls	-	-	-	-	-	-
Point of Sale	0%	0%	17%	27%	n/a	n/a
Sales and Distribution	0%	0%	0%	0%	n/a	n/a
Consignment Control	0%	0%	0%	0%	0%	0%

Source: PwC online survey of industry and telephone consultations

Table 50 outlines the proportion of businesses that do not already adopt the security measures, but are likely to if the Code was extended to include the four highest risk toxic chemicals of security concern.

Table 50: Proportion of businesses that do not already adopt the security measures but are likely to under Option 3

	Introducer	Processor	Wholesaler	Retailer	End-user	Transport/ logistics
Employee and Contractor Checking	29%	31%	25%	40%	18%	45%
Security Awareness	24%	31%	38%	60%	13%	40%
Inventory Control	-	-	-	-	-	n/a
Receipt of Chemical	19%	23%	19%	40%	16%	25%
Theft and Diversion Procedures	24%	31%	25%	40%	22%	35%
Physical Access Controls	-	-	-	-	-	-
Personnel Access Controls	-	-	-	-	-	-
Point of Sale	0%	0%	19%	40%	n/a	n/a
Sales and Distribution	0%	0%	0%	0%	n/a	n/a
Consignment Control	0%	0%	0%	0%	0%	0%

Source: PwC online survey of industry and telephone consultations

Awareness costs

The one-off cost associated with businesses digesting and assessing whether to adopt the Code for Options 2, and 3 has been estimated based on a PwC online survey of industry. The cost has then been multiplied by the population of businesses that are likely to actually read the Code. Broadly, the calculation method is given by Figure 6.

Figure 6: Method for calculating cost of reading and understanding the proposed Code

Estimated cost per business

PwC conducted a survey of industry to ascertain how long the existing Code took businesses to read and understand. This is to be used as a proxy for the time that it would take businesses to read and understand the extension of the Code under Option 2. Some 48 responses about the time to read and understand were received from businesses that currently apply the existing Code to the 11 precursor chemicals, however four were stripped out as outliers (10,000; 1,000; 5 and 2 minutes respectively).

To calculate the average time per business, a simple average was first applied to the remaining responses by supply chain node. The averages for each node were then adjusted according to the proportion of the population that each supply chain node represented. That is, a weighted average was calculated.

Population statistics have been derived from Table 3. Note that as this population already accounts for overlap between nodes, respondents who operate across more than one node have been counted in the averages of each of their nodes.

The weighted average time spent per supply chain node is set out in Table 51 below.

Table 51: Per business time spent reading and understanding proposed Code

Supply chain node	Average number of minutes	Average number of hours
Introducer	131.8	2.20
Processor	145	2.42
Wholesaler	71.7	1.20
Retailer	79	1.32
End-user	71.7	1.20
Transport/logistics	132.1	2.20

Note: Numbers may not sum exactly due to rounding.
Source: PwC online survey of industry

Number of businesses

The per business cost must then be applied to the number of businesses that are likely to read the Code. As per PwC's online survey of industry, the percentage of businesses who handle at least one of the 11 HME precursors and at least one of the 84 toxic chemicals is estimated to be 61 per cent. Furthermore, PwC's online survey of industry also indicated that 67 per cent of businesses that handle one of the 11 HME precursors were aware of the existing Code. Businesses that use or handle the precursors and are aware of the existing

Code are assumed to be unlikely to require time to read and understand the proposed extended Code, and therefore should be stripped out of the population.

This is equal to 61 per cent multiplied by 67 per cent. Therefore, 41 per cent of the population will not read the Code (59 per cent will).

Under Option 2, the awareness rate is assumed to be equivalent to that of the precursors RIS (67 per cent).

Table 52: Awareness costs for Option 2

	Number of hours needed to read Code	Employee cost ($/hr.)	Proportion of population that may read the Code	Awareness rate	Population	Total awareness cost ($ millions)
Introducers	2.20	77	0.59	0.67	826	**0.06**
Processors	2.42	77	0.59	0.67	516	**0.04**
Wholesalers	1.20	77	0.59	0.67	529	**0.02**
Retailers	1.32	77	0.59	0.67	478	**0.02**
End-users	1.20	77	0.59	0.67	179,062	**6.49**
Transport/ Logistics	2.20	77	0.59	0.67	4,888	**0.33**
Total						**6.94**

Source: PwC online survey of industry

As per PwC's online survey of industry, the awareness rate for Option 3 would be higher (83 per cent).

Table 53: Awareness costs for Option 3

	Number of hours needed to read Code	Proportion of population that may read the Code	Awareness rate	Population	Total awareness cost ($ millions)
Introducers	2.20	0.59	0.83	413	**0.03**
Processors	2.42	0.59	0.83	258	**0.02**
Wholesalers	1.20	0.59	0.83	265	**0.01**
Retailers	1.32	0.59	0.83	239	**0.01**
End-users	1.20	0.59	0.83	50,435	**2.26**
Transport/ Logistics	2.20	0.59	0.83	2,444	**0.20**
Total					**2.55**

Source: PwC online survey of industry

Finally, although Option 1 does not involve a code of practice, there would still be awareness costs in businesses digesting and assessing whether to implement security measures outlined in a targeted awareness campaign. Based on data in the previous RIS, we have estimated the awareness rate to be 80 per cent of the awareness rate surrounding the Code applying to the 84 toxic chemicals of security concern. This rate is therefore 54 per cent. (80 per cent x 67 per cent).

Table 54: Awareness costs for Option 1

	Number of hours needed to read Code	Proportion of population that may read the Code	Awareness rate	Population	Total awareness cost ($ millions)
Introducers	2.20	0.59	0.54	826	**0.04**
Processors	2.42	0.59	0.54	516	**0.03**
Wholesalers	1.20	0.59	0.54	529	**0.02**
Retailers	1.32	0.59	0.54	478	**0.02**
End-users	1.20	0.59	0.54	179,062	**5.19**
Transport/ Logistics	2.20	0.59	0.54	4,888	**0.26**
Total					**5.56**

Source: PwC

Assumptions and calculations for Option 3

Cost to industry of awareness raising using the modules

AGD will release 5 modules that businesses can use to raise their employees' awareness of security issues surrounding the four toxic chemicals of security concern. Unlike the current situation with precursors, and the other options, businesses would therefore not have to create their own chemical security training programs.

Employees undertaking the training package will do between one and three modules, each module taking approximately 15 minutes to complete. As per AGD advice, the majority of users will only conduct one module, as the remaining modules only apply to specific groups. We have therefore assumed that 90 per cent will conduct one module, 5 per cent will conduct two and 5 per cent will conduct three. Using a weighted average, the training package will take 17 minutes (0.29 hours) per employee.

Stakeholder feedback from PwC's online survey of industry (n=12) also indicated that 42 per cent of businesses would undergo security awareness training on a one-off basis only, while the remaining 58 per cent will commit on an ongoing basis.

Applying these proportions, and using the same wage rate and average employee per node assumptions as earlier in this appendix, the per business cost associated with 'Security Awareness' is shown in Table 55.

Table 55: Per business costs associated with 'Security Awareness' for Option 3

Node	One-off	Ongoing	Total
	$ (per business)	$ (per business, average annual over 10 years)	NPV ($ per business)
Introducers	366	513	**4,618**
Processors	366	513	**4,618**
Wholesalers	48	67	**605**
Retailers	48	67	**605**
End-users	102	143	**1,290**
Transport/ Logistics	36	51	**452**

Source: PwC

The per business cost for 'Security Awareness' only applies to the population of businesses that use or handle any of the three toxic industrial high risk chemicals. This is because users of aluminium phosphide already undergo training through RTOs, and the security awareness component is expected to be assimilated into these programs at no additional cost. Therefore, the population of aluminium phosphide users had to be stripped from the population. For end-users, this was conducted by removing grain farmers and one quarter of researchers out of the population. For all other nodes, it was assumed that aluminium phosphide represented one quarter of the population of businesses. The population of the three toxic industrial high risk chemicals is therefore shown in Table 56.

Table 56: Number of organisations that use or handle any of the 3 toxic industrial highest risk chemicals of security concern

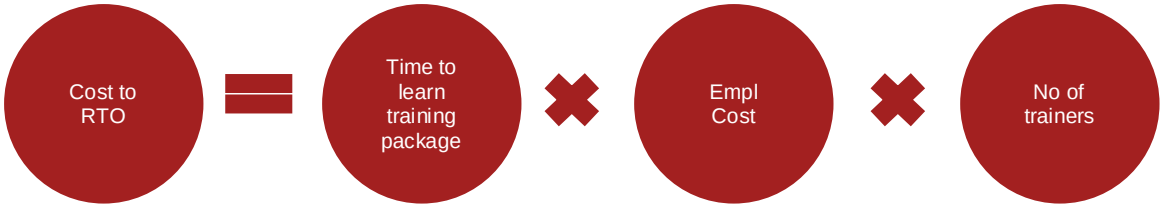
Node	Total
Introducers	310
Processors	194
Wholesalers	198
Retailers	179
End-users	26,552
Transport/ Logistics	1,833
Total	**29,266**

Source: PwC

One-off cost to RTOs to learn training material

The costs to RTOs for training costs is given by Figure 7

Figure 7: Method for calculating cost to RTOs



Time to learn training package

Time commitment = Number of modules x Time per module

There would be a small time commitment for RTO trainers to integrate the very core awareness raising messaging into their existing training courses. While probably an overestimate, this RIS assumes that the time required is broadly similar to the time for an employee to get across the five modules:

Time commitment = 5 x 15 minutes = 1.25 hours

Employee cost

From assumptions above, the hourly employee cost is $76.52.

Number of trainers

Number of trainers = Number of agvet chemical RTOs x Average number of trainers per RTO

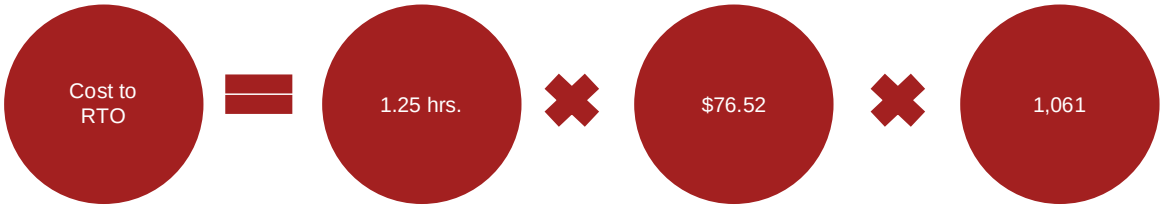
The number of agvet chemical RTOs in Australia, obtained from AusIndustry is 505.

The average number of trainers per RTO was obtained by telephone consultations with RTOs. On average, each RTO was found to have 2.1 trainers.

Number of trainers = 505 x 2.1 =1,061 trainers

The one-off cost to RTOs to learn the training material is therefore as shown in Figure 8.

Figure 8: Cost to RTO calculations



This is equal to an NPV of $101,482 over 2014-23.