Australian Government

Department of Health

Review of Biological Agents of Security Concern

Consultation Report

October 2015

Contents

1 Executive summary

The List of Security Sensitive Biological Agents (List of SSBAs) sets out the biological agents and toxins that the Minister for Health considers to be of security concern to Australia. This includes any agents that may be used for a terrorist or criminal act and agents that could be developed, produced, stockpiled, acquired or retained in types and quantities that could allow the agent to be used as a weapon. The List of SSBAs is informed through information received from the Australian Intelligence Community (AIC) and scientific and technical experts.

The List of SSBAs is a cornerstone to the Security Sensitive Biological Agent (SSBA) Regulatory Scheme, which sets out the security requirements for the handling of biological agents on the list.

The Department of Health, who administer the SSBA Regulatory Scheme have recently completed a review of biological agents of security concern with a view to determining if any changes are required to the List of SSBAs. The review assessed the security risk and health impacts of biological agents that have the potential to be used in a terrorist or criminal act within Australia.

This report outlines the findings of the review including the recommendations, changes in similar regulatory schemes, the methodology used and future directions for the SSBA Regulatory Scheme.

Recommendation 1

The review recommends that, due to information received from the AIC, *Salmonella* Typhi and *Vibrio cholerae* are no longer of a security risk level in Australia that requires regulation under the SSBA Regulatory Scheme and that these agents can be removed from the List of SSBAs.

If this recommendation is accepted, it is expected to have an impact on the visibility of the regulatory scheme and a communication plan will be required to ensure that an awareness of legislative requirements remains within the laboratory community.

Recommendation 2

The review further recommends that the nomenclature on the List of SSBAs for Influenza viruses is altered to '*highly virulent Influenza virus, infecting humans*' to reflect the commonly used terminology when referring to influenza viruses infecting humans.

Recommendation 3

The Notes associated with the List of SSBAs in relation to influenza virus are recommended to be altered to improve clarity on when strains are regulated and should read:

- *proven to cause disease with a moderate to high clinical severity or high mortality in humans; and*
- *the general population is immunologically naïve to the virus; or*
- *is listed as a Security Sensitive Biological Agent by the Minister for Health*

Examples of such viral strains include the 1918 pandemic Influenza virus A and Influenza virus A H5N1.

The review also considered future directions for the SSBA Regulatory Scheme. Rapid improvements in technology mean that the creation of SSBAs through synthetic biology is becoming more feasible, and there is the potential for dual use issues to arise and for a need for security regulation of genetically modified SSBAS that are live, viable and pathogenic, genetic elements, toxin salts and biologically active sub-units to manage the security threats around the use of these agents.

2 Introduction

The deliberate release of harmful biological agents such as viruses, bacteria, fungi and toxins has the potential to cause significant damage to human health, the environment and the Australian economy.

Prior to the Council of Australian Governments (COAG) *Review of Biological Agents of Security Concern (COAG Review)* in 2002, there was little governance of the security of these agents. The COAG Review identified that the existing controls were focused on safety rather than security; and that there was a need to regulate the secure storage, possession, use and transport of certain biological agents to minimise the risk of their use for terrorist or criminal purposes.

The List of SSBAs undergoes periodic review to reflect changes in intelligence, feasibility of use or health impact information (for example, new drug treatments or the discovery of new more virulent strains), changes in the National Security Public Alert Level[1] and to determine if agents should be included or removed from the List of SSBAs and the security ranking.

2.1 Council of Australian Governments review of biological agents of security concern

In 2002, COAG agreed to a national review of the regulation, reporting and security surrounding the storage, sale and handling of hazardous materials, namely ammonium nitrate; harmful biological materials; radiological sources; and hazardous chemicals. A working group, chaired by the Department of Prime Minister and Cabinet, was formed to undertake the review. In 2006, the working group produced the *COAG Review of Hazardous Materials, Regulation and Control of Biological Agents: Methodology of agent assessment scheme and final list of agents to be regulated* (COAG Biological Report).

The COAG Biological Report noted that with an increasing risk of global terrorism, advances in scientific knowledge and expertise has raised the potential for the use of a biological weapon in a terrorist attack. The agents most likely to be used are those that have a high human morbidity or mortality rate, those that can cause extensive damage to agriculture and those that generate a high level of fear and anxiety within communities.

The COAG Biological Working Group identified all the potential agents which warranted assessment for consideration in the list of biological agents to be regulated. The following sources were used to identify the initial list of candidate agents:

- Australia Group[2] list of biological agents, animal pathogens and plant pathogens for export control;
- the Australian Defence and Strategic Goods list;
- the biological agent control lists from the United States, United Kingdom and Canada;
- other publicly accessible information - broad internet searches were conducted to identify any organisms that could be potentially used as a terrorist agent and that were of relevance to the Australian context; and

[1] The National Terrorism Public Alert Level is set by the Australian Government in close consultation with the States and Territories. Australia's Public Alert Level is currently at HIGH – meaning that a terrorist attack is considered likely. 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.

[2] The Australia Group is an informal forum of countries which, through the harmonisation of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons.

- expertise, know-how and personal knowledge of the COAG Biological Working Group.

From this initial list of candidates, 200 agents were chosen for individual risk assessments consisting of an assessment of the health impact, feasibility and interest in use, with 22 biological agents or toxins recommended for regulation. These agents were split into two tiers, with Tier 1 agents being of the highest security concern and Tier 2 agents being of a high security concern.

On 13 April 2007, COAG considered the recommendations of the COAG Biological Report and agreed to the establishment of a national regulatory scheme, based on a risk management approach, for biological agents of security concern.

3 The Security Sensitive Biological Agent (SSBA) Regulatory Scheme

The SSBA Regulatory Scheme was established under Part 3 of the *National Health Security Act 2007* (NHS Act) with the aim of limiting opportunities for acts of bioterrorism or biocrime to occur using harmful biological agents. The scheme was developed using risk management principles to achieve a balance between security concerns and the interests of the regulated community, and aims to maintain full access to SSBAs for those with a legitimate need.

The administration of the SSBA Regulatory Scheme resides within the Australian Government Department of Health (the Department). Entities regulated by the SSBA Regulatory Scheme are required to report certain events to the Department, such as receipt, transport, disposals, incidents, acquisition of new SSBAs or changes in the legitimate purpose (as defined by the NHS Act) for handling the SSBA.

The SSBA Regulatory Scheme regulates two main types of entities – Registered Entities and Non-Registered Entities. Registered Entities are those that handle SSBAs on a medium to long term basis, including storage, and are subjected to higher levels of security requirements under the SSBA Regulatory Scheme. These entities include government laboratories, university and research facilities and reference laboratories.

Non-Registered Entities are those that handle SSBAs, or suspected SSBAs, on a short term (usually less than seven working days) basis prior to disposal. These entities are usually diagnostic laboratories, such as hospital pathology laboratories, and are subject to less stringent requirements under the SSBA Regulatory Scheme. Each entity may have one or more facilities that handle SSBAs.

The SSBA Regulatory Scheme requires all entities and facilities handling SSBAs or suspected SSBAs to comply with the NHS Act, the *National Health Security Regulations 2008* (NHS Regulations) and the SSBA Standards. The NHS Act and NHS Regulations set out the overarching legislative basis for the scheme, including who and what is regulated, reporting requirements, legitimate purposes for handling an SSBA or suspected SSBA, exemptions, administration, and compliance and monitoring.

The NHS Act also allows for the establishment of a National Register of SSBAs, that records reportable event information relating to SSBAs. The National Register holds an appropriate national security classification and the NHS Act specifically limits which agencies and under what circumstances information held on the National Register can be released.

The SSBA Standards are established under Division 3 of the NHS Act and contain a set of mandatory requirements relating to the secure handling, transport, storage and disposal of SSBAs and of information relating to SSBAs, as well as a SSBA management system. In addition to the mandatory requirements, the Standards also provide information on how these requirements may be met and about best practice. The SSBA Standards have been designed to harmonise with other laboratory regulatory schemes such as those administered by the Office of the Gene Technology Regulator and the Department of Agriculture and Water Resources (Biosecurity).

3.1 The List of Security Sensitive Biological Agents

The List of SSBAs sets out those agents that the Minister for Health considers to be of security concern to Australia. Tier 1 SSBAs are of the highest security concern and are subject to more stringent requirements for handling, including mandatory background checks for persons handling these agents. Tier 2 agents are of a high security risk with handling requirements proportional to their lower risk level, for example - a personnel background check is recommended but not mandatory.

The current List of SSBAs is set out in Figure 1. Toxin thresholds refer to the minimum amount of toxin held by an entity for the toxin to be regulated under this scheme.

Figure 1 – The List of Security Sensitive Biological Agents

Tier 1 SSBAs (with toxin thresholds)	Tier 2 SSBAs
Abrin (5 mg)	*African swine fever virus*
Bacillus anthracis (Anthrax – virulent strains)	*Capripoxvirus* (Sheep pox virus and Goat pox virus)
Botulinum toxin (0.5 mg)	*Classical swine fever virus*
Ebolavirus	*Clostridium botulinum* (Botulism; toxin-producing strains)
Foot-and-mouth disease virus	*Francisella tularensis* (Tularaemia)
Highly pathogenic influenza virus, infecting humans	*Lumpy skin disease virus*
Marburgvirus	*Peste-des-petits-ruminants virus*
Ricin (5 mg)	*Salmonella* Typhi (Typhoid)
Rinderpest virus	*Vibrio cholerae* (Cholera) (serotypes O1 and O139 only)
SARS coronavirus	*Yellow fever virus* (non-vaccine strains)
Variola virus (Smallpox)	
Yersinia pestis (Plague)	

Notes

1. *The agents above only refer to infectious, viable and pathogenic organisms or active toxins.*

2. *'Highly pathogenic influenza virus infecting humans' includes influenza viral strains that fulfil all the criteria listed below:*

    - *considered highly pathogenic in usual host animal;*
    - *proven infection of humans; and*
    - *involved in an outbreak of human disease.*

    Examples of such viral strains include the 1918 pandemic Influenza virus A and Influenza virus A H5N1.

3. *'Botulinum toxin' does not refer to a form approved for therapeutic use under the Therapeutic Goods Act 1989. For example, the forms of Botulinum toxin approved for therapeutic use and known under their commercial names Botox™ or Dysport™.*

4. *The List is not a legislative instrument.*

Under the NHS Act, an up-to-date List of SSBAs must be made available on the Health Department website. The current list is published at www.health.gov.au/ssba.

4 Comparable Overseas Schemes and Reviews

4.1 Canada

Canada is currently finalising the implementation of a regulatory framework for the *Human Pathogens and Toxins Act (HPTA) (2009)*[1]. The HPTA applies to all persons conducting specified activities with human pathogens and toxins, whether imported or domestically acquired, and is administered by the Public Health Agency of Canada.

The Canadian legislation sets out a risk-based licensing scheme for facilities conducting controlled activities with human pathogens and toxins and has security clearance requirements for persons that have access to these agents. The legislation will be complemented by additional non-regulatory facility and operational standards for activities conducted with human pathogens and toxins in Canada. Previous versions of these standards have been in place since 1990.

The first stage of implementation of the HPTA came into force in 2009 and included:

- Mandatory registration, with all persons responsible for activities involving human pathogens or toxins required to register their facility.
- An obligation to take reasonable precautions to protect the health and safety of the public when knowingly dealing with human pathogens or toxins.
- An obligation to advise the Minister, within 90 days, of the risk groups of human pathogens or toxins in a person's possession, and their location and an obligation to designate a person with the appropriate safety training as a contact.

[1] http://www.phac-aspc.gc.ca/lab-bio/regul/hpta-lapht-eng.php

- A ban on any activity with smallpox.
- A prohibition on intentionally releasing human pathogens or toxins causing risk to the health or safety of the public.

Canada is currently in the second stage of implementation for the HPTA which includes setting the list of security sensitive biological agents and toxins based on the *List of Human and Animal Pathogens and Toxins for Export Control* as published by the Australia Group. Similar to Australia's SSBA Regulatory Scheme, toxins will have quantity thresholds set and a facility that handles less than the specified threshold will not be regulated for that toxin.

The full HPTA and its associated legislation are expected to come into force on 1 December 2015.

4.2 United States of America

The United States of America Federal Select Agent Program[1] oversees the possession, use and transfer of biological select agents and toxins, which have the potential to pose a severe threat to public, animal or plant health or to animal or plant products. The Federal Select Agent Program is jointly comprised of the US Department of Health and Human Services and the US Department of Agriculture.

In 2010 an Executive Order was issued requiring that the Secretaries of the Department of Health and Human Services and Department of Agriculture designate a subset of the Biological Select Agents and Toxins list as Tier 1 Select Agents or Toxins to enable tailored risk management approaches to the handling of these agents. Tier 1 agents are described as those that present the greatest risk of deliberate misuse with the most significant impact for mass casualties or significant impact to the economy, critical infrastructure or public confidence. The Executive Order also required that agencies consider a reduction in the number of agents regulated and the establishment of personnel reliability standards and physical and information security standards for Tier 1 agents. Following the Executive Order, 13 agents were designated at Tier 1 agents and 19 biological agents were removed from the list. The US currently regulates 60 agents of security concern.

4.3 United Kingdom

The UK has a number of regulatory and legislative measures designed to prohibit and prevent the development, production, transfer, stockpiling or use of biological weapons that cover human, animal and plant agents. The Anti-terrorism, Crime and Security Act (ACTSA) 2001[2] governs the regulation of biological agents in the United Kingdom. Part 7 of ACTSA is designed to secure potentially dangerous agents from hostile exploitation and provides, inter alia, "the police with powers to require security measures at laboratories in the UK that hold specified pathogens and toxins".

In 2007, the list of agents regulated had 'agents affecting animals other than man' added to Schedule 5 of the ACTSA. Schedule 5 covers not only intact or wild type agents, but also

[1] http://www.selectagents.gov/
[2] http://www.legislation.gov.uk/ukpga/2001/24/contents

genetically modified organisms that retain the ability for serious harm and nucleic acid sequences that can encode infectious or replication competent forms to the listed agents or, if inserted into another organism, can alter or enhance the organisms ability to cause serious harm to health.

4.4 World Health Organization (WHO)[1]

The WHO is currently trialing a new Framework for the development and application of measures to assess the severity of influenza, including for use in a pandemic. Similar to the SSBA List Review, the framework will look at the transmissibility, severity of the disease and the impact. As the WHO does not have a biological security focus, no review of the threat of use as a bioweapon is expected to be undertaken.

The framework is expected to be finalised in late 2015 following a working group review meeting in May 2015.

4.5 International Conventions

4.5.1 Biological Weapons Convention[2]

The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, usually referred to as the Biological Weapons Convention (BWC), was the first multilateral disarmament treaty banning an entire category of weapons. Australia is a signatory to this convention.

The BWC obliges States Parties to prohibit the development, production, stockpiling, acquisition and retention of biological and toxin weapons. The convention also prohibits States Parties from assisting or encouraging others to manufacture or acquire biological weapons, or transferring biological weapons to any recipient. Further, the BWC requires States Parties to facilitate technical and scientific cooperation in the use of biotechnology for peaceful purposes.

The BWC does not prohibit biological agents themselves, rather the prohibitions apply to biological agents or toxins that are of types or quantities that have no justification for prophylactic, protective or other peaceful purposes.

The domestic implementation of the prohibitions contained in the BWC are covered in the *Crimes (Biological Weapons) Act 1976*, and the transfer provisions in Article 3 of the BWC are covered by the *Biosecurity Act 2015*.

4.5.2 Chemical Weapons Convention[3]

The Chemical Weapons Convention (CWC) is an international treaty that bans the development, production, stockpiling and/or use of chemical weapons (CW), including toxins and requires the complete and verifiable destruction of existing CW stockpiles.

As a party to the CWC, Australia prohibits offensive CW activity. The CWC is principally implemented through the *Chemical Weapons (Prohibition) Act 1994* (the CWP Act) by the Australian Safeguards and Non-Proliferation Office (ASNO) within the Department of Foreign Affairs and Trade.

[1] http://www.who.int/en/
2 www.dfat.gov.au/security/biological_weapons.html
[3] https://www.opcw.org/chemical-weapons-convention/

Ricin is included in the List of SSBAs and is listed in Schedule 1 – Part A of the CWC toxic chemicals.

4.5.3 United Nations Security Council Resolution 1540[1]

The United Nations Security Council Resolution (UNSCR) 1540, obliges States, inter alia, to refrain from supporting by any means non-State actors from developing, acquiring, manufacturing, possessing, transporting, transferring or using nuclear, chemical or biological weapons and their delivery systems.

UNSCR 1540 imposes binding obligations on all States to establish domestic controls to prevent the proliferation of nuclear, chemical and biological weapons, and their means of delivery, in particular for terrorist purposes, including by establishing appropriate controls over related materials, and to adopt legislative measures in that respect. The NHS Act supports other Australian legislation to fulfil these obligations.

5 Consultation

Under the NHS Act, the Minister for Health may add a biological agent to the List of SSBAs if information is received indicating that the agent is likely to be, or is considered to be, a security threat, or remove the agent if an agent on the List of SSBAs is no longer considered to be a security threat. The Minister may also alter the reportable quantities for a toxin.

Division 2 of Part 3 of the NHS Act stipulates when reviewing the List of SSBAs, the Minister must obtain and have regard to advice from:

- *an agency or instrumentality of the Commonwealth that has responsibility for obtaining and assessing information about risks and threats posed by biological agents that may be of security concern to Australia;*
- *persons with scientific or technical knowledge of biological agents that may be of security concern; and*
- *States and Territories.*

Health has undertaken preliminary consultations with the following agencies to determine the risk profile of the biological agents:

- the Australian Federal Police (AFP);
- the Australian Security Intelligence Organisation (ASIO);
- the Department of Agriculture and Water Resources;
- the Defence Intelligence Organisation (DIO);
- the Office of the Gene Technology Regulator(OGTR); and
- scientific and medical officers within the Department of Health.

Consultation with the States and Territories will occur through the Australia-New Zealand Counter-Terrorism Committee (ANZCTC)—comprising senior police and First Minister's department representatives from the States and Territories, and senior officials from relevant Commonwealth agencies—and the ANZCTC Chemical, Biological, Radiological and Nuclear Security Sub-Committee (CBRNSSC). The role of the CBRNSSC is to share information, initiate strategies and oversee activities to mitigate the impact of incidents

1 http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1540%20(2004)

involving CBR agents. It provides strategic guidance and advice to the ANZCTC and monitors nuclear related issues.

Consultation will also be undertaken with the regulated community and other interested stakeholders. These groups will be emailed, using the contact information provided by regulated entities and content from the SSBA information mailing list[1], to inform parties of the opening of the consultation period, provision of consultation documentation and advise on how to provide comments and feedback. Documentation will also be placed on the Department of Health website (under the SSBA webpage) inviting the general public to comment.

All feedback is requested in writing though a designated Consultation Feedback Form and all consultation documentation will be made available through the SSBA webpage (www.health.gov.au/ssba).

The consultation period will open on 9 November 2015 and run for a period of six (6) weeks until 18 December 2015. Following the consultation period, comments will be reviewed and changes made to the recommendations as appropriate. Once the consultation is finalised, documentation will be prepared to brief the Minister for Health to seek approval of any changes to the List of SSBAs.

6 Review Methodology

6.1 History of agent assessment

The methodology used by the COAG working group was set out in the *COAG Review of Hazardous Materials, Regulation and Control of Biological Agents: Methodology of agent assessment and final list of agents to be regulated of September 2006*. The COAG working group identified approximately 200 agents for individual assessment using risk management considerations. Ultimately, a two-tiered list of 22 agents was developed and this was used to form the List of SSBAs under the NHS Act. The COAG document holds a security classification and is not available for public release.

6.2 Current Agents for Assessment

In order to ensure that the appropriate agents were captured in this review, the top 80 agents in the COAG Biological Report Working Group List, which includes the 22 agents designated as SSBAs, were identified for review. The remaining agents on the COAG Working Group Assessment List were briefly re-assessed to ensure that they had not increased in threat. In addition to the COAG agents, henipaviruses (Hendra and Nipah viruses) were added to the assessment list following renewed media interest within Australia in these agents as a potential bioterrorism threat. All agents, including any that were not reviewed in this current process, may be revisited at a later date if significant information relating to changes to the health impact, threat, or feasibility of use is received.

A horizon scan for any emerging agents of interest, such as the Middle East Respiratory Syndrome coronavirus (MERS CoV) or new strains of influenza A was also conducted to determine security risk. These horizon scans are ongoing

[1] The SSBA Mailing List is a self-nominated contact list of persons interested in receiving information and updates about the SSBA Regulatory Scheme. Contact through this list is by e-mail only and requests for addition to this list can be made via ssba@health.gov.au.

6.3 Impact Working Group (IWG)

Under the NHS Act, the Minister for Health has the power to alter the list of biological agents to add or remove a biological agent or to alter a toxin threshold. In order to do this, the Minister must have regard to advice from Commonwealth agencies that have responsibility for assessing information about biological agents that may be used as bio weapons, and persons with scientific or technical knowledge about such agents.

To meet the requirement for assessment by Commonwealth agencies that have responsibility for assessing information about biological agents that may be used as bio weapons (i.e. the threat of use), the AIC was consulted with liaison facilitated through the Australian Federal Police.

To meet the requirement for assessment by persons with scientific or technical knowledge about such agents an Impact Working Group (IWG) was formed.

Membership of the IWG included representatives from the Australian Federal Police, the Department of Agriculture and Water Resources, and the Department of Health's Office of Health Protection (including Communicable Diseases, Health Protection Policy and the Medical and Scientific Advisory Unit) and the Office of the Gene Technology Regulator. Members represented expertise in communicable diseases, security risks, public health, risk assessment and assessment of the economic impact of agents that affect plants and animals.

The primary focus of the IWG was to assess the health/economic impacts of the agents. Information relating to the security risk of each biological agent was provided to the committee through the Australian Federal Police representative, who acted as a liaison point for the IWG with the wider AIC.

An overview of the methodology used to determine the risk score for each agent is set out below.

6.4 Assessment Parameters

A risk-based approach was adopted for the assessment of each agent with a risk assessment algorithm developed to facilitate quantitative assessment of each agent. An end-to-end Matrix Assisted Risk Assessment (MARA) methodology, was used to calculate the probability or consequence of the feasibility and impact criteria, respectively. The feasibility and impact probability scores were then used to obtain an overall risk assessment ranking. Probability scores of 0 – 5 were applied to each assessment parameter, with 0 representing no effect and 5 representing a severe effect. Increments of 0.5 were accepted.

The risk assessment algorithm, endorsed by COAG for the 2007 review, was devised for the specific purpose of providing a quantifiable risk assessment for each agent in order to complete the risk matrix. However, it should be noted that there are inherent difficulties associated in quantifying many of the criteria used. As such all ratings were considered only within the context of this specific purpose as a comparative/relative measure.

The overall risk assessment score is based on traditional risk management considerations where in the context of potential bioterrorist/biocrime events, the consequence of such events were assessed in terms of the impact on humans, animals and plants affected by the agents.

6.5 Health Impact Assessment

For each biological agent an analysis of the health impact was undertaken using an end-to-end Matrix Assisted Risk Assessment (MARA) methodology. The MARA used discrete scenarios to calculate the probability or consequence of the impact criteria. Each assessment looked at the potential magnitude of impact on humans and on agriculture for those agents affecting plants or animals of economic significance.

For agents affecting human hosts, the impact of the agent was assessed on the health aspects including the flow on affect to the health system. For agricultural agents, the economic impact of use was included. For zoonotic agents affecting both human and non-human hosts, the impact score used was the higher of the health impact or economic impact score.

6.5.1 Morbidity and Mortality

For agents affecting humans, the health impact assessment looked at the morbidity and mortality rates within the Australian health context, including overall population health and vaccination levels. The final assessment for mortality was based on the Case Fatality Rate (CFR) which was defined as *the proportion of individuals contracting an illness caused by an agent and who die because of that illness*.

Morbidity considerations included the impact on an individual as well as the impact on the health system in terms of the costs of the care required to manage the illness or injury resulting from the agent. The final Mortality/Morbidity score was taken as the higher score of either mortality or morbidity.

6.5.2 Transmissibility

The Transmissibility criterion assessed the ability of the agent to spread from an infected person to other people including the efficiency of transmission from person to person via specified routes of transmission, (for example casual contact, casual contact in a small area/confined space, or requirements for vectors) as well as those agents not easily transmitted, difficult to transmit, or with no person-to-person transmission.

6.5.3 Difficulty to Treat

This criterion assessed the ability to treat a disease outbreak, toxin poisoning, illness or disease caused by an agent. Assessment included pre- and post-exposure treatments, such as vaccines, medication and supportive care; the availability of the treatments in Australia and the impact on the clinical outcome.

6.5.4 Economic Impact

For agents affecting agriculture, the economic impact was also assessed. The consequence aligned with the dollar value ascribed to the severity of the economic impact measured in the period of one year. The criteria considered included the control/eradication costs as well as domestic and export economic impacts (for example, loss of market, recovery times and reputational damage).

As there are many variables that could influence the impact on the Australian economy, it was considered important to evaluate factors such as how long an outbreak would last, if the agent could be eradicated or controlled and how the export market would react in excluding affected exported products. The Department of Agriculture was extensively consulted for these assessments.

6.5.5 Assumptions

When undertaking the Health Impact Assessments a number of assumptions were made:

- Not all biological agents and their symptoms will be familiar to health care professionals. For exotic diseases, this may lead to a delay in diagnosis. Where this delay may occur, discussions on the transmissibility gained a higher importance.
- Sporadic cases at the beginning of an event may not be diagnosed correctly for uncommon diseases or disease events may not be connected.
- A robust syndromic surveillance system is in place within Australia with large scale (>20 events in a localised area, >200 events Australia wide) detected by such a system. This system may not be likely to detect a wide spread vector borne disease but such an event may be detected by clinicians.
- For the Difficulty to Treat scores:
    - If there is no vaccine or treatment for the disease caused by the agent, then supportive care will be scored to show the full impact of the agent.
    - Unless otherwise stated, it is assumed that the efficacy of any drug registered in Australia has been fully tested.
    - The presence of emerging antibiotic resistance in a specific organism was taken into account where such a resistance is considered to currently have a significant impact on treatment options.
- When undertaking assessment of toxins[1]:
    - It was acknowledged that there can be some difficulty in extrapolating toxic effects from animal studies to humans for some biological agents and uncertainty factors, consistent with international best practice, were used to account for intra- and inter-species differences.
    - Assessments used acute Lethal Dose $_{50}$ (LD_{50})[2] to provide an estimate of the relative toxicity of a substance for a specific exposure route.
    - LD_{50} was used as an endpoint to approximate the potential mortality to humans where case fatality rate data was unavailable.

6.6 Security Threat Assessments

The AIC was requested to undertake a review of the current threat of the use of these agents as bioweapons. This review was facilitated by the AFP in consultation with ASIO and DIO.

The overall threat of an agent was determined through an assessment of the interest in the use of the agents and a determination of the feasibility of use.

6.6.1 Interest

The interest assessment measured the level of interest in the agent for use by terrorist, criminal or issue motivated groups of concern to Australia. These assessments hold a national security classification and are not available for public release.

6.6.2 Feasibility

This criterion assessed the availability, the ease of production and the ease of dissemination to determine the overall feasibility of use.

[1] Toxin Health Impact Assessments were lead by the Office of Chemical Safety in the Department of Health.
[2] In toxicology, LD_{50} is the median lethal dose required to kill half (50%) of the test population after a specified time period. A lower LD_{50} is indicative of increased toxicity.

- *Availability:* assessed the ease of access to the agent within Australia, including if the agent was readily available in Australia, the ease of importation, and the availability of information relating to the use of the agent, including background information and methodologies.
- *Ease of production:* assessed the ease in which the agent could be produced in a form that could be used as a bioweapon, including the ease in isolating or producing the agent and the requirement for specialised equipment or knowledge/skills.
- *Ease of dissemination:* was determined by an assessment of the ability to spread the agent to a large number of targets including the ease of preparing the agent for dissemination, possible methods for dissemination and the level of preparation required (e.g. use of a crude or sophisticated dissemination method or production for a large or a small scale release).

6.7 Calculation of overall risk score

The final risk score was calculated by first determining the overall threat score and the overall health impact score. These scores were then used to determine the risk score for each biological agent. The formulas used to calculate each score are listed below.

6.7.1 Health Impact score

The mean for the health impact (as described in section 6.5) for agents affecting human hosts was calculated using the following:

$$Impact\ Mean = \tfrac{1}{3}\ (Mortality/Morbidity + Transmissibility + Difficulty\ to\ Treat)$$

For agents affecting non-human hosts (animals and plants), the 'Impact' criterion was assessed on the economic impact. It should be noted that human pathogens and toxins were not assessed for potential economic impact.

6.7.2 Threat score

The threat score (as outlined in section 6.6) was based on the following:

- Interest in the agent; and
- Feasibility (*Feasibility = ⅓ (Availability + Production + Dissemination*)

Threat was then determined using the following formula:

$$Threat = \tfrac{1}{2}\ (Interest + Feasibility)$$

6.7.3 Overall risk score

The final risk score for each biological agent was determined by using the formula:

$$Risk = Threat \times Impact$$

This score was then used to rank the biological agents to assist in determining if a change to regulatory status was warranted.

6.7.4 Weighting of security risk

The SSBA Regulatory Scheme is based on management of the security risk of biological agents not the public health risk. In order to ensure that any agents fit this risk criteria, a second ranking was undertaken using just the overall threat score to determine if any agents had a high enough threat score to indicate further discussions with the intelligence community were required in regards to regulation for security purposes.

7 Proposed Changes to the List of SSBA

7.1 Changes to the biological agents regulated

7.1.1 Inclusion of new agents on the List of SSBA

The review found that, for the agents reviewed, there was no significant alteration in the overall threat levels that would indicate the inclusion of new biological agents on the List of SSBAs.

The SSBA Regulatory Scheme will continue to monitor emerging agents and changes to threat levels for the reviewed agents, to determine if any agents should be added to the List of SSBAs.

7.1.2 Removal of agents from the List of SSBA

During the review process, the SSBA Regulatory Scheme took into consideration feedback received on the issues surrounding the inclusion of *S.* Typhi and *V. cholerae* on the List of SSBA. *S.* Typhi and *V. cholerae* (serotypes 01 or 0139 only) are considered to be Tier 2 SSBAs.

Feedback on these agents indicated that *S.* Typhi and *V. cholerae* may no longer be considered a threat to national security and so additional consultation on these specific agents was undertaken with the AIC. Following an extensive review of the security risk of these agents within both the Australian and global environment, it was noted that the overall security risk for these agents in the Australian context was consistent with a recommendation for the removal of these agents from the List of SSBAs.

Impact on the regulated community

Following advice from the AIC that the SSBA Regulatory Scheme could consider removal of *S.* Typhi and *V. cholerae* from the List of SSBAs, an assessment was undertaken in order to determine the impact on the regulated community.

While the SSBA Regulatory Scheme does not charge facilities for the submission or processing of reports, registration or inspection activities, a regulatory, and therefore a cost, impost is placed on facilities to meet the requirements for handling SSBAs. A higher regulatory burden is placed on a Registered Facility due to the more stringent security requirements for facilities that handle and store agents long term and there is a proportionally lower burden on a Non-Registered Facility to temporarily handle and store SSBAs or suspected SSBAs. The regulatory requirements placed on facilities are seen as important to ensure the maintenance of security of these agents and every effort has been made to ensure that this impost is as reasonable as possible while still maintaining the level of security required to manage risk. Efforts have also been made to ensure that the SSBA Regulatory Scheme harmonises with other laboratory regulators to reduce regulatory burden and conflicts.

The majority of handling for *S.* Typhi and *V. cholerae* is by Non-Registered Facilities. These facilities handle SSBAs, usually suspected SSBAs only, for diagnostic purposes and dispose of the agent following confirmatory testing. It is estimated that approximately 100+ non-registered facilities may be affected if the agents are removed. For those facilities registered with the SSBA Regulatory Scheme to store or handle these agents on a long term basis, those

that hold a Registered Facility status for these two agents only may choose to de-register with the scheme if these agents are removed.

Removal of agents that are no longer a security concern from the List of SSBAs will reduce the regulatory burden on the laboratory and research communities.

The regulatory impact assessment also noted that as these agents are primarily handled by non-registered facilities, a negative effect of their removal is that there may be a significant drop in awareness of the regulatory scheme in the laboratory community. This would need to be carefully managed to ensure that, if the agents were removed, that the scheme was not 'forgotten' and that other handling of SSBAs continued to be reported. If *S.* Typhi and *V. cholerae* are removed from the regulatory scheme, it is recommended that regular and appropriate communications will be required to assist in maintaining awareness of the requirements of the legislation within the laboratory community.

Recommendation

Recommendation 1

It is recommended that, as an assessment by the AIC has determined that *Salmonella* Typhi and *Vibrio cholerae* are no longer of a security risk level that requires regulation under the SSBA Regulatory Scheme, that these agents are removed from the List of Security Sensitive Biological Agents.

7.2 Changes to the regulation of Influenza virus

7.2.1 Alteration of name

During the review of *highly pathogenic influenza virus, infecting humans*, the IWG noted that it was important to continue to distinguish strains of security concern from seasonal influenza. The review also noted that 'highly pathogenic' was used more to refer to pathogenicity in avian infections where as 'highly virulent' was used to denote infection in humans. The IWG recommended that the List of SSBAs refer to influenza virus as '*highly virulent Influenza virus, infecting humans*' with the words *highly* and *virulent* to remain un-capitalised.

7.2.2 Clarity about regulated strains

The aim of the SSBA Regulatory Scheme when regulating influenza virus is to capture novel/exotic strains with pandemic potential as these are the most likely to be of interest to terrorist or criminal groups. It is not the intent of the regulatory scheme to capture seasonal influenza viruses.

The List of SSBAs provides clarity on the agents regulated with a set of guidance notes. For the influenza virus these notes currently read:

Highly pathogenic influenza virus infecting humans' includes influenza viral strains that fulfil all the criteria listed below:

- *considered highly pathogenic in usual host animal;*
- *proven infection of humans; and*
- *involved in an outbreak of human disease.*

Examples of such viral strains include the 1918 pandemic Influenza virus A and Influenza virus A H5N1.

Feedback from the IWG, medical experts and from the regulated community indicated that the current notes for influenza virus do not provide enough clarity as to the strains regulated and may either inadvertently exclude strains from regulation or include those which are more akin to seasonal strains.

The IWG noted that when determining if a strain was to be regulated the criteria of the strain having a high transmissibility and high case fatality rate (CFR) may not always be the only criteria as the health risk of the agent was dependant on the interrelationship of these two parameters. For example, if a strain showed a moderate case fatality rate but an extremely high transmissibility rate, regulation may be considered and a security assessment requested.

The working group agreed that any regulated strain should be associated with proven infection in humans, have a transmissibility at least equal to, and a CFR greater than, that of seasonal influenza and should take into account the immunological naivety of the population to the virus. These criteria would then allow for an assessment of the pandemic and health threat of the virus in conjunction with a security assessment as to the interest and feasibility of use.

To reflect these discussions it is proposed that the List of SSBA notes for influenza virus are altered to:

'Highly virulent influenza virus, infecting humans' includes influenza viral strains that fulfil the criteria listed below:

- *proven to cause disease with a moderate to high clinical severity or high mortality in humans; and*
- *the general population is immunologically naïve to the virus; or*
- *is listed as a Security Sensitive Biological Agent by the Minister for Health*

Examples of such viral strains include the 1918 pandemic Influenza virus A and Influenza virus A H5N1.

Recommendations

Recommendation 2

The nomenclature for the SSBA listing for influenza virus is altered to '*highly virulent Influenza virus, infecting humans*' to reflect the commonly used terminology when referring to influenza viruses infecting humans.

Recommendation 3

The notes for when an influenza virus is to be considered to be an SSBA are altered to:

'Highly virulent influenza virus, infecting humans' includes influenza viral strains that fulfil the criteria listed below:

- *proven to cause disease with a moderate to high clinical severity or high mortality in humans; and*
- *the general population is immunologically naïve to the virus; or*

- *is listed as a Security Sensitive Biological Agent by the Minister for Health*

Examples of such viral strains include the 1918 pandemic Influenza virus A and Influenza virus A H5N1.

8 Future Directions

8.1 Synthetic Biology and Dual Use Research

Under the NHS Act, biological agents to be regulated must be live, viable and pathogenic or an active toxin. The NHS Act currently excludes the regulation of genetic sequences that may code for pathogenicity or toxin production, however all gene technology work is regulated by the Office of the Gene Technology Regulator (OGTR) and requires licencing unless otherwise authorised under the *Gene Technology Act 2000* (GT Act) and associated legislation.

The GT Act is designed to protect the health and safety of people, and to protect the environment, by identifying risk posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with genetically modified organisms (GMOs). The legislation requires licensing for 'higher risk' GMOs, which includes those that could potentially be used as biological weapons or for other malicious purposes, including those that involve modifications that may alter pathogenicity, virulence, host range or treatment of a microorganism; cloning or high expression of toxin genes; or animals, plants or fungi that are capable of secreting infectious agents as a result of the genetic modification. All licence applications are subject to case-by-case scientific risk assessment and risk management and the Gene Technology Regulator has the power to manage risk through the inclusion of enforceable conditions on any licence granted.

However, the OGTR does not have a legislative requirement to assess the security risk of any GMOs and is not required to engage with the AIC in any risk assessment. The OGTR also does not have a mandate to monitor the national security risk of any dual use issues that may arise from the handling and manipulation of GMOs.

The SSBA Regulatory Scheme and the OGTR have a co-operative working arrangement that includes the use of the OGTR inspectors to undertake inspections on behalf of the SSBA Regulatory Scheme. In addition to this, the two regulatory schemes liaise in regards to any work on SSBAs that may also include genetic modification. Considerable effort has gone into ensuring that the two regulatory schemes are harmonised in their requirements as much as possible to ensure that laboratories do not have conflicting requirements under the schemes. The SSBA Regulatory Scheme has in place an arrangement with the OGTR to receive information relating to agents that may also be SSBAs so that both schemes can work with the facilities to ensure that safety and security needs are met.

Security regulation of genetic elements and toxin subunits is already undertaken by overseas regulatory schemes such as the US Select Agent Scheme which regulates the following in relation to genetic elements, recombinant nucleic acids, and recombinant organisms:

> *(1) Nucleic acids that can produce infectious forms of any of the select agent viruses*
>
> *(2) Recombinant nucleic acids that encode for the functional form(s) of any of the select toxins if the nucleic acids:*

(i) can be expressed in vivo or in vitro, or

(ii) are in a vector or recombinant host genome and can be expressed in vivo; or

(3) Select agents and toxins that have been genetically modified.

In addition to this, the Australia Group also regulates genetic elements of the agents on the control lists. The Australia Group is an informal forum of countries which, through the harmonisation of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons.

Participants in the Australia Group do not undertake legally-binding obligations. The effectiveness of their cooperation depends solely on a shared commitment to chemical and biological weapon non-proliferation goals and the strength of their respective national measures. Key considerations in the formulation of participants' export licensing measures are that they should:

- be effective in impeding the production of chemical and biological weapons;
- be practical, and reasonably easy to implement; and
- not impede the normal trade of materials and equipment used for legitimate purposes.

The Australia Group's activities serve to support the objectives of the CWC and BWC by enhancing the effectiveness of national export licensing measures.

The Australia Group Biological Agent Common Control List states that:

> *Biological agents are controlled when they are an isolated live culture of a pathogen agent, or a preparation of a toxin agent which has been isolated or extracted from any source, or material including living material which has been deliberately inoculated or contaminated with the agent. Isolated live cultures of a pathogen agent include live cultures in dormant form or in dried preparations, whether the agent is natural, enhanced or modified.*
>
> *Genetic Elements and Genetically-modified Organisms:*
>
> - *Genetic elements that contain nucleic acid sequences associated with the pathogenicity of any of the microorganisms in the list.*
> - *Genetic elements that contain nucleic acid sequences coding for any of the toxins in the list, or for their sub-units.*
> - *Genetically-modified organisms that contain nucleic acid sequences associated with the pathogenicity of any of the microorganisms in the list.*
> - *Genetically-modified organisms that contain nucleic acid sequences coding for any of the toxins in the list or for their sub-units.*

The COAG Biological Report noted that it would be an end goal of the SSBA Regulatory Scheme to specifically include the security regulation of genetically modified variants of agents on the List of SSBAs that are live, viable and pathogenic, toxin salts and biologically active sub-units. This would mean the inclusion on the List of SSBAs of additional items similar to those listed by the Australia Group and the US Select Agent Program.

It should be noted that the SSBA education campaigns continue to stress that live, viable and pathogenic organisms that meet the description of an SSBA may be subjected to security regulation as well as health and safety regulation through the OGTR.

Further work and consultation will need to be undertaken by the Department of Health in regards to how regulation of these agents would operate under the SSBA Regulatory Scheme and to ensure harmonisation with other regulatory requirements such as those imposed under the Australian Gene Technology legislation.

Dual Use Experiments of Concern

Dual-use biological research may be legitimate research that could be misused to threaten public health or other aspects of national security and can create an ethical issue for researchers as the outcome could be used for malicious purposes by others.

While the SSBA Regulatory Scheme does not currently directly monitor dual use, all research conducted on SSBAs must be responsible and legitimate under the NHS Act (Section 41) and the NHS Act states that all applications for the registration of a purpose for handling an SSBA that include research must be vetted by scientific and technical experts.

The SSBA Regulatory Scheme currently liaises with the AIC to scrutinise any application for SSBA research. If the research is not deemed to be responsible and legitimate, the NHS Act requires that a temporary registration is put in place. The matter is then referred to the relevant authorities for investigation. If the entity is found to have committed an offence against the *Crimes (Biological Weapons) Act 1976* then the temporary registration is cancelled and the matter is referred to the appropriate authorities.

No changes to the NHS legislation to specifically include regulation of dual use are required at this time as it is adequately covered through the legitimate use provisions, but this report notes that in the future, provisions to cover dual use issues may be required. This may take the form of an alteration to the definition of legitimate purpose under the NHS Act or the inclusion of specific provisions within the NHS Act itself.

9 Glossary

AIC	Australian Intelligence Community. The AIC comprises six Commonwealth intelligence agencies: • the Office of National Assessments (ONA); • the Australian Security Intelligence Organisation (ASIO); • the Australian Signals Directorate (ASD); • the Defence Intelligence Organisation (DIO); • the Defence Imagery and Geospatial Organisation (DIGO); and • the Australian Secret Intelligence Service (ASIS).
Case Fatality Rate (CFR)	A measure of the severity of a disease. CFR is defined as the proportion of reported cases of a specified disease or condition which are fatal within a specified time.
COAG	The Council of Australian Governments is the peak intergovernmental forum in Australia. COAG membership consists of the Prime Minister, State and Territory Premiers and Chief Ministers and the President of the Australian Local Government Association.
Health	Australian Government Department of Health. Health is responsible of the administration of the SSBA Regulatory Scheme.
IWG	Impact Working Group – the working group responsible for the assessment of biological agents of security concern to determine if there should be changes made to the List of SSBAs.
List of SSBAs	The List of Security Sensitive Biological Agents that determines which agents are regulated under the SSBA Regulatory Scheme. This list can be found on the Department of Health website – www.health.gov.au/ssba
MARA	Matrix Assisted Risk Assessment – this was the risk assessment process used to assist in determining health impact risk.
NHS Act	*National Health Security Act 2007.* The NHS Act establishes the SSBA Regulatory Scheme.
NHS Regulations	*National Health Security Regulations 2008*
SSBA	Security Sensitive Biological Agent
SSBA Regulatory Scheme	The Security Sensitive Biological Agent Regulatory Scheme regulates handling, including use and storage, of SSBAs and suspected SSBAs.
SSBA Standards	Security Sensitive Biological Agent Standards. These Standards set out the physical, personnel, transport, information management, inactivation and decontamination requirements for handling SSBAs and agents suspected of being SSBAs.