Australian Government

Nuclear-based science benefiting all Australians

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ANSTO Nuclear Medicine Project

Statement of Evidence for the Parliamentary Standing Committee on Public Works

Prepared by: The Australian Nuclear Science and Technology Organisation (ANSTO)

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Executive Summary

The Australian Nuclear Science and Technology Organisation (ANSTO) is Australia's national nuclear research and development organisation and the centre of Australia's nuclear expertise.

ANSTO operates Australia's OPAL research reactor used in medical isotope production and ground breaking research. Currently, each week OPAL produces 10,000 doses of potentially life-saving radiopharmaceuticals. These medicines are used in the diagnosis and treatment of numerous heart, liver, bone and kidney conditions as well as cancers. ANSTO's landmark infrastructure and nuclear expertise is also used to conduct research into areas of key national importance such as climate change, water resource management and better ways to diagnosis skin cancer.

This proposal outlines the justification for the ANSTO Nuclear Medicine (ANM) facility to be located at ANSTO's Lucas Heights campus. This new facility has two components: a new nuclear medicine manufacturing facility and a co-located Synroc waste treatment plant.

The export scale nuclear medicine manufacturing facility will guarantee the future supply of Molybdenum-99 (Mo-99) to Australians. Mo-99 is one of the world's most important nuclear medicines and allows the detection of life threatening diseases and the opportunity to treat patients before a critical stage is reached. In Australia each year 550,000 people receive a diagnosis using Mo-99. The new facility will also allow Australia to meet a significant proportion of the world's increasing demand for Mo-99 which currently totals around 45 million doses a year. As a facility which will produce medicine from low-enriched uranium, the project will position Australia at the forefront of a global movement to eradicate the use of highly-enriched uranium and the military risks associated with it.

The Synroc facility is based upon ANSTO's proprietary technology and is world "first of a kind" facility able to treat a variety of wastes. The Synroc facility will provide a viable economic solution to consolidating waste which is a legacy of 50 years of Australian nuclear medicine production.

The entire project, including design, construction and equipment, is forecast to cost $168 million and is scheduled for completion by 2016.

1. Need for Works

1.1 Historical background

ANSTO has been in the business of producing and selling nuclear medicines for over 40 years, and Mo-99 for over 30 years. The ANM project is therefore a natural extension of this existing business function.

The radiopharmaceutical Mo-99 is used in 80 per cent of nuclear medicine procedures to diagnose heart disease and a range of cancers in procedures used by 45 million patients globally. In Australia, Mo-99 is made in Australia's research reactor, OPAL. Mo-99 is then processed in a separate facility at ANSTO into a form suitable for use by over 200 hospitals in Australia and New Zealand. Australia's current Mo-99 manufacturing facility at ANSTO must close by 2017.

Synroc is an Australian-owned and developed technology. ANSTO will use Synroc to treat the by-products of its nuclear medicine production as it can reduce the pre-storage volume of waste by up to 99 per cent when compared to other waste solutions like cementation.

This submission supersedes a previous June 2010 public works submission for a Synroc waste treatment plant to process waste from ANSTO's existing Mo-99 production facility (Parliamentary Standing Committee on Public Works approval letter dated 17 June 2010). The location of the new proposed Synroc plant has been subject to a siting option study which identified that a location closer to OPAL and adjacent to the new Mo-99 facility is the optimum location.

1.2 The need for the works

ANSTO is currently dependent on its existing Mo-99 plant and imports of nuclear medicine to ensure a reliable supply to Australia. This plant is ageing and will reach the end of its useful life in 2017.

The existing Mo-99 facility was retro-fitted with the existing suite of radiation shielding enclosures or 'hot cells' in 2006. This plant was designed and commissioned as a demonstration plant with a life of 10 years. It was always anticipated that this plant would be superseded within its design life.

The purpose of the Synroc waste treatment facility will be to treat the waste which is a necessary by-product of nuclear medicine production. Synroc technology is an Australian innovation which immobilises nuclear waste into a synthetic rock which is safe for long-term storage. The Synroc plant will also be used to treat legacy waste from over 50 years of Australian nuclear medicine production into a form suitable for ultimate disposal.

The plant could also create excellent spin-off opportunities for Australia. While Australia will not store other countries' waste, the Synroc plant will become an operating demonstration facility to showcase how Synroc technology could be exported with significant commercialisation potential.

1.3 Options Considered

There were a range of siting options considered for the location of the nuclear medicine manufacturing facility and the Synroc plant. Following this investigation, it was determined that the plants should be co-located near Australia's OPAL reactor. Locating the plants near the reactor provides the lowest recurrent cost and enhanced security. This is discussed further in section under Site Selection.

The base case option for this project is to not build the new plant and continue supplying Mo-99 to the local Australian Market through the existing plant. In this option, as the plant is approaching the end of its useful life there will need to be a significant refurbishment of the plant and during this work the supply of Mo-99 will need to be imported which would cost Australia at least an extra $30 million per year, a cost which would have to passed on to the Australian healthcare system. In addition the refurbishment of the existing plant will face a number of issues including:

- There are no expansion options due to the location of the existing building, meaning Australia would need to rely on imported medicines to meet increasing patient demand. The current layout and operation is also sub-optimal from an efficiency perspective;
- A number of critical, high-cost plant and equipment components were designed to operate for 10 years after commissioning. By 2017 these components will no longer be useable or serviceable. ANSTO will need to either shut down or significantly repair and refurbish these components which would be technically challenging and costly, making life extension an unfeasible option;
- Given the nature of the material being processed in the existing Mo-99 facility, it would have to be completely shut down during the refurbishment process, resulting in a significant disruption to supply; and
- Any replacements or modifications would be inconsistent with best practice Occupational Health and Safety standards.

The other option is to not invest in the plants and import Mo-99 isotope. This option was discounted as the global supply of Mo-99 is under threat. The Organisation for Economic Co-operation and Development (OECD) predicts the closure of nuclear reactors responsible for 70 per cent of the world's current Mo-99 supplies by 2020, making importation highly expensive and potentially impossible.

ANSTO has also considered all reasonable alternatives to the processing of Mo-99 using Low Enriched Uranium (LEU). These include:

- An Acidic process using Highly Enriched Uranium (HEU) - this process uses known technology which is utilised by current major producers; however it uses HEU which is against the Australian Government's policy and creates a safeguards security risk in uranium management; and
- A solution reactor – this process reduces fission waste and does not require expensive targets. However the technology used is under development and therefore high risk.

The alkaline process using LEU has key advantages over the alternatives in that:

- The uranium used in the manufacture of the target plates will be LEU in line with Australian Government policy;
- It is based upon proven technology; and
- Assistance in construction and commissioning can be obtained from NTP, who operate a similar plant in South Africa.

The Synroc waste treatment plant will be needed in a form and scale suitable to address the waste which is a necessary by-product of the production of Mo-99. The plant will also need be able to treat legacy waste from the past 50 years of Australian nuclear medicine manufacture. The Synroc plant will also be built to a scale which will allow it to operate as a demonstration facility, demonstrating the potential for other nations to import this Australian technology.

ANSTO has considered all reasonable alternatives that have been used by other Mo-99 producers and compared them to the Synroc technology. These include:

- Bitumisation – considered but dismissed as it has been abandoned in Europe and is not acceptable to a repository due to its fire risk;
- Increased liquid waste tanks storage capacity; and
- Cementation.

The Synroc process has key technological, operational and logistical advantages over the alternatives. It is the only alternative that can effectively treat legacy and future wastes arising from the Mo-99 production.

Figure 1 demonstrates the significant difference in final annual waste volume generated (Synroc vs Cementation) for the current ANSTO Mo-99 production process.

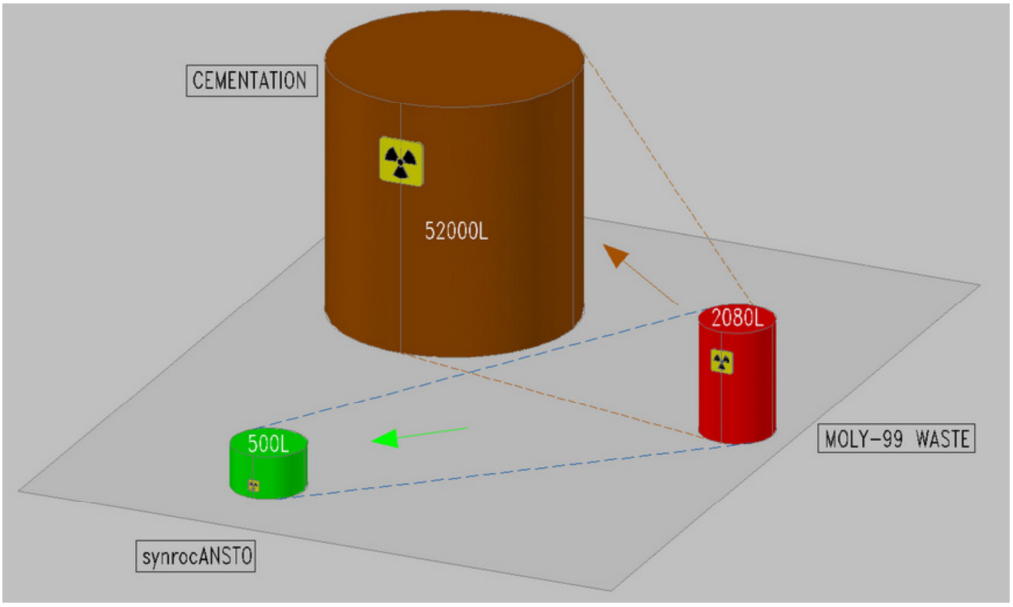

Figure 1: Annual Waste Volumes (Synroc vs Cementation) for current ANSTO Mo-99 Production

If the cementation method of waste treatment was used to treat 2000 litres of ILLW, it would produce 52,000 litres of concrete packages for storage. Utilisation of the Synroc technology would reduce this to just 500 litres. This 100 fold reduction in the final volumes of waste stored will generate significant storage and logistical savings for ANSTO, the Commonwealth Government and other prospective users of this ANSTO technology. The Synroc technology will have marginally higher capital investment. However, when the full life cycle costs are taken into consideration there will be significant savings compared to other treatment and storage methods.

Figure 2 demonstrates the significant transport and waste disposal volumes (comparing Synroc vs Cementation) based on a 10 year production volume at the current ANSTO Mo-99 production capacity.

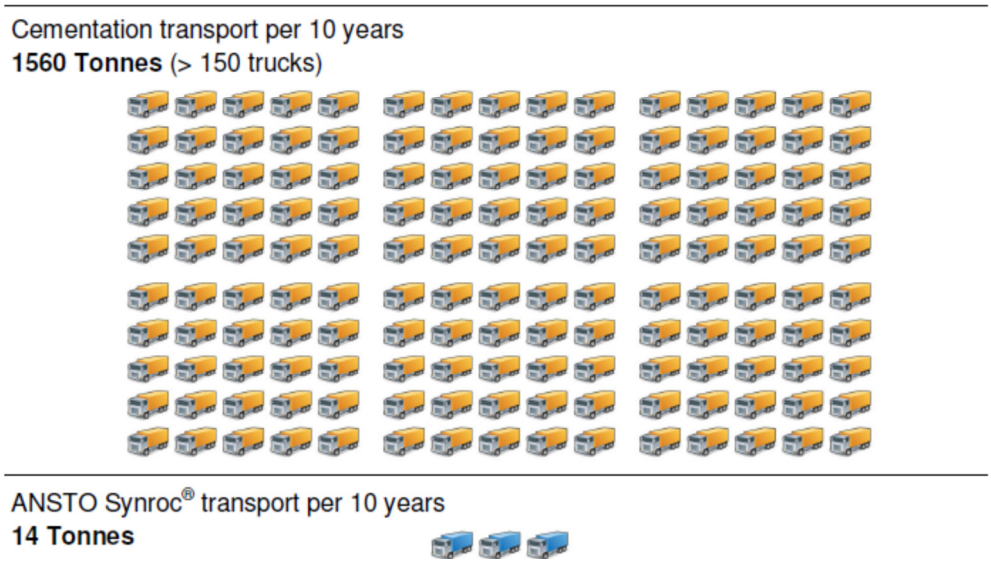

Figure 2: 10 year Disposal Volumes of Waste (Synroc vs Cementation) for current ANSTO Mo-99 Production

1.4 Reasons for adopting the proposed course of action

The following are reasons for the proposed course of action to construct a new larger Mo-99 isotope production facility:

- Increase the ability of Australia to help meet the demands of the rising worldwide demand for Mo-99 isotope due to the ageing populations of Europe and North America and the growing use of the isotope in emerging countries.
- Between 95 and 98 per cent of global Mo-99 is currently being produced using highly enriched uranium (HEU) target plates which contain weapons-grade uranium and is a major concern for the US and other countries, Australia included. Conversion to Low Enriched Uranium (LEU) fuel and targets for Mo-99 production has been agreed by most governments for security and non-proliferation reasons. This concern has created a demand for the use of LEU for both reactor fuel and target plates particularly in the United States and Asia Pacific. Australia is the only country in the world that currently and consistently produces Mo-99 from low-enriched uranium. The

new Mo-99 facility will allow Australia to produce Mo-99 in high enough quantities to meet rising global demand.

- Provides the ability to locate the new facility close to all interrelated facilities such as the new Synroc waste treatment plant and the OPAL reactor.
- Allow for the following test design principles to be embodied into the new facility:
    a. A modular design to allow components to be easily replaced.
    b. Redundancy of unit operations to allow ample time for maintenance activities meaning reliable, secure supply for patients.
    c. The ability to circumvent breakdowns with in line redundancy.
- It will allow for the incorporation of liquid and solid waste holding facilities and the implementation a proven system for treatment of gaseous emissions.

The following are reasons for the proposed course of action to construct a Synroc waste treatment plant:

- Australia's legacy nuclear waste, currently stored at Lucas Heights, requires treatment prior to final disposal at the proposed National Radioactive Waste Management Facility;
- Synroc technology provides for a long-term safe, economical and stable waste form to treat the waste arising from Mo-99 production. All Mo-99 producers around the world are faced with similar challenges to ANSTO for treatment of waste from their operations. A number of Mo-99 producers worldwide have expressed an interest in exploring the Synroc process option based on ANSTO having an operating facility for assessment.
- The new facility will include proven design principles and will be designed to ensure maximum process reliability.

The benefits for Australians from the construction of the new ANSTO Nuclear Medicine Facility are shown in the following table.

Benefit for Australia	
Deliver world-class research and innovation in Nuclear Science and Technology	• Enables ANSTO to develop its radioisotope sales opportunities and provide a commercial income which could boost nuclear medical research and development activities. • Australian developed intellectual property (IP) for the treatment of the waste: utilising ANSTO's proprietary technology for long term safe storage and disposal.
Expand ANSTO's Reach and Contribution, Exploiting Landmark Technologies	• The new Mo-99 facility will lead the world in the use of low enriched uranium for Mo-99 production. • The Synroc plant will be a 'world first' demonstration of Australian technology. • The Government has already invested $460m in constructing the OPAL multipurpose reactor, this project is the next step in maximising the Government's return on this investment.

Benefit for Australia	
Serve the Nuclear Needs of the Government, Industry, Community and People of Australia	• The use of low enriched uranium for Mo-99 production reinforces internationally ANSTO's and the Australian Government's commitment to non-proliferation. • The new Mo-99 facility will guarantee a domestic supply and helps fill a chronic shortage internationally.

1.5 Heritage Considerations

An environmental impact assessment of the proposed site was carried out prior to the construction of the OPAL research reactor to identify any sites or items of potential heritage significance. The assessment covered sites of aboriginal or European cultural significance, sites listed on the register of the national estate, effects on national estate sites or of Aboriginal or European cultural significance, and safeguards to mitigate environmental impacts.

The site does not have any indications of archaeological impacts both of heritage or indigenous nature. In addition the sites do not contain or the projects will not impact any listed buildings of historic significance or buildings requiring preservation or aboriginal significance.

ANSTO has a Heritage Working Group which was established to gather and convey information on the history of ANSTO, as well as providing advice and support for retaining areas of historical importance across site. ANSTO's Heritage Working Group has been consulted in relation to these two projects.

1.6 Environmental Assessment

Environmental management at ANSTO is a part of the ANSTO Business Management System (ABMS) and is the mechanism to ensure that ANSTO's environmental footprint is minimised.

ANSTO's environmental philosophy is defined within ANSTO's Health, Safety and Environmental Policy. ANSTO's commitment to protecting the environment is demonstrated through its certification to the international environmental management standard ISO 14001.

ANSTO's processes for environmental management are documented in a series of Environmental Management Plans which are devised, documented and implemented in accordance with the requirements of the ISO 14001.

It is not envisaged that there will be any significant impact on the environment. The new larger Mo-99 isotope production facility will replace an existing licensed facility and, during construction, will cause only very minor environmental effects.

During construction, the environmental factors to be managed include the excavation of the building basement, control of surface water run-off from the site and noise, dust and vibration as a result of the construction activities. There might be some localised noise during construction but the impact will be minimised due to ANSTO's

1.6km buffer zone. In order to manage these impacts, a project specific Construction Environmental Management Plan will be required from the main contractor.

Waste materials generated by the process will be managed within the context of ANSTO's existing management arrangements for wastes.

There is no impact to flora and fauna as the site was cleared of flora during the construction of the OPAL reactor, and is within a security fenced zone which prohibits local fauna entering the site.

Environmental monitoring of ANSTO's Lucas Heights campus includes checks of the underground water levels. The new facilities will be properly drained and subject to ANSTO's on-going water sampling process.

When the new facility is in operation, the discharges will be:

- Gaseous emissions, which will be limited by the commitment outlined in the section on Environmental Sustainability below, and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) facility licence.
- Liquid and solid wastes, which will be managed within the context of ANSTO's existing management arrangements for wastes outlined in the section on Environmental Sustainability.

Environmental matters have been examined in an *Environmental Management Plan* prepared as part of the Siting Licence Application to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) under the *Australian Radiation Protection and Nuclear Safety (ARPANS) Act 1998*. In addition a Referral to the Department of Sustainability, Environment, Water, Population and Communities under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* has been prepared. No significant environmental matters have been found in preparing these documents.

1.7 Governing Agency Act

ANSTO is subject to the provisions of various Commonwealth Acts and regulations made under these various Acts and Commonwealth Awards. The principal Act is the *Australian Nuclear Science and Technology Organisation Act 1987* (ANSTO Act) which details the organisation's functions, powers, Board, Chief Executive Officer's duties, staffing, finance and other roles and responsibilities.

1.8 Local Community Impact

ANSTO's campus has a 1.6km buffer zone. There are pockets of communities living in Barden Ridge and Engadine. These suburbs are not densely populated and any traffic which is generated as a result of construction and operational activities will be negligible to the residents.

As part of the normal ANSTO processes on significant construction projects, construction environmental plans will detail potential issues and management controls that will be adopted. Noise, dust and vibration issues will be closely

monitored and no adverse impacts on the surroundings are anticipated. Furthermore, the economic activity generated from the construction operations will enhance the local economy and employment opportunities.

During the operational life of the facility there will be additional staff employed at the ANSTO Lucas Heights site for the operation and support of the plants. These staff will be able to be easily accommodated using existing transport services and infrastructure.

The Mo-99 facility and the Synroc Waste Treatment plant require licensing under the *Australian Radiation Protection and Nuclear Safety (ARPANS) Act 1999* and licence applications to the regulator the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) have been made.

1.9 Consultation Carried Out Among Relevant Stakeholders

A comprehensive stakeholder engagement plan has been developed to manage communication with key stakeholders.

The ANSTO Nuclear Medicine (ANM) project was announced by the Government in September 2012, including the intention to construct two new facilities at ANSTO's Lucas Heights campus. The announcement was well received by key stakeholders, including key health and medical associations. The announcement was also welcomed by international stakeholders given increasing levels of concern of looming global shortages of Mo-99 and the potential for such shortages to disrupt diagnosis of heart and cancer patients.

ANSTO values its strong relationships with the local community and various communication activities have already taken place to ensure public confidence in the project, including;

- A proactive media campaign targeting local media;
- Briefings for local community leaders; and
- Placing detailed information about the project on the ANSTO website.

2. Purpose of Works

2.1 Project Objectives

The successful execution of these projects will secure Australia's supply of Mo-99, position Australia as a major supplier of Mo-99, provide a viable economic solution to consolidating waste which is a legacy of 50 years of Australian nuclear medicine production and allow ANSTO to showcase Synroc technologies to the world.

The key objectives of the ANM Mo-99 project are:

a) Within approved project budget and milestones, deliver to ANSTO a safe, modern and reliable facility that manufactures Mo-99 from low enriched

uranium targets irradiated in Australia's OPAL research reactor (low enriched does not have the military risks associated with highly enriched uranium); and

b) Secure Australia's ability to produce Mo-99.

The key objectives of the Synroc project are:

a) To ensure the safe long-term management of Intermediate Low Level Waste.
b) Demonstrate ANSTO Synroc technology on a production scale for commercialisation around the world.

2.2 Site Selection

The site has been investigated extensively in relation to the safety assessments and ARPANSA licences for other Nuclear Installations including the OPAL reactor and has proved to be a suitable location.

The site is established and is currently used for existing similar licensed operations. It has several advantages including:

- The 1.6 km buffer zone and the security perimeter fence.
- Site access controlled by Australian Federal Police.
- Good infrastructure including power, water supply, waste services and communications.
- Good support services including health physics, general safety and engineering.
- A comprehensive health, safety and environment management system certified to international standards.
- An established environmental monitoring programme.
- In close proximity to associated facilities, such as the OPAL Reactor, this will help optimise operations.

The siting of the ANM Mo-99 and Synroc plant were subject to a siting options investigation which revealed the following:

- The co-location of the Mo-99 and Synroc plant near the OPAL reactor best captures the operational efficiency of producing Mo-99 and processing waste.
- The location of the plants complies with ANSTO's 2055 Master Plan.

2.3 Scope of Works

Project Location

The sites for these facilities are within ANSTO's main fenced site at Lucas Heights, NSW, in the reactor precinct near the existing OPAL research reactor. The ANSTO fenced site is in bushland in the Sutherland Shire 28km southwest of the centre of Sydney; and 3.2km from Engadine railway station. The ANSTO fenced site is Commonwealth land and is therefore not subject to council regulations. The campus master plan and ANSTO's Building Code provides a guide for the development of all facilities on campus.

Planning and Design Concepts

The ANSTO Building Code assists in the preparation of design and requirements for construction, alteration, or maintenance of infrastructure, including buildings, at all ANSTO sites. Compliance with this code is mandatory. The code enables efficient translation of ANSTO's design rules into infrastructure solutions.

The projects, in compliance to the ANSTO Building Code have the following features:

Component	Description
Control and Security	The new buildings will be integrated with the existing buildings and systems on the ANSTO campus from a fire protection, building management control system and electronic security perspective.
Structure	All floors will be designed as per Australian Standard 1170. The specialist radiation shielding enclosures will be underpinned by piers which are independent of the building structure to comply with seismic requirements. The roof will be designed for a 40 year life and provide elements for safe roof access for maintenance.
Materials	The materials for the building design will be selected on the basis to provide a maintenance free, useful life of 40 years as a minimum. The materials will be locally available and supported. Façade materials under consideration include materials like brick / block work, pressed metal panel, and compressed fibre cement.
Furnishings	The fit out to office area will be simple and cost effective. The plant area will use standardised furnishing and equipment, as currently exits at ANSTO
Mechanical services	The limited amount of office areas will be provided with efficient package units to provide thermal comfort in these areas.
Hydraulic services	Water will be supplied to the plants by branching off the existing water main. Rain water recycling will be considered and recycling tanks provided.
Electrical	The Synroc plant and Mo-99 buildings will have main switchboards and distribution boards fed from the Lucas Heights site supply. At this time the anticipated emergency backup strategy will be a diesel generator to supply essential electrical loads in case of a power failure. Certain computer and building safety systems will have a Battery UPS (Uninterruptable Power Supply) as additional back up supply. This strategy will be confirmed during detailed design.
Acoustics	Acoustic performance and the reduction of sound transfer shall be ensured. Special treatment to external surfaces may be required in the vicinity of high noise zones such as plant rooms. For all air-conditioning, ventilation and other mechanical services installations, a report by an acoustic consultant will be prepared to verify that the noise ratings of all internal and external spaces adjacent to the installation are within acceptable design levels.

Component	Description
Landscaping	The projects will include landscaping and turfing to provide improved amenity and aesthetics of the building
Civil works	The plants are located off the existing loop road Einstein Avenue on the ANSTO campus. There will be minor road works connecting the plants to the Einstein Ave.

The new larger Mo-99 isotope production facility “core” design is based on the existing ANSTO production facility and a South African facility, to ensure maximum safety, simplicity, robustness and cost effectiveness of operation. The current design maturity is based on a series of conceptual design studies which have been reviewed by ANSTO’s senior Engineering and Capital Programme staff for scope and quality of estimate. There is confidence that the current engineering maturity has produced an estimate which is well scoped and is conservative, and draws on considerable nuclear engineering experience.

The new Mo-99 isotope production facility is a two level building which will be compliant with relevant Australian Standards and Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) requirements for a nuclear installation. Certain areas of the building will also be compliant with the Code of Good Manufacturing practice for Therapeutic Goods.

The building will contain:

- A production area with radiation shielding enclosures for the handling, process and maintenance of the facility;
- Tanks for the interim storage of production liquid wastes;
- A treatment system for production off gases;
- Laboratories for analysing starting materials and finished product;
- A product dispatch area;
- Staff amenities; and
- Reticulated building services, including water, waste water, ventilation, electrical, lighting, security, fire detection, alarms and Public Address.

The Synroc Waste Treatment plant is a first of a kind waste processing facility which will be compliant with relevant Australian Standards, ARPANSA requirements, and the Commonwealth Government Department of Innovation, Industry, Science, Research and Tertiary Education. The project is currently at 50% design stage with all layouts and plant configurations defined.

The Synroc plant can be thought of as having three main areas. The first area being the white area which contains spaces like offices, meeting rooms, and hot cell operations rooms. The second area is the blue area which contains space for the support of the hot cell equipment. The third is a red area which contains the hot cells for the purpose of processing the waste into a synthetic rock material, hence Synroc.

The Synroc project contains an approved test and evaluation plant, this plant will be essential to demonstrate the technology to the regulator whilst seeking regulatory approvals. The test and evaluation plant will also serve as a useful training tool, as well as a marketing device.

Environmental Sustainability

ANSTO is committed to providing sustainable sensitive building designs. The ANSTO building code addresses ANSTO's commitment and response to Environmentally Sustainable Design (ESD). The allocation of precincts on the ANSTO Campus is the beginning of providing a framework for ESD implementation at ANSTO. Consolidating activities and locating them in precincts minimises travel distances and provides operational efficiencies.

The National Australian Built Environment Rating System (NABERS) measures an existing building's environmental performance during operation. NABERS rates a office buildings on the basis of its measured operational impacts in categories such as energy, water, waste and indoor environment. These environmental indicators and the associated measurement techniques have been the subject of extensive research and deliberation, drawing on international and local expertise. ANSTO has committed to providing a minimum 4.5 Stars for all office areas.
The building fabrics will comply with the Building Code Australia Section J as well as being orientated in a manner which provides minimal solar heat gain.
The project will implement the following initiatives as appropriate:

- Rainwater harvesting and re-use for landscape irrigation.
- Sun shade on windows to minimise solar heat gain in offices.
- Waste separation and streaming to maximise recycling.

Master and Site Planning

ANSTO has developed a 2055 Site Master Plan which will provide a state of the art scientific installation and a user friendly facility.

ANSTO began in 1955 and over the last 50 years the Lucas Heights site has grown in size with a huge amount of new and redeveloped infrastructure. The 2055 planning process delivers the necessary vision and guides to encourage the best site development.

ANSTO will grow more over the next 45 years and is conscious of the physical constraints of the Lucas Heights site and the impact of changing technology. The seven site principles below have been developed to guide the planning process of current and future site developments:

- Create a safe site
- Create an efficient site
- Create a site that encourages public interaction
- Create a site that is appealing scientifically, functionally and aesthetically
- Create infrastructure that is environmentally friendly
- Create a site that does not discriminate

- Create a site that encourages cooperative, interactive and creative staff activities

The Lucas Heights site is zoned to bring like activities physically closer to one another. These activities include research, community and business and green corridors for environment and recreation. These zones and precincts will in many instances determine the location of new buildings and facilities.

The ANSTO building code along with various other guidelines and procedures assists with planning and implementing all future development across site.

The master planning working groups and committees have been examining the needs of ANSTO, what works and what doesn't, and are creating change while preserving ANSTO's history.

Provisions of People with Disabilities

ANSTO is committed to complying with *Disability Discrimination Act* and as such, the new facilities have been designed to comply with the Act. In addition, the paths around the buildings will enable disabled access. Where it is appropriate to comply with AS 1428, ANSTO will undertake design and construction works in accordance with this standard, however, as many of these areas are secure zones with highly specialised processes, disabled access will not always be possible.

Childcare Provisions

It is envisaged that access to childcare facilities within close proximity to the site will be available for staff working on the Lucas Heights site.

Security Measures

The ANSTO Security and Safeguards division, under the control of the Chief Security Officer, is responsible to the ANSTO CEO for security and safeguards arrangements. This division has sections responsible for protective security and operations, security support and nuclear safeguards. ANSTO has also designated the roles of Agency Security Advisor and Information Technology Security Advisor, as required by the Australian Government Protective Security Policy Framework.

ANSTO Security and Safeguards work in close cooperation with the Australian Federal Police (AFP) who provides security services on the ANSTO Lucas Heights site. The AFP provides continuous staffing of the Lucas Heights Site Control Centre.

The sites will be contained entirely within the Lucas Heights Science and Technology Centre (LHSTC) boundary fence. Only staff and contractors that have undergone the security clearance process by ANSTO Security are able to gain unescorted access to the LHSTC site via the Access Control System. Visitors and short-term contractors are required to sign in at the ANSTO reception desk before gaining access. In addition, they must be escorted by an ANSTO ID pass holder at all times within the LHSTC boundary fence, as per the ANSTO Visitor Policy.

ANSTO maintains a scalable protective security system, with the ability to implement additional precautions to address an increase in threat level.

The security procedures at the proposed facilities are designed to protect the assets and also to help with the protection of people from exposure to hazards. Both sites will be protected by the same modern surveillance systems as are employed across the rest of ANSTO. These systems are continuously monitored by onsite AFP Protective Service officers.

The design and construction of the two facilities will be with full involvement of the ANSTO Protective Security and Operations section.

For future operations of the two facilities there will be procedures in place that will ensure the safety and security of all feed materials, products and active wastes. These procedures will be similar in principle to those for the current facilities.

Fire Protection

The new facilities will comply with all fire and life safety requirements. In particular, the new facilities will be fitted with:

- Fire detection system with central monitoring;
- Fire hydrants and hose reels
- Fire sprinklers
- Specialist gas fire suppression system
- Early warning intercom systems.

ANSTO will extend the requirements for fire and occupant safety training and induction prior to occupation and during occupation.

Occupation Health and Safety Measures

The ANSTO Work Health and Safety (WHS) management system meets the requirements of: the *Work Health and Safety Act, 2011;* and the *Work Health and Safety Regulations 2011.* The WHS management system complies with AS/NZS 4804:2001.

The WHS management system encompasses the WHS policy, WHS management arrangements and WHS standards and practices. The management system is described in a suite of documents which are divided up into 11 categories to outline the arrangements in place for maintaining a healthy and safe responsible work environment.

WHS accountabilities and responsibilities are in-line with the WHS Act and are described along with authorisations for specific roles at ANSTO in the WHS management system documents

WHS is managed through a risk management approach incorporating the principles of hazard identification, risk assessment, control of hazards, and a monitor and review process. The risk management process complies with AS/NZS 4360.

Consultation and communication on WHS occurs through the elected Health and Safety Representatives, Health and Safety Committees and a Central Safety Consultative Forum. ANSTO provides appropriate WHS training for each person's role and this is defined in WHS management system documents.

Plans and Drawings

Associated plans and drawings are attached in Appendix 1.

3. Cost Effectiveness

3.1 Overall Project Budget

A$168.8m combined project budget is available and it is anticipated to be funded from 100% government equity investment.

3.2 Project Delivery System

A Program Steering Committee has been established and is being chaired by the ANSTO Chief Executive Officer. ANSTO has appointed a Program Director to ensure that the Program is delivered in a consistent manner, as well as capturing the synergies between the projects. The Program Director is supported by a team of project managers responsible to the program director for the delivery of specific program work packages. The facilities will be wholly owned by ANSTO.

The delivery system selected will provide a cost effective outcome while providing highly effective and sustained long term benefits to ANSTO and the Commonwealth. The delivery model for the Synroc project relies on the specialist team at ANSTO Synroc being the technology vendor to the project, with strategic supplier relationships being formed with a nuclear company, as well as a local technology integrator. The model has been designed to specifically provide protection of ANSTO Intellectual Property in order to maximise commercialisation potential overseas.

The Mo-99 project delivery model will utilise existing proven technology from South African operator, NTP, to base the plant design. It is proposed that a nuclear company be engaged to be the integrator of the technology as well as to the take the lead in the design and construction of the building. ANSTO' Engineering and Capital Programs division will provide the overall project leadership and support to ensure the plant is delivered on time and within budget.

The project team will conduct an appropriate due diligence assessment on any potential partner that will contribute to the design, construction or commissioning of the proposed facility. The level of contractual arrangements with the third party will determine the scope of the due diligence assessment to be conducted. The main areas of review being:

- Develop detailed knowledge of the partner – market research to be conducted
- Production experience – have they delivered to industry in the past
- Proven technology solution – determine the risk of proposed solution
- Company resources – review commitment, financials, experience, facilities
- Market reputation – to protect ANSTO reputation

3.3 Project Schedule

The Mo-99 facility has these key schedule dates:

Activity	Mo-99 Plant
Preliminary design of facility and process	May 2013
Tender for detailed design and construct	August 2013
Detailed design	July 2014
Facility construction and commissioning	May 2015
Process installation and commissioning	November 2015
Commence operation	March 2016

The Synroc Waste Treatment plant has these key milestones:

Activity	Synroc Waste Treatment Plant
Completion of Design	June 2013
Commence construction	June 2013
Complete construction	October 2014
Complete Commissioning	December 2015
Operational commencement	June 2016

4. Public Value

4.1 Benefit the public will gain both now and in the future

Mo-99 is the most widely used medical radioisotope. It is used in approximately 85% of nuclear medicine procedures worldwide. The installation of a new Mo-99 production plant at ANSTO will ensure supplies in the domestic Australian market and enable the phase out of operations of the existing ageing Mo-99 facility. As well as producing supplies for the domestic market, the new facility will allow ANSTO to meet a significant proportion of the world's demand for Mo-99. The facility will use low enriched uranium targets which is internationally preferred to minimise proliferation concerns.

The Synroc plant to be built in conjunction with the ANM Mo-99 facility will deliver a permanent, safe and economical way of treating waste from past, current and future manufacture of nuclear medicines. In addition, this plant will be an operational scale demonstration of the Synroc process which is a best practice technology for treating this type of waste.

4.2 Projected final value of the works

The projected final value of the works is $168m.

5. Appendices

5.1 Appendix 1 Associated Plans and Drawings