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Transportation Management Plan

US Ecology Idaho Inc for Nelson Parade Material

December 3, 2021 DRAFT, Revision 05

This Transportation Management Plan fully and accurately describes the relevant parties and their expertise, provides characterization of the subject material, a summary of the logistical process, references applicable international and national transport regulations, classifies the material for shipping purposes, describes the packaging and securing in compliance with all applicable regulations, provides segregation and stowage information and emergency response procedures in compliance with all international regulations and in all other respects provides all necessary information for the safe and compliant transportation of the subject material.

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Necessity for Change

After over a year of negotiating with Veolia in good faith for use of the Matraville facility near Port Botany and receiving a commitment from Veolia for support of the execution of the Hunter's Hill project, it is now necessary to fundamentally change the logistics plan for the project due to factors beyond the control of the parties involved.

Veolia provided a courtesy notification of the intended project execution to their landlord at the Port Botany facility. The reaction of the landlord was extremely negative to the proposed storage of the Hunter's Hill material on site and the landlord demanded unspecified remuneration both immediately and in the future should Veolia proceed with the project. The landlord (Henroth Group) has threatened legal action should the project proceed without their consent.

While it is possible for Veolia to proceed without the landlord's approval, the risk to future goodwill in dealing with the landlord as well as extreme financial risk to the project overall has made this unlikely.

After best efforts have been made during the planning of the logistics for the Hunter's Hill project to export directly from the state of origin, the principals have determined that the best path forward is to move the material in a safe, proven and cost-effective routing for this class of material.

At least 90% of all material classified for export as Class 7 UN2912, departs Australia from Adelaide including almost all of the uranium ore mined in the country. Alara owns a facility in Adelaide that is licensed for the storage of radioactive material including UN2912 and the Adelaide port is best suited in all of Australia for the export of Class 7 material.

While the extended trucking from Sydney increases cost and risk slightly, these are more than mitigated by the gained cost control of the Alara owned storage facility, the flexibility in vessel booking and loading at the Adelaide port and the overall use of a safe and established routing that has been well established over the years for like material.

The potential for further cost savings gained by combining other similar cargo in need of transport to the same destination in the US further proves out this proposed method.

Transportation Management Plan

US Ecology Idaho Inc. for Nelson Parade Material

April 27, 2021 DRAFT, Revision 01

1. Purpose

US Ecology Idaho Inc. (USE) provides this Transportation Management Plan for the safe and compliant transportation of the subject material.

2. Parties

US Ecology (USE) is a US-based company hired by Property New South Wales ("PNSW"), an agency of the New South Wales provincial government in Australia, to transport the subject material from 7-11 Nelson Parade, Sydney, New South Wales, Australia, to the Company's facility in Idaho, USA. The material was originally mined in Australia as an ore with naturally-occurring Radium and was processed at the Nelson Parade site between 1914-1917 for the extraction of Radium. The Radium was used for various medical and health purpose at the time (rejuvenators, water energizers, etc.).

2.3 Relevant Expertise of the Parties

US Ecology Idaho (USE)– US Ecology is the oldest hazardous and radioactive materials management firm in the United States and Canada. The company imports or exports ~100,000 tons per year of hazardous and radioactive materials, primarily between Canada and the US, with significant other business in the Middle East, Mexico, Australia, and elsewhere. Its representatives have applicable training in US Department Of Transportation (USDOT) hazardous and radioactive materials shipping, International Maritime Dangerous Goods (IMDG) regulations, International Atomic Energy Agency (IAEA) Safe Transport of Radioactive Material Regulations (SSR-6 Rev 1), radioactive and hazardous materials management, emergency response, and US Customs compliance. The company has maintained a perfect environmental compliance record for the import of radioactive materials. USE also owns and operates a hazardous and radioactive materials disposal facility located near Grand View, Idaho, USA which will dispose of the subject material.

Property New South Wales Government (PNSW) – an agency of the New South Wales provincial government in Australia. The Government of New South Wales, also referred to as the New South Wales Government or NSW Government, is the Australian state

democratic administrative authority of New South Wales. PNSW maintains expertise in land management, contaminated property remediation, and environmental clean-up.

ALARA Logistics – Headquartered in Houston, Texas, ALARA is a major transporter of nuclear material and products worldwide. ALARA is a recognized expert in the safe transport of radioactive materials. Its subcontractors in this project include:

ADG Australia – Operating from it's facility at 21 Scarborough Road, Lonsdale SA 5160, ADG has been a reliable transporter of high consequence materials with a particular focus on Class 7. With it's combination of transportation licenses and storage permits, the ADG operation is well suited to execute any transport operation required of Class 7 material.

NSW Trucking – Trucking companies that are appropriately insured, have recently inspected equipment and drivers that meet the training requirements for Restricted Solid Waste (RSW) as well as Class 7 will be required to complete the segment moves within Sydney for this project. ALARA has evaluated multiple carriers in NSW that meet these requirements and the final matrix of carriers used will be determined by available drivers/equipment as well as rate of material recovery and packaging at the remediation site.

Steve Forler Trucking – is a licensed and bonded freight shipping and trucking company headquartered in Boise, Idaho. Steve Forler Trucking is one of the U.S.-based trucking companies that will haul the loaded Sealand containers from the U.S. port of arrival to US Ecology Idaho's disposal facility near Grand View, Idaho. Steve Forler Trucking is licensed and permitted to transport hazardous and radioactive material throughout the United States.

Tri-State Motor Transport – With offices in Glendale, Arizona, Tri-State Motor Transport is licensed and permitted to transport hazardous and radioactive material throughout the United States. Tri-State is one of the U.S.-based trucking companies that will haul the loaded SeaLand containers from the U.S. port of arrival to US Ecology Idaho. Other transporters may also be used that meet the qualifications provided by Steve Forler Trucking and Tri-State Motor Transport.

3. Material Characterization

The subject material was mined as Ore, with naturally-occurring Radium, in South Australia. The ore was transferred to and processed at the Nelson Parade site between 1914-1917 for the extraction of Radium. The material to be packaged and transported consists of:

- Soil and soil-like material, with some debris which includes concrete, rocks, and other inorganic material. Organic materials within the subject material are minor and associated with natural vegetation and soil. The material consists of ~ 1,712 metric tonnes (1,887 US tons), at a typical soil density of 1.22 grams per cubic centimeter (76 pounds per cubic foot).

The material has been extensively characterized by PNSW with oversight by Australian provincial and national authorities. These authorities considered the material to be non-hazardous. However, it does have radiological contamination at the following levels:

Isotope	Mean Activity Concentration Bq/g
Uranium 238	2.2
Radium 226	4.9
Radium 228	0.08
Lead 210	4
Thorium 230	4
Thorium 232	0.08

Following packaging for transport, the NORM material may exhibit a measurable external dose rate of ~2 µSv/h (~0.2 mR/hr) at 1 meter from a 20' International Organization for Standards (ISO) SeaLand shipping container ("SeaLand"). Further information about the chemical and physical properties of the material and associated hazards is found in the attached Safety Data Sheets (Attachment 1).

The material is not considered to be a Marine Pollutant.

4. Summary of Logistical Process

The material will be packaged into IP-1 bags and palletized on site. These palletized bags will be loaded into custom 20' SeaLands at the project site. The palletized bags will be lashed within the SeaLands in a manner consistent with IMDG and international regulations as well as AMSA recommendations.

The loaded containers will be moved to the ADG facility in Lonsdale SA for short term storage, while awaiting the charter vessel. Storage of the SeaLand containers is expected to be for an average duration of 60-150 days depending on the functioning of the scheduled vessel market. The SeaLands will be shipped chartered ocean freight to the Port of Tacoma, Washington, USA.

The SeaLand containers then will be transported from the Port of Arrival to USE's Idaho facility for disposal.

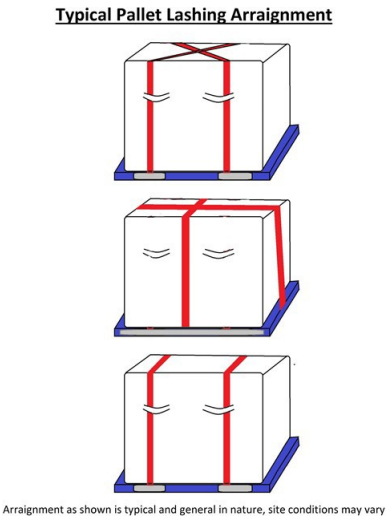


Figure A

4.1 Detailed Logistical Process

4.1.1 Handling On-Site and from Nelson Parade to B-Double Loading in Enfield

The remediation contractor will be responsible for the loading and handling of the packages at the project site. Once the remediation contractor has loaded each package within the loading frame, they will seal, remove and place the package on a staged pallet. See Figure A for a depiction of the method used to lash an IP1 bag to the pallet. The remediation crew will then strap the package to the pallet as shown in figure A and mark the mass on the package. US Ecology's onsite representative will then verify the sealed package complies with all requirements for transport and disposal. The palletized package will then be loaded on site into SeaLand containers for transfer to ADG in Adelaide.

ALARA will contract with local permitted and licensed transportation companies to convey the loaded SeaLand containers to the ADG facility in Adelaide.. ALARA has provided an overall risk assessment document which is provided as an Attachment.

Figure B

ALARA will operate Skel container chassis pulled by standard power between the project site and the trucking facility in Sydney to minimize the impact to the surrounding residents and infrastructure. An example of a Skel chassis is shown in Figure B.

4.1.2 Transport to and Storage of material at ADG in Adelaide

ALARA will prepare the ADG facility in Adelaide to store between 100 and 120 Sealand containers.
ALARA will coordinate with ADG to prepare the site by encompassing the selected short-term storage area with chain link fence for improved security and adding road fill to improve vehicle access. Within the fenced area, ALARA will stage the loaded SeaLand containers and perform a thorough inspection to ensure compliance with all transport regulations. ALARA will move the containers to a yard north of Sydney to transfer the containers as UN2912 under the ADGC and NSW EPA regulations onto B-Double trailers and three containers will be transported per power unit to the ADG facility in Lonsdale SA. No container will touch the ground at the transfer facility and no container will be held at the transfer facility for more than 24 hours during the transfer to ensure that the shipment remains "in commerce" and "in-transit" from Hunter's Hill to the ADG facility in SA.

4.1.3 Transport of the Sealands from ADG to Port of Adelaide

The loaded SeaLands will be transported by truck from ADG to the Port of Adelaide as the distance is 34 kilometers from the ADG facility to the Port gate. The intention is to charter a vessel that may carry over 100 containers at once. The port allows that the containers can delivered up to one week prior to vessel arrival. On arrival at port, the SeaLands will be off-loaded, staged, and await final loading onto the vessel upon arrival.

4.1.4 Notification of a Security Breach

Physical security measures to minimize unauthorized access to the Project Site, Sydney Transfer Station, ADG and/or a loaded SeaLands container by human force will be deployed. The local police service as well as the applicable regulatory agency will be notified in the event of a security breach at the Project Site, Sydney Transfer station, ADG and/or a loaded SeaLands container. Project personnel will be briefed to watch out for suspicious behavior concerning the various work and storage sites.

4.2 Applicable Transport Regulations in Australia

In New South Wales, Australia, the material has been classified by the NSW Environmental Protection Authority ("NSW EPA") as a "Restricted Solid Waste." The loaded SeaLand containers will be transported from the Nelson Parade project site to the Sydney transfer yard as Restricted Solid Waste.

The Australian Commonwealth, State and Territory radiation regulatory agencies, including VIC Health and SA EPA adopt the international requirements for the transport of Radioactive Material published by the International Atomic Energy Agency ("IAEA"). These IAEA requirements are within the Code of Practice for the Safe Transport of Radioactive Material, RPS C-2 (ARPANSA, 2019).

NSW EPA has reviewed information on the subject material and confirmed that "the material in question, is below our regulatory threshold and therefore no placarding is required when transported within NSW."

Further, under contract to PNSW, ANSTO has provided a Technical Note titled "Implications for Transportation of Encapsulated Material at the Nelson Parade Site, Hunters Hill, NSW" dated 8 January 2019, and determined that the material is not a Radioactive Material subject to transport regulation under ARPANSA requirements.

As such, the material will be transported as "Restricted Solid Waste" and not as "Radioactive Material" from Hunters Hill to the transfer yard in Sydney.

The ADGC, UN and IMDG classify the material as UN2912 Radioactive Material, Low Specific Activity 1. The containers will be transported as such from the transfer yard in Sydney to ADG in South Australia via Victoria.

4.3 Applicable Transport Regulations outside of Australia

Outside of Australia, the International Maritime Organization, the United States Department of Transportation ("USDOT") and all other Competent Authorities have adopted the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (SSR-6 Revision 1, 2018).

The International Maritime Dangerous Goods regulations (IMDG, Amdt. 40-20) specifically adopted SSR-6. The USDOT regulations found at 49 Code of Federal Regulations (CFR) are also harmonized with SSR-6. After leaving Australia, the IAEA SSR-6 provides a consistent regulatory basis for international shipments.

The IAEA's Safety Guide SSG-26 titled *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* provides further clarification on the proper interpretation of SSR-6. This Transportation Management Plan was prepared in accordance with these regulations, as well as the World Nuclear Transport Institute *Good Practice Guide for Checking Shipping Containers Prior to Loading*, and the *Good Practice Guide for the Securing of Drums of Uranium Ore Concentrate.*

Following the classification procedure in SSR-6, the Material is properly classified as a Class 7 Radioactive Material for international transport. As a result, each package and SeaLand will be fully marked, labeled, placarded, and otherwise shipped in accordance with IAEA regulations for Class 7 transport from the Transfer Yard at Enfield through to US Ecology Idaho.

4.4 Shipping Classification outside of Australia: Class 7

The material is classified as UN2912 RADIOACTIVE MATERIAL (LSA-1)

The material averages ~412 pCi/g (~15.26 Bq/g) of Radium 226, Radium 228, Uranium 238, Thorium 232, Thorium 230 and Lead 210.

The calculations below are based off a calculated maximum activity found in any one container (IP-1 bag), to be conservative.

Section 226 of IAEA SSR-6 defines Low specific activity material as:

> *Low specific activity (LSA) material shall mean radioactive material that by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity.*

This material meets the requirements of IAEA Section 409(a)(iv) which limits LSA-1 to thirty (30) times the values for activity concentrations specified in paragraphs 402-407.

The activity concentration for Ra-226 shown in Section 3 of this TSP is different from that of its parent radionuclide, U-238, indicating the absence of secular equilibrium. The absence of secular equilibrium is to be expected given the nature of the historical operations undertaken at Hunters Hill. The material is therefore inferred to be a mixture of radionuclides. Since the soil is to be transport, an exempt activity concentration was calculated for a mixture of radionuclides using the formula within paragraph 405 of SSR-6. The calculated exempt activity concentration is 3.2 Bq/g. An IAEA requirement to qualify material as LSA-1 is for the material to meet Section 409(a)(iv) whereby its activity concentration is to be less than thirty (30) times the respective exempt activity concentration. The total activity concentration within the subject material is 15.3 Bq/g, which is less than 96 Bq/g being the thirty times upper limit.
Therefore, the material qualifies to be shipped as LSA-1.

Each SeaLand holds 10 each containers (bags) meeting IP-1 standards. The final number of containers per SeaLand was determined based on the weight of each container, and optimum loading and weight distribution, in accordance with USEI's Detailed Packing Plan.

Each Container (bag) will weigh an average of 1,800 kgs (3960 lbs), with the total mass of subject material within a SeaLand container not exceeding 18,000 kgs (39,600 lbs). The activity of 18,000 kg of subject material is estimated to be 0.274 GBq. Actual values will be reported on the Detailed and Summary Packing Lists for each container.

Due to the low activity of the material and the receiving facility's limitations, the 10 millisievert per hour 3 metre dose limit found in Clauses 411 and 517 of SSR-6 will not be exceeded or even approached. As a result, those provisions within SSR-6 relevant to higher dose rate values or 2 mSv/h or greater from packaged low specific activity material are considered not to be applicable for the consignment and as such are not addressed within this TMP.

4.5 Other LSA Requirements

Consistent with 518(b) of SSR-6, each container may be shipped under Exclusive Use. Exclusive Use is defined in IMDG in 1.2.1:

> *Exclusive use, for the transport of Class 7 material, means the sole use, by a single consignor, of a conveyance or of a large freight container, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the consignor or consignee (emphasis added).*

As required by 544(l) of TS-R-1, the words "EXCLUSIVE USE SHIPMENT" must be included in the transport documents, and Exclusive Use instructions provided. See attached Exclusive Use instructions (Attachment 4).

IAEA SSR-6 544(h) requires the Category to be included on the transport documents, which will be either "I-White," or "II-Yellow" depending on the final activity and TI calculated after the SeaLand is loaded.

Packaging & Securing

The subject material has been packaged by trained and competent operators to meet all international transport requirements for Class 7 material. This includes the *IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units* (2014), as well as the IMDG code, and the World Nuclear Transport Institute *Good Practice Guide for Checking Shipping Containers Prior to Loading*, and the *Good Practice Guide for the Securing of Drums of Uranium Ore Concentrate.*

Specifically, the material is packaged as follows:

The material shall be placed into Pac-Tec manufactured IP-1 bag containers. These IP-1 bags are tested to meet IP-1 requirements. This testing was performed in accordance with USDOT / IAEA requirements for IP-1 Packaging “UN” are Industrial Package Type IP-1 requirements in the IAEA and IMDG regulations (See Figure 1):

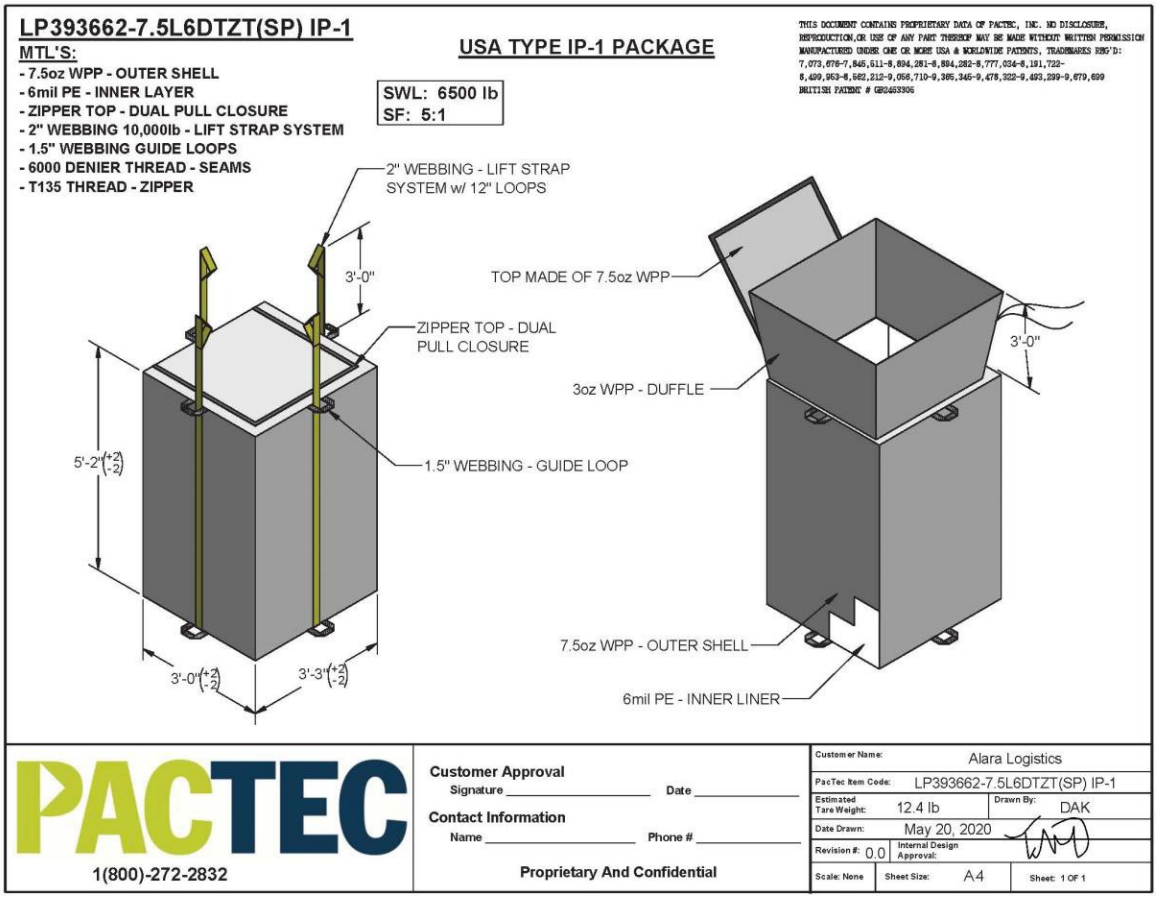


Figure 1: Typical IP-1 certified Container (bag).

The IP-1 Containers are then secured to a pallet using the lashing system shown in Figure 2:

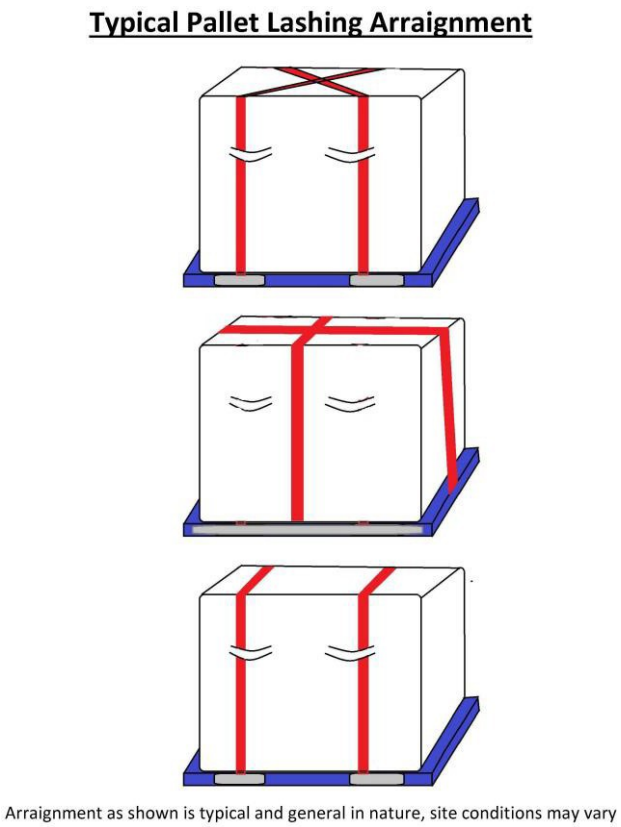


Figure 2: Typical lashing system of a Container to a pallet.

The IP-1 bags are then stowed inside a SeaLand container. The SeaLand container also meeting IP-II and IP-III criteria (IMDG 38-16, 6.4.5.4.4). The IP-1 bags are blocked, braced and lashed by trained and competent operators using a strapping system consistent with Chapter 3 of the *Guide for Safe Transport of UOC*, in conformance with the ASMT D5728-12 *Standard Practices for Securement of Cargo in Intermodal and Unimodal Surface Transport*, consistent with recommendations in the *IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units* (2014) and the World Nuclear Transport Institute *Good Practice Guide for the Securing of Drums of Uranium Ore Concentrate.*

A diagram showing typical securement is found in Figures 3 & 4.

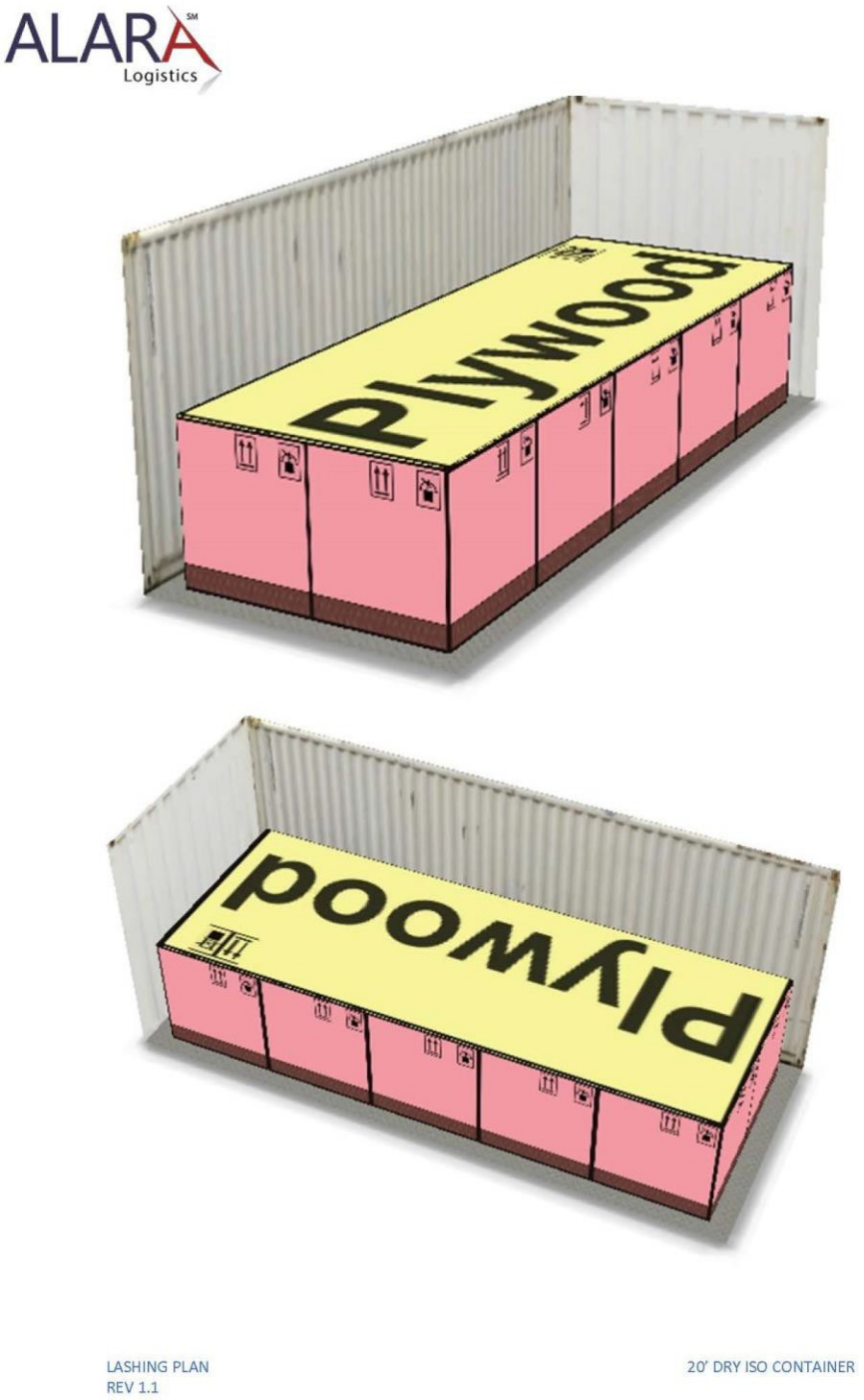


Figure 3: Lashing system using plywood for upper retention.

Please note that HDPE and other like materials may be used in leu of plywood.

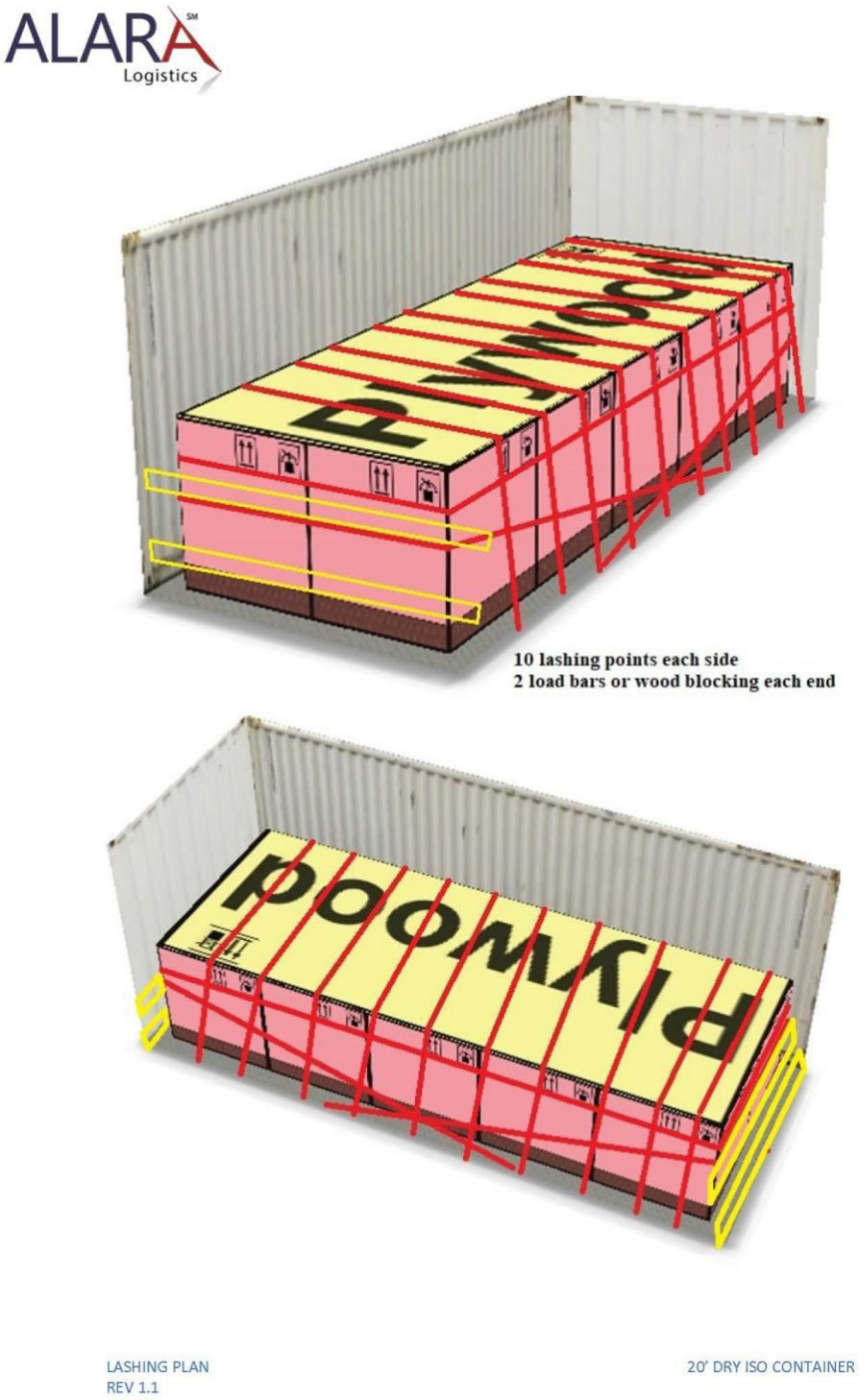


Figure 4: Lashing system with plywood in place and strapping.

Please note that HDPE and other like materials may be used in leu of plywood.

Once the Containers are loaded and secured, the SeaLands are sealed using high security seals meeting or exceeding the current PAS ISO 17712 standards for high security seals.

USE's representative will apply a security seal to each SeaLand container and record the unique seal numbers on the Container Packing List at the project site. Any tampering with the seals will be immediately reported to the competent authority (Attachment 3) or US Customs and Border Protection.

4.6 Transport Index (TI) Calculation

The subject material is expected to exhibit a dose rate of ~2 µSv/h (0.143 to 0.183 mR/hr) at 1 meter from the outside of a SeaLand container. Consistent with Section 524 of IAEA SSR-6:

> "The TI for each rigid overpack, freight container, or conveyance shall be determined as the sum of the TIs of all packages contained therein. For a shipment from a single consignor, the consignor may determine the TI by direct measurement of dose rate."

USE personnel will assign the TI based on either of these two methodologies, with preference to the Sum of The TIs method since it does not require a survey under the SeaLand container, reducing health and safety risk.

It is expected that if the Sum of The TIs method is used, each Container will be I-WHITE and the sum of the TIs will be <0.5 which will allow for I-WHITE labels on the SeaLands.

It is expected that the ~2 µSv/h dose rate at 1-meter , multiplied by the factor of 3 for a 20' SeaLand from Table 5.1.5.3.1 of SSR-6, would give a TI of 0.6. A II-YELLOW label would be assigned based on the scaled dose rate of 5.4 µSv/h.

However, final decisions on how to assign the TI will be done in the field and provided for each Container and SeaLand on the Detailed Radiological Inventory and Packing Lists.

4.7 Segregation & Stowage

It is expected that the entire consignment of containers will be shipped on a single vessel.

The regulatory requirement found in Chapter 7- Provisions Concerning Transport Operations of the IMDG (Table 7.1.4.5.18 – Class 7 Radioactive Materials Segregation table) provides that 10 containers of Radioactive Material with a total TI of 6, should be separated from passengers and crew by the distance of one (1) "20 ft Equivalent Units" or TEUs, approximately 6.5 meters. This separation distance will result in no appreciable dose to any member of the crew or a passenger. Note that IMDG 7.1.4.5.13 limits doses to any member of the crew to 5 mSv in a year (500 mrem) and 1 mSv (100 mrem) to a passenger. Segregation will result in insignificant or no dose to a member of the crew or passenger.

Under deck storage in A3 or A5 bays is generally recommended. Further, consistent with the *Guide for Safe Transport of UOC*, it is recommended that when possible the sea-lands be placed door to door within the hold, minimizing the potential of spills, release, or tampering while transported by sea.

Figure 2: Placement of containers in under deck holds (Photo courtesy of the *Guide for Safe Transport of UOC)*

4.8 Reportable Quantity

USDOT regulations define Reportable Quantities (RQ) of radioactive material which require additional notifications and markings with limits set in 49 CFR 172.101 Table 2 of Appendix A. These requirements are not found in SSR-6 or the IMDG. The material does not exhibit an RQ for radioactive material.

4.9 Other Transport Requirements

The "soil" portion of the material is subject to USE's Soil Import Permit # P330-18-00141 issued by the U.S. Department of Agriculture. This Permit requires careful handling of all Containers to ensure no soil contaminates the Containers or SeaLand. It further requires

that all Containers be properly sealed and secured from the Project Site through to disposal at US Ecology Idaho. And it requires the application of a Soil Label on the outside of the SeaLand. These requirements will be followed.

4.10 Import

As part of its normal regulatory consultation process USE consulted with the Competent Regulatory Authorities in the U.S. to verify that the material may be imported for disposal at US Ecology Idaho. The two agencies of primary jurisdiction are the U.S. Nuclear Regulatory Commission ("USNRC") and the Idaho Department of Environmental Quality ("IDEQ").

On April 1, 2020, the USNRC confirmed the material is not subject to import licensing by the USNRC. The IDEQ has also confirmed that the material meets USE's waste acceptance criteria and may be imported for disposal without restriction.

5. Emergency Response

This section was developed based on relevant sections of the regulations including IAEA SSR-6 Sections 304-305 and 509, IMDG Chapter 7.8, USDOT 49 CFR Part 172 Subparts G, Emergency Response Information, and Subparts H, Training and the USDOT Emergency Response Guide #162 (Attachment 2).

USE will provide emergency response support through its 24-hour a day, 7-day a week, 365 day-year Emergency Response office, if required. US Ecology's emergency response contact information is listed on the Manifest as follows:

Emergency Contact: US Ecology at 1 (207) 829-1115, US Ecology Profile #50317

USE can provide all relevant information to emergency responders about the characteristics and hazards associated with the material. In addition, USE will contract with local, qualified emergency response providers to respond and remediate any spill, if not already arranged by the transporter with custody of the material (e.g. trucking company or steamship line).

However, any properly trained hazardous materials responder can respond to a spill since spill response procedures for this material are no different from the other classes of dangerous goods. A spill of the subject material should be treated the same as an incident involving any other dangerous good/heavy metal concentrate.

Spill response actions should conform with Emergency Response Guide #162 (Attachment 2).

The following information is also provided for emergency responders.

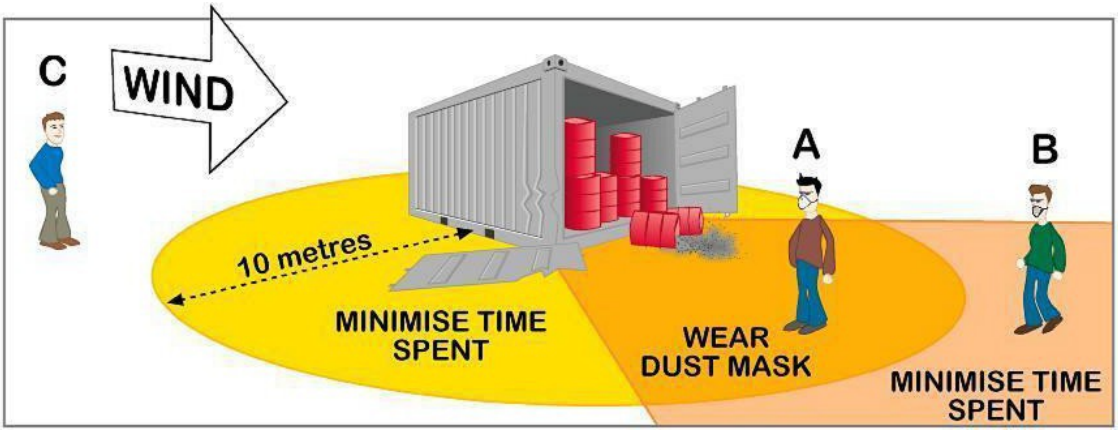


Figure 3: Figure courtesy of the *Guide for Safe Transport of UOC*

It is possible, although extremely unlikely, that during container lifting and transfer operations a container may be dropped from such a height that the sea-land container itself and its contents may rupture. Given the certified integrity of the Container and SeaLand, this scenario is extremely unlikely. However, in the event that a breach occurs, the primary hazards associated with a release would be airborne contamination or a release of materials to soil or water. Since the contamination is at low levels and consists of long-lived radionuclides, any release will be easily verified by visual observation and radiological survey.

The following actions should be taken in order insofar it is possible to do so:

- Rescue and remove any injured personnel.
- Stop the spill. For example, if a container is in the air and releasing its contents, immediately lower it to the ground.
- Alert unaffected personnel to move to an upwind location.
- Isolate and cordon off the spill area and deny entry to unnecessary personnel.
- Manage in accordance with typical emergency response plans for dangerous goods, such as ERG #162, or equivalent internal procedures (for the Port,shipping line, etc.). Escalate to local competent authorities or US Ecology's emergency responder if internal, trained resources are not adequate.

- Personnel cleaning up the spill shall wear standard PPE: dust masks, safety glasses, coveralls, cotton or rubber gloves.
- Cover the spill with a tarp to prevent the material from becoming airborne. Divert any streams of water from the spill area. Cover any storm grates, drains, or other pathways to water.
- Remove the spilled contents and place them into an Industrial Package 1 (IP-1) container, such as a lined Super Sack or an 85-gallon plastic overpack drum. Avoid hand to face movements such as smoking, eating or drinking when handling material.
- Once the bulk of the material is removed by vacuum, shoveling, or sweeping the affected area, completely remove visual evidence of the spill. (Sweeping should be done gently to prevent material from becoming airborne. If a vacuum is used, it should be equipped with a HEPA filter.)
- Place all spilled materials and disposable cleanup materials such as PPE into a suitable IP-1 container and place it inside a sea-land container.
- Perform a radiological survey of the spill area to ensure there is no detectable residual radioactive material. Wipe the area with large area wipes and count the wipes to ensure that there is no detectable removable radioactive material.
- Report the spill, along with a copy of this Transportation Management Plan to US Ecology and the Competent Authority:

  US Ecology emergency response group at 1 (207) 829-1115

  US Ecology: Chad Hyslop at 1 (208) 794-3415

  Competent Authority (see Attachment 3)

5.1 Spillages in Transit or Whilst at Sea

The likelihood of a spillage while in transit or at sea is very low due to the strict packaging and packing requirements. Furthermore, all containers should be stowed under deck in the vessel. The shipping containers are generally positioned door to door, which minimizes the opportunity for the doors to open should some external event trigger a significant impact or force on the containers.

The IMDG Code describes the emergency response procedures for an incident involving dangerous goods, including radioactive materials, at sea. The Ship's Master and crew are the emergency services and medical team for every situation on board once disconnected from land. All personnel working on ships are fully trained to meet the requirements of the International Convention for the Safety of Life at Sea (SOLAS) 1974, and the International Convention for the Prevention of Pollution from Ships 1973 (MARPOL) and its 1978 Protocol, as amended.

In the unlikely event of a spillage or fire the crew should invoke actions in accordance with IMDG Chapter 7.8.

Medical advice for all dangerous goods is outlined in the Medical First Aid Guide (MFAG) which is also contained in IMDG 7.8.1.2. This guide will be followed by the Ship's Master and crew in order to effectively and safely respond to any incident.

5.2 Safety Data Sheet

USE has prepared Safety Data Sheets which will accompany this material, found at Attachment 1.

Hazards to Handlers, Carriers, the Community & Environment

The information presented in this Plan, with Attachments,demonstrates that the hazards to handlers, carriers, the community, and the environment from transport of this material is extremely low.

Inhalation

Because the material is packaged inside sealed bags, then inside an ISO certified sea-land container, there is no plausible possibility of an inhalation hazard, the primary risk from alpha-emitting radioactive materials. This risk is eliminated during normal transport operations.

In the unlikely event of a spill, trained emergency responders following the proper techniques discussed in the Emergency Response section and Emergency Response Guide #162 (Attachment 2), taking into consideration the information provided in the Safety Data Sheet (Attachment 1) can eliminate risks from inhalation by wearing the proper Personal Protective Equipment (PPE).

External Gamma Radiation

As discussed previously, the subject material is expected to exhibit an external gamma radiation dose rate between 1.4 to 1.8 µSv/h (0.14 to 0.18 mR/h) at 1 meter from a sea-land container. This dose to a person can be minimized or eliminated by limiting the time near the container, increasing the distance between the container and people, and providing additional shielding (such as other containers). This information has been taken into account in developing the Stowage and Segregation recommendations for ocean shipping (see Segregation & Stowage above). This includes a separation distance from the crew or passenger quarters of at least 1 container length. This provides sufficient distance to eliminate any external gamma radiation dose to people. The same is true for on-land storage: by maintaining a reasonable distance from the container the radiation dose is eliminated.

During truck transport operations, the driver will be in the cab of the vehicle approximately 3-5 meters from the container, with additional shielding provided by the steel cab of his vehicle. Even assuming the driver was within 1 meter of the container, with a gamma dose rate of ~2 µSv/h (~0.2 mR/h), doses will be much less. The prospective dose values are a fraction of the dose that an average citizen receives from the sun, soil, medical procedures, etc. on an annual basis. The prospective doses are considered to be is a negligible amount and would not be observable above the dose received from natural background radiation.

No member of the public can reasonably be expected to be in closer contact with the material than the truck driver. As a result, the public has no risk of receiving even a minimal radiation dose from the transport of this material.

All other handlers, longshoremen, and ship workers will also have less contact with the material than the truck driver.

There will also be no impact to the environment unless a spill occurs. A spill will be responded to by competent, trained individuals who will remove the material and package it appropriately under the procedures outlined in the Emergency Response section. Given the secure packaging of the material it is highly unlikely that a spill will occur.

5.3 Contact

Questions about the information provided here may be addressed to:

Chad Hyslop, International Programs Manager, US Ecology
Office 1 (208) 319-1604, Cell 1 (208) 794-3415, chad.hyslop@usecology.com

Justin Jensen, Radiological Waste Acceptance, US Ecology Idaho
Office 1 (208) 834-2285, justin.jensen@usecology.com

Mark Campbell, ALARA Logistics
Mobile: 1-412-614-0916, Mark.Campbell@alaralogistics.com

US Ecology Emergency Response 1 (207) 829-1115, Profile #50317

Attachment 1: Safety Data Sheet

SAFETY DATA SHEET
FOR CONTAINERIZED SCALE RESIDUE CONTAINING RADIUM

Safety Data Sheet for: **Containerized Radium Scale Residues in the chemical form of Radium Sulfate**	

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	Oceaneering as the representative of PTTEP Australlsia
Address	Lot 1702 McKinnon Road, Pinelands, NT, Australia 0829
Telephone	+61 8 8932 2902 / bfeldtman@oceaneering.com
24 hr Emergency	'+61 8 8932 5777 / bfeldtman@oceaneering.com
Product Name	Pipe Scale Residues containing Radium Sulfate (Ra-226 and Ra-228)
Synonyms	Naturally Occurring Radioactive Materials (NORM)
Uses	Byproduct from the extraction, transport, and processing of oil and gas products
SDS Date	30 June 2015

2. HAZARD IDENTIFICATION

INTERNATIONAL CLASSIFICATION

Naturally Occurring Radioactive Material (Ra-226, Ra-228)

GHS CLASSIFICATION

Acute Toxicity: Oral: Category 4

Acute Toxicity: Inhalation: Category 4

Specific Target Organ Systemic Toxicity (Repeated Exposure): Category 4 (bones).

Aquatic Toxicity (Chronic): Category 4

HAZARD CLASSIFICATION

Classified as hazardous according to the criteria of Safe Work Australia. May be classified as Dangerous according to the Australian Dangerous Goods (ADG) Code. Not classified by the Globally Harmonised System of Classification and Labeling of Chemicals (GHS).

SIGNAL WORD

Danger

HAZARD STATEMENT:

Harmful if swallowed.

Harmful if inhaled.

	May cause damage to organs through prolonged or repeated exposure (bones).
PREVENTION STATEMENT	Do not breathe dust or fume. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear respiratory protection.
RESPONSE STATEMENTS	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. IF INHALED: Remove to fresh air and keep at rest in position comfortable for breathing. Specific treatment is urgent – see first aid instructions.

HAZARD SYMBOL	H	Harmful
RISK PHRASES	R 20	Can be harmful by inhalation and ingestion.
	R37	Danger of cumulative effects.
	R53	May cause long-term adverse effects in the aquatic environment.
SAFETY PHRASES	S20/21	When using do not eat, drink or smoke, avoid inhaling or ingesting dust.
	S45	In case of accident or if you feel unwell, seek medical advice immediately.
	S61	Avoid release to the environment. Refer to special instructions.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	EINECS (European Inventory of Existing Commercial Chemical Substances)	CAS No (Chemical Abstracts Service Registry Number)	Content	Classification
Containerized radium residues (as Ra_2SO_4 or RaCl)	233-035-7 (chloride)	7446-16-4 (sulphate) 10025-66-8 (chloride)	10-30%	None
Sand (SiO_2)	238-878-4	14808-60-7	70-90%	None
Minor impurities including trace metals (Al 0.06%; Ca 0.07%; Fe 0.18%; Zr 0.036%)	Not Applicable	Not Applicable	< 1%	Not Applicable

4. FIRST AID MEASURES

Eye If material gets into the eyes, hold the eyelids apart and flush the eye continuously with running water. Continue flushing for at least 15 minutes or until advised to stop by the Poisons Information Centre or a doctor.

Inhalation If inhalation occurs, seek medical advice.

Skin Flush all affected areas with running water. Seek medical advice if irritation develops.

Ingestion See medical advice or contact Poisons Information Centre.

Medical Advice Treat symptomatically. (Assess and treat the identified symptoms)

5. FIRE FIGHTING MEASURES

Flammability Non-flammable. No fire or explosion hazard exists.

Fire and Explosion Treat as per requirements for surrounding fires. If scale material is present in any associated fire event, remain upwind and notify those downwind of the potential inhalation hazard. Evacuate and control access to the area and contact emergency services. Wear personal protective equipment (PPE) appropriate to conditions surrounding the fire.

Extinguishing Non-flammable material. Prevent contamination of drains and or waterways, absorbing any runoff using sand or similar absorbent type materials.

HAZCHEM Code 2Z Water fog or fine sprays must be used, there is NO danger of violent reaction or explosion; appropriate breathing apparatus (for fire only) must be worn and the spillage must be contained.

6. ACCIDENTAL RELEASE MEASURES

Spillage

Wear PPE as per Section 8 below. Exposure Controls / Personal Protection. Cover spillage with a tarpaulin or moist sand or similar material. For small spills, spray lightly with water to minimise dust, collecting and placing the material into suitable receptacles (eg) drums or containers. For large spills, remove spilled material with mechanical equipment. Do not flush residues into sewers, water ways or drainage systems. Refer to local Competent Authority prior to the removal of collected materials, and decontamination of cleanup equipment. A list of Australian Competent Authorities is available at <http://www.arpansa.gov.au/pubs/rps/comp_auth.pdf>

7. PACKAGING, STORAGE AND HANDLING

Packaging

NORM scale residues are packaged to comply with all necessary international standards. This involves the radium NORM material being packed into sealed 200 litre steel drums meeting IP-1 (Industrial Package Type 1) international packaging standards, or 4,000 kg bags that are UN rated and also meet IP-1 packaging standards. Each drum having a tight fitting lid, secured by means of a steel locking ring that is clamped by a locking ring bolt. The drums normally contain approximately 250 kg of scale depending on material density. Each bag having a leak-proof inner liner, secured for shipping according to manufacturer instructions. The containers are stowed securely into 20 foot ISO (International Organisation for Standardisation) shipping containers to withstand the significant G forces expected during road, rail and sea transportation and associated handling operations. The NORM scale effectively has a triple encapsulation of an inner plastic liner, a sealed container (drum or bag) within an outer shipping container and this greatly reduces the likelihood of radium scale spilling as a result of an incident.

Storage

Storage should be undertaken in accordance with the relevant international, domestic, and regional regulations. Where regular storage occurs, it is good practice to always use the same area within the shipping terminal for the storage of radium scale containers to assist personnel to identify, familiarize and remember storage locations. In selecting storage locations select areas to store shipping containers of radioactive materials away from office, accommodation, workshops, regular and highly trafficked areas. Segregate from foodstuffs, oxidizing, corrosive, flammable, explosives or other dangerous goods materials.

Handling

Specialised container lifting equipment must be used when loading shipping containers. The strapping method for securing the containers inside of the 20 foot shipping containers using a polyester webbing strap as recommended in Chapter 3 of the Guide for Safe Transport of UOC publication ISBN 978-1-922106-11-7 and subsequently approved by the Australian Maritime Safety Authority (AMSA) as the Competent Authority approving load restraints for the transport of Dangerous Goods and Hazardous Materials by road, rail or sea. <http://www.amsa.gov.au/>. Methods of securing bags in accordance with the ASTM Standard D5728-12 Standard Practices for Securement of Cargo in Intermodal and Unmodal Surface Transport.

Normal operating procedures involving diligence and due care should be exercised when handling shipping containers of radium scale material.

As with any general purpose (GP) shipping container, visual observation and checking for evidence of material or moisture discharges from the shipping container should be reported and investigated.

Forklift handling a drum

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Standards	Ingredient	Reference	TWA (8 hour)		STEL		ALI	
			ppm	mg/m^3	ppm	mg/m^3	Bq	
	Radium and daughter progeny (natural), soluble and insoluble compounds (Ra-226 and Ra-228)	ASCC (Australia), ACGIH TLV (US), and 10CFR 20 (US)	N/A	N/A	N/A	N/A	7.4E4 (ingestion, Ra-226) 7.4E4 (ingestion, Ra-228)	2.2E4 (inhalation, Ra-226) 3.7E4 (inhalation, Ra-228)

Biological limit values

The International Maritime Dangerous Goods (IMDG) regulations in Section 7.1.4.5.13 limits the dose to any member of a ship's crew to 5 mSv in a year (500 mrem) and 1 mSv (100 mrem) to a passenger. (Ref. 10)

Engineering controls

Multiple encapsulation through the utilisation of plastic liners inside containers securely stowed inside locked and sealed steel shipping containers. Limit your exposure to radium by reducing the time spent near it, increasing the distancefrom the material, and providing shielding in between people and the container. Table 1 in Chapter 7 of the IMDG recommends a segregation distance of 2 TEUs ("20 ft sea-land container Equivalent Units) between passengers and crew from a typical shipping container of Radium. At this distance gamma exposure is zero and more than satisfies the criteria found in IMDG Section 7.1.4.5.13. (Ref. 10)

Personal Protective Equipment (PPE)

PPE is not required under normal conditions of use. In the case of a spill, the following PPE may be required: a Class P2 (particulate) respirator, dust-proof goggles, coveralls and PVC, rubber or cotton gloves.

The use of radiation badges to monitor exposure is not required for persons handling, storing and or transporting drummed radium scale in shipping containers. Some monitoring may be required during spill cleanup.




9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Brown sands with dark drown, black, or white powders present	**Solubility (Water)**	Insoluble under normal conditions
Odour	Odourless	**Specific Gravity**	>4.5
pH	Not Applicable	**% Volatiles**	Not Available
Vapour Pressure	Nearly 0 @ 20 degrees C	**Flammability**	Non Flammable
Vapour Density	Not Applicable	**Flash Point**	Not Applicable
Boiling Point	Not Applicable	**Upper Explosion Limit**	Not Applicable
Melting Point	>1300 degrees C	**Lower Explosion Limit**	Not Applicable
Evaporation Rate	Not Applicable	**Odour Threshold**	Not Applicable
Decomposition Temperature	>1300 degrees C	**Viscosity**	Not Applicable
Partition Coefficient	57-530,000 ml/g (Ref 4)	**Auto Ignition Temperature**	Non Flammable

10. STABILITY AND REACTIVITY

Stability	Stable under all conditions of storage, handling and transport.
Conditions to avoid	No reported incompatibilities.
Materials to avoid	Avoid storage or transporting adjacent to volatile, corrosive or oxidizing materials.
Decomposition Products	Decomposes to daughter progeny through radioactive decay. Principal decay products are Actinium (Ac-228), Radon (Rn-222 and Rn-220), Bismuth (Bi-21, -214, -218), Polonium (Po-214, -212, and -210) and Lead (Pb-212, -210)
Hazardous reactions	Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Summary	Radium and its decay products exhibit alpha, beta and gamma radiation. The hazards from exposure to these forms of radiation can occur in two ways: by external irradiation outside of the body and by exposure to internal contamination from radium that has been inhaled, ingested or absorbed through the skin. Although both Ra-226 and Ra-228 emit low energy gamma rays, they are typically in equilibrium with decay progeny with average gamma emission energies greater than 1 MeV. Therefore, an external dose hazard is associated with Ra-226/Ra-228 and their decay progeny (Ref. 8).
Acute toxicity	Radium, in high doses/quantites, has been shown to cause adverse health effects such as anemia, cataracts, fractured teeth, cancer and death. The greater the total amount of your exposure to radium, the more likely you are to develop one of these diseases. The concentration of radium in the drummed pipe scale residues is very low and thus carries a reduced acute toxicity risk.
Skin corrosion/irritation	None reported.
Serious eye damage/irritation	Low to moderate irritant. Exposure may result in irritation, pain and redness.
Respiratory or skin sensitisation	No evidence of sensitization by respiratory or dermal routes.
Germ cell mutagenicity	There is some evidence of genetic effects from radiation from radium in animal studies, however there has been no evidence reported in human studies.
Carcinogenicity	Long-term exposure to radium increases the risk of developing several diseases. Inhaled or ingested radium increases the risk of developing such diseases as lymphoma, bone cancer, and diseases that affect the formation of blood, such as leukemia and aplastic anemia. These effects usually take years to develop. External exposure to radium's gamma radiation increases the risk of cancer to varying degrees in all tissues and organs.
Reproductive toxicity	There is limited available data on the reproductive toxicity in humans.
Aspiration hazard	Material is relatively soluble. Up to 80% of material uptake will be excreted in urine and feces. Reminder may be retained within the bones.

Ingredient Name	CAS No	NTP	IARC	OSHA
Radium (as Ra_2SO_4)	7446-16-4	Not listed	Not listed	Not listed*
*NIOSH classifies insoluble radium compounds as potential occupational carcinogens, but states that the potential for cancer is a result of alpha-emitting properties and radioactive decay products (e.g., radon).				

12. ECOLOGICAL INFORMATION (Ref. 8)

Eco Toxicity	Very low in sulphate form. Ra_2SO_4 is not readily soluble in water andrequires low pH solutions to dissolve and become mobile.

Persistence / Degradability	Being present in the soil, radium may accumulate in food in small amounts (assuming a readily soluble chemical salt form such as RaCl). Radon (radium daughter progeny noble gas) can be found in the air or dissolved in water, but it is not generally present in food. Radon is not found at any appreciable concentration in surface water. Radium in soils does not readily biodegrade.
Bio accumulative potential	Bioaccumulation in aquatic species (fish) is low.
Mobility	Mobility depends upon radium being in a soluble form (notably RaCl). Radium as Ra_2SO_4 is insoluble in water and is not readily mobile once deposited in a matrix such as oil & gas pipe scale.

13. DISPOSAL CONSIDERATIONS

Waste disposal	Do not dispose of material, other than with the instructions and approval ofthe relevant Competent Authority. <http://www.arpansa.gov.au/pubs/rps/comp_auth.pdf>
Legislation	Consult with the local Competent Authority. <http://www.arpansa.gov.au/pubs/rps/comp_auth.pdf>

14. TRANSPORT INFORMATION

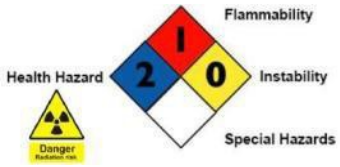
ROAD RAIL AND SEA (ADGR / RID / US DOT / TDG – IMDG / IMO)

Proper shipping name	UN2912, RADIOACTIVE MATERIAL (LSA-1)
Physical Form	Sands with dry powder residues (radium sulphate in pipe scale)
Chemical Form	Ra-226 and Ra-228 as Ra_2SO_4

Name of each radionuclide	Natural radium and daughter progeny
Category of Packages	TYPE IP-1
Maximum Activity	55 Bq/g
Transport Index:	Typically between 1 and 3 per container.
Subsidiary risk(s)	None
Packing Group	None

15. REGULATORY INFORMATION

UNITED STATES

HMIS (Hazardous Material Identification System)	**Health**	2	NFPA (US National Fire Protection Association)	
	Flammability	0		
	Physical Hazard	0		
	Personal Protection			

16. OTHER INFORMATION

Additional information – Abbreviations and References	
ACGIH	American Conference of Governmental Industrial Hygienists
ADGR	Australian Dangerous Goods Regulations
ALI	Annual Limit on Intake
AMSA	Australian Maritime Safety Authority
ASCC	Australian Safety and Compensation Council
CAS No.	Chemical Abstract Service number - used to uniquely identify chemical compounds.
DG	Dangerous Goods
EC_{50}	Concentration at which 50% of the maximum effect is observed
EINECS	European Inventory of Existing Chemical Substances
GHS	Globally Harmonized System of classification and labeling of chemical materials
GP	General Purpose (twenty foot shipping container)
HAZCHEM 2Z	Water fog or fine sprays must be used, there is NO danger of violent reaction or explosion; appropriate breathing apparatus (for fire only) must be worn and the spillage must be contained.
HMIS	Hazardous Materials Identification System
HSIS	Hazardous Substances Information System
IARC	International Agency for Research on Cancer.
IDLH	Immediately dangerous to life and health
IMDG	International Maritime Dangerous Goods (Code)
IMO	International Maritime Organisation

Additional information – Abbreviations and References	
LD_{50}	LD stands for "Lethal Dose". Oral LD_{50} is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. The LD_{50} is one way to measure the short-term poisoning potential (acute toxicity) of a material.
LSA-1	Low Specific Activity (rating of radiation risk)
LOEC	Lowest Observable Effect Concentration
mg/ m^3	Milligrams per cubic metre.
ml/g	Milliliters per gram
NFPA	National Fire Protection Association (United States)
NTP	National Toxicology Program (US) National Institute of Environmental Health Sciences.
OSHA	Occupational Safety and Health Administration
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline)
PPE	Personal Protective Equipment
ppm	Parts Per Million
PVC	Poly vinyl chloride
RID	Regulations concerning the International Transport of Dangerous Goods by Rail (European law)
STEL	Short Term Exposure Limit
STOST	Specific Target Organ Systemic Toxicity (single exposure)
TDG	Transportation of Dangerous Goods Act (Canada)
TLV	Threshold Limit Value
TWA	Time Weighted Average (Exposure Standard)
µg	Microgram
UN	United Nations
UOC	Uranium Oxide Concentrates
USDOT	United States Department of Transport

List of references used in this SDS	
1. Commonwealth of Australia 2014. *Australian Code for the Transport of Dangerous goods by Road and Rail* (ADG Code). National Transport Commission, Canberra.	2. Kirby, H. W. and Salutsky, Murrell L. (1964) The Radiochemistry of Radium, Subcommittee on Radiochemistry, National Academy of Sciences
3. ILPI 2010. Hazardous Materials Information System. www.ilpi.com/msds/ref/hmis/html	4. US EPA, Office of Air and Radiation. Understanding Variation in Partition Coefficients, K_d, Values. Volume III. EPA-402-R-04-022C. July 2004.
5. National Institute for Occupational Safety and health (NIOSH) – Pocket Guide to Chemical Hazards	6. National Toxicology Program, 2005. 11th Report on Carcinogens http://ntp.niehs.nih.gov/
7. Safe Work Australia not dated. Hazardous Substances Information System – Guidance Material for Hazard Classifications. http://hsis.ascc.gov.au/SearchHS.aspx	8. US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, 1999. Toxicology Profile for Radium. December 1990
9. International Atomic Energy Agency, regulations for the Safe Transport of Radioactive Material. Safety requirements No. SSR-6.	10. International Maritime Dangerous Goods (IMDG) code Version 37-14 (2014)

Report Status

The information contained in this Safety Data Sheet (SDS) is provided to assist in evaluating the safety characteristics of the substance in question. Additional questions can be addressed to the Supplier or the relevant Competent Authority.

End of Report

Attachment 2: Emergency Response Guide

ERG 162 ID UN2912 Radioactive material, Low specific activity (LSA-1), 7

Potential Hazard

HEALTH

· Radiation presents minimal risk to transport workers, emergency response personnel and the publicduring transportation accidents. Packaging durability increases as potential hazard of radioactive contentincreases.
· Undamaged packages are safe. Contents of damaged packages may cause higher external radiation exposure, or both external and internal radiation exposure if contents are released.
· Low radiation hazard when material is inside container. If material is released from package or bulk container,hazard will vary from low to moderate.
Level of hazard will depend on the type and amount of radioactivity, the kind of material it is in, and/or the surfaces it is on.
· Some material may be released from packages during accidents of moderate severity but risks to people are not great.
· Released radioactive materials or contaminated objects usually will be visible if packagingfails.
· Some exclusive use shipments of bulk and packaged materials will not have "RADIOACTIVE" labels. Placards, markings and shipping papers provide identification.
· Some packages may have a "RADIOACTIVE" label and a second hazard label. The second hazard is usually greater than the radiation hazard; so follow this GUIDE as well as the response GUIDE for the second hazard class label.
· Some radioactive materials cannot be detected by commonly available instruments.
· Runoff from control of cargo fire may cause low-level pollution.

FIRE OR EXPLOSION

· Some of these materials may burn, but most do not ignite readily.
· Uranium and Thorium metal cuttings may ignite spontaneously if exposed to air (see GUIDE 136).
· Nitrates are oxidizers and may ignite other combustibles (see GUIDE 141).

PUBLIC SAFETY

· CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
· Priorities for rescue, life-saving, first aid, fire control and other hazards are higher than the priority for measuring radiation levels.
· Radiation Authority must be notified of accident conditions. Radiation Authority is usually responsible for decisions about radiological consequences and closure of emergencies.
· As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions.
· Stay upwind.
· Keep unauthorized personnel away.
· Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

· Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing willprovide adequate protection.

EVACUATION

Large Spill

· Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

· When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

EMERGENCY RESPONSE

Fire

· Presence of radioactive material will not influence the fire control processes and should not influence selection of techniques.
· Move containers from fire area if you can do it without risk.
· Do not move damaged packages; move undamaged packages out of fire zone.

Small Fire

· Dry chemical, CO_2, water spray or regular foam.

Large Fire

· Water spray, fog (flooding amounts).
· Dike fire-control water for later disposal.

SPILL OR LEAK

· Do not touch damaged packages or spilled material.
· Cover liquid spill with sand, earth or other non-combustible absorbent material.
· Dike to collect large liquid spills.
· Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

· Call 911 or emergency medical service.
· Medical problems take priority over radiological concerns.
· Use first aid treatment according to the nature of the injury.
· Do not delay care and transport of a seriously injured person.
· Give artificial respiration if victim is not breathing.
· Administer oxygen if breathing is difficult.
· In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
· Injured persons contaminated by contact with released material are not a serious hazard to health care personnel, equipment or facilities.
· Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

Attachment 3: Competent Authorities

Country: Australia
Mode/Specialization: not regulated
Competent Authority/Contact:
Phil Rigby
Senior Operations Officer
Environmental Solutions - Radiation
Environment Protection Authority
Department of Planning, Industry and Environment
T 02 9995 5987 | E phil.rigby@epa.nsw.gov.au
4 Parramatta Square, 12 Darcy St, Parramatta, NSW 2150.

Country: United States of America
Mode/Specialization: Class 7
Competent Authority/Contact:
Radioactive Materials Division
Office of Hazardous Materials Technology
Pipeline and Hazardous Materials Safety
Administration U.S. Department of Transportation
Washington DC U.S.A. 20590
Tel: + 1 (202) 366-4545
Fax: +1 (202)366-3753
Telex: 892-427 TWX: (710) 822 9426

During Ocean Transport:

A complete list of international Competent Authorities can be found at:
http://www-ns.iaea.org/downloads/rw/transport-safety/transport-safety-nca-list.pdf

Attachment 4: Exclusive Use Instructions

US Ecology Shipment # XXXXXXXXXX
Container # XXXX-11111111

1.) The container described above is an ***"Exclusive Use"*** shipment for the purpose of transporting radioactive material to the US Ecology facility in Grand View, ID, USA.

2.) All initial, intermediate and final loading and unloading of this container shall be accomplished under the supervision or directions of an authorized representative of US Ecology.

3.) This container may not be opened, and material may not be loaded or unloaded in transit.

4.) Immediately notify US Ecology at 1 (207) 829-1115, US Ecology Profile #50317 or US Ecology at 1 *(208) 794-3415* or 1 *(208) 834-2275* immediately of any problems with this shipment or any incidents which may delay its delivery.

5.) "**Radioactive** " placards ***must*** be displayed at all times. Placards shall be cleaned, repaired or replaced as needed.

6.) In the event of an emergency, follow the initial actions described in **ERG Guide 162** (*for UN2912, Radioactive Material, Low Specific Activity (LSA-I).* Contact US Ecology as soon as possible for further instructions.

7.) Emergency response telephone numbers are provided in item (4) above.

Attachment 5: ALARA Risk Analysis

DOC TYPE:	Risk Assessment		
DOC NUM:	TBC		
Title:	**Hunters Hill – ALARA Risk Assessment**	Date:	24/06/2020
		Revision:	TBC
Author:	D Crouch	No. of Pages:	7
Reviewed by:			
Approved by:			

1 Consequence levels

Rank	Injury	Health effect	Environmental impact	Asset production loss	Business reputation
1	Minor injury, first aid treatment.	Temporary occupational health effect, not affecting work performance or causing absence, and not requiring medical treatment.	Negligible environmental impact, effect contained locally.	Negligible < $10,000	Negligible impact on reputation.
2	Single MTI (Injury requiring medical treatment with no lost time), or a single ADI (Alternative Duties Injury).	Single temporary occupational health condition, requiring medical treatment (MTI) or restricted duties (ADI), but with no lost time off work. e.g. skin irritation.	Minor environmental impact, slight or negligible impact, negligible remedial / recovery work.	Minor > $10,000 < $100,000	Minor impact. Public awareness, but no public concern.
3	Single LTI (an injury requiring medical treatment, time off work and rehabilitation), or multiple MTI's.	Single LTI (illness requiring medical treatment, time off work and rehabilitation), or multiple MTI's arising from occupational illnesses e.g. noise induced hearing loss, chronic back injury.	Serious environmental impact with some on-site impact and recovery work. Some local media interest.	Serious > $100,000 < $1 M	Serious, adverse local public or media attention or complaints.
4	Permanent disability; multiple LTI's.	Permanent disabling illness; or multiple LTI's. Long term absence with incomplete recovery.	Significant environmental impact with off-site impact and recovery work. Some local and regional media interest.	Significant > $1 M < $10 M	Significant impact on business reputation and / or national media exposure.
5	Single fatality.	Single fatality from occupational illness or disease e.g. poisoning, cancer, tropical diseases etc.	Major environmental impact with significant site impact and recovery work. Regional / national media interest.	Major > $10 M < $100 M	Major adverse national media / public / political attention.
6	Multiple fatalities.	Multiple fatalities from occupational illness or disease e.g. poisoning, cancer, tropical diseases etc.	Extremely severe environmental impact with significant recovery work. Global media interest.	Extreme > $100 M	Extreme adverse public, political or media outcry, resulting in international coverage. Critical impact on business reputation and future.

2 Likelihood of occurrence

Rating	Likelihood of occurrence	Frequency of occurrence	Percentage change of occurrence
1	Extremely unlikely A credible event, but extremely unlikely to occur	1 in 1000 years	0.001%
2	Very unlikely A credible event, with remote possibility of occurrence	1 in 100 years	0.01%
3	Unlikely A known and credible event with a history of occurrence in industry	1 in 10 years	0.1%
4	Likely (Possible) A credible event having a known frequent occurrence in industry	Yearly	Between 1% - 10%
5	Very likely A regular occurrence in industry	Monthly	> 10%
6	Almost certain A highly likely occurrence, expected to occur in industry	Weekly	100%

3 Risk matrix

Consequence (increasing >>)	Likelihood (increasing >>)					
	1	2	3	4	5	6
	2	4	6	8	10	12
	3	6	9	12	15	18
	4	8	12	16	20	24
	5	10	15	20	25	30
	6	12	18	24	30	36

Risk Level	Classification	Description
Risk Level 1 (18 – 36)	Extreme Risk	Highly hazardous and highly likely event. In all cases, the potential consequences are too high to allow the operation to commence or continue. Operations in this risk band shall be eliminated, avoided or totally re-planned to ensure that the residual risk is reduced to at least Risk Level 2.
Risk Level 2 (12 – 16)	High Risk	Level of risk may be tolerable, provided identified risk reduction measures have been fully implemented and all action taken to reduce risk to ALARP. The Operations Manager must approve risk assessments for work in this band.
Risk Level 3 (5 - 10)	Medium Risk	Generally acceptable level of risk where further risk reduction is shown not to be practicable. The Operations Supervisor must approve risk assessments for work in this band.
Risk Level 4 (1 – 4)	Low Risk	Generally considered to be a low risk. Further risk reduction measures should always be considered but may not be practicable. The Permit Authority may approve risk assessments in this band.

4 Risk Assessment

	Task	Hazard	L	C	Risk	Control	L'	C'	Risk'
1.1	Verify bag load while in frame	Radiological exposure to worker above 30 µSv per shift	2	1	2	Electronic dosimeter on ALARA personnel during bag inspection	2	1	2
2.1	Lift bag from frame onto pallet	Bag falling while on forklift and injuring worker	3	4	12	Exclusion zone underneath all suspended loads	1	4	4
2.2		Bag lifting loops breaking while suspended	3	2	6	Bags designed to lift more than maximum expected load of 1,800 kgs	1	2	2
3.1	Bag strapped to pallet with two ratchet straps	Manual handling injury from pinch points when using ratchets	3	1	3	PPE gloves to be worn while using ratchets and straps under tension.	1	1	1
4.1	Bag/pallet moved to hardstand area by forklift	Mobile equipment impacting workers	3	3	9	Hi-vis clothing or vests to be worn by all workers and visitors in and between the bagging and hardstand area	2	3	6
4.2		Mobile equipment accident	4	3	12	Forklift and other mobile equipment only operated by competent operators and verification of high-risk work licence before use	2	3	6
4.3		Mobile equipment getting bogged or tipping	4	4	16	Access and travel routes used by mobile equipment to be pre-determined and surface to be within the manufacturers required operating conditions of the equipment.	2	2	4
5.1	Bagged material in temp storage area	Unplanned exposure to workers	2	1	2	Signage and control to storage area access by Radiation Safety Officer	2	1	2
5.2			2	1	2	Basic security measure in place (temp fencing and locks) to prevent unauthorised access to bag/pallet material	2	1	2
6.1	Trucking of material out of work area	Interaction of trucks with other mobile equipment or workers	4	3	12	Traffic management plan for movement of all vehicles and radio communication with site supervisor before entry	2	2	4
6.2			4	3	12	Designated light vehicle access and parking away from truck access routes	2	2	4
6.3			4	3	12	Hi-vis clothing or vests to be worn by all workers and visitors in and around truck access routes	2	2	4

	Task	Hazard	L	C	Risk	Control	L'	C'	Risk'
6.4		Trucks having difficulty manoeuvring in cul-de-sac work area	2	1	2	Sufficient area allocated for truck movements	1	1	1
6.5			1	1	1	Use of rigid (not articulated) trucks in the work area	1	1	1
7.1	Trucking between work site and ADG facility	Road traffic accidents	3	3	12	Use of truck licenced drivers only	2	2	4
8.1	Unloading rigid truck at SITE facility and into CTU	Mobile equipment impacting workers	3	3	9	Hi-vis clothing or vests to be worn by all workers and visitors in and between the bagging and hardstand area	2	3	6
8.2		Loss of load on forklift	4	3	12	Forklift and other mobile equipment only operated by competent operators and verification of high-risk work licence before use	2	3	6
8.3			4	4	16	Access and travel routes used by mobile equipment to be pre-determined and surface to be within the manufacturers required operating conditions of the equipment.	2	2	4
9.1	Loading and lashing of CTU as per approved load plan	Unbalanced load inside CTU	3	1	3	All unloading and loading to be under direction of ALARA site supervisor	2	1	2
9.2		Damage to bag during loading	3	2	6	Forklift and other mobile equipment only operated by competent operators and verification of high-risk work licence before use.	2	2	4
9.3		Lashing not as per load plan	2	2	4	All lashing to be under direction of ALARA site supervisor			
9.4		Manual handling injury from pinch points while using ratchet straps	3	1	3	PPE gloves to be worn while using ratchets and straps under tension.	1	1	1
10.1	On-site stacked storage of containerised bags/pallet	Damage to container during handling and stacking	3	2	6	Forklift and other mobile equipment only operated by competent operators and verification of high-risk work licence before use.	2	2	4
10.2		CTU's collapsing due to overloading	3	4	12	CTU spec allows for 5-high stacking. Site will restrict stacking to only 3 high.	1	4	4
10.3		Unauthorised access to CTU storage area	2	1	2	Signage and control to storage area access by Radiation Safety Officer or ALARA supervisor	2	1	2

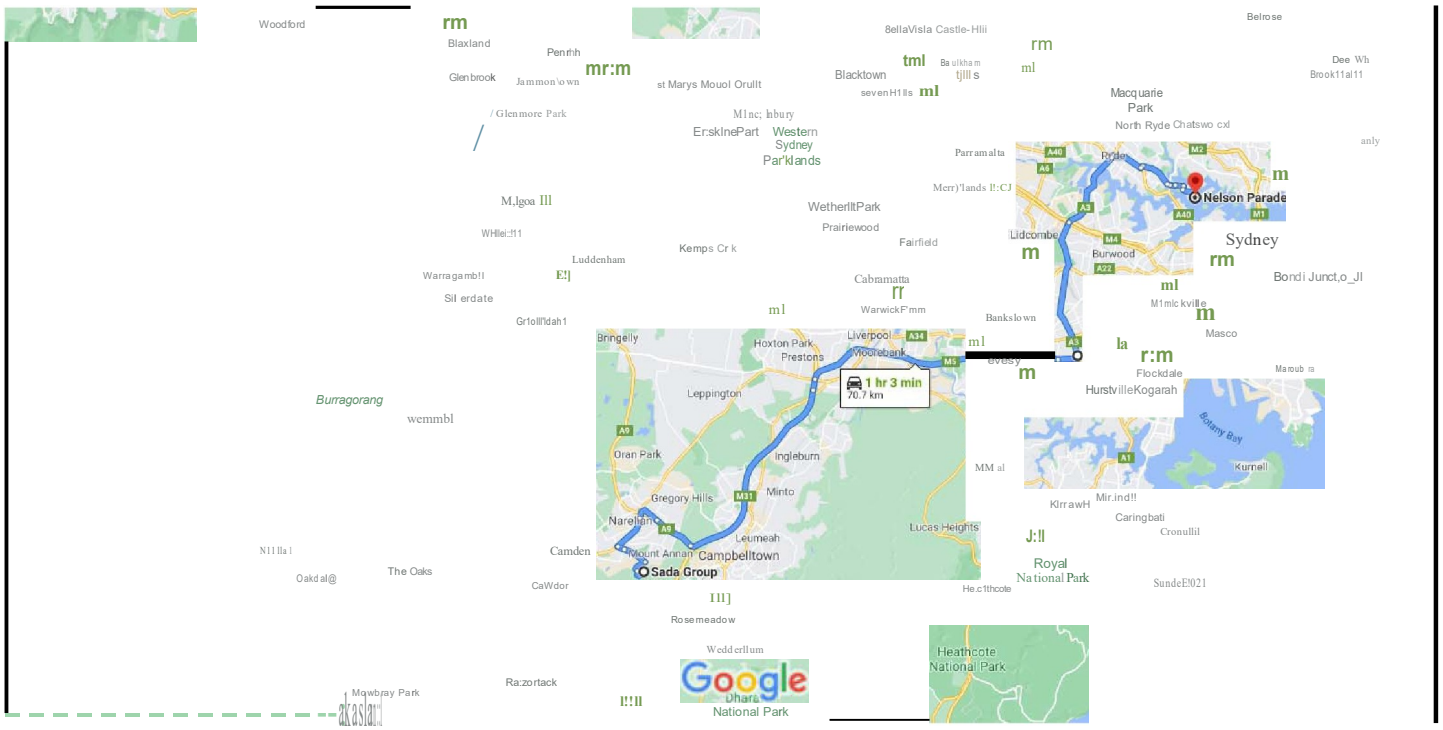
	Task	Hazard	L	C	Risk	Control	L’	C’	Risk’
10.4		Unauthorised access inside CTU	2	1	2	Basic security measure in place (temp fencing, locks and security seals) to prevent unauthorised access to bag/pallet material	2	1	2

Attachment 6: Transport Routes

Sada Group to Nelson Parade

Primary Route
Empty Container to Nelson Parade Only

Google Maps



Sada Group

50 Barrow Rd, Spring Farm NSW 2570, Australia

Get on Narellan Rd/A9 in Smeaton Grange from Liz Kernohan Dr a111d Camden Bypass

--1 7. Head southwest

,, 2 Slight right

,, 3. At the roundabout, take the 7 s1 exit onto Liz Kernohan Dr

•• 4. At the roundabout, continue straight to stay on Liz Kernohan Dr

--1 5. Use the right 2 lanes to turn right onto Camden Bypass

--1 6. Keep right at the fork, follow signs for Narellan Rd/Campbelltown/A9 and merge onto Narellan Rd/A9

8. Slight left to merge onto Hume Motorway/M31 toward LiverpooVSydney

9. Continue onto S Western Fwy

10. Keep right at the fork to continue on MS, follow signs for Sydney Airport

A

11. Take the exit toward King Georges Rd/A3

12. Keep left at the fork, follow signs for A3/King Georges Rd/Sydney Olympic Park and merge onto King Georges Rd/A3

0

13. Keep right to continue on Homebush Bay Dr/A3

0

14. Use the left lane to take the A40/Victoria Rd ramp to Gladesville/Sydney

15. Use the right 2 lanes to turn right onto Victoria Rd/A40 (signs for Gla desville/Sydn ey)

Take Ryde Rct Alexandra St and Woolwich Rd to Nelson Parade in Hunters Hill

16. Use the left 2 lanes to turn left onto Monash Rd

17. At the roundabout, take the 2nd exit onto Ryde Rd

18. Ryde Rd turns slightly left and becomes Gladesville Rd

19. Continue onto Church St

20. Continue onto Mount St

21. Continue onto Alexandra St

22. Turn right onto Ferry St

23. Ferry St turns slightly left and becomes Woolwich Rd

24. Turn right onto Giadstone Ave

25. Turn left onto Prince George Parade

26. Turn left onto Nelson Parade

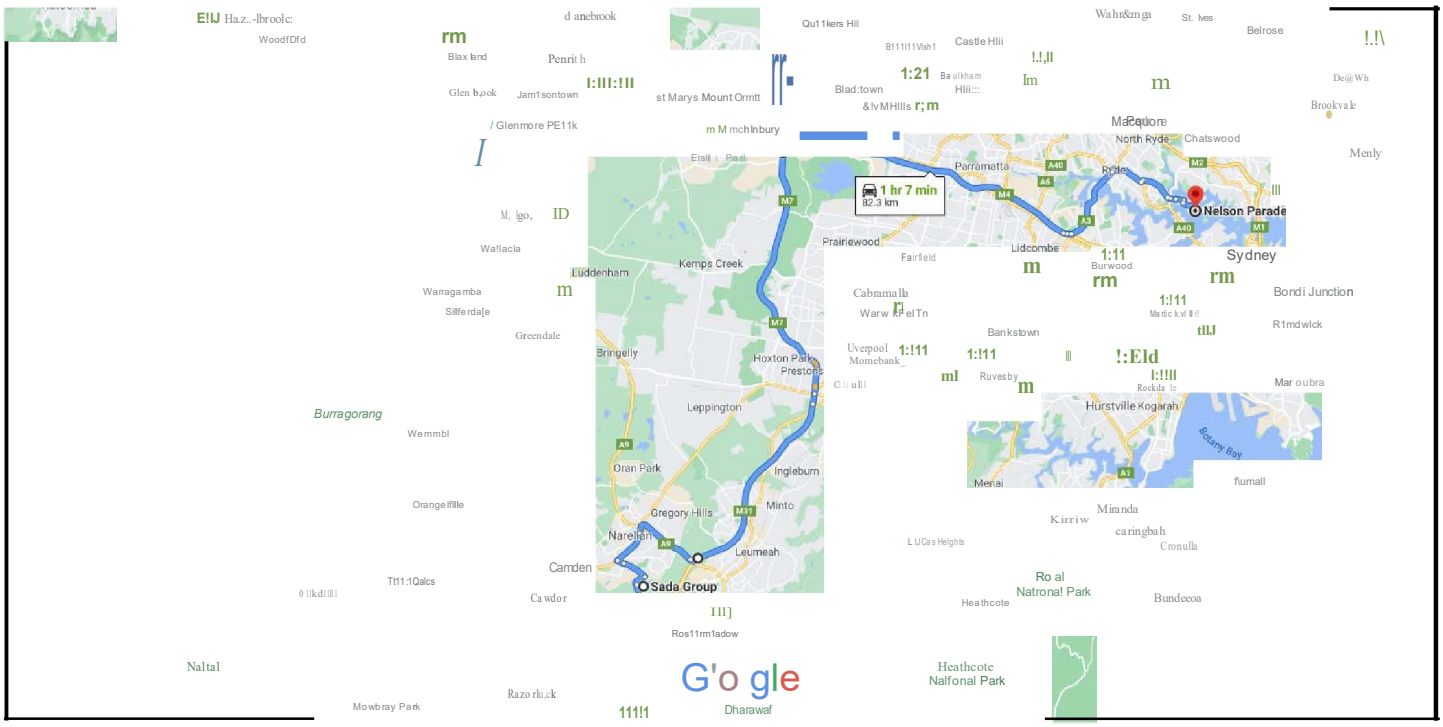
Nelson Parade

Hunters Hill NSW 2110, Australia

Sada Group to Nelson Parade

Secondary Route

Google Maps



Sada Group

50 Barrow Rd, Spring Farm NSW 2570, Australia

Get on Hume Motorway/M31 in Blairmount from Liz Kernohan Dr. Camden Bypass and Narellan Rd/A9

--1 7. Head southwest

,, 2 Slight right

,, 3. At the roundabout, take the 1 s1 exit onto Liz Kernohan Dr

•• 4. At the roundabout, continue straight to stay on Liz Kernohan Dr

--1 5. Use the right 2 lanes to turn right onto Camden Bypass

--1 6. Keep right at the fork, follow signs for Narellan Rd/Campbelltown/A9 and merge onto Narellan Rd/A9

--1 7. Slight left to merge onto Hume Motorway/M31 toward LiverpooVSydney

Follow Hume Motorway/M31, M7 and M4 to Homebush Bay Dr/A3 in **Sydney** Olympic **Park. Take the Homebush Bay Dr/A3 exit from M4**

,, 8. Merge onto Hume Motorway/M31

,, 9. Continue onto S Western Fwy

,, 10. Keep left at the fork to continue on M7, follow signs for Blacktown/ Newcastle

A

• • 11. At the interchange Light Horse, Use the left lane to follow signs for M4 toward Blacktown/Sydn ey

A

• • 12. Take the Homebush Bay Dr/A3 exit toward Ryde/ Hurstvil le/ SydneyOlympic Park

A

• • 13. Use the middle lane to continue toward Homebush Bay Dr/A3

A

Continue on A3. Take Victoria Rd/A40, Ryde Rd and Woolwich Rd to Nelson Parade in Hunters Hill

--1 14. Use the left 2 lanes to turn left onto Homebush Bay Dr/A3

--1 15. Use the left lane to take the A40/Victoria Rd ramp to Gladesville/Sydney

--1 16. Use the right 2 lanes to turn right onto Victoria Rd/A40 (signs for Gla desville/Sydn ey)

--1 7 7. Use the ieft 2 ianes to turn ieft onto Monash Rd

--1 18. At the roundabout, take the 2nd exit onto Ryde Rd

19. Ryde Rd turns slightly left and becomes Gladesville Rd

20. Continue onto Church S1

21. Continue onto Mount St

22. Continue onto Alexandra St

23. Turn right onto Ferry St

24. Ferry St turns slightly left and becomes Woolwich Rd

25. Turn right onto Giadstone Ave

26. Turn left onto Prince George Parade

27. Turn left onto Nelson Parade

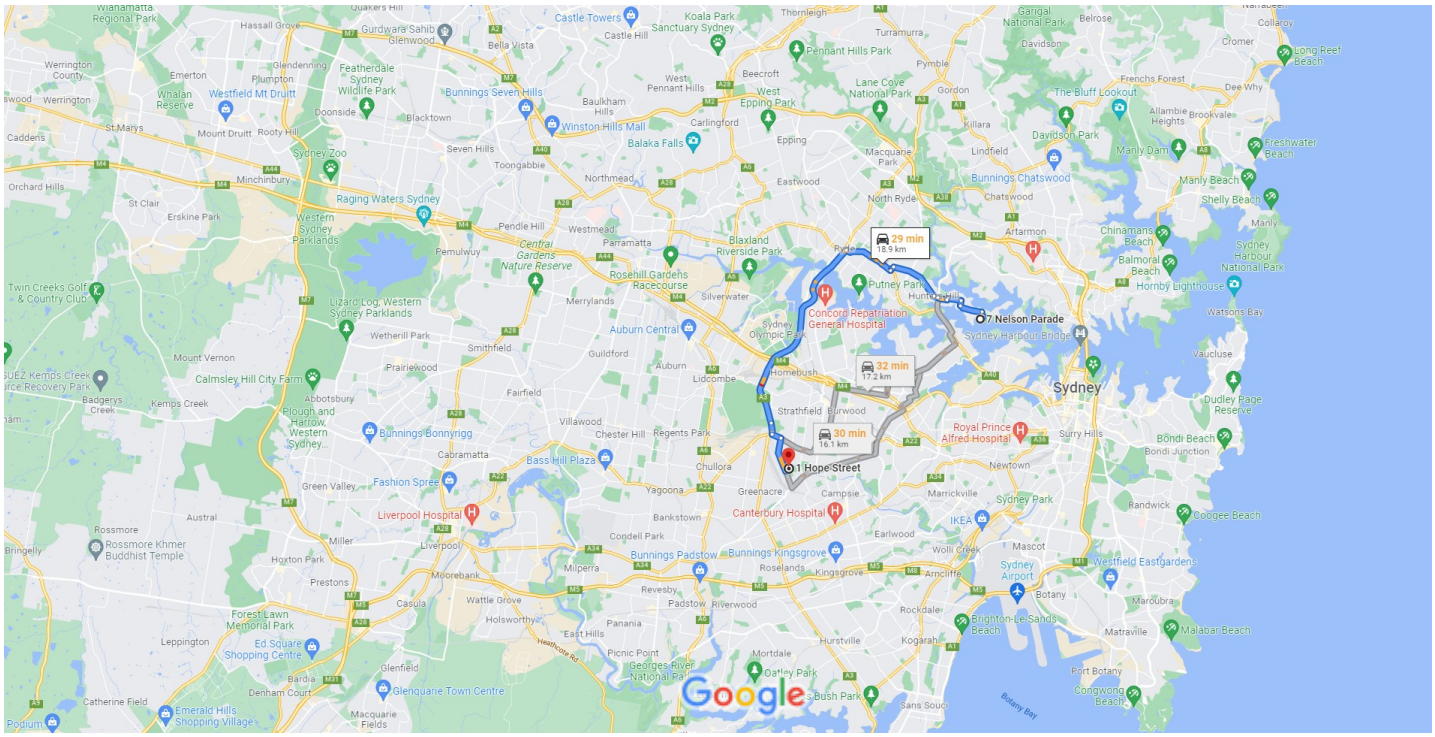
Nelson Parade

Hunters Hill NSW 217 0, Austra lia

Nelson Parade to Enfield

Primary Route

Google Maps 7 Nelson Parade to 1 Hope St Drive 18.9 km, 29 min



Map data ©2021 Google 2 mi

7 Nelson Parade

Hunters Hill NSW 2110, Australia

Take Woolwich Rd, Alexandra St and Ryde Rd to Victoria Rd/A40 in Gladesville

10 min (5.3 km)

1. Head east on Nelson Parade toward Prince George Parade

200 m

2. Turn right onto Prince George Parade

86 m

3. Turn right at the 1st cross street onto Gladstone Ave

120 m

4. Turn left onto Woolwich Rd

1.0 km

5. Woolwich Rd turns slightly right and becomes Ferry St

220 m

6. Ferry St turns left and becomes Alexandra St

550 m

7. Continue onto Mount St

67 m

8. Turn right onto Church St

400 m

9. Continue onto GladesvilleRd

180 m

10. Gladesville Rd turns slightly right and becomes Ryde Rd

2.2 km

11. At the roundabout, take the 1st exit onto Monash Rd

210 m

Take A3 to Cosgrove Rd in Strathfield

14 min (12.0 km)

12. Use any lane to turn right onto Victoria Rd/A40

2.2 km

13. Turn left to merge onto Church St/A3 toward Devlin St/Sydney Olympic Pk

Continue to follow A3

8.9 km

14. Use the left lane to take the Hume Hwy/A22 ramp to Sydney

500 m

15. Turn left onto Hume Hwy/Liverpool Rd/A22

400 m

Follow Cosgrove Rd to Hope St in Strathfield South

2 min (1.6 km)

16. Turn right onto Cosgrove Rd

Go through 2 roundabouts

1.5 km

17. At the roundabout, take the 1st exit onto Hope St

Destination will be on the left

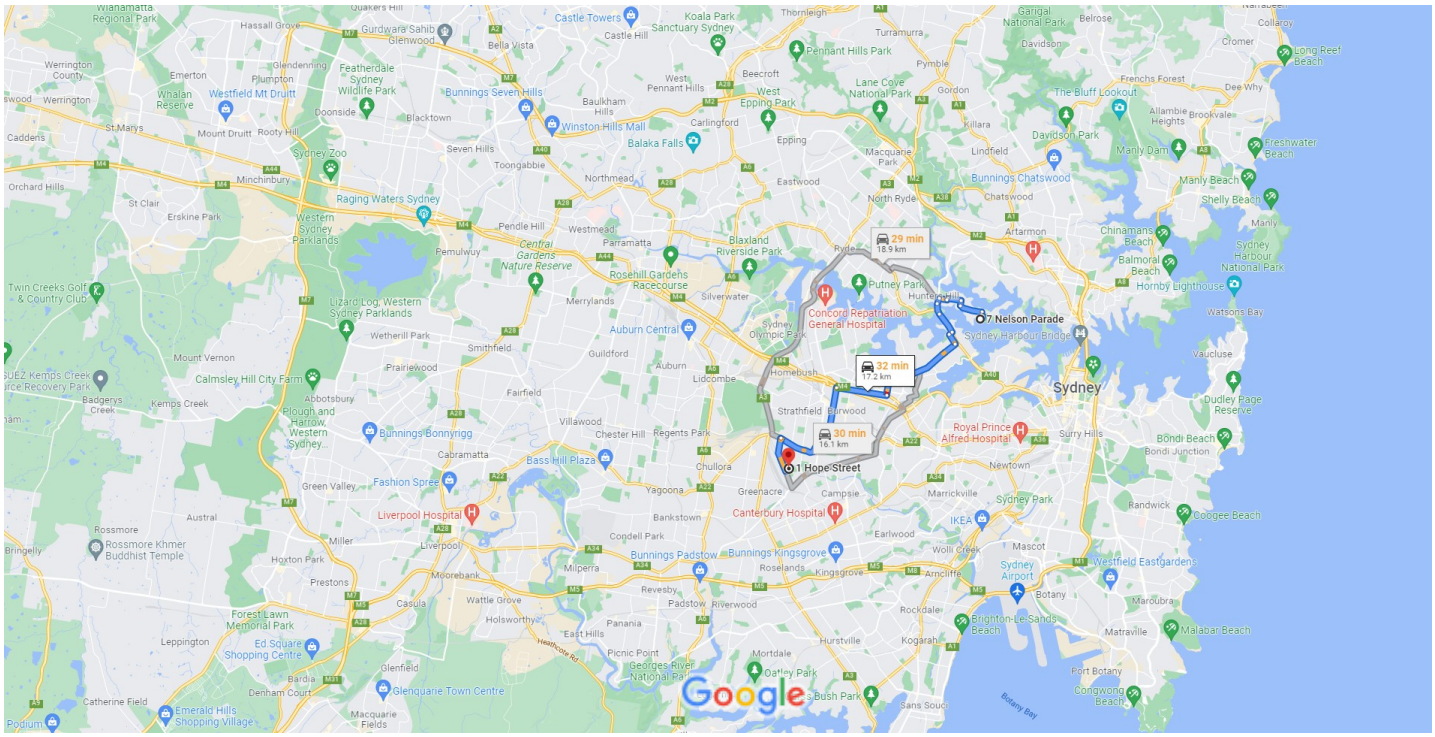
140 m

1 Hope St

Strathfield South NSW 2136, Australia

Nelson Parade to Enfield
Secondary Route

Google Maps 7 Nelson Parade to 1 Hope St Drive 17.2 km, 32 min



Map data ©2021 Google 2 mi

7 Nelson Parade

Hunters Hill NSW 2110, Australia

Get on Burns Bay Rd from Woolwich Rd, Alexandra St and Church St

6 min (2.8 km)

1. Head east on Nelson Parade toward Prince George Parade

200 m

2. Turn right onto Prince George Parade

86 m

3. Turn right at the 1st cross street onto Gladstone Ave

120 m

4. Turn left onto Woolwich Rd

1.0 km

5. Woolwich Rd turns slightly right and becomes Ferry St

220 m

6. Ferry St turns left and becomes Alexandra St

550 m

7. Continue onto Mount St

67 m

8. Turn right onto Church St

350 m

9. Turn left to merge onto Burns Bay Rd toward Sydney

250 m

Take Lyons Rd and Great Western Hwy/Parramatta Rd/A44 to Wentworth Rd in Strathfield

13 min (8.2 km)

10. Merge onto Burns Bay Rd

450m

11. Continue onto Gladesville Bridge/Victoria Rd/A40

Continue to follow Victoria Rd/A40

950 m

12. Use the right 2 lanes to turn right onto Westbourne St

160 m

13. Use any lane to turn left onto Marlborough St

500 m

14. Use the right 2 lanes to turn right onto Lyons Rd

3.2 km

15. At the roundabout, take the 1st exit onto Harris Rd

Go through 1 roundabout

750 m

16. Use any lane to turn right onto Great Western Hwy/Parramatta Rd/A44

2.2 km

17. Turn left onto Wentworth Rd

4 min (2.0 km)

Continue on Hume Hwy/Liverpool Rd/A22 to Strathfield South

6 min (4.1 km)

18. Use any lane to turn right onto Hume Hwy/Liverpool Rd/A22

2.6 km

19. Turn left onto Cosgrove Rd

Go through 2 roundabouts

1.5 km

20. At the roundabout, take the 1st exit onto Hope St

Destination will be on the left

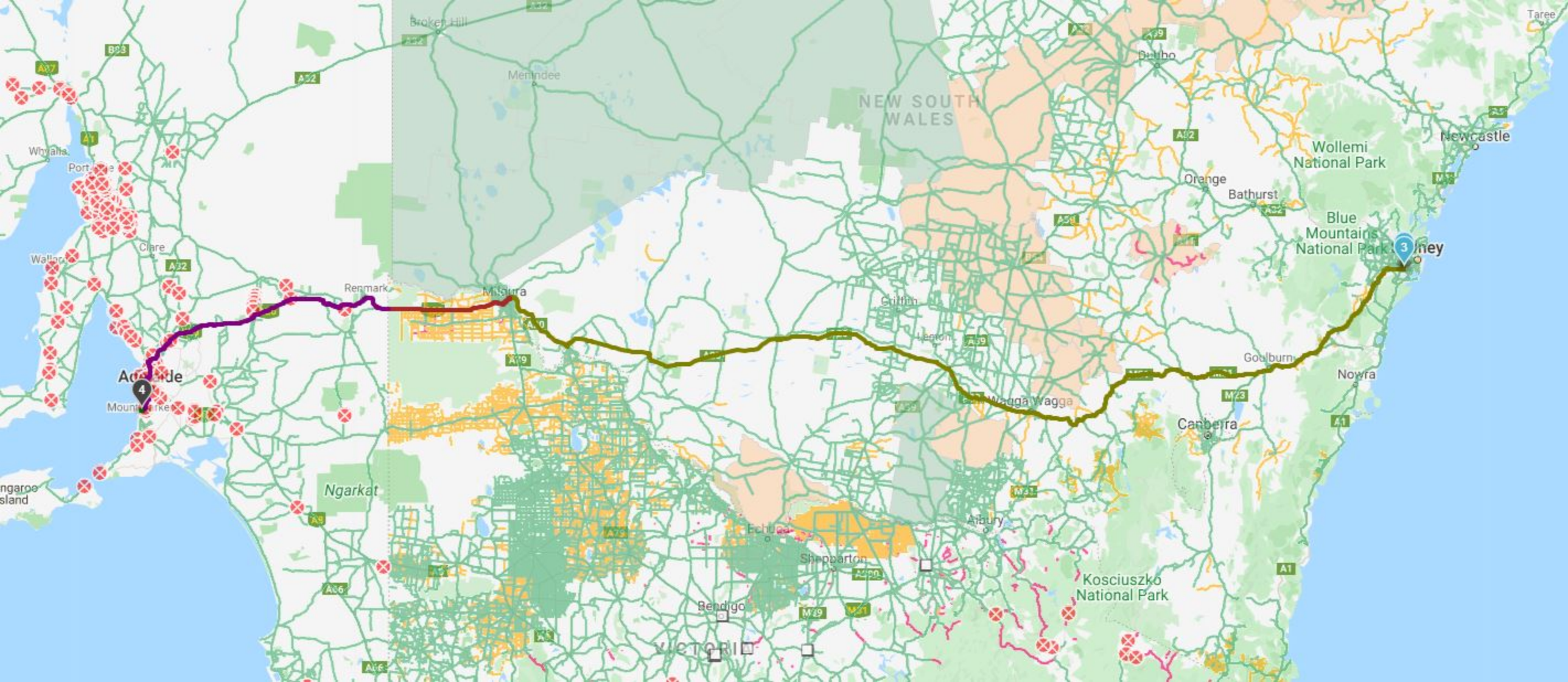
15 s (140m)

1 Hope St

Strathfield South NSW 2136, Australia

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

ENFIELD TO ADG ROUTE FOR B-DOUBLE TRAILERS


Broken Hill
Menindee
NEW SOUTH WALES
Dubbo
Taree
Newcastle
Wollemi National Park
Orange
Bathurst
Blue Mountains National Park
Sydney
Whyalla
Port Pirie
Clare
Wallaroo
Renmark
Griffith
Leeton
Goulburn
Nowra
Wagga Wagga
Canberra
Adelaide
Mount Barker
Ngarkat
Kangaroo Island
Albury
Shepparton
Bendigo
Kosciuszko National Park
VICTORIA
3
4

Route planner tool

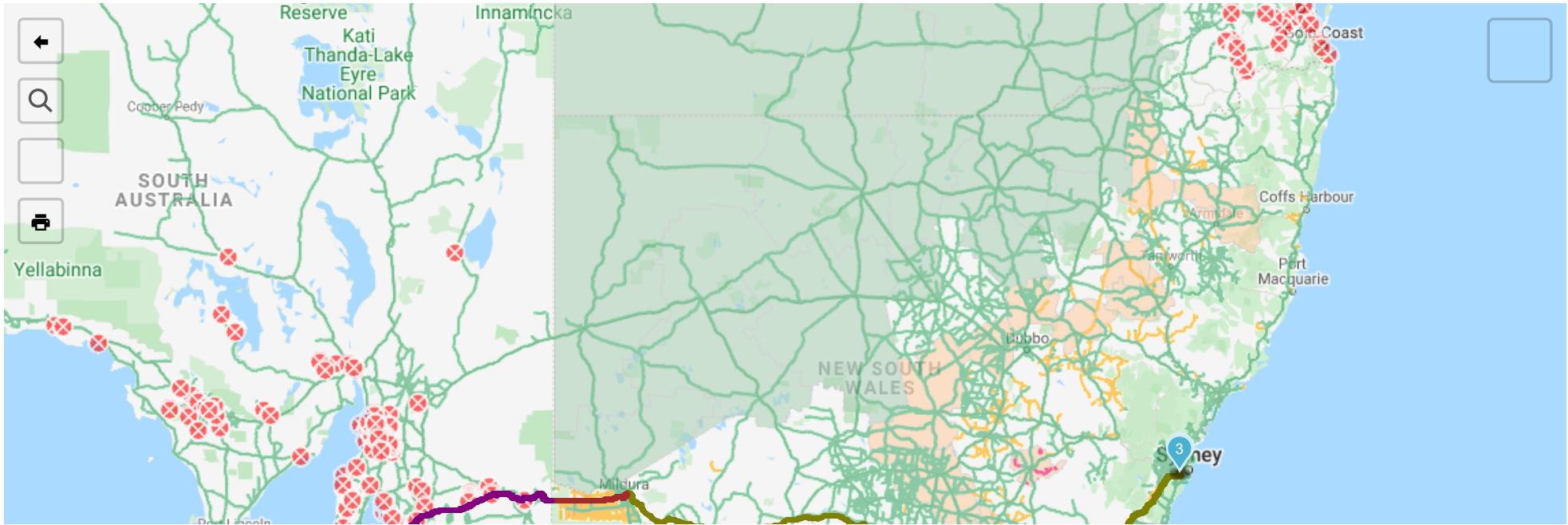
Route notes

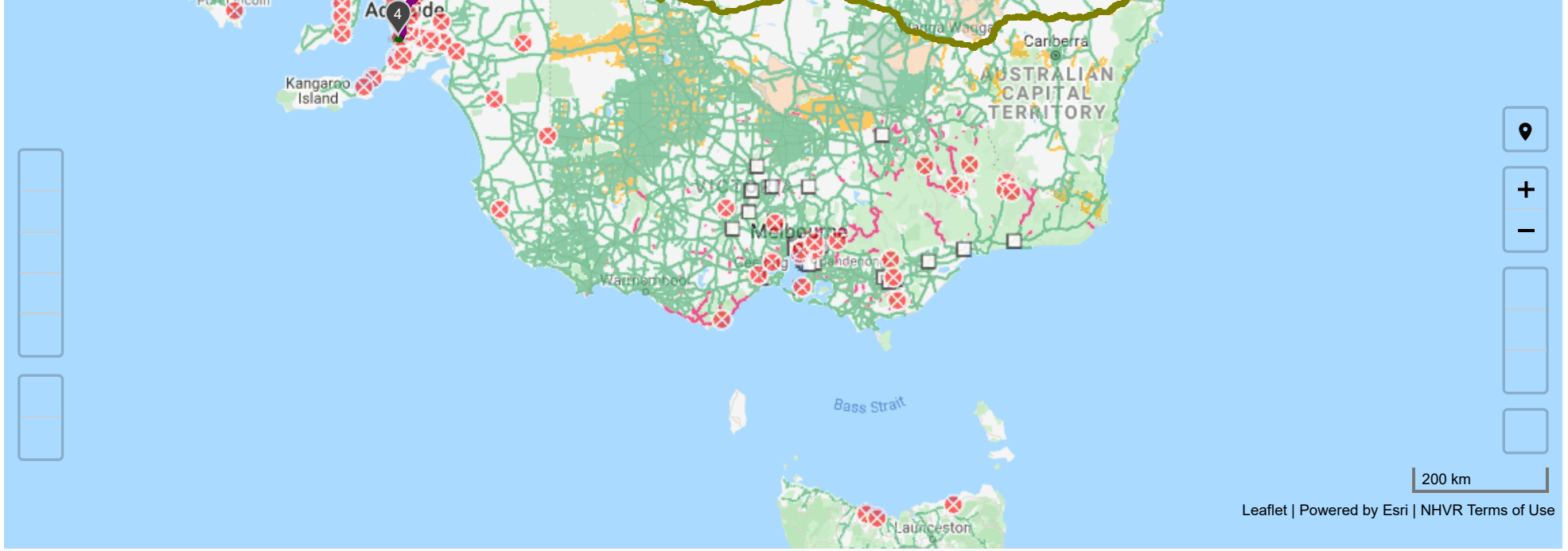
0 / 49999

Route summary

Start: 1 Hope Street, Strathfield South NSW
Cosgrove Road, Strathfield
Cosgrove Rd, [Strathfield South -]
Hume Hwy, Strathfield South
Unknown, Strathfield South
Liverpool Rd, Greenacre
Roberts Rd, Greenacre
Wiley Ave, [Greenacre - Wiley Park]
King Georges Rd, [Wiley Park - Beverly Hills]
M5 East,
King Georges Rd, Narwee
South Western Mtwy, [Narwee - Casula]
South Western Fwy, Glenfield
Hume Mtwy, [Glenfield - Berrima]
HUme Mtwy,
Hume Mtwy, Berrima
Hume Hwy, [Berrima - Tarcutta]
Sturt Hwy, [Tarcutta - Wagga Wagga]
Olympic Hwy, [Wagga Wagga -]
Sturt Hwy,
Newell Hwy,
Sturt Hwy, [Euroley - Gol Gol]
Adelaide St, Gol Gol
Sturt Hwy, [Gol Gol -]
Calder Hwy,
Sturt Hwy, [- Truro]
Stuart Hwy, Truro
Sturt Hwy, [Truro - Reid]
Northern Expy, Mudla Wirra
Sturt Hwy, Mudla Wirra
Northern Expy, [Mudla Wirra -]
Wakefield Hwy, [Waterloo Corner -]
Port Wakefield Rd, Waterloo Corner
Wakefield Hwy, Munno Para
Port Wakefield Rd, [Port Adelaide -]
Wakefield Hwy, Munno Para

Port Wakefield Rd, Port Adelaide
Wakefield Hwy, [Munno Para - Port Adelaide]
Port Wakefield Rd, Burton
Wakefield Hwy, [Munno Para - Paralowie]
Port Wakefield Rd,
Wakefield Hwy, [Port Adelaide - Green Fields]
Port Wakefield Rd, [Green Fields -]
Princes Hwy,
Salisbury Hwy, [Port Adelaide - Wingfield]
North-south Mtwy, Wingfield
North-South Mtwy, [Wingfield - Regency Park]
South Rd, [Renown Park - Yatala]
North-South Mtwy,
South Rd, Yatala
Port Rd, Hindmarsh
South Rd, Adelaide
Port Rd, Mile End
South Rd, [- Adelaide]
Port Rd, Adelaide
South Rd, [St Marys - Bedford Park]
Main South Rd, Bedford Park
Southern Expy, [Bedford Park - Reynella]
Sherriffs Rd, [Morphett Vale - Noarlunga]
Unknown, Noarlunga
Lindsay Rd, [Lonsdale - Noarlunga]
Brian Rd, Noarlunga
End: 21 Scarborough Way, Lonsdale SA



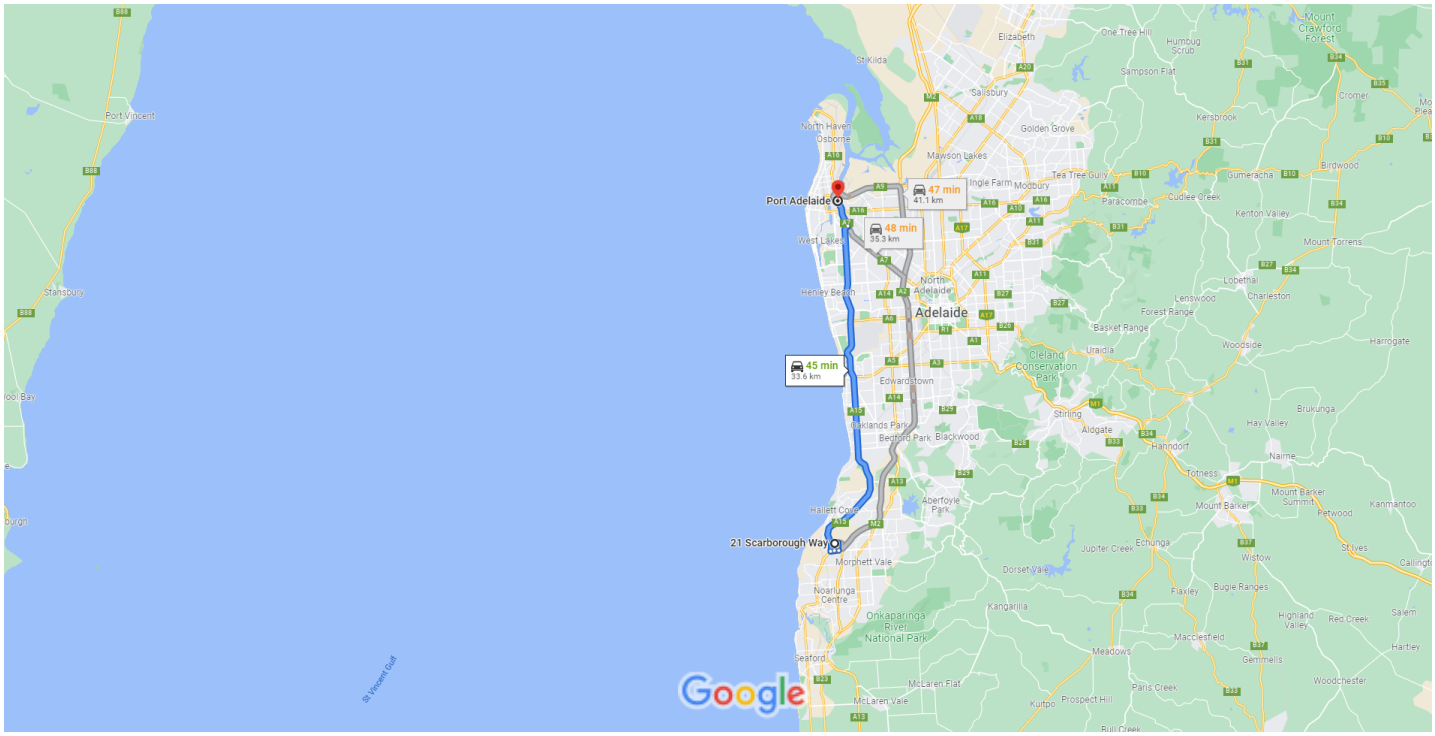

Kangaroo Island
Canberra
AUSTRALIAN CAPITAL TERRITORY
Melbourne
Bass Strait
Launceston
200 km
Leaflet | Powered by Esri | NHVR Terms of Use

ADG to Port
Primary Route

Google Maps

21 Scarborough Way, Lonsdale SA, Australia to Port Adelaide SA, Australia

Drive 33.6 km, 45 min



Map data ©2021 2 mi

21 Scarborough Way

Lonsdale SA 5160, Australia

Take Brian Rd, Lindsay Rd and Sherriffs Rd to Lonsdale Rd/A15

4 min (1.6 km)

1. Head east on Scarborough Way toward Brian Rd

230 m

2. Turn right onto Brian Rd

350 m

3. Turn left onto Lindsay Rd

300 m

4. Turn right to stay on Lindsay Rd

350 m

5. Turn left toward Sherriffs Rd

28 m

6. Turn right at the 1st cross street onto Sherriffs Rd

300 m

Follow A15 to A7 in Port Adelaide

41 min (32.0 km)

7. Use the right 2 lanes to turn right onto Lonsdale Rd/A15

Continue to follow A15

29.7 km

8. Use any lane to turn left onto Port Rd/A7

Continue to follow A7

2.3 km

Port Adelaide

South Australia 5015, Australia

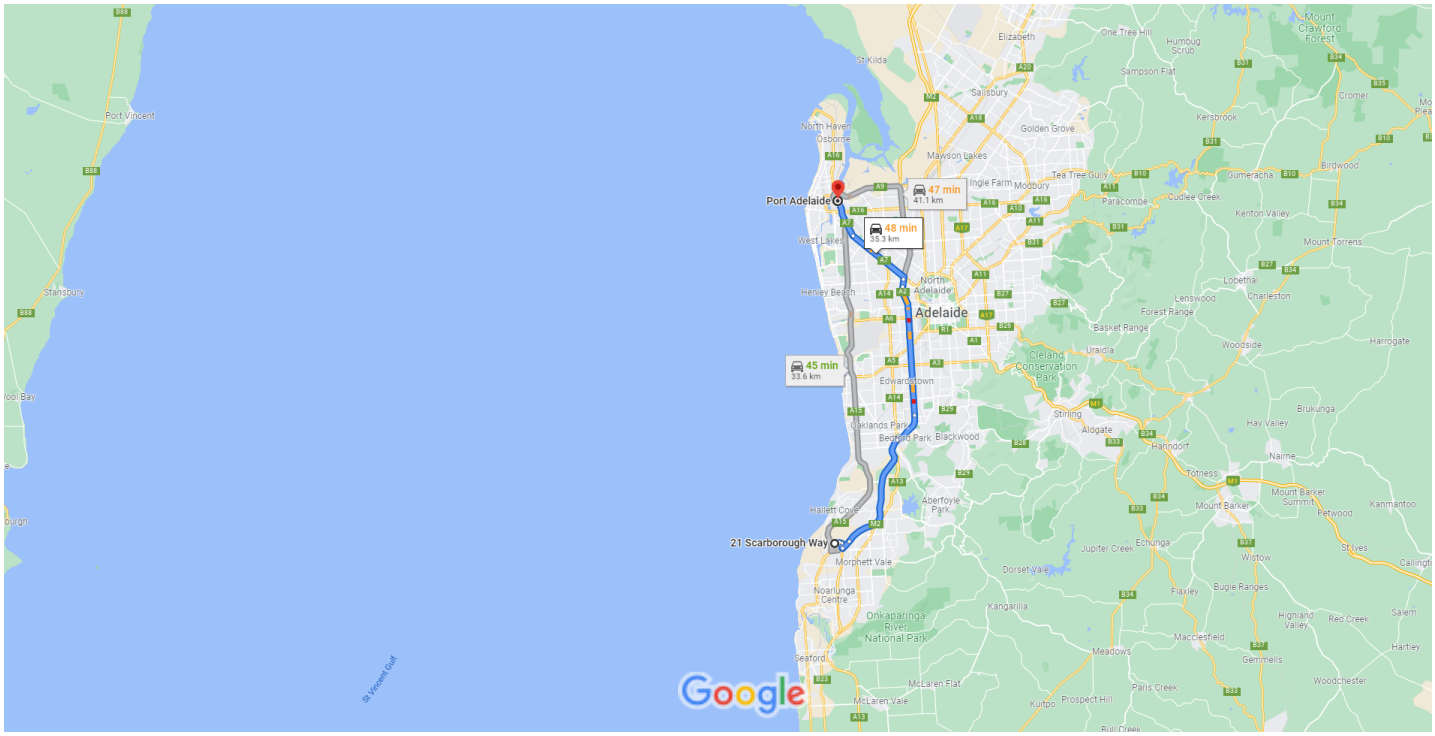
These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

ADG to Port
Secondary Route

Google Maps

21 Scarborough Way, Lonsdale SA, Australia to Port Adelaide SA, Australia

Drive 35.3 km, 48 min



Map data ©2021 2 mi

21 Scarborough Way

Lonsdale SA 5160, Australia

Get on M2 in Reynella from Brodie Rd

3 min (1.8 km)

1. Head east on Scarborough Way toward Brian Rd

350 m

2. Turn right onto Liston Rd

230 m

3. Turn right onto Brodie Rd

500 m

4. Turn left to merge onto M2

800 m

Follow M2 and South Rd to A7 in Port Adelaide

41 min (33.4 km)

5. Merge onto M2

10.4 km

6. Keep right to stay on M2

2.7 km

7. Merge onto South Rd/A2

48 m

8. Continue straight to stay on South Rd/A2

10.8 km

9. Slight left onto South Rd

650 m

10. Turn left onto Port Rd/A7

5.7 km

11. Use the right 2 lanes to turn slightly right to stay on Port Rd/A7

Continue to follow A7

3.2 km

Port Adelaide

South Australia 5015, Australia

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

ADG and Victoria Licenses

ALARA LOGISTICS PTY LTD
Post Office Box 2375
GLADSTONE PARK VIC 3043

Radiation Act 2005

Management Licence

Licence Holder:	ALARA LOGISTICS PTY LTD
Licence Number:	300085772
Duration:	3 year(s)
Expiry Date:	25/5/2024
Date Printed:	08/10/2021

This management licence authorises the abovementioned licence holder to conduct the radiation practice(s) listed in the Schedule(s) of this licence. This management licence is subject to the conditions specified in Schedule 1 of this licence.

Note: A management licence may have as many as ten Schedules. However, this licence only includes those Schedules that are relevant to the radiation practices that the licensee is authorised to conduct.

SCHEDULE 1: General Licence Conditions

Condition No	Condition
M8	The management licence holder must report any radiation safety incident which occurs in the conduct of the radiation practice in a manner and time consistent with the document titled 'Mandatory Reporting of Radiation Incidents' published by the Department and available from the Department's website.
M9	Where this licence permits the disposal of a sealed source, a sealed source apparatus or other types of radioactive material, the management licence holder must ensure the disposal complies with the requirements of the document titled 'Disposal of Radioactive Material' published by the Department and available from the Department's website. Where this licence permits the disposal of ionising radiation apparatus (e.g. X-ray units) or non-ionising radiation apparatus, the management licence holder must notify the Department within 14 days of the disposal occurring. The notification must be made using the Internet Notification of Acquisition Form available from the Department's website. Where this licence permits the possession of a radiation source, the management licence holder must notify the Department after taking possession of the radiation source using the Internet Notification of Acquisition Form available from the Department's website within: (a) 24 hours of taking possession of a High Consequence Sealed Source or High Consequence Group of Sealed Sources as defined in the Radiation Act 2005; and (b) 14 days of taking possession of other types of sealed sources or sealed source apparatus; and (c) 14 days of taking possession of ionising radiation apparatus (e.g. X-ray units) or non-ionising apparatus. The requirement to notify the Department of the acquisition and disposal of a radiation source does not apply to: (a) Unsealed radioactive material; and (b) Implantable seeds used for brachytherapy and anatomical localisation; and (c) A radiation source that is in the licence holder's possession for a period of less than 14 days and the radiation source is not a High Consequence Sealed Source or High Consequence Group of Sealed Sources as defined in the Radiation Act 2005. Note that for the purposes of the Radiation Act 2005, disposal includes: (a) relocation of a radiation source to a destination outside Victoria; and (b) relinquishing possession of a radiation source through sale of the radiation source or giving away of the radiation source or any other means.

SCHEDULE 1: Practice Specific Conditions

Condition No	Condition
M1723	The management licence holder must in the transport of any radioactive material comply with the 'Code of Practice for the Safe Transport of Radioactive Material (2014)' as published by the Australian Radiation Protection and Nuclear Safety Agency.
M1724	The Management Licence holder must not facilitate the disposal of a high consequence sealed source or a high consequence group of sealed sources as defined in the Radiation Act 2005.
M1725	The Management Licence holder must not transport a high consequence sealed source or a high consequence group of sealed sources as defined in the Radiation Act 2005.
M1734	The management licence holder must comply with the obligations of the 'disposal facilitator' in the document titled 'Disposal of Radioactive Material' published by the Department and available from the Department's website.

SCHEDULE 8: Radiation Practices Not Involving Possession of Radiation Sources

Permitted Site Address	Unit 2 62 - 68 Garden Drive TULLAMARINE VIC 3043		
Auth. Number	**Permitted Radiation Practice**	**Permitted Radiation Source**	**Conditions**
A522543	Transport of radioactive material (as a contract carrier)	Unsealed radioactive material	M1723
A538433	Disposal facilitation	Sealed sources (that are not high consequence sealed sources)	M1724, M1734
A522544	Transport of radioactive material (as a contract carrier)	Sealed sources (that are not high consequence sealed sources)	M1723, M1725

SCHEDULE 9: Definitions

"AHPRA" means Australian Health Practitioner Regulation Agency.

"Approved Tester" means an approved tester appointed under Part 5 A of the Radiation Act 2005. The department maintains a list of the Approved Testers. The list is available at: http://122.252.13.117/environment/approved_testers.asp

"certificate of compliance" means a certificate issued by an Approved Tester under section 33(1) of the Radiation Act 2005 in respect of a prescribed radiation source.

"contract carrier" means a person or an organisation that transports radioactive material on behalf of others.

"Department" means Department of Health and Human Services.

"DXA" means Dual-energy X-ray absorptiometry.

"high consequence group of sealed sources" means a category 1 group of sealed sources, a category 2 group of sealed sources or a category 3 group of sealed sources as defined in the Radiation Act 2005.

"high consequence sealed source" means a category 1 sealed source, a category 2 sealed source or a category 3 sealed source as defined in the Radiation Act 2005.

"ionising radiation apparatus" means an apparatus that produces ionising radiation when energised (e.g. medical X-ray unit, XRF analyser) but does not include —

(a) a sealed source apparatus; or
(b) an apparatus that is —
  (i) prescribed by the Radiation Regulations 2017 not to be an ionising radiation apparatus; or
  (ii) declared not to be an ionising radiation apparatus under section 4 of the Radiation Act 2005.

"NORM" means naturally occurring radiative material.

"pQCT" means Peripheral quantitative computed tomography.

"prescribed radiation source" means a radiation source that is prescribed to be a prescribed radiation source by the Radiation Regulations 2017 for the purpose of compliance testing.

The following types of X-ray equipment "when used for human diagnostic imaging purposes" have been prescribed by the Radiation Regulations 2017 and require periodic testing against the relevant Radiation Safety Standards:

- Plain Film Radiographic X-ray Equipment
- Fluoroscopic X-ray Equipment
- Computed Tomography Scanners
- Mammography X-ray Equipment

"private carrier" means a person or an organisation that possesses radioactive material and as part of their normal operations transports that radioactive material.

"radioactive material" means—

(a) any material that spontaneously emits ionising radiation that —
  (i) has an activity concentration equal to, or greater than, the amount prescribed by the Radiation Regulations 2017; and
  (ii) consists of, or contains, an activity equal to, or greater than, the amount prescribed by the Radiation Regulations 2017; or
(b) any material that spontaneously emits ionising radiation that —
  (i) has an activity concentration, or consists of, or contains, an activity, less than the amount prescribed by the Radiation Regulations 2017; and
  (ii) occurs in prescribed circumstances —

but does not include —

(c) raw material with unmodified concentrations of radionuclides unless that material is prescribed by the Radiation Regulations 2017 to be radioactive material;
(d) material that is —
  (i) prescribed by the regulations not to be radioactive material; or
  (ii) declared not to be radioactive material under section 4 of the Radiation Act 2005;

"sealed source" means radioactive material that is —

(a) permanently sealed in a capsule; or
(b) closely bound and in solid form.

"sealed source apparatus" means an apparatus that produces ionising radiation because it contains a sealed source but does not include an apparatus that is —

(a) prescribed by the Radiation Regulations 2017 not to be a sealed source apparatus; or
(b) declared not to be a sealed source apparatus under section 4 of the Radiation Act 2005;

"unsealed radioactive material" means radioactive material that is not a sealed source.

SCHEDULE 10: Offences

This Schedule outlines major offences with respect to the conduct of a radiation practice as set out in the Radiation Act 2005.

Section 12. Conduct of radiation practice prohibited unless licensed

(1) A person must not conduct a radiation practice unless the person—

(a) holds a management licence, that is in force, that allows the person to conduct that radiation practice; or

(b) is exempted under section 16 from the requirement to hold a licence in respect of that radiation practice and the person conducts the radiation practice in accordance with the exemption.

Penalty: In the case of a natural person, 1800 penalty units;

In the case of a body corporate, 9000 penalty units.

(2) An offence under this section is an indictable offence.

Section 15. Licence holders must comply with conditions of licence

(1) A management licence holder must not knowingly, recklessly or negligently fail to comply with any condition of their licence.

Penalty: In the case of a natural person, 1200 penalty units;

In the case of a body corporate, 6000 penalty units.

Section 18. Offence to allow persons who do not hold a use licence to use a radiation source

(1) A management licence holder must not direct, request or knowingly allow a person who the management licence holder knows is not a use licence holder, or is a use licence holder whose licence is suspended, to use a radiation source in the management licence holder's possession.

Penalty: In the case of a natural person, 1200 penalty units;

In the case of a body corporate, 6000 penalty units.

(2) An offence under subsection (1) is an indictable offence.

(3) Subsection (1) does not apply if the person who uses a radiation source in the management licence holder's possession—

(a) is exempted under section 16 from holding a use licence in respect of that use; and

(b) uses that source in accordance with that exemption.

Section 19. Offence to allow a use licence holder to use a radiation source in a manner not permitted by licence

(1) A management licence holder must not direct, request or knowingly allow a use licence holder to use a radiation source in the management licence holder's possession in a manner that the management licence holder knows is contrary to the conditions of the use licence holder's use licence.

Penalty: In the case of a natural person, 1200 penalty units;

In the case of a body corporate, 6000 penalty units.

(2) An offence under subsection (1) is an indictable offence.

Section 36. Use of prescribed radiation sources prohibited unless there is a certificate of compliance

(1) A person who is in possession of a prescribed radiation source must not require, direct, allow or permit a person to use the prescribed radiation source unless there is a certificate of compliance in respect of that source that has not expired.

Penalty: In the case of a natural person, 1200 penalty units;

In the case of a body corporate, 6000 penalty units.

(2) An offence under this section is an indictable offence.

LICENCE TO USE OR HANDLE RADIOACTIVE SUBSTANCES

Radiation Protection and Control Act 1982

Mr Stephen R Smith
ADG Freight Services Pty Ltd
21 Scarborough Way
LONSDALE SA 5160

Certificate Number:	25319
Docket Number:	38320
Date of Issue:	16/02/2021
Date of Expiry:	31/03/2022

The person named above has been granted a licence to use or handle radioactive substances pursuant to **Section 28 of the Radiation Protection and Control Act 1982**. This licence is issued subject to the conditions listed on the reverse side of this certificate and remains valid from the date of issue until the date of expiry.

The following employment details are recorded:

ADG Freight Services Pty Ltd
21 Scarborough Way
LONSDALE SA 5160

IMPORTANT NOTICE - LICENCE CONDITIONS

Please carefully review the condition(s) attached to your licence and if you believe your licence condition(s) are incorrect, please contact the Radiation Protection Branch immediately using the details below.

CHANGE OF DETAILS

Please notify the Radiation Protection Branch of any changes to the licence details above as soon as possible using the back of this form.

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001 | 211 Victoria Square Adelaide South Australia
T (08) 8463 7826 | **F** (08) 8124 4671 | www.epa.sa.gov.au/environmental_info/radiation

CONDITIONS OF LICENCE

SCHEDULE 176 Use of Unsealed substances and Sealed sources subject to Work Plans

CHANGE OF DETAILS

When completed send this form to:
Radiation Protection Branch,
Environment Protection Authority
GPO Box 2607, ADELAIDE SA 5001

Certificate Number: 25319
Docket Number: 38320

Name of Licensee: .....

New Address: .....

.....

Email: ..... Phone: .....

Signed: ..... Date: .....

Employer (if changed) Name: .....

Address: .....

.....

CONDITION DETAILS

SCHEDULE 176

1. Subject to Condition 2, the licensee shall only use sealed radioactive sources with activity not exceeding 750GBq.
2. Where the activity of a sealed radioactive source to be used or handled exceeds 50GBq, and the use or handling involves removing the source from its shielded containment a work plan shall be submitted to the Radiation Protection Division before the source is so used or handled.
3. The licensee shall only use unsealed radioactive substances that are listed in Schedule 1 of the Regulations where the activity of any such substance does not exceed the activity allowed to be used in Type C premises.

ANSTO Memo Regarding Regulatory Clarification

Australian Government | ANSTO Science. Ingenuity. Sustainability.

MEMORANDUM

To	Scott Burrows	Date	8 September 2021
From	Robert Blackley	Ref/File No.	Exemption criteria
Subject	Radiological exemption criteria in Australia		

Regulatory documents on Exemption of material

Within Australia, radioactive material and ionising apparatus is regulated by State Regulators and/or the Commonwealth Regulator.

The Commonwealth regulator, ARPANSA, regulates commonwealth agencies and the importation and exportation of materials into and from Australia. ARPANSA also provides legislative frameworks for State regulators.

In NSW the primary radiation regulator is the NSW EPA.

A list of the State and Territory regulators within Australia can be found at https://www.arpansa.gov.au/regulation-and-licensing/regulation/state-territory-regulators

Exclusion and Exemption of radioactive material

Within Australia, radioactive material whose magnitude or likelihood is not amenable to control through legislation is *excluded* from regulation.

Other material may be *exempted* from notification, registration and licencing if the health risks and risks to the environment are sufficiently low, and radiation protection, including the cost of regulatory control, is optimised.

Within Australia requirements for exemption and exclusion are provided in the ARPANS Act and ARPANS Regulations (2018). Guidance on exemption levels for specific radionuclides or practices is outlined in the National Directory for Radiation Protection (NDRP) (2017).

In the NDRP (2017) Schedule 4 lists the exemption levels for U_{nat} as 1 Bq/g or 1000 Bq. This activity concentration and activity level are for the head of chain (ie U-238) assuming that all of the decay chain is in secular equilibrium. Separate, higher activity concentrations and activity levels for exemption are provided for individual radionuclides in the decay chain if the decay chain is not in secular equilibrium.

Within NSW requirements for exemption and exclusion are provided in the radiation Control Act (1990) and Radiation Control Regulations (2013).
The Radiation Control Regulations (2013) further defines a *radioactive substance* as material where:

a) the prescribed amount (specific total activity) is greater than 100 becquerels per gram (***criteria 1***), and
b) a prescribed activity (**criteria** 2) is equal to or greater than 1 (see formula in Table 1).

Disposal of material in NSW

For the classification of material as waste, the NSW EPA *Waste Classification Guidelines: Part 3: Waste containing radioactive material* (2014) provides step by step guidance on classification for material containing radioactive material. As the material on the site is solid particulate material, the summary of the classification only considers solid waste material. Further information on other waste forms such as liquid wastes are described in detail in the NSW Waste Classification Guidelines.

Table 1 – Radiological formula for waste classification under NSW EPA waste guidelines

Test No.	ID	Formula	Target
Criteria 1	Specific activity	Total activity concentration	< 100 Bq/g
Criteria 2	Prescribed activity	$\frac{A1}{40} + \frac{A2}{400} + \frac{A3}{4{,}000} + \frac{A4}{40{,}000}$	< 1
Criteria 3	Total activity ratio	$(A1 \times 10\text{-}3) + (A2 \times 10\text{-}4) + (A3 \times 10\text{-}5) + (A4 \times 10\text{-}6)$	< 1
Criteria 4	Specific activity ratio	$SA1 + (SA2 \times 10\text{-}1) + (SA3 \times 10\text{-}2) + (SA4 \times 10\text{-}3)$	< 1

Note: SA1 to SA4 are the specific activity (of the material) of Group 1 to Group 4 radionuclides, as set out in Column 1 of Schedule 1 of the Radiation Control Regulation 2013.

Note: A1 to A4 are the total activity of Group 1 to Group 4 radionuclides, as set out in Column 1 of Schedule 1 of the Radiation Control Regulation 2013.

Summary of radiological waste classification steps in NSW

a) The waste guidelines specify that the radioactivity of the waste must be assessed in accordance with the Radiation Control Act (1990) and Regulation (2013).

b) Wastes with a specific activity greater than 100 becquerels per gram (***criteria 1***) and consisting of, or containing more than, the prescribed activity (***criteria 2***) of a radioactive element in Schedule 1 of the Radiation Control Regulation 2013, whether natural or artificial, must be classified as *hazardous wastes*.

c) Wastes with either a specific activity greater than 100 becquerels per gram (***criteria 1***) or consisting of, or containing more than, the prescribed activity (***criteria 2***) of a radioactive element in Schedule 1 of the Radiation Control Regulation 2013, whether natural or artificial, must be classified as either *general waste* or *restricted solid waste,* by applying **criteria 3** and **4**.

d) Where the specific activity ratio (***criteria 4***) or total activity ratio (***criteria 3***) is greater than one, non-liquid wastes must be classified as *restricted solid waste* unless: other characteristics of the waste mean that it must be classified as *hazardous waste* (for example, it may be pre-classified as *hazardous waste* in accordance with Step 3 of Part 1 of the Guidelines).

e) Where the specific activity ratio (***criteria 4***) and total activity ratio (***criteria 3***) are equal to or less than one, the waste must be classified as '*General solid waste'* unless its other characteristics mean that it must be classified as another classification in line with Part 1 of the Guidelines.

Disposal of material in Australia

For the disposal of radioactive material within Australia, guidance is provided in ARPANSA's Guide for Classification of radioactive Waste, RPS G-4 (2020). In RPS G-4 waste is classified as either:

- Exempt waste
- Very Short Lived Waste
- Very Low Level Waste
- Low Level Waste
- Intermediate Level Waste
- High Level Waste

Classification of Hunters Hill Site Material

Under the NSW waste classification guidelines, the fill material at the site at Nelson Parade Hunters Hill would be classified as 'Restricted Solid Waste'.

Under the Australian waste classification guidelines, RPS G-4, the fill material at the site at Nelson Parade Hunters Hill is above the Exemption Level specified in the NDRP RPS, and would likely be classified as Very Low Level Waste.