

National Framework for Radioactive Waste Management

Contents

1	Forward.....	2
2	The National Framework for Radioactive Waste Management	3
2.1	Nuclear Safety and Radiation Protection Act	4
2.2	Management of Radioactive Waste Regulations	4
2.3	Radioactive Waste Regulator	4
2.4	Radioactive Waste Management Programme	4
3	Guiding principles.....	5
4	Stakeholder Responsibilities	6
4.1	Employers.....	6
4.2	Commission for the Protection from Ionising and Non Ionising Radiation	6
4.3	Operator of future centralised storage facility.....	7
4.4	Technical service providers.....	7
5	Policies and Strategies for the Management of Radioactive Waste	8
5.1	Financing of radioactive waste management	8
5.2	Waste minimisation.....	8
5.3	Waste Conditioning.....	8
5.4	Central Storage Facility.....	9
5.5	Future Disposal	9
5.6	Gaining control over sources that are out of regulatory control	10
5.7	Emergency Plans	11
5.8	Orphan Source Recovery	11
5.9	Return of radioactive sealed sources	11
5.10	Shipment of Radioactive waste out of Malta	11
5.11	Imports of Waste	12
5.12	Discharges from nuclear medicine departments	12
5.13	Education and Training	12
5.14	Research	12
5.15	Public Participation	13
6	Key Performance Indicators	13
7	Funding of Radioactive waste management	14
7.1	Assessment of programme costs.	14
7.2	Source of funding programme.....	16

1 Forward

Malta's use of radioactive material

Malta currently uses limited amounts of radioactive material in both medical and industrial beneficial applications. In addition to the radioactive material currently in use Malta also has some radioactive material in storage from past applications.

The current and past use of radioactive material has led to the production of limited amounts of radioactive material that needs to be appropriately managed at the end of its useful life.

Malta does not have any nuclear fuel activities and does not use, handle or store waste from the nuclear fuel cycle.

Management of radioactive waste

The objective of radioactive waste management is to enable radioactive waste to be treated in a manner that protects human health and the environment now and in the future without imposing undue burdens on future generations.

In order for Malta to continue to obtain the benefits from the use of radioactive material and to manage radioactive material in storage from past applications there is a need for Malta to address issues relating to the management of radioactive waste.

The management of radioactive waste needs to be appropriate and proportionate and needs to be in-line with obligations as established by the European Union (EU) and the International Atomic Energy Agency (IAEA).

The Government has the ultimate responsibility for the management of radioactive waste and to this end empowered the Commission for the Protection from Ionising and Non Ionising Radiation by virtue of the Nuclear Safety and Radiation Protection Act (CAP 585), hereinafter referred to as the *Act*.

The Government of Malta issued the Management of Radioactive Waste Regulations , hereinafter referred to as the *Regulations*, under the *Act*.

The Regulations state that the Commission for the Protection from Ionising and Non Ionising Radiation (RPC), has the responsibility for the National Framework for Radioactive Waste Management.

The National Framework for Radioactive Waste Management encompasses the *Act*, the *Regulations*, the activities of the RPC and the Radioactive Waste Management Programme (RWMP).

The RWMP is presented in this document and gives the policies and strategies for radioactive waste management.

2 The National Framework for Radioactive Waste Management

Through the National Framework for Radioactive Waste Management (referred to in this document as the *National Framework*) the Government aims to protect the environment and the population from the effects of ionising radiation emanating from radioactive waste.

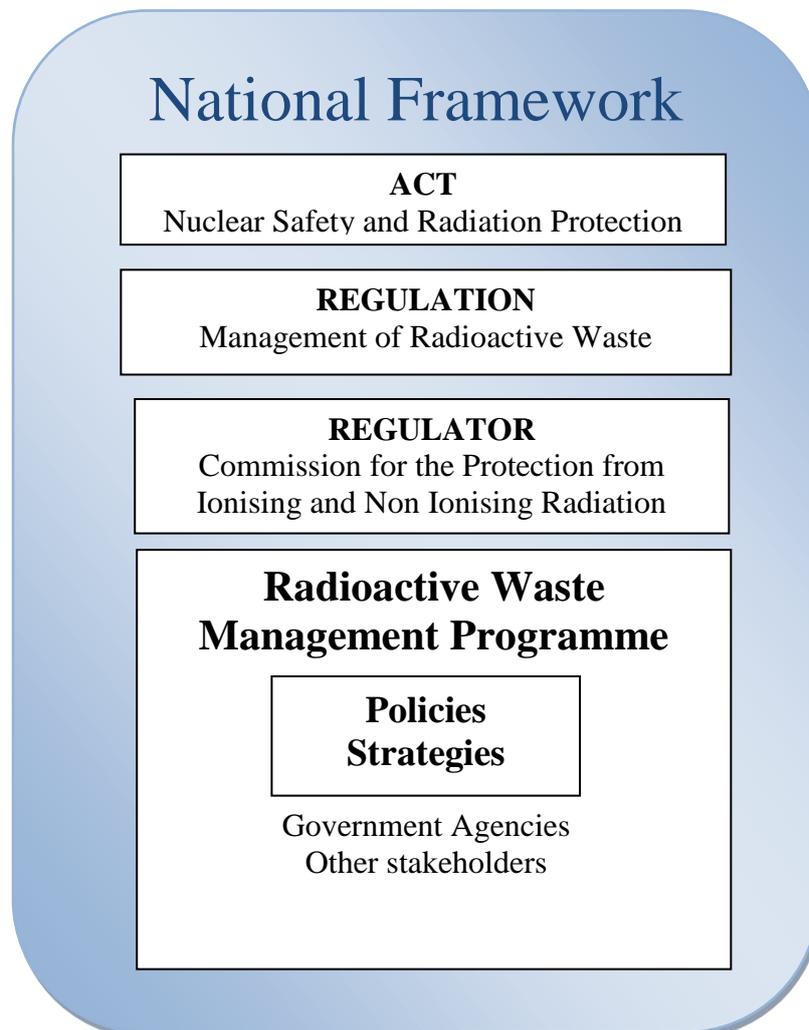
The National Framework consists of

Act :- Nuclear Safety and Radiation Protection Act (CAP 585)

Regulation:- Management of Radioactive Waste Regulations (referred to in this document as the regulations)

Regulator:- Commission for the Protection from Ionising and Non Ionising Radiation

Radioactive Waste Management Programme:- This is required by Regulation 6 of the Regulations and contains policies and strategies and elaborates on the responsibilities of the various stakeholders



2.1 Nuclear Safety and Radiation Protection Act

The purpose of the Act is to include provisions for the adequate protection of people in current and future generations against the harmful effects of ionising radiation. The regulatory control of radioactive waste falls within this scope. Part XI of the Act deals specifically with the regulatory control of radioactive waste.

2.2 Management of Radioactive Waste Regulations

The Regulations, made under the Act, enabled Malta to transpose those aspects of Council Directive 2011/70/Euratom on the establishment of Community Framework for the responsible and safe management of spent fuel and radioactive waste as well as the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management that had not been transposed directly by the Act.

The Regulations require that Malta has an appropriate Radioactive Waste Management Programme (RWMP) in place for the management of radioactive waste.

The RWMP (as required by regulation 6) is based on the principles given in section 3 and is set out in sections 4 and 5 of this document

2.3 Radioactive Waste Regulator

Article 36 of the Act and regulation 12 of the Regulations gives the RPC the responsibility for acting as the regulator for the management of radioactive waste.

2.4 Radioactive Waste Management Programme

This RWMP has been created following consultation with the relevant stakeholders and sets out the Government's position with regard to the management of radioactive waste.

The radioactive waste management programme aims to provide for the safety and sustainability of radioactive waste management over generations.

The radioactive waste management programme contains policies and strategies

Policies

Policies define goals for the management of radioactive waste.

The policy aspects have been designed to be valid in the long term and should only need revision in the event of new international obligations or if there is a significant change in the radioactive waste characteristics of Malta. The Policies form a starting point for the development of radioactive waste management strategies

Strategies

Strategies are the means for achieving the goals and requirements set out in the policy. Strategies are the ways and methods to implement the policies.

3 Guiding principles

The management of radioactive waste in Malta will be based upon the following general principles. Section 5 applies these principles in the different aspects of radioactive waste management.

1. The prime responsibility for radioactive waste resides with the waste producer.
2. Minimisation of the generation of radioactive waste.
3. Ensuring adequate and suitable conditioning of waste.
4. Development of adequate financing schemes to allow for management of radioactive waste.
5. Setting up of a centralised storage facility.
6. Prohibition of the importation of radioactive waste into Malta.
7. Take-back arrangements shall be in place with the original suppliers for sealed sources.
8. Malta will manage any radioactive waste that cannot be sent overseas (in line with Supervision and Control of Shipments of Radioactive Waste and Spent Fuel) Regulations, SL 549.51 and will seek disposal options for such waste in Malta.
9. Gain control over sources that are out of regulatory control.
10. Safe recovery of orphan sources.
11. Export of sources for reuse/recycling.
12. All stakeholders shall be adequately trained.
13. Participatation in international research activites.
14. To reduce the likelihood of accidents due to, or loss of radioactive wastes.
15. Storage of short lived medical unsealed radioactive sources by waste producer.
16. To have an appropriate emergency response systems in place.
17. That radioactive waste shall be centrally managed in the long term.
18. To enhance public confidence in relation to the radioactive waste management through public consultation.
19. Shall define how and when the identified goals and requirements will be achieved for the management of radioactive waste
20. Shall identify the competencies needed for achieving the goals and how they will be provided
21. Shall elaborate on the ways in which the various types of radioactive waste in the country, including, where appropriate, spent fuel, will be managed during all phases of the radioactive waste life cycle (from cradle to grave);
22. The implementation of waste management options to be proportionate to the waste using a graded approach.
23. Evidence-based and documented decision-making process shall be applied with regard to all stages of the management of radioactive waste
24. The interdependencies between all steps in radioactive waste generation and management shall be taken into account
25. The use of passive safety features for the long term management of radioactive waste.

4 Stakeholder Responsibilities

To have an effective radioactive waste programme there needs to be allocation of responsibility and accountability.

Whereas the government has the responsibility for the long term central management of waste at a national level including final disposal. Primary responsibility for the management of radioactive waste rests with the waste generator.

The allocation of the responsibilities will be:

4.1 Employers

Employers obligations:-

- Comply with all current and future Maltese legislation including Basic Safety Standards for Ionising Radiation Regulations (SL 585.01)
- Establish a safe and secure on-site storage
- Notify the RPC when a source reaches the end of its useful working life
- Keeps records of all sources at the site including disused sources
- Provide sufficient funds for the management of waste

4.2 Commission for the Protection from Ionising and Non Ionising Radiation

Regulation 12 of the regulations gives the responsibility to the RPC for the implementation of the regulations and Regulation 12(3) states elaborates on the RPC's role and states:

- a. Advise the Minister on financial issues relating to the radioactive waste management programme.
- b. Advise the Minister on assignment of responsibilities to various stakeholders
- c. Monitor the radioactive waste management programme key performance indicators The key performance indicators shall include the significant milestones to achieve the permanent solution (including central storage and disposal) and timeframes for the achievement of those milestones.
- d. Maintain an inventory of all radioactive waste and estimates for future quantities, indicating the location and amount of the radioactive waste in accordance with appropriate classification of the radioactive waste as required.
- e. Provide a system of appropriate licencing of radioactive waste management activities, including appropriate measures for the post-closure periods of disposal facilities;

- f. Perform enforcement actions, including the suspension of activities and the modification, expiration or revocation of a licence together with requirements, if appropriate, for alternative solutions that lead to improved safety;
- g. Seek to improve the national framework, taking into account operating experience, insights gained from the decision-making process referred to in Regulation 6(6) of these Regulations, and the development of relevant technology and research.
- h. Perform reviews and update, as required, the national programme, taking into account technical and scientific progress as appropriate as well as recommendations, lessons learned and good practices from peer reviews
- i. Notify to the European Commission of the national programmes and any subsequent significant changes.
- j. Report to the European Commission on the implementation of this Directive for the first time by 23 August 2015, and every 3 years thereafter, taking advantage of the review and reporting under the Joint Convention.
- k. Respond to any request from the European Commission for any clarification made in connection with the national programme.
- l. At least every 10 years, arrange for self-assessments of the national framework, competent regulatory authority, national programme and its implementation, and invite international peer review of the national framework, competent regulatory authority and/or national programme with the aim of ensuring that high safety standards are achieved in the safe management of radioactive waste. The outcomes of any peer review shall be reported to the European Commission and the other Member States, and may be made available to the public where there is no conflict with security and proprietary information.
- m. Comply with the Maltese reporting requirements and full attendance of meetings under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

4.3 Operator of future centralised storage facility.

The operator of storage facility shall:

- Set up and manage the centralised storage facility,
- Obtain a licence from the RPC and comply with all conditions specified in the licence for operation of the facility
- Take over legal ownership for all disused/spent sources within its facilities
- Ensure safety and security of disused/spent sources during the long term storage at its facilities
- Keep records of all radioactive sources within its facilities
- Keep RPC informed about the inventory of disused/spent radioactive sources

4.4 Technical service providers.

- Be authorised by RPC,
- Give any required technical support for the RWMP

5 Policies and Strategies for the Management of Radioactive Waste

5.1 Financing of radioactive waste management

Policy	<ol style="list-style-type: none"> 1. To ensure that sufficient funds are available for the management of radioactive waste. 2. The owner of the waste will be responsible for the financing its management. 3. An assessment of the national programme costs and the underlying basis and hypotheses for that assessment, which must include a profile over time.
Strategy	<ol style="list-style-type: none"> 1. RPC to produce various budget estimates for different storage, disposal scenarios . The budget estimates to include the costs for the whole programme over time 2. The government shall decide on how the programme shall be financed over time. 3. No funding for radioactive waste management is to come from budget allocated to the RPC

5.2 Waste minimisation

Policy	<ol style="list-style-type: none"> 1. To have the minimum number of sources that need to be treated as radioactive waste 2. To ensure that the physical volume of waste is minimized as is safely achievable
Strategy	<ol style="list-style-type: none"> 1. RPC only to give clearance for import of radioactive material for justified uses. 2. The replacement of radioactive sources by non-radioactive alternatives if available. 3. Return of disused sealed sources to the overseas supplier.

5.3 Waste Conditioning

Policy	<ol style="list-style-type: none"> 1. Any Conditioning is to allow for future disposal options produce a waste package acceptable for handling, storage, transport, disposal
Strategy	<ol style="list-style-type: none"> 1. Conditioning to be done in accordance with waste acceptance criteria of future storage or waste facility. 2. Until such time as storage/disposal facilities are available the RPC to ensure that users who currently hold sources make sure that: <ul style="list-style-type: none"> • Waste is not to embedded in any permanent matrix such as lead or concrete.

	<ul style="list-style-type: none"> • Waste to be shielded using the ALARA principle. • Full documentation to be created for each waste package <p>3. Any organisation running a central storage facility is to get RPC approval before performing any conditioning.</p>
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5.4 Central Storage Facility

Policy	<ol style="list-style-type: none"> 1. Until such time a disposal option is available, a central storage facility is to be set up. 2. Long-lived Sources will be stored in one central storage facility 3. Central store will have a planned operating life of at least fifty years.
Strategy	<ol style="list-style-type: none"> 1. RPC To obtain equipment for storage facility to include: <ol style="list-style-type: none"> a) 20 foot ISO storage container b) Type A storage container and capsules designed for transport and storage c) Lead shielding bricks 2. RPC to present to the Government options for the setting up of storage room with costings, options to include: <ol style="list-style-type: none"> a) General governmental waste agency to take responsibility for the management of the store. b) Private organisation takes on the responsibility for the management of the store at his own facility c) Private organisation takes on the responsibility for the management of the store at government site 3. Government identifies entity to to set up and run storage facility. 4. Government to set any fees to be charged for the use of the store. 5. Facility and any TSOs to be licenced by RPC and will fall under all appropriate Maltese regulations including, but not limited to Management of Radioactive Waste Regulations and Basic Safety Standards for Ionising Radiation Regulations (SL585.01) 6. Once central facility is operational users are to transfer disused sources to it. 7. RPC will not authorise the storage of disused sources on site once central facility is operational. 8. Organisation running the central storage facility is to take ownership for all disused/spent radioactive sources within its facilities

5.5 Future Disposal

Policy	<ol style="list-style-type: none"> 1. Indefinite storage is not an option, the goal is to seek a viable disposal option for radioactive waste. 2. Disposal is seen as the final solution for the management of long lived (ie half-lives > 30 years) radioactive waste. 3. Prior to a viable disposal option being found, long lived waste to be stored in central location.
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	<ol style="list-style-type: none"> 4. Any Maltese disposal option must consider the environmental aspects. Complete environmental risk assessment must be performed 5. In view of the fact that no disposal option has been identified at the moment a disposal option will be sought before thirty years have elapsed. 6. In the event that a disposal facility is set up in Malta, the concepts or plans for the post-closure period of a disposal facility's lifetime, including the period during which appropriate controls are retained, and the means to be employed to preserve knowledge of that facility in the longer term to be considered.
Strategy	<ol style="list-style-type: none"> 1. A viable disposable option will be sought before thirty years have elapsed. The permanent solution (i.e. disposal) will take into account the current inventory and sources recovered due to detection at the ports and sources recovered due to the campaigns. 2. It is likely that the following options could be considered: <ul style="list-style-type: none"> • Export of material • Bore Hole Disposal option; • Any other multi-lateral solution as may become available 3. The disposal option will need to take into account the nature of the waste, namely: <ul style="list-style-type: none"> • Total number of existing sources and possible future acquisitions to waste inventory. • Radionuclides, • Activities • Physical state of the source, including any possible degradation in the sources. • Site characterisation

5.6 Gaining control over sources that are out of regulatory control

Policy	<ol style="list-style-type: none"> 1. To bring into regulatory control any sources that are discovered. 2. To develop a source recovery plan 3. To aim to detect radioactive material in trans-shipment through Malta 4. Any material discovered in trans-shipment to be returned to country of origin
Strategy	<ol style="list-style-type: none"> 1. On discovery of source within Malta, RPC or CPD to be informed. If required radiological emergency plan to be initiated. 2. Customs to monitor imports at major ports of entry, including all goods entering Malta through the Malta Freeport. 3. Customs to monitor a proportion of goods in trans-shipment through Malta Freeport 4. Radioactive material discovered in trans-shipment to be returned to country of origin 5. RPC to to decide on targeted areas which may be subject to search within Malta. 6. Once central storage facility is available run campaigns for collection of sources, including schools and lightning rods. 7. Initiatives targetted at metal recycling facilities in Malta

	8. Initiatives for the removal of radioactive lightning rods from use.
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5.7 Emergency Plans

Policy	<ol style="list-style-type: none"> Employers shall have their own appropriate plans to deal with safety and security of any material in use or in storage RPC/CPD to have ability to respond as required
Strategy	<ol style="list-style-type: none"> RPC to ensure that employers have emergency plans in place through the authorisation and inspection process. RPC/CPD to initiate the National Radiological Emergency Plan when required RPC to keep the radiological emergency plan and the threat assessment updated

5.8 Orphan Source Recovery

Policy	1. Recovery performed by trained personnel in a controlled manner paying due consideration to radiation safety issues of workers and the public.
Strategy	<ol style="list-style-type: none"> Recovery to be performed in line with the National Radiological Emergency Plan which assigns CPD as the lead technical agency On discovery of source the recovery is to be co-ordinated by CPD as the lead technical agency. Office of Secretariat of the RPC to give CPD advice on recovery operations. Immediate action for Category 1, 2 and 3 sources. National radiological emergency to be initiated by either RPC or CPD

5.9 Return of radioactive sealed sources

Policy	<ol style="list-style-type: none"> Attempts to be made to send any existing disused sources to storage /disposal facilities in other countries New sealed sources to be returned to supplier once these become disused . Any transport operation do be fully compliant with applicable transport regulations
Strategy	1. RPC will not authorise the import of new sources unless a declaration is provided by the user for the export of the source.

5.10 Shipment of Radioactive waste out of Malta

Policy	<ol style="list-style-type: none"> Export of radioactive waste will be encouraged Any export of radioactive waste to be done in conformity with (Supervision and Control of Shipments of Radioactive Waste and Spent Fuel) Regulations, SL 549.51
Strategy	1. Until such time as a disposal option becomes available in Malta, RPC will encourage Radiation Employers to explore the possibility of exporting radioactive waste

	<ol style="list-style-type: none"> 2. RPC to ensure radiation employers aware of SL 549.51 3. EPA to Process any applications made in connection with SL 549.51
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5.11 Imports of Waste

Policy	1. Malta will not accept radioactive waste to be imported into Malta for any purpose.
Strategy	1. RPC will not give clearance for import.

5.12 Discharges from nuclear medicine departments

Policy	1. Unsealed nuclear medicine emissions to the environment will be kept as low as reasonably achievable taking into account economic and social factors.
Strategy	<ol style="list-style-type: none"> 1. Unsealed nuclear medicine sources to be stored for as long as reasonably achievable and emissions to the environment must be under a discharge authorisation issued by the RPC pursuant to Basic Safety Standards for Ionising Radiation Regulations (SL585.01) 2. Emissions to be subject to radiological assessment following RPC operating procedure.

5.13 Education and Training

Policy	1. Persons involved in the handling, transport, storage and possible future disposal shall be sufficiently trained.
Strategy	<ol style="list-style-type: none"> 1. RPC to enforce the requirements stipulated in regulation 13 of Management of Radioactive Waste Regulations that their staff have adequately trained. 2. RPC to facilitate participation in any IAEA training activities in the field of radioactive waste management.

5.14 Research

Policy	1. Malta will support and participate if possible in any international research initiatives in the management of radioactive waste.
Strategy	<ol style="list-style-type: none"> 1. RPC to keep abreast of any EU/IAEA activities in this area and to get support for such activities. 2. RPC to seek to get any relevant stakeholders involved in any EU/IAEA training activities.

5.15 Public Participation

Policy	<ol style="list-style-type: none"> 1. Seek to keep public fully informed and involved in the long term management of radioactive waste. 2. Public be given the necessary opportunities to participate effectively in the decision- making process regarding radioactive waste management
Strategy	<ol style="list-style-type: none"> 1. This programme and any revisions to go out for public consultation. 2. RPC to make available to public National Report for the Joint Convention and any other reports made in connection with key performance indicators

6 Key Performance Indicators

Key performance indicators (KPI) are discernible events that can be used to determine if Malta is meeting its policy targets

The RPC shall be responsible for monitoring KPIs and shall produce reports at least every three years to coincide with reporting obligations under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Policy	KPI
Financing of radioactive waste management	<ul style="list-style-type: none"> • RPC to present to Government indicative cost options by January 2019 • Governmental decision
Waste minimisation	<ul style="list-style-type: none"> • RPC to maintain an up to date inventory of radioactive waste • RPC to analyse the annual temporal distribution of number and activity of radioactive waste
Waste Conditioning	<ul style="list-style-type: none"> • RPC to issue licence conditions in connection with the conditioning
Central Storage Facility	<ul style="list-style-type: none"> • Site for storage facility to be identified by mid 2019 • Acquisition of specialist equipment for waste management along with 20 foot ISO container by January 2019 • Specialist advice on setting up storage facility end 2019 • Central store to be licenced by end 2019 • Transfer sources to centralised store by end 2020
Future Disposal	<ul style="list-style-type: none"> • Governmental decision on disposal method prior to 2023
Gaining control over sources that are out of regulatory control	<ul style="list-style-type: none"> • Emergency plan and Customs SOP to be reviewed • Targeted campaign to be performed
Emergency Plans	<ul style="list-style-type: none"> • All sites holding waste to have had their on-site emergency plans reviewed by RPC • Emergency plan reviewed

	<ul style="list-style-type: none"> • Emergency plan exercise
Orphan Source Recovery	<ul style="list-style-type: none"> • Emergency plan reviewed • Emergency plan exercise
Return of radioactive sealed sources	<ul style="list-style-type: none"> • All new sealed sources have agreement for their export at the end of their use in Malta. • Export Repatriation/recycling of sources currently in store by end 2021
Shipment of Radioactive waste out of Malta	<ul style="list-style-type: none"> • Export possibilities for radioactive waste sources have been explored.
Imports of Waste	<ul style="list-style-type: none"> • Confirmation that no radioactive waste has been imported
Discharges from nuclear medicine departments	<ul style="list-style-type: none"> • Each nuclear medicine department to have produced annual discharge figures • RPC to produce annual discharge values for Malta
Education and Training	<ul style="list-style-type: none"> • Educating staff involved in handling, storage and disposal and to maintain on-going training • RPC to have reviewed training for organisations holding waste
Research	<ul style="list-style-type: none"> • RPC to keep abreast of any EU/IAEA activities in this area and to get support for such activities
Public Participation	<ul style="list-style-type: none"> • Any new regulations and RWMP to go out for public consultations • Joint Convention reports to be published

7 Funding of Radioactive waste management

7.1 Assessment of programme costs.

Programme costs to be updated and reviewed by RPC.

The largest component of the RWMP will be the setting up of the storage facility and possible export of waste

	Option	Cost breakdown	Total 10 year cost
1	Export of waste. *	<u>Waste preparation by TSO @ €80/hour</u> Total hours estimate 2 weeks =80 hours Cost = 80 x <u>€80</u> = €6,400 <u>Export Estimate for Am-241*</u> €69,000	

		(£61,000 indicative quote from overseas company)	One time cost €75,400
2	Governmental Waste Management company to manage facility and contract work out to TSO.	<p><u>Waste preparation by TSO contracted out by Waste management organisation @ €80/hour</u></p> <p>1st year: Initial two weeks plus 4 hours /per month</p> <p>80+(11x4) hrs= 124hrs Cost= €9,920</p> <p>Subsequent years 12x4hrs=48hrs Cost = €3840</p> <p><u>Export Estimate for Am-241*</u> €69,000 (£61,000 indicative quote from overseas company)</p> <p>If not all waste is exportable, then the annual cost keeps recurring.</p>	<p>First year €9,920</p> <p>Subsequent years until export €3,840</p> <p>Export €69,000</p> <p>Total 10 year Cost include export @ 10 year €113,480</p>
3	Storage and waste preparation by private entity	<p><u>It is assumed that this will be around €35,000 annually. (This will include waste preparation and site rent)</u></p> <p><u>Export Estimate for Am-241*</u> €82800 (€69,000 +20%) additional 20% is an assumed margin private operator would take)</p> <p>If not all waste is exportable, then the annual cost keeps recurring.</p>	<p>First year €35,000</p> <p>Subsequent years until export €35,000</p> <p>Export €82,800</p> <p>Total 10 year Cost include export in 10 year €432,800</p>
4	Storage of waste at government site waste prepared by private contractor who manages site	<p><u>Refurbish room</u> €9000 (from outline bill of quantities prepared)</p> <p><u>Waste preparation by contractor @ €80/hour</u></p> <p>1st year: Initial two weeks plus 4hours /per month 80+(11x4) hrs= 124hrs Cost= €10240</p> <p>Subsequent years 12x4hrs=48hrs Cost= €3840</p>	<p>First year €19,240</p> <p>Subsequent years until export €3,840</p>

		<u>Export Estimate for Am-241*</u> €69,000 (£61,000 indicative quote from overseas company)	Export €69,000 Total 10 year Cost include export @ 10 year €122,800
5	Bore Hole disposal (IAEA methodology)	<u>Waste preparation by contractor @ €80/hour</u> 4 wks = 160hrs €12,800 10 Subsequent years 12x4hrs=48hrs Cost= €3840/year 10 year cost €38,400 Bore hole disposal estimate 1 million dollars (€850,000) https://www.iaea.org/OurWork/ST/NE/NEFW/Technical-Areas/WTS/BOSS-main.html	Waste deposited in bore hole after 10 years €901,200
6	Deep Geological (Using existing old oil well holes)	Cannot be estimated, however expert advice from the IAEA will be asked for. The use of already drilled holes may lower the costing drastically.	Unknown

*Currently there is no known overseas entity which will be willing to accept all radioactive material. Export options may be available for Am-241 lightning rod sources and other Am-241 sources

7.2 Source of funding programme

Each owner of a source will need to pay a fee for disposal to the Government
 The Government will meet any short-fall between the expenses and the income