Monitoring Factsheet: Contaminants

October 2015

1. Subject: Contaminants

Contaminants or hazardous substances are defined as chemical elements and compounds or groups of substances that are toxic, persistent and liable to bio-accumulate[1], and other substances or groups of substances which give rise to an equivalent level of concern[2].

Hazardous substances can be broadly classified into two principal groups: synthetic substances and non-synthetic substances. Synthetic substances refer to man-made compounds such as pesticides, pharmaceuticals and anti-fouling agents, whereas non-synthetic substances include naturally occurring substances such as trace metals, aliphatic and aromatic hydrocarbons, as well as by-products of combustion activities.

2. Monitoring Requirements

2.1. Water Framework Directive – WFD (2000/60/EC) & Priority Substances Directive (2008/105/EC as amended by 2013/39/EC)

The WFD and its daughter directive, the Priority Substances Directive, establish requirements for good surface water chemical status in terms of levels of chemical pollution. Directive 2009/90/EC lays down technical specifications for chemical analysis and monitoring of water.

There are three types of monitoring for surface waters described in Annex V of the WFD:

- surveillance monitoring: parameters indicative of all the biological, hydromorphological, general and specific physico-chemical quality elements and the priority list of pollutants which are discharged in significant quantities into the water body;
- operational monitoring: parameters indicative of the biological, physico chemical and hydromorphological quality elements most sensitive to the pressures to which the water body is subject and all priority substances discharged and other substances discharged in significant quantities; and

[1] Bioaccumulation refers to the accumulation of substances in an organism

[2] Piha H. 2010. Marine Strategy Framework Directive Task Group 8 Report Contaminants and Pollution effects; 171pp.

- investigative monitoring: targeted at identification of causes of degradation of state and in cases of accidental pollution incidents.

The new Priority Substances Directive (2013/39/EU) also identifies the need for a mechanism to provide the Commission with targeted high quality monitoring information on the concentration of substances in the aquatic environment, with a focus on emerging pollutants and substances for which available monitoring data are of insufficient quality for the purpose of risk assessment. In order to maintain monitoring costs at reasonable levels, this mechanism should focus on a limited number of substances that are constantly revised by means of a temporary watch list of emerging pollutants. Therefore this new mechanism is also known as the Watch List Mechanism and shall be used to complement monitoring data gathered from the normal WFD monitoring programme mentioned above.

2.2. Marine Strategy Framework Directive – MSFD (2008/56/EC)

2.2.1. Annex III characteristics/pressures/impacts

The MSFD calls for an assessment of the environmental status based on a list of characteristics listed in Table 1 of Annex III to the Directive, and pressures and impacts listed in Table 2 of the same Annex.

Implementation of this monitoring factsheet will enable a description of the situation with regard to chemicals, including chemicals giving rise to concern, sediment contamination, hotspots, health issues and contamination of biota (especially biota meant for human consumption), in accordance with this Table 1 of Annex III and assessment of the following pressures listed in Table 2:

'Contamination by hazardous substances' including:

- Introduction of synthetic compounds (e.g. priority substances under Directive 2000/60/EC which are relevant for the marine environment such as pesticides, antifoulants, pharmaceuticals, resulting, for example, from losses from diffuse sources, pollution by ships, atmospheric deposition and biologically active substances),
- introduction of non-synthetic substances and compounds (e.g. heavy metals, hydrocarbons, resulting, for example, from pollution by ships and oil, gas and mineral exploration and exploitation, atmospheric deposition, riverine inputs),
- introduction of radio-nuclides.

2.2.2. Annex I Good Environmental Status Descriptors

MSFD Annex I descriptors of Good Environmental Status and the associated criteria and indicators established by MSFD Commission Decision 2010/477/EU for assessment of progress towards the achievement of GES in terms of these descriptors, and which will be addressed by this monitoring factsheet are listed hereunder:

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects.

- Criterion 8.1: Concentration of contaminants
  - Concentration of the contaminants which:
    - (i) exceed the relevant Environmental Quality Standards set out pursuant to Article 2(35) and Annex V to Directive 2000/60/EC in coastal or territorial waters adjacent to the marine region or sub-region, be it in water, sediment and biota; and/or
    - (ii) are listed as priority substances in Annex X to Directive 2000/60/EC and further regulated in Directive 2008/105/EC, which are discharged into the concerned marine region, sub-region or subdivision; and/or
    - (iii) are contaminants and their total releases (including losses, discharges or emissions) may entail significant risks to the marine environment form past and present pollution in the marine region, sub-region or subdivision concerned, including as a consequence of acute pollution events following incidents involving for instance hazardous and noxious substances;

    measured in the relevant matrix (such as biota, sediment and water) in a way that ensures comparability with the assessment under Directive 2000/60/EC (8.1.1).

- Criterion 8.2: Effects of contaminants.
  - Occurrence, origin (where possible), extent of significant acute pollution evens (e.g. slicks from oil and oil products) and their impact on biota physically affected by this pollution (8.2.2)

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

- Criterion 9.1: Levels, number and frequency of contaminants
  - Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels (9.1.1);
  - Frequency of regulatory levels being exceeded (9.2.2)

2.3. Euratom Treaty

The Euratom Treaty requires Member States to establish the facilities necessary to carry out continuous monitoring of the level of radioactivity in the air, water and soil and to ensure compliance with basic standards.

Malta has established the 'National Environment Radioactivity Surveillance Plan for Malta' to ensure that environment radiological surveillance is in compliance with Article 35 and 36 of the Euratom Treaty and with the IAEA Basic Safety Standards for the radiation protection of the public. For the purposes of this plan, Malta is defined as one region as required by Commission Recommendation 2000/473/Euratom. This monitoring programme includes monitoring of coastal waters in three stations (North, Centre and South) for detection of gamma emitting radionuclides.

2.4. Barcelona Convention

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its protocols aim at reducing pollution in the Mediterranean Sea and protecting and improving the marine environment in the area, thereby contributing to its sustainable development.

2.4.1. LBS Protocol and MEDPOL

The Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (LBS Protocol) identifies a list of substances of which control should be sought through action plans, programmes and measures.

The Programme for the Assessment and Control of Marine Pollution in the Mediterranean region (MEDPOL) is the environmental assessment component of the Mediterranean Action Plan (MAP) of the Barcelona Convention. As part of its objectives MEDPOL includes the monitoring and periodic assessment of the state of the environment in relation to selected contaminants with a view to establish temporal trends of such contaminants, assess effectiveness of policy measures and aid in the control of pollution through compliance with regulatory limits. MEDPOL Phase III identifies mandatory and recommended parameters for monitoring in effluents (input loads), water, sediment and biota.

The Barcelona Convention/MAP are working towards an Integrated Monitoring Programme and an Integrated Policy of Assessments to be established by 2015. The Integrated Monitoring Programme should be able to provide all the data needed to assess whether Good Environmental Status defined through the ECAP process[3] has been achieved or maintained. The essential technical groundwork to develop the

[3] Ecosystem-based approach undertaken as part of the Barcelona Convention.

integrated monitoring programme (such as the development of methodological, technical issues, scope, feasibility, quality control, cost-effectiveness, common indicators) will be undertaken in 2014-2015. The integrated monitoring and assessment programme is to run on a 2 year initial basis in order to assess the effectiveness of the programmes, perform further gap analysis and establish needs for adaptation.

2.4.2. Prevention and Emergency Protocol

The Protocol Concerning Cooperation in Preventing Pollution from Ships and, in cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol) covers prevention of, preparedness for and response to marine pollution from sea-based sources. According to this protocol, Contracting Parties shall issue instructions to masters or other persons having charge of ships flying its flag and to the pilots of aircraft registered in its territory to report:

- all incidents which result or may result in a discharge of oil or hazardous and noxious substances and
- the presence, characteristics and extent of spillages of oil or hazardous and noxious substances, including hazardous and noxious substances in packaged form, observed at sea which pose or are likely to pose a threat to the marine environment or to the coast or related interests of one or more of the Parties.

This information should be reported to Parties which may be affected, preferably through the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC).

2.4.3. Offshore Protocol

The Offshore Protocol deals with the protection of the Mediterranean Sea against pollution from exploration and exploitation of the continental shelf. The use and storage of chemicals for these activities is regulated, with the disposal of harmful or noxious substances listed in Annex 1 to the Protocol being prohibited, and those listed in Annex 2 requiring a special permit prior to their disposal at sea. Oil companies licensed by Government to drill an exploration well are contractually liable for any loss or damage done to the environment. They are also obliged to (i) notify Government immediately in case of an accident and (ii) to take the necessary action to prevent and remedy such accidents.

With regards to monitoring requirements the Protocol states the following:

- *the operator is required to measure or to have measured by a qualified entity the effects of the activities on the environment, in the light of the nature, scope, duration and technical methods employed in the activities and of the characteristics of the area and to report on them periodically or upon request by the competent authority according to a procedure established by the competent authority in its authorisation system.*
- *The competent authority shall establish where appropriate a national monitoring system in order to be in a position to monitor regularly the*

installations and the impact of the activity on the environment so as to ensure that the conditions attached to the grant of the grant of the authorisation are being fulfilled.

2.5. Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

The main aim of REACH is to ensure a high level of protection of human health and the environment from the risks that can be posed by chemicals. REACH stipulates a procedure for the authorization of the use or placing on the market of substances listed in Annex XIV of the regulation. These substances include:

- substances meeting the criteria for classification as carcinogenic, mutagenic or toxic for reproduction category 1 or 2 in accordance with Directive 67/548/EEC;
- substances which are persistent, bioaccumulative and toxic in accordance with the criteria set out in Annex XIII of the REACH Regulation;
- substances having endocrine disrupting properties or those having persistent, bioaccumulative and toxic properties or very persistent and very bioaccumulative properties, which do not fall within the categories listed above — for which there is scientific evidence of probable serious effects to human health or the environment and which give rise to an equivalent level of concern.

Candidate list of substances of very high concern for authorization are published in accordance with Article 59(10) of the REACH regulation.

2.6. Directive on ship-source pollution and on the introduction of penalties, including criminal penalties, for polluting offences (2005/35/EC as amended by Directive 2009/123/EC)

Directive 2005/35/EC, which relates to ship-source pollution and the introduction of penalties for infringements, is the legal basis for CleanSeaNet, a satellite-based monitoring system for detection and surveillance of illegal discharges in European marine waters, maintained by the European Maritime Safety Agency (EMSA). This service provides a range of detailed information including oil spill alerts to Member States, rapid delivery of available satellite images and oil slick position.

This Directive is implemented through the Ship-Source Pollution Regulations (Subsidiary legislation 226.01).

2.7. Commission Regulations 1881/2006 & 1259/2011; Council Regulation (EURATOM)3954/87 on Contaminants in Foodstuff

These regulations set maximum regulatory levels for certain contaminants in foodstuff in order to ensure protection of public health. Monitoring of the levels of contaminants in retail samples of foodstuff, including fish and seafood is a requirement of these regulations.

2.8. E-PRTR Regulation (Regulation 166/2006)

The regulation concerning the establishment of a European Pollutant Release and Transfer Register calls for reporting by the operators of the facilities listed in Annex I to the regulation, of releases of pollutants. Such reporting should include:

- the annual amount of releases to air, water and land of any pollutant specified in Annex II for which the applicable threshold value specified in this Annex is exceeded; and
- the annual amount of off-site transfers of the same pollutants in waste water destined for waste-water treatment for which the threshold value specified in Annex II is exceeded.

2.9. Industrial Emissions Directive (2010/75/EU)

This Directive applies to industrial activities and lays down the rules on integrated prevention and control of pollution arising from such activities. Member States shall take the necessary measures to provide that industrial installations listed in Annex I to the Directive are operated in a manner that includes all the appropriate preventive measures against pollution. Permits to operate the installations shall include emission limit values for the polluting substances listed in Annex II to the Directive, which are likely to be emitted from the installation concerned in significant quantities. Application for permits should also include measures planned to monitor emissions into the environment. The frequency of the periodic monitoring shall be determined by the competent authority in a permit for each individual installation or in general binding rules.

The competent authority shall ensure that, under normal operating procedures, emissions do not exceed the emission levels associated with the best available technologies.

3. Targets

This section includes targets set by policies in relation to contaminants.

Implementation of this monitoring factsheet will enable assessment of progress towards the achievement of targets adopted by Malta as part of the EU Marine Strategy Framework Directive and the Water Framework Directive targets. Such monitoring may also apply in assessing progress towards targets articulated through other processes.

Policy	Status to be achieved	Targets
Water Framework Directive	'Good water chemical status' in coastal waters defined in terms of levels of chemical pollution in the aquatic environment which do not present any hazards or risks to human health, aquatic biota and ecosystem functioning	Environmental Quality Standard (hereinafter referred to as 'EQS') stipulated by the Priority Substances Directive for specific chemicals in water, sediment or biota should not be exceeded in order to achieve 'good water chemical status'. Member States can either adopt these EQS or else set national EQS that offer the same level of protection as those defined in the Directive. In addition to contaminants identified in the Priority Substances Directive, additional contaminants known as River Basin Specific Pollutants identified by the Member State also require EQS to be defined by the individual Member State and met. Meeting the national EQS for these additional substances contributes to achieving good chemical status.
Marine Strategy Framework Directive	Good Environmental Status: Concentration of selected contaminants in relevant matrices is in line with set environmental quality standards, or otherwise in line with undisturbed conditions	Long-term monitoring of selected contaminants is indicative of acceptable levels of contaminants, with no deterioration trends for non-synthetic and synthetic contaminants in relevant matrices.
		Achieve better understanding of sea-based sources of pollution, through a risk assessment of potential contributions of maritime sectors to contamination in the marine environment, also taking into consideration current measures pursuant to international maritime policies and agreements.
	Good Environmental Status: Significant	Setting up a system for collecting,

	acute pollution events resulting from shipping and related operations, and land-based activities, are, in so far as possible, prevented, with any pollution incidents effectively controlled and assessed with a view to avoid significant pollution effects (to be applied at the level of territorial waters)	recording and reporting information on significant pollution incidents in line with the requirements of the MSFD, with a view to better understand significance and trends, and to inform any necessary response (strategic as well as incident-related)
	Good Environmental Status: Significant acute pollution events resulting from hydrocarbon exploration and exploitation are, in so far as possible, prevented, with any pollution incidents effectively controlled and assessed with a view to avoid significant pollution effects (to be applied at the level of the area designated for hydrocarbon exploration and exploitation).	
MSFD & EC Regulations 1881/2006, 1259/2011 and 3954/87	Good Environmental Status: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.	Thresholds for heavy metals lead, cadmium and mercury, polycyclic aromatic hydrocarbons, dioxins (and polychlorinated biphenyls) and radionuclides stipulated in EC Regulations 1881/2006, 1259/2011 & Council Regulation (EURATOM)3954/87. Any exceedances to these permissible levels should be reported.
Barcelona Convention: ECAP Process	Operational Objective: Concentration of priority contaminants (as listed under the Barcelona Convention and LBS Protocol) is kept within acceptable limits and does not increase. *Common Indicator 11*[4]*:* ▪ *Concentration of key harmful contaminants measured in the relevant matrix (biota, sediment, seawater)* Good Environmental Status defined as 'Level of pollution is below a determined threshold defined for the area and species'	Concentrations of specific contaminants below EACs or below reference concentrations
		No deterioration trend in contaminants concentrations in sediment and biota from human impacted areas, statistically defined.
		Reduction of contaminants emissions.

[4] UNEP/MAP 2014.Working document on Common Indicators for the Mediterranean. Integrated Correspondence Groups of GES and Targets Meeting, Athens (Greece), 17-19 February 2014 , UNEP(DEPI)/MED WG.390/3

	Effects of released contaminants are minimized. *Common Indicator 12*[5]*:* ▪ *Level of pollution effects of key contaminants where a cause and effect relationship has been established.* Good Environmental Status defined as 'Concentrations of contaminants are not giving rise to acute pollution events	Contaminants effects below threshold Decreasing trend in the operational releases of oil and other contaminants from coastal, maritime and offshore activities
	Acute pollution events are prevented and their impacts are minimized. *Common Indicator 13*[6]*:* ▪ *Occurrence, origin (where possible) extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances) and their impact on biota affected by this pollution)* Good Environmental Status defined as 'Occurrence of acute pollution events are reduced to the minimum'	Decreasing trend in the occurrences of acute pollution events
	Levels of known harmful contaminants in major types of seafood do not exceed established standards. *Common Indicator 14*[7]*:* ▪ *Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood* Good Environmental Status defined as 'Concentrations of contaminants are within the regulatory limits for consumption by humans'	Concentrations of contaminants are within the regulatory limits set by legislation.

[5] UNEP/MAP 2014.Working document on Common Indicators for the Mediterranean. Integrated Correspondence Groups of GES and Targets Meeting, Athens (Greece), 17-19 February 2014 , UNEP(DEPI)/MED WG.390/3

[6] UNEP/MAP 2014.Working document on Common Indicators for the Mediterranean. Integrated Correspondence Groups of GES and Targets Meeting, Athens (Greece), 17-19 February 2014, UNEP(DEPI)/MED WG.390/3

[7] UNEP/MAP 2014.Working document on Common Indicators for the Mediterranean. Integrated Correspondence Groups of GES and Targets Meeting, Athens (Greece), 17-19 February 2014, UNEP(DEPI)/MED WG.390/3

	Levels of known harmful contaminants in major types of seafood do not exceed established standards. *Indicator:* ▪ *Frequency that regulatory levels of contaminants are exceeded.* Good Environmental Status defined as 'No regulatory levels of contaminants in seafood are exceeded'	Decreasing trend in the frequency of cases of seafood samples above regulatory limits for contaminants.

4. Competent Authorities

Policy	Competent Authority
WFD	Malta Environment and Planning Authority (coastal waters, inland surface and transitional waters)
MSFD	Office of the Prime Minister (delegation of technical implementation to the Malta Environment and Planning Authority)
Euratom Treaty: monitoring of coastal waters	Malta Environment and Planning Authority
Directive 2005/35/EC on ship-source pollution	Transport Malta (Maritime) & Armed Forces of Malta.
Barcelona Convention – LBS protocol, MEDPOL	Malta Environment and Planning Authority
Barcelona Convention – Emergency and Prevention Protocol	Transport Malta (Maritime)
EC Regulations 1881 of 2006, 1259 of 2011 and Council Regulation 3954/87	Environmental Health Directorate & Veterinary Services
E-PRTR regulations & Industrial Emissions Directive	Malta Environment and Planning Authority

5. Spatial Extent of monitoring requirements

Policy	Extent of marine waters
WFD	12 nautical miles
MSFD	Extent of waters to be monitored depends on relevance and established GES and targets.
Euratom Treaty: monitoring of coastal waters	Malta is defined as one region and monitoring is carried out at three coastal monitoring stations
Directive 2005/35/EC on ship-source pollution	Regulations apply to any ship in Maltese waters and any ship on the high seas if the discharge of any harmful substance from any such ship results or may be reasonably expected to result in major harmful consequences in Maltese waters or to the coastline of Malta or related interests, including fishing.
Barcelona Convention – LBS protocol, MEDPOL & ECAP Process	Regional
Barcelona Convention - Emergency and Prevention Protocol	Regional
EC Regulations 1881 of 2006, 1259 of 2011 and Council Regulation 3954/87	Sampling involves retail samples of fish and seafood
E-PRTR and Industrial Emissions Directive	Effluent monitoring

6. Monitoring Approach

This monitoring factsheet includes four monitoring subprogrammes listed hereunder:

Monitoring sub-programme	Title	Monitoring Purpose
1	Contaminant levels - in water/sediment	Pressure
2	Contaminant levels – in species, including seafood	Pressure
3	Contaminant inputs – sea-based acute events including oil spills	Pressure
4	Contaminant inputs – land-based sources	Pressure

The monitoring sub-programmes are geared towards the assessment of the levels of selected contaminants in relevant environmental media, hence the level of pressures on ecosystems from contaminants. The monitoring sub-programmes will also be providing information on the input of contaminants in the marine environment through anthropogenic activities, by building on relevant mechanisms already in place.

The lists of contaminants included in the monitoring sub-programmes are provisional, to be confirmed or updated following the initial monitoring year/s. Other contaminants which may pose risks to the marine environment and to its resources should be included, as soon as new information or verifications are available. This includes chemicals that may be identified from time to time by the EU Commission, in agreement with Member States, regarding the Watch List mechanism as required by Article 8b of Directive 2013/39/EU.

Reduction of parameters from the list of contaminants to be monitored could be effected after analysis of data.

Selection of contaminants to be monitored is based on the following:

i. the results attained in the baseline monitoring survey carried out in 2012. In general, chemicals which were consistently found below the Limits of Detection and which are not known to be discharged are not included;
ii. Substances for which Member States shall apply the biota EQS in line with Article 2 of Directive 2013/39/EU and substances for which Member States shall take measures aimed at ensuring that such concentrations do not significantly increase in sediment and/or relevant biota (as per Article 2 (6) of the Directive) are included in the relevant environmental media;
iii. Substances for which programmes and measures should be prepared for monitoring as agreed by MEDPOL Focal Points at their meeting held in France in November 2009 (as indicated in UNEP(DEPI)/MEDIG.21/5) are included.

Monitoring of such substances should be subject to regional agreement. The preferred environmental medium in which monitoring should take place still needs to be determined;

iv. a phased approach should be applied in line with Article 2 of Directive 2013/39/EU amending Article 3 of Directive 2008/105/EC by defining:
   - stricter EQS for some substances to be applied by December 2015
   - new substances for which Member States shall establish and submit a supplementary monitoring programme by 22 December 2018

v. the substances for which supplementary monitoring is to be established are included with the list of substances to be monitored. Nevertheless, since supplementary monitoring needs to be established by 2018, these substances are not being considered further by the monitoring sub-programmes i.e. monitoring methodologies, areas, frequency and assessment procedures are not being established.

7. Assessment of status

Assessment of status is detailed for the monitoring sub-programmes as relevant.

8. Monitoring Sub-Programme 1: *Contaminant levels - in water/sediment*

8.1. Monitoring Parameters

8.1.1. Contaminants in Water

Table 1: List of contaminants to be monitored in water

Number (2013/39/EU)	Substances	WFD & EQS Directive 2013/39/EU	MSFD regionally agreed contaminants	River Basin Specific Pollutants (WFD)	LBS protocol (Article 8) & MEDPOL	Euratom Treaty	REACH	Other substances of concern
Priority monitoring								
Non-Synthetics								
4	Benzene	×						
15	Fluoranthene	×[8]						
20	Lead and its compounds	×[9]					×	
21	Mercury and its compounds	×			×[10]			
22	Naphtalene	×[11]						
23	Nickel and its compounds	×[12]						
28	Benzo(a)pyrene	×						
28	Benzo(b)fluoranthene	×						
28	Benzo(g,h,i)perylene	×						
28	Benzo(k)fluoranthene	×						
28	Indeno(1,2,3-c,d)pyrene	×						
	Barium			×				
	Chromium and its compounds			×			×	
	Copper			×				
	Manganese			×				
	Zinc			×				
Synthetics								
10	1,2-Dichloroethane	×					×	
11	Dichloromethane	×						
32	Trichloromethane	×						
Monitoring in selected stations								
Non-Synthetics								
	Beryllium			×				
	Boron			×				
	Fluorides			×				
Synthetics								
	Carbamezepine & its metabolite							×

[8] Stricter EQS to be applied by December 2015
[9] Stricter EQS to be applied by December 2015
[10] Listed in Annex I to the LBS Protocol and in UNEP(DEPI)/MED IG.21/9
[11] Stricter EQS to be applied by December 2015
[12] Stricter EQS to be applied by December 2015

Number (2013/39/EU)	Substances	WFD & EQS Directive 2013/39/EU	MSFD regionally agreed contaminants	River Basin Specific Pollutants (WFD)	LBS protocol (Article 8) & MEDPOL	Euratom Treaty	REACH	Other substances of concern
	(10,11-Dihydro-10,11-dihydroxycarbamazepine)							
Euratom Treaty Monitoring								
	^{137}Caesium					×		×
	^{60}Cobalt					×		
	^{40}Potassium					×		
Supplementary monitoring to be established by 2018								
Synthetics								
34	Dicofol	×						
35	Perfluorooctane sulfonic acid & derivatives	×					×	
36	Quinoxyfen	×						
37	Dioxins[13]	×						
	Polychlorinated biphenyls (PCBs)				×[14]			
	Polychlorinated dibenzodioxins (PCDDs)				×[15]			
	Polychlorinated dibenzo furans (PCDFs)				×[16]			
38	Aclonifen	×						
39	Bifenox	×						
40	Cybutryne	×						
41	Cypermethrine	×						
42	Dichlorvos	×						
43	Hexabromocyclododecane	×					×	
44	Heptachlor & Heptachlor epoxide	×						
45	Terbutryn	×						

[13] Directive 2013/39/EU establishes EQS for dioxins in biota based on the sum of PCDD+PCDF+PCB-DL. Monitoring of these individual substances is being discussed as part of the MEDPOL process and are hence listed as part of the 'dioxin' group. Although dioxins are non-synthetic substances, they are being listed as synthetic, in view of their man-made production.

[14] Listed in UNEP(DEPI)/MED IG.21/5; organohalogen compounds are also listed in Annex I to the LBS Protocol

[15] Listed in UNEP(DEPI)/MED IG.21/5; organohalogen compounds are also listed in Annex I to the LBS Protocol

[16] Listed in UNEP(DEPI)/MED IG.21/5; organohalogen compounds are also listed in Annex I to the LBS Protocol

8.1.2. Contaminants in sediment

Table 2: List of contaminants to be monitored in sediment

Number (2013/39/EU)	Substances	WFD & EQS Directive 2013/39/EU	**MSFD regionally agreed contaminants**	**River Basin Specific Pollutants (WFD)**	**LBS protocol (Article 8) & MEDPOL**	REACH	Other substances of concern
Priority monitoring							
Non-Synthetics							
2	Anthracene	×[17]					
6	Cadmium and its compounds	×	×		×[18]	×	
15	Fluoranthene	×[19]					
20	Lead and its compounds	×[20]	×		×[21]	×	
21	Mercury and its compounds	×	×		×[22]		
22	Naphtalene						
23	Nickel and its compounds						
28	Polyaromatic hydrocarbons	×[23]	×		×[24]		
28	Benzo(a)pyrene	×					
	Barium			×			×
	Chromium and its compounds			×	×[25]	×	×
	Copper			×	×[26]		×
	Manganese			×			×
	Zinc			×	×[27]		×
Synthetics							
5	Brominated diphenylethers	×[28]				×	
7	C10-C13 Chloroalkanes	×				×	
12	Di(2-ethylhexyl)phthalate	×			×[29]	×	
16	Hexachlorobenzene	×			×[30]		
17	Hexachlorobutadiene	×					
18	Hexachlorocyclohexane	×			×[31]		
26	Pentachlorobenzene	×[32]					

[17] Stricter EQS to be applied by December 2015
[18] Mandatory by MEDPOL PHASE III
[19] Stricter EQS to be applied by December 2015
[20] Stricter EQS to be applied by December 2015
[21] Recommended by MEDPOL PHASE III
[22] Mandatory by MEDPOL PHASE III
[23] Stricter EQS to be applied by December 2015
[24] Recommended by MEDPOL PHASE III
[25] Recommended by MEDPOL PHASE III
[26] Recommended by MEDPOL PHASE III
[27] Recommended by MEDPOL PHASE III
[28] Stricter EQS to be applied by December 2015
[29] Listed in UNEP(DEPI)/MEDIG.21/9
[30] Listed in UNEP(DEPI)/MEDIG.21/9
[31] Listed in UNEP(DEPI)/MEDIG.21/9

Number (2013/39/EU)	Substances	WFD & EQS Directive 2013/39/EU	**MSFD regionally agreed contaminants**	**River Basin Specific Pollutants (WFD)**	**LBS protocol (Article 8) & MEDPOL**	REACH	Other substances of concern
30	Tributyltin	×	×				
	Perchlorates[33]						×
	Polychlorinated biphenyls		×				×
Monitoring in selected stations							
Non-Synthetics							
	Arsenic[34]					×	×
	Beryllium			×			×
	Boron			×			
	Fluorides			×			×
	Total Petroleum hydrocarbons						×
Synthetics							
	Carbamezepine & its metabolite (10,11-Dihydro-10,11-dihydroxycarbamazepine)						×
Supplementary monitoring to be established by 2018							
Synthetics							
34	Dicofol	×					
35	Perfluoroctane sulfonic acid & derivatives (PFOS)	×				×	
36	Quinoxyfen	×					
41	Cypermethrin						×
43	Hexabromocyclododecane	×				×	
44	Heptachlor & Heptachlor epoxide	×					

[32] According to Article 2(6) of Directive2013/39/EU, Member States are required to arrange for the long-term trend analysis of concentrations of those priority substances that tends to accumulate in sediment and/or biota, including this substance, on the basis of monitoring of surface water status…Member States shall take measures aimed at ensuring that such concentrations do not significantly increase in sediment and/or relevant biota

[33] Although perchlorate is a naturally occurring substance, it is being included with the synthetics due to the fact that it is manufactured for the purposes of pyrotechnics, which is a possible route through which this substance is being introduced into the marine environment.

[34] Monitoring of 'Arsenic' in sediments should be carried out in sediments in receiving waters of urban waste water discharges and off Delimara power stations

8.2. Supporting Parameters

Parameter	Unit	Related Monitoring Factsheet
Dissolved Nitrates (NO_3-N)	NO_3-N µmol/L, µg/L	Eutrophication
Dissolved Nitrites (NO_2-N)	NO_2-N µmol/L, µg/L	
Ammonium ions (NH_4-N)	NH_4-N µmol/L, µg/L	
Dissolved Phosphates (PO_4-P)	PO_4-P µmol/L, µg/L	
Silicate (SiO_2)	SiO_2 µmol/L	
Total Nitrogen	N µmol/L, µg/L	
Total Phosphorous	P µmol/L, µg/L	
Total Organic Carbon	%weight	
Dissolved Oxygen	% saturation	
Water Turbidity	Secchi depths, NTU	
Chlorophyll-a	µg/L	
Temperature	°C	
Salinity	psu	
pH		
Water hardness ($CaCO_3$/sum of Ca and Mg concentrations) – for analysis of Cd only		N/A
Sediment grain size through granulometric analysis		
Aluminium & Iron in sediments		
Hydrodynamics Data		Hydrographical Changes

8.3. Monitoring methodologies

This section briefly outlines methodologies for monitoring contaminants in water and sediment. Adherence to methodological standards as listed in Section 12 to be ensured at all times.

8.3.1. Priority monitoring and monitoring in selected stations: water

- Two replicate water samples are collected using Niskin Bottles/Van Dorn samplers at surface and 2m depth at monitoring stations;
- Samples are appropriately preserved and stored in agreement with the accredited laboratory performing the chemical analyses.

8.3.2. Priority monitoring and monitoring in selected stations: sediment

- Two replicate samples of the first 3cm superficial sediments are collected using box corers or Van Veen grabs;
- Sediment samples are stored in acid-washed containers. For mercury, samples must be stored in acid-washed borosilicate glass or quartz containers.
- Records of the colour, appearance and any particular smells of each sample are kept;
- Subsamples of sediment to be collected immediately after sampling and subject to granulometric analysis and analysis of Total Organic Carbon (refer to monitoring factsheet on 'nutrient and organic matter enrichment').
- Correlation analysis would need to be carried out on the reported levels of contaminants in superficial sediments, and the granulometric statistics and total organic carbon content of the sediments. Subsequently, if need be, reported levels of contaminants should be recorded both as raw, and as levels corrected for organic content, and particle size.

8.3.3. Euratom Treaty Monitoring (water)

Sampling for radionuclides in marine waters follows the 'Procedure for the determination of Concentration of ^{137}Cs, ^{60}Co and ^{40}K in ASG resins of sea water samples' as reviewed in June 2013 by the Malta Environment and Planning Authority. This methodology is summarised hereunder:

- water samples are collected from specified monitoring stations, stored at <5°C in a darkened environment and acidified to prevent growth of bacterial colonies using 8M HNO_3 (2ml/litre);
- For K-40 analysis, 300cm^3 of each water sample are filtered through 0.45µm filter membrane.

- For Cs-137 and Co-60 analysis, 50L of the samples are filtered through a peristaltic pump, a 0.45µm filter membrane and flowed through a 24ml tubular syringe (flow rate of 5L/hr).
- The Atomic Spectroscopy Group Resin attained from the sea water samples and the 300cm^3 was sample are sent to accredited laboratories for gamma spectroscopy analysis.

8.4. Monitoring stations/areas

Monitoring stations listed in this section shall be updated after the first monitoring year on the basis of a risk-based approach following further knowledge on the status of each station in terms of contaminants.

8.4.1. Priority monitoring

Inshore monitoring stations for 'priority monitoring' contaminants (Table 1 - Table 2) and supporting parameters (Section 8.2) are listed in Table 3. The same list of substances are monitored in water (only) sampled in four offshore stations as listed in Table 4 and shown in Figure 1.

Table 3: Inshore Monitoring Stations (water and sediment)

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
Operational Monitoring Stations			
CP04-1	Operational	453769,71	3977836,62
CP04-2	Operational	449013,07	3979914,24
CP05	Operational - Harbour	457169,68	3973252,05
CP06-1	Operational	461078,41	3971492,15
CP06-2	Operational	460522,84	3970960,01
CP07	Operational - Harbour	459771,77	3964111,98
Surveillance Monitoring Stations			
CS01	Surveillance	425781,39	3992303,97
CS02	Sur + Reference Site	435571,14	3992063,13
CS03	Sur + Reference Site	442502,54	3984741,51
CS08	Surveillance	453654,59	3962794,34
CS09	Sur + Protected area	439697,26	3976129,46
National Monitoring Stations of relevance to 'Contaminants'			
CN01-2	Op – Diffuse Sources	429492,88	3987775,43
CN02-1	Op – Diffuse sources	433397,15	3992518,78
CN03-1	Op – Sewage Outfall	435420,03	3986084,12
CN03-2	Op - Harbour	437057,14	3987236,76
CN03-3	Op-Harbour	440130,02	3983083,45
CN04-1	Op – diffuse sources	442596,44	3981355,59
CN04-2	Op – desalination plant	453870,17	3976951,54

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
CN04-3[35]	Op - bunkering site	445500,41	3984462,78
CN04-4	Op - diffuse sources	444937,85	3978614,21
CN05-1	Op - Harbour	455167,45	3973034,62
CN05-2	Op - Harbour	456279,18	3972594,26
CN06-1	Op - diffuse sources	460815,92	3969206,43
CN07-1	Op - Thermal effluent	460712,08	3966044,50
CN07-2	Op – Harbour	459413,96	3965607,40
CN07-3	Op – Harbour	458110,28	3965070,20
CN08-1	Op – Desalination Plants	447163,40	3965389,58
CN09-1	Op – Sewage Outfall	440099,89	3979621,63

Table 4: Offshore monitoring stations (water sampling)

Offshore Monitoring stations	Coordinates (Full UTM ED50)	
	Longitude	Longitude
Malta North	378799.33 4	4028101.37
Malta East	530961.17 3	3976110.62
Malta South	473775.46 3	3904926.63
Malta West	375854.66 3	3951016.29

Figure 1: Offshore monitoring stations (Water sampling)

[35] This station shall also be used to specifically monitor PHCs and PAHs in sediment of bunkering areas since the station is representing Bunkering Area 1

8.4.2. Monitoring in selected stations

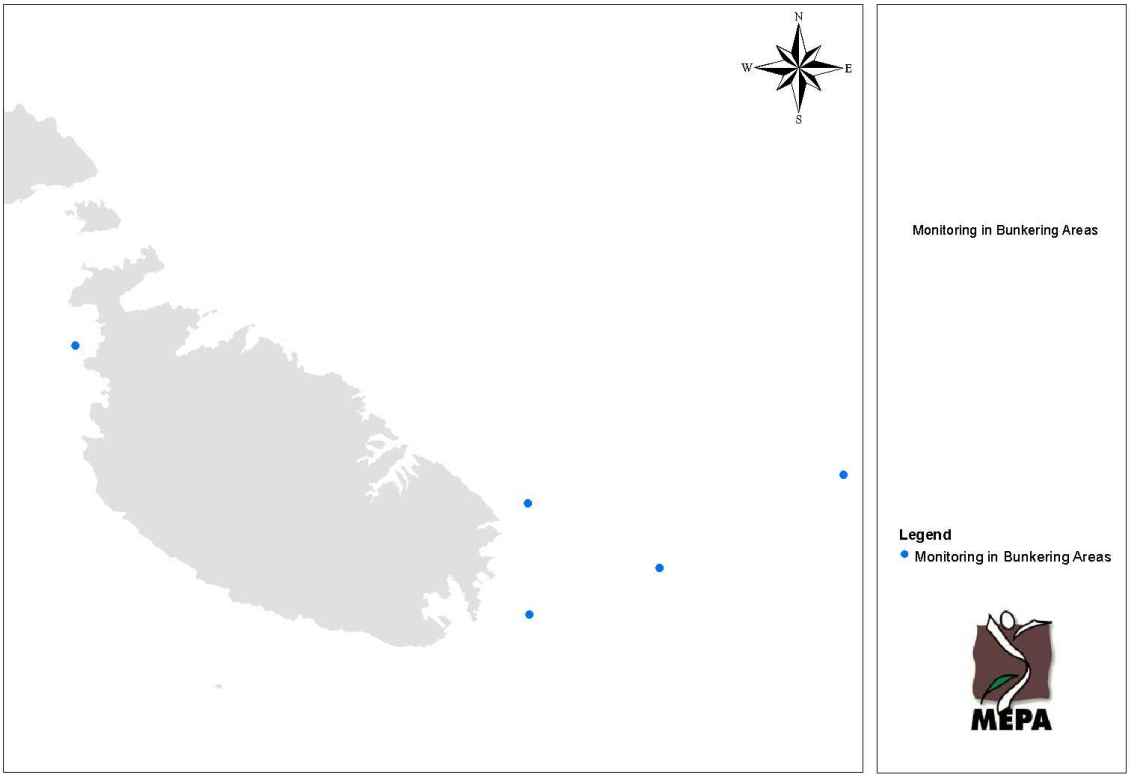
8.4.2.1. Bunkering/waiting areas

Petroleum hydrocarbons and Polyaromatic hydrocarbons are monitored in sediment sampled in bunkering/waiting areas as listed in Table 5 and shown in Figure 2.

Table 5: Monitoring of Petroleum hydrocarbons and Polyaromatic hydrocarbons in bunkering sites (sediment only)[36]

Monitoring of PHCs & PAHs in bunkering/waiting areas (sediment only)		
Bunkering Area 2	463215,69	3970468,46
Bunkering Area 3	480042,40	3971974,31
Bunkering Area 4	463310,71	3964577,20
Bunkering Area 6	439080,51	3978830,25
Waiting Area	470247,20	3967047,73

Figure 2: Monitoring in bunkering areas (sediment)



[36] Note that Bunkering Area 1 is already represented by monitoring station CN04-3 in Table 3

8.4.2.2. Areas subject to discharge of urban waste water

The presence of arsenic in sediment and carbamezepine and its metabolite in water and sediment will be determined through one-off monitoring within areas subject to discharge of urban waste water are indicated in Table 6 and Table 7, and shown in Figure 3.

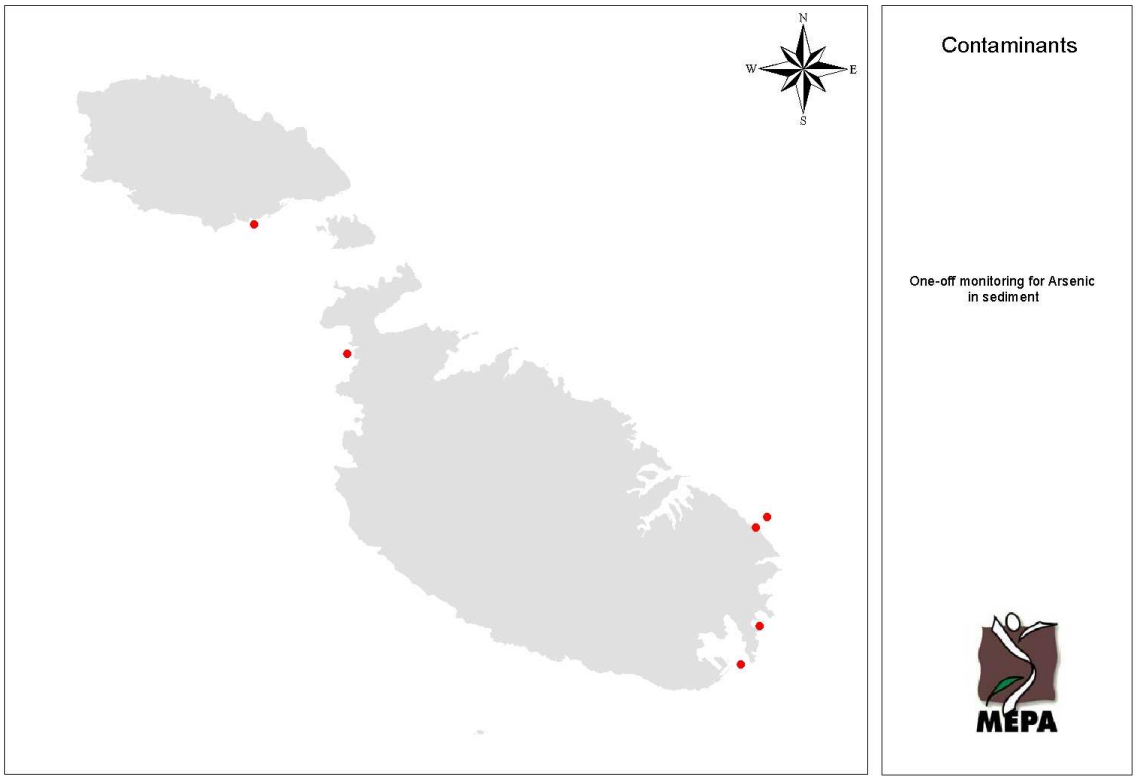
Table 6: One-off monitoring for Arsenic in sediment

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
CP06-1	Operational – sewage outfall	461078,41	3971492,15
CP06-2	Operational – sewage outfall	460522,84	3970960,01
CP07	Operational - Harbour	459771,77	3964111,98
CN03-1	Op – Sewage Outfall	435420,03	3986084,12
CN07-1	Op - Thermal effluent	460712,08	3966044,50
CN09-1	Op – Sewage Outfall	440099,89	3979621,63

Table 7: One-off monitoring for Carbamezepine & its metabolite (10,11-Dihydro-10,11-dihydroxycarbamazepine) in water & sediment

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
CP06-1	Operational – sewage outfall	461078,41	3971492,15
CP06-2	Operational – sewage outfall	460522,84	3970960,01
CN03-1	Op – Sewage Outfall	435420,03	3986084,12
CN07-1	Op - Thermal effluent	460712,08	3966044,50
CN09-1	Op – Sewage Outfall	440099,89	3979621,63

Figure 3: Monitoring Stations for one-off monitoring of Arsenic and Carbamezepine & its metabolite (10,11-Dihydro-10,11- dihydroxycarbamazepine)



8.4.2.3. Harbour areas

Monitoring of River Basin Specific Pollutants Beryllium, Boron and Fluorides will be carried out in Marsaxlokk harbour and one reference area as per Table 8.

Table 8: Monitoring for Beryllium, Boron and Fluorides in water & sediment

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
CS09	Sur + Protected area	439697,26	3976129,46
CN07-2	Op – Harbour	459413,96	3965607,40
CN07-3	Op – Harbour	458110,28	3965070,20

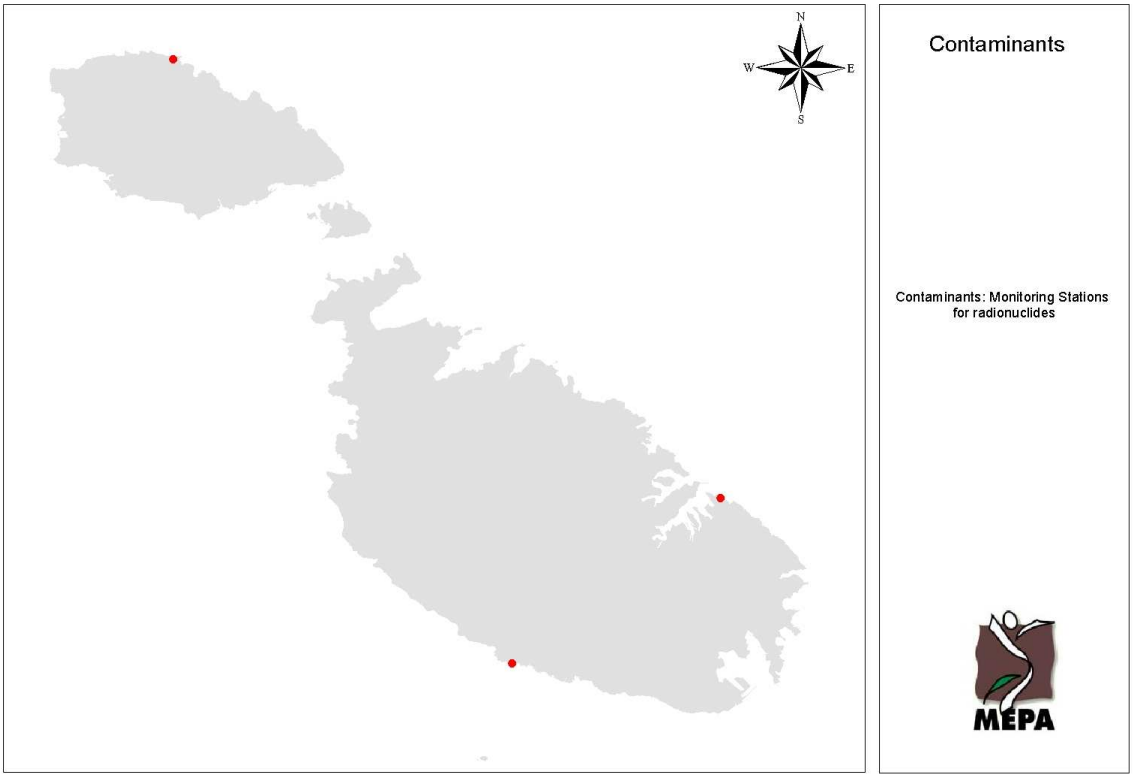
8.4.3. Euratom Treaty Monitoring (water)

Monitoring stations for radionuclides in water are listed in Table 9 and shown in Figure 4.

Table 9: Monitoring Stations for radionuclides – Euratom Treaty (water only)

Station	Longitude	Latitude
Lapsi	N35.82721	E14.42430
Wied Ghammieq	N35.89692	E14.53089
Xwejni	N36.07897	E14.24757

Figure 4: Monitoring Stations (Radionuclides)



8.5. Monitoring frequency

	Environmental Medium	Monitoring Stations	First Monitoring Year	Subsequent years
Priority Monitoring	Water	Inshore stations	Monthly	Monthly, every 3 years (subject to revision)
		Offshore stations	6-monthly (summer and winter)	To be determined following the first monitoring year
	Sediment	Inshore stations	Yearly	To be determined following the first monitoring year
Petroleum hydrocarbons & Polyaromatic hydrocarbons	Sediment	Bunkering sites	Yearly	To be determined following the first monitoring year
Arsenic & Carbamezepine	Water	Selected stations	One-off	To be determined depending on presence of substance or otherwise
	Sediment			
River Basin Specific Pollutants: Boron, Beryllium & Fluorides	Water	Selected stations	Monthly	To be determined depending on presence of substance or otherwise
	Sediment		Yearly	
Radionuclides (Euratom Treaty Monitoring)	Water	Selected stations	3-monthly	

8.6. Assessment of status

8.6.1. Contaminants in water and sediment

Table 10 lists the Environmental Quality Standards, where available, against which concentration of contaminants in water and sediment are to be assessed. Any exceedances of such threshold will be recorded and % exceedances (if any) will be plotted spatially. The map of exceedances may be updated after every monitoring survey. The annual rates of exceedances of thresholds will show the degree of progress in achieving set targets.

Interpretation of these thresholds is subject to the following:

- All thresholds for contaminants in water as proposed are **only** applicable to waters within 1 Nautical mile of the shoreline. Thresholds for water beyond this limit can only be set after sufficient data is available.
- Unless already identified in EU Directive 2013/39/EC, the EQSs should be considered as **preliminary and tentative**. It is essential to ensure that such proposed thresholds will be periodically updated in the light of the expected

increasing amount of data on levels of contaminants being generated by monitoring.

- Thresholds are being set for water and sediments in terms of annual average (AA) and maximum concentration (MAC) which may not be exceeded at any one time. 'Annual mean levels' refers to the arithmetic mean of all the values recorded for that particular parameter over the whole year (minimum of one reading per season). For the computation of such arithmetic mean, values which are recorded as being below Limit of Quantification (LOQ) of the analytical test should be entered as 50% of such limit.
- Whenever possible, background levels for a particular contaminant were determined by estimating the 90^{th} percentile level of data from clean areas. However, these should also be treated as preliminary.

In cases where thresholds are not available assessment of status will be based on trends in concentration of contaminants.

Table 10: EQS for monitoring of contaminants in sediments and water. The EQS in water are those stipulated by Directive 2013/39/EC where available (in blue); other EQS/MAC-EQS are preliminary being proposed for the purpose of assessment of status and are subject to changes pending the outcome of the initial monitoring cycles.

		Seawater			Sediments		
		AA-EQS (ug/L)	MAC-EQS (ug/L)	Background levels (ug/L)	AA-EQS	MAC-EQS	Background levels
2	Anthracene				45ug/kgDW[b]	NED	NED
4	Benzene	8	50	Not detectable (0.1) [a]			
5	Brominated diphenyl ethers				NED	NED	NED
6	Cadmium				0.3mg/kg DW[b]	0.1mg/kgDW[37]	0.1ug/gDW[d]
7	C10-13 Chloroalkanes				NED	NED	Not detectable (0.01mg/kgDW)[a]
10	1,2-Dichloroethane	10	n/a	Not detectable (0.1)[a]			
11	Dichloromethane	20	n/a	0.1[a]			
12	Di(2-ethylhexyl)phthalate				NED	NED	0.04mg/kgDW[c]
15	Fluoranthene	0.0063	0.12	Not detectable (0.005)[a]	110ug/kgDW[b]	NED	0.05mg/kgDW[c]
16	Hexachlorobenzene				0.4ug/kgDW[b]	NED	Not detectable (0.00002mg/kgDW)[a]
17	Hexachlorobutadiene				NED	NED	Not detectable (0.005mg/kgDW)[a]
18	Hexachlorocyclohexane				0.2ug/kgDW[b]	NED	Not detectable (0.005mg/kgDW)[a]
20	Lead	1.3	14	0.8[c]	30mg/kgDW[b]	30mg/kgDW[38]	1.5mg/kgDW[c]

[37] Revised from Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

21	Mercury and its compounds	NED	0.07	0.05[c]	0.3mg/kgDW[b]	0.15ug/kgDW[d]	0.04mg/kgDW[c]
22	Naphthalene	2	130	Not detectable (0.005)[a]	35ug/kgDW[b]	NED	NED
23	Nickel	8.6	34	3	30mg/kgDW[b]	16mg/kgDW[39]	7mg/kgDW[c]
26	Pentachlorobenzene				NED	NED	NED
28	Polyaromatic hydrocarbons				NED	3ug/gDW[d]	0.1ug/kgDW[c]
28	Benzo(a)pyrene	0.00017	0.027	0.01[c]	30ug/kgDW[b]	NED	0.01ug/kgDW[c]
28	Benzo(b)fluoranthene	NED	0.017	Not detectable (0.01)[a]			
28	Benzo(g,h,i)perylene	NED	0.00082	Not detectable (0.01)[a]			
28	Benzo(k)fluoranthene	NED	0.017	Not detectable (0.01)[a]			
28	Indeno(1,2,3-cd)-pyrene	NED	n/a	Not detectable (0.005)[a]			
30	Tributyltin				55ug/kgDW[b]	NED	Not detectable (0.2ug/kgDW)[a]
32	Trichloromethane	2.5	n/a	NED			
	Arsenic				NED	NED	NED
	Barium	NED	NED	NED	NED	NED	43mg/kgDW[c]
	Beryllium	NED	NED	NED	NED	NED	0.2mg/kgDW[c]
	Boron	NED	NED	NED	NED	NED	30mg/kgDW[c]
	Carbamezepine	NED	NED	NED	NED	NED	NED
	Chromium	NED	NED	NED	NED	15mg/kgDW[40]	10mg/kgDW[c]
	Copper	NED	NED	NED	NED	16mg/kgDW[41]	2mg/kgDW[c]

[38] Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

[39] Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

[40] Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

	Fluorides	NED	NED	NED	NED	NED	Not detectable (0.2mg/kgDW)[a]
	Manganese	NED	NED	NED	NED	NED	80mg/kgDW[c]
	Perchlorates				NED	NED	NED
	Polychlorinated biphenyls				NED	NED	NED
	Total Petroleum hydrocarbons				NED	NED	65mg/kgDW[c]
	Zinc	40	100[d]	1[d]	NED	120mg/kgDW[42]	17mg/kgDW[c]

a = contaminant should not be detectable, at least at the Limits of Quantification indicated in brackets

b = based on thresholds set by neighbouring countries (Italy)

c = based or partly based on 90percentile level of reported levels of contaminant in clean areas by baseline survey carried out in 2012

d = based on thresholds set by neighbouring countries (Greece)

NED: Not enough data available to determine thresholds

[41] Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

[42] Axiak, V. 2003. Proposal for a National Marine Pollution Strategy to Control Direct Discharges into the Marine Environment. Final document submitted for consideration by the Environment Protection Directorate of the Malta Environment and Planning Authority; 96 pp. Available online at: http://www.mepa.org.mt/topics-water-monitoring

8.6.2. Radionuclides in Water (Euratom Treaty)

Thresholds for radionuclides have been established through the 'Radiation Protection Board Operating Procedures'. For coastal waters, the thresholds at which action would be required are indicated as 'any values greater than 10% above the maximum of the Maltese range given in the reference value table'. The latter is being reproduced in Table 11.

Table 11: Reference Values quoted by the 'Radiation Protection Board Operating Procedures' for coastal waters

Maltese average and range of readings (2007-2012)		Bq/litre		
		Mean	Range	
			Minimum	Maximum
	Cs-137	0.0020	0.0007	0.0037
	Co-60	0.1092	0.0900	0.138
	K-40	14.3748	11.5600	16.7500

9. Monitoring Sub-Programme 2: *Contaminant levels – in species, including seafood*

9.1. Monitoring Parameters

9.1.1. Contaminants

Lists of contaminants to be monitored in biota are compiled in Table 12.

Table 12: List of contaminants to be monitored in biota

Number (2013/39/EU)	Substances	WFD & EQS Directive 2013/39/EU	MSFD regionally agreed contaminants	**River Basin Specific Pollutants (WFD)**	**LBS protocol (Article 8) & MEDPOL**	REACH	Other substances of concern	EC 1881/2006
Priority monitoring								
Non-Synthetics								
6	Cadmium and its compounds		×		×[43]	×		×
15	Fluoranthene	×						
20	*Lead*[44] and its compounds		×		×[45]	×		×
21	Mercury and its compounds	×	×		×[46]			×
28	Benzo(a)pyrene[47]	×	×					×
Synthetics								
16	Hexachlorobenzene	×			×[48]			
17	Hexachlorobutadiene	×						
30	Tributyltin		×				×	
	Polychlorinated biphenyls (including non-dioxin like PCBs)		×					×
Supplementary monitoring to be established by 2018								
Synthetics								
34	Dicofol	×[49]						

[43] Mandatory by MEDPOL PHASE III

[44] Lead should only be considered as priority monitoring in fish/crustacea/molluscs, since it is a requirement of EC Regulation 1881 of 2006 with a view to facilitate links between monitoring of contaminants in biota and contaminants in foodstuff.

[45] Recommended by MEDPOL PHASE III

[46] Mandatory by MEDPOL PHASE III

[47] In line with Directive 2013/39/EC, for the group of priority substances of polyaromatic hydrocarbons (PAHs), the biota EQS and corresponding AA-EQS in water refer to the concentration of benzo(a)pyrene, on the toxicity of which they are based. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water.

[48] Listed in UNEP(DEPI)/MED IG.21/5

[49] New substance with effect from 22 December 2018 + Member States to apply biota EQS

35	Perfluorooctane sulfonic acid and its derivatives	×[50]				×		
37	Dioxins[51]	×[52]	×					×
43	Hexabromocyclododecane	×[53]				×		
44	Heptachlor	×[54]						

9.1.2. Species

Species to be used for monitoring of contaminants in biota and seafood are listed in Table 13.

Table 13: Monitoring of contaminants in biota

	Retail Samples (Thunnus thynnus, Xiphias gladius and/or Coryphaena hippurus)	*Posidonia oceanica*	*Fish and Crustacea*	
			Mullus barbatus & Merluccius merluccius	*Aristaeomorpha foliacea & Parapenaeus longirostris*
Fluoranthene				×
Benzo(a)pyrene				×
Lead	×		×	
Cadmium	×		×	
Mercury	×	×	×	
Hexachlorobenzene		×	×	
Hexachlorobutadiene		×	×	
Polychlorinated biphenyls (including non-dioxin like PCBs)			×	
Tributyltin			×	

9.2. Supporting Parameters

Bioparameters (fish and crustacea)	Related Monitoring Factsheet
Length	Fish & Commercial species
Sex	
Maturity	
Individual Weight	
Age	

[50] New substance with effect from 22 December 2018 + Member States to apply biota EQS

[51] According to Directive 2013/39/EU, monitoring for dioxins should be subject to supplementary monitoring by 2018. This Directive establishes EQS for dioxins in biota based on the sum of PCDD+PCDF+PCB-DL. Monitoring of these individual substances is being discussed as part of the MEDPOL process.

[52] New substance with effect from 22 December 2018 + Member States to apply biota EQS

[53] New substance with effect from 22 December 2018 + Member States to apply biota EQS

[54] New substance with effect from 22 December 2018 + Member States to apply biota EQS

9.3. Monitoring methodologies

9.3.1. Retail Samples of pelagic fish

Priority monitoring for contaminants in foodstuff involves routine monitoring pursuant to EC regulation 1881 of 2006 (as amended by 1259/2011) and Council Regulation 3954 of 1987.

- Collection of retail samples of *Thunnus thynnus*, *Xiphias gladius* and *Coryphaena hippurus* from local suppliers/markets depending on availability; Samples to be randomly selected although samples should originate from Malta[55];
- Samples to be analysed in accordance with Commission Regulation 1883/2006[56] and Commission Regulation 333/2007[57]
- Record keeping as follows:
  - number of contaminants that exceed set limits
  - species for which levels are exceeded
  - number of events when regulatory limits are exceeded, source location, species concerned, absolute levels of contaminants

9.3.2. *Posidonia oceanica* (applicable to waters up to 40m depth)

- A fixed number of *Posidonia oceanica* (L.) Delile[58] shoots are collected at each monitoring station.
- Shoots are preserved at -20°C and kept frozen.
- Seagrass shoots are dissected in order to separate rhizomes from leaves and foliar basal parts and analysed for contaminants in line with standard methodologies.

9.3.3. Fish & Crustacea

- Analysis of contaminants in fish and crustacea (other than retail samples) is performed on specimens collected by the Mediterranean International Bottom Trawl Surveys (MEDITS). Sub-samples of *Mullus barbatus* and *Parapenaeus longirostris* from catch areas within the shallow depth strata

[55] Reference made to EC Regulation No. 104/2000: improvements in the traceability of retail samples are expected in the medium-term.

[56] laying down methods of sampling and analysis for the official control of levels of dioxins and dioxin-like PCBs in certain foodstuffs

[57] laying down methods of sampling and analysis for the official control of the levels of lead, cadmium, mercury, inorganic tin, 3-MCPD and benzo(a)pyrene in foodstuffs

[58] The marine angiosperm *Posidonia oceanica* (L.) Delile is selected as a bioindicator for detection of chemical pollutants, in view of both the natural features of the organism (benthic, long-living, widespread) and its distribution (coastal areas which are generally exposed to anthropogenic impacts), which make this organism both prone to bioaccumulation and easy to be retrieved in impacted zones. It is widely known that *P. oceanica* accumulates a number of xenobiotic contaminants which can be subsequently transferred to the upper levels of the trophic chain.

and sub-samples of *Merluccius merluccius* and *Aristaeomorpha foliacea*[59] from deeper catch areas are used for this purpose.

- Two specimens of marketable size of the selected species of per selected haul are retained.
- Muscle tissue of fish and crustacean tissue excluding head and thorax are analysed for contaminants as listed in Table 13.

9.4. Monitoring stations/areas

9.4.1. *Posidonia oceanica*

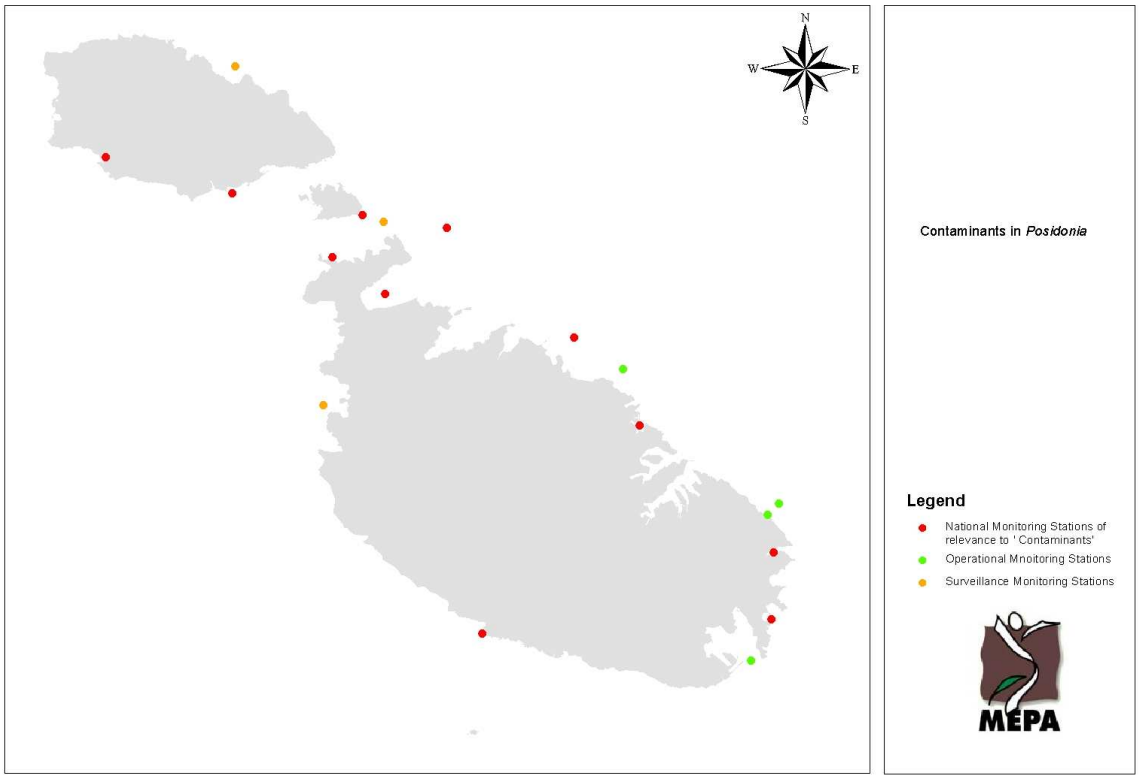
Monitoring stations for monitoring of contaminants in *Posidonia oceanica* are listed in Table 14 and shown on Figure 5. Monitoring stations shall be updated after the first monitoring year on the basis of a risk-based approach following further knowledge on the status of each station in terms of contaminants.

Table 14: Monitoring Stations (*Posidonia oceanica*)

Mon. Site Ref. Code	Monitoring Network	Coordinates (Full UTM ED50)	
		Longitude	Latitude
Operational Monitoring Stations			
CP04-1	Operational	453769,71	3977836,62
CP06-1	Operational	461078,41	3971492,15
CP06-2	Operational	460522,84	3970960,01
CP07	Operational - Harbour	459771,77	3964111,98
Surveillance Monitoring Stations			
CS02	Sur + Reference Site	435571,14	3992063,13
CS03	Sur + Reference Site	442502,54	3984741,51
CS09	Sur + Protected area	439697,26	3976129,46
National Monitoring Stations of relevance to 'Contaminants'			
CN01-2	Op – Diffuse Sources	429492,88	3987775,43
CN03-1	Op – Sewage Outfall	435420,03	3986084,12
CN03-3	Op – Harbour	440130,02	3983083,45
CN03-6	Op – Minor Sewage Outfall	441540,34	3985079,15
CN04-1	Op - diffuse sources	442596,44	3981355,59
CN04-3	Op - bunkering site	445500,41	3984462,78
CN04-4	Op - diffuse sources	444937,85	3978614,21
CN04-6	Nitrates Directive	454528,54	3975162,74
CN06-1	Op - diffuse sources	460815,92	3969206,43
CN07-1	Op - Thermal effluent	460712,08	3966044,50
CN08-1	Op – Desalination Plants	447163,40	3965389,58

[59] Selection of species would facilitate link between monitoring of contaminants in biota with monitoring of contaminants in foodstuff since the species selected are also consumed in Malta - hence the need to collect samples from catch areas. The choice of *A. foliacea* and *P. longirostris* is based on the requirements of the Priority Substances Directive which indicates that for Fluoranthene and PAHs, the biota EQS refers to crustaceans and molluscs. Such species would also cater for the requirements of EC Regulation 1881 of 2006.

Figure 5: Monitoring Stations (*Posidonia*)



9.4.2. Fish & Crustacea

MEDITS stations located within or in the vicinity of (within 1.5 NM) catch areas as represented by trawling zones are indicated in Table 15 together with the species sampled in such hauls to be subject to analysis of contaminants.

Table 15: Selected MEDITS hauls within or in the vicinity of catch areas and species to be collected depending on presence in haul.

MEDITS Haul	Mean Depth (m)	Specimens to be collected depending on availability	Coordinates (start & end)	
			Longitude	Latitude
49	83	*Mullus barbatus*	35.8770	14.9377
			35.8755	14.9078
55	125	*Mullus barbatus* *Parapenaeus longirostris*	35.9958	14.7113
			36.0183	14.7222
54	127	*Mullus barbatus* *Parapenaeus longirostris*	36.1097	14.7272
			36.0903	14.7078
5	187	*Mullus barbatus* *Parapenaeus longirostris*	35.9543	14.2607
			35.9632	14.2318
79	203	*Mullus barbatus* *Parapenaeus longirostris*	36.1602	14.4338
			36.1828	14.4478
76	335	*Merluccius merluccius* *Parapenaeus longirostris*	36.4140	14.4165
			36.3707	14.4470
10[60]	345	*Merluccius merluccius* *Parapenaeus longirostris*	36.1948	14.0110
			36.2155	14.0675
70	441	*Merluccius merluccius* *Aristaeomorpha foliacea*	36.4750	14.3452
			36.4360	14.3847
74[61]	471	*Merluccius merluccius* *Aristaeomorpha foliacea*	36.1288	14.0868
			36.1587	14.1480
7[62]	606	*Aristaeomorpha foliacea*	36.0805	13.9863
			36.1242	13.9343
8[63]	640	*Aristaeomorpha foliacea*	36.1090	13.9632
			36.1433	13.9190

9.5. Monitoring frequency

Biota	Initial Monitoring episode	Subsequent years
Retail samples	2-yearly	
Posidonia oceanica	Yearly	To be determined
Fish & Crustacea	Yearly	To be determined

[60] Within 1.5 nautical mile of trawling zone
[61] Within 1.5 nautical mile of trawling zone
[62] Within 1.5 nautical mile of trawling zone
[63] Within 1.5 nautical mile of trawling zone

9.6. Assessment of status

9.6.1. Contaminants in biota

Table 16 lists the Environmental Quality Standards, where available, against which concentration of contaminants in fish & crustacea are to be assessed. Any exceedances of such thresholds will be recorded and % exceedances (if any) will be plotted spatially. The map of exceedances may be updated after every monitoring survey. The annual rates of exceedances of thresholds will show the degree of progress in achieving set targets.

It should be noted that:

- Unless already identified in EU Directive 2013/39/EC, the EQSs should be considered as preliminary and tentative. It is essential to ensure that such proposed thresholds will be periodically updated in the light of the expected increasing amount of data on levels of contaminants being generated by monitoring.
- Whenever possible, background levels for a particular contaminant were determined by estimating the 90th percentile level of data from clean areas. However, these should also be treated as preliminary.
- EQS for biota would not apply to *Posidonia oceanica*. Such EQS would need to be determined on the basis of monitoring data.

In cases where thresholds are not available assessment of status will be based on trends in concentration of contaminants.

Table 16: EQS for monitoring of contaminants in fish and crustacea. The EQS is that stipulated by Directive 2013/39/EC; other EQS are preliminary being proposed for the purpose of assessment of status and are subject to changes pending the outcome of the initial monitoring cycles

		Biota	
		EQS	Background level
6	Cadmium	1mg/kgWW for fish[a]	25ug/kgWW for fish[a]
15	Fluoranthene	30ug/kg WW (crustacea, molluscs)	NED
16	Hexachlorobenzene	10ug/kg WW (fish)	NED
17	Hexachlorobutadiene	55ug/kg WW (fish)	NED
20	Lead	NED	25ug/kgWW for fish[a]
21	Mercury and its compounds	20ug/kg WW (fish)	35ug/kgWW for fish[a]
28	Benzo(a)pyrene	5ug/kg WW (crustacea, molluscs)	NED
30	Tributyltin	NED	NED
	Dioxins (including dioxin-like and non-dioxin like PCBs)	NED	NED

a = based on thresholds set by neighbouring countries (Greece)
NED: Not enough data available to determine thresholds

9.6.2. Contaminants in seafood

Regulatory limits set by EC regulations against which levels of contaminants in seafood should be assessed are indicated in Table 17.

When bringing together data collected from the monitoring of contaminants in foodstuff, the following information should be collected:

- the frequency that levels exceed the regulatory levels
- which fish or seafood component exceeded these levels
- the actual levels that have been detected
- the contaminants for which exceeding levels have been detected in parallel.

Table 17: Thresholds for contaminants in foodstuff as stipulated by Commission Regulations 1881 of 2006 and 1259 of 2011

Species	Maximum levels as stipulated by Commission Regulation 1881 of 2006 & Commission Regulation 1259 of 2011						
	Lead (mg/kg wet weight)	**Cadmium (mg/kg wet weight)**	**Mercury (mg/kg wet weight)**	Polyaromatic hydrocarbons (Benzo-a-pyrene) (ug/kg wet weight)	Dioxins		
					Sum of dioxins (WHO-PCDD/F-TEQ) (pg/g wet weight)	**Sum of dioxins and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ) (pg/g wet weight)**	**Sum of PCB28, PCB52, PCB101, PCB138, PCB153 & PCB180 (ICES-6) ng/g wet weight**
Thunnus thynnus	0.30	0.10	1.00	2.00	3.50	6.50	75.00
Xiphias gladius	0.30	0.30	1.00	2.00	3.50	6.50	75.00
Coryphaena hippurus	0.30	0.05	0.50	2.00	3.50	6.50	75.00
Mullus spp.	0.30	0.05	1.00	2.00	3.50	6.50	75.00
A. foliacea & *P. longirostris*	0.50	0.50	0.50	5.00	3.50	6.50	75.00

10. Monitoring Sub-Programme 3: *Contaminant inputs – sea-based acute events including oil spills*

10.1. Monitoring Parameters and methodologies

Monitoring is linked to the occurrence of significant pollution events in the marine environment such as an oil or chemical spill. Such monitoring is to be undertaken following (i) reports from vessels and aircraft of pollution events in the marine environment; (ii) reports on potential spills through remote sensing carried out by EMSA and (iii) reports made by national entities.

i. Investigation of reports[64]

ii. Data to be collected and inputted in an established registry:
- location,
- origin (where possible)
- year, date and time of spill (where possible)
- weather and sea conditions prevalent at time of spill (where possible)
- nature and quantity/extent of the spill
- details of contingency/remedial action taken

10.2. Monitoring Areas

The data collection process will be undertaken within territorial waters.

[64] In the case of reports submitted through CleanSeaNet (EMSA) investigation depends on the confidence level, the potential threat to the Maltese Islands (in view of location and direction of currents), as well as availability of assets

11. Monitoring Sub-Programme 4: *Contaminant inputs – land-based sources*

Discharge of contaminants in the marine environment will be assessed through existing mechanisms as follows:

- Land-based activities directly discharging to the marine environment will be registered as part of the requirements of Article 5 of Directive 2008/105/EC[65]. This registry will include data on input load characteristics.

- Input loads are reported as part of the European Pollutant Release and Transfer Register (E-PRTR)[66] and as part of the reporting of the National Budget of pollutant load to marine and coastal environment under the UNEP/MAP LBS protocol (Table 18). In accordance with the E-PRTR regulations, operators of facilities undertaking one or more of the activities specified in Annex I to the regulations, above the applicable capacity thresholds specified therein, shall report the amount of releases to water of any pollutant specified in Annex II (as reproduced in Table 18) for which the applicable threshold value is exceeded. The polluting substances to be reported would be determined on a case-by-case basis. The amounts are reported annually to the competent authority, together with an indication of whether the information is based on measurement, calculation or estimation of the releases to water of pollutants listed in Annex II of the regulation.

- Monitoring of emissions into the marine environment as part of the requirements of the Industrial Emissions Directive. The polluting substances listed in Annex II to the Directive are listed below. The polluting substances and the frequency of the periodic monitoring shall be determined by the competent authority in a permit for each individual installation or in general binding rules:
    - Organohalogen compounds and substances which may form such compounds in the aquatic environment;
    - Organophosphorous compounds;
    - Organotin compounds;
    - Substances and mixtures which have been proved to possess carcinogenic or mutagenic properties or properties which may affect reproduction in or via the aquatic environment;
    - Persistent hydrocarbons and persistent and bioaccumulable organic toxic substances;

[65] According to this article: '*Member States shall establish an inventory, including maps, if available, of emissions, discharges and losses of all priority substances and pollutants listed in Part A of Annex I to this Directive for each river basin district or part of a river basin district lying within their territory including their concentrations in sediment and biota, as appropriate…*'

[66] http://prtr.ec.europa.eu/FacilityLevels.aspx

- Cyanides
- Metals and their compounds;
- Arsenic and its compounds;
- Biocides and plant protection products;
- Materials in suspension
- Substances listed in Annex X to Directive 2000/60/EC

- Permitting processes related to disposal of waste at sea in terms of the Waste Regulations 2011 published by Legal Notice 184 of 2011 (transposing Directive 2008/98/EC on waste and repealing certain Directives).

- Existing data collection processes on the quantities of Plant Protection Products imported in Malta.

Table 18: List of polluting substances listed in Annex II of the E-PRTR regulation. This table indicates whether reporting of E-PRTR substances is also required by the LBS protocol and/or MEDPOL Phase III. The number of the polluting substance as listed in the EQS Directive is included to facilitate link between input loads and assessment of contaminants in the marine environment. Shaded cells indicate that polluting substance will also be monitored in the relevant environmental media in accordance with this monitoring factsheet.

CAS Number	Number as per EQS Directive 2013/39/EC	Pollutant	E-PRTR Threshold for reporting (kg/year)	LBS protocol & MED POL Phase III
		Arsenic and compounds (as As)	5	×[67]
7440-43-9	6	Cadmium and compounds (as Cd)	5	×[68]
		Chromium and compounds (as Cr)	50	×[69]
		Copper and compounds (as Cu)	50	×[70]
7439-97-6	21	Mercury and compounds (as Hg)	1	×[71]
7440-02-0	23	Nickel and compounds (as Ni)	20	×[72]
7439-92-1	20	Lead and compounds (as Pb)	20	×[73]
		Zinc and compounds (as Zn)	100	×[74]
15972-60-8	1	Alachlor	1	
309-00-2	9a	Aldrin	1	
1912-24-9	3	Atrazine	1	
57-74-9		Chlordane	1	
143-50-0		Chlordecone	1	
470-90-6	8	Chlorfenvinphos	1	
85535-84-8	7	Chloro-alkanes C_{10}-C_{13}	1	
2921-88-2	9	Chlorpyrifos	1	
50-29-3	9b	DDT	1	
107-06-2	10	1,2-dichloroethane	10	
75-09-2	11	Dichloromethane	10	
60-27-1	9a	Dieldrin	1	
330-54-1	13	Diuron	1	
115-29-7	14	Endosulphan	1	
72-20-8	9a	Endrin	1	
		Halogenated organic compounds	1000	×[75]
76-44-8	44	Heptachlor	1	
118-74-1	16	Hexachlorobenzene	1	
87-68-3	17	Hexachlorobutadiene	1	
608-73-1	18	1,2,3,4,5,6-hexachlorocyclohexane	1	
58-89-9		Lindane	1	
2385-85-5		Mirex	1	

[67] Listed in Annex II to the LBS Protocol
[68] Mandatory by MEDPOL PHASE III
[69] Recommended by MEDPOL PHASE III
[70] Recommended by MEDPOL PHASE III
[71] Mandatory by MEDPOL PHASE III
[72] Recommended by MEDPOL PHASE III
[73] Recommended by MEDPOL PHASE III
[74] Recommended by MEDPOL PHASE III
[75] Recommended by MEDPOL PHASE III

	37	PCDD+PCDF (dioxins + furans)	0.0001	
608-93-5	26	Pentachlorobenzene	1	
87-86-5	27	Pentachlorophenol	1	
1336-36-3		Polychlorinated biphenyls	0.1	
122-34-9	29	Simazine	1	
127-18-4	29a	Tetrachloroethylene	10	
56-23-5	6a	Tetrachloromethane	1	
12002-48-1	31	Trichlorobenzenes	1	
79-01-6	29b	Trichloroethylene	10	
67-66-3	32	Trichloromethane	10	
8001-35-2		Toxaphene	1	
75-01-4		Vinyl chloride	10	
120-12-7	2	Anthracene	1	
71-43-2	4	Benzene	200 (as BTEX)	
	5	Brominated diphenylethers (PBDE)	1	
	24	Nonylphenol & nonylphenol ethoxylates (NP/NPEs)	1	
100-41-4		Ethyl benzene	200 (as BTEX)	
75-21-8		Ethylene oxide	10	
34123-59-6	19	Isoproturon	1	
91-20-3	22	Naphthalene	10	
		Organotin compounds (as total Sn)	50	×[76]
117-81-7	12	Di-(2-ethylhexyl)phthalate (DEHP)	1	
108-95-2		Phenols (as total C)	20	
	28	Polycyclic aromatic hydrocarbons	5	×[77]
108-88-3		Toluene	200 (as BTEX)	
	30	Tributyltin and compounds	1	
		Triphenyltin and compounds	1	
1582-09-8	33	Trifluralin	1	
1330-20-7		Xylenes	200 (as BTEX)	
		Chlorides (as total Cl)	2 million	
1332-21-4		Asbestos	1	
		Cyanides (as total CN)	50	×[78]
		Fluorides (as total F)	2000	×[79]
1806-26-4	25	Octylphenols & Octylphenol ethoxylates	1	
206-44-0	15	Fluoranthene	1	
465-73-6	9a	Isodrin	1	
36355-1-8		Hexabromobiphenyl	0.1	
191-24-2	28	Benzo(g,h,i)perylene	1	

[76] Listed in Annex I to the LBS Protocol
[77] Recommended by MEDPOL PHASE III
[78] Listed in Annex II to the LBS Protocol
[79] Listed in Annex II to the LBS Protocol

12. Quality Assurance & Quality Control

Sampling methodologies and analysis of samples shall be carried out in line with MEDPOL standard methodologies (www.unepmap.org) and WFD technical specifications for chemical analysis & monitoring of water status as per Directive 2009/90/EC (transposed in regulation 10 of Legal Notice 24 of 2011). This schedule provides definitions related to water monitoring aspects, choice of methods of analysis, minimum performance criteria for the methods of analysis, calculation of and presentation of mean values, as well as quality assurance and control recommendations. Analysis of contaminants shall ensure that the minimum performance criteria for all methods of analysis applied are based on an uncertainty of measurement of 50 % or below (k = 2) estimated at the level of relevant environmental quality standards and a limit of quantification equal or below a value of 30 % of the relevant environmental quality standards.

The following standards/guidelines will also be followed:

Standards:

- EN ISO 5667-3: 2012 including guideline procedures for sampling programmes and techniques, preservation and handling of different types of water and sediments, bio-testing of samples and other general techniques.
- CEN standard EN 13804: Foodstuffs – Determination of trace elements – Performance criteria, general considerations and sample preparation.
- EN ISO/IEC 17025:2005: General requirements for the competence of testing and calibration laboratories

Guidance:

- WFD Guidance document on surface water chemical monitoring (No. 19)
- WFD Guidance document on chemical monitoring of sediments and biota (No 25)
- WFD Technical Guidance for Deriving Environmental Quality Standards (No 27)
- Manual for marine monitoring in the COMBINE programme of HELCOM. Helsinki Commision, Baltic Marine Environment Protection Commission
- OSPAR Commission (2013) JAMP Guidelines for monitoring of contaminants in seawater. OSPAR – Protecting and Conserving the North-East Atlantic and its Resources, Agreement 2013-2; 19pp.

13. Links to monitoring processes

This monitoring factsheet incorporates and streamlines monitoring requirements of the EU Water Framework Directive (2000/60/EC), Marine Strategy Framework Directive (2008/56/EC), EC regulations 1881/2006 & 1259/2011, Council Regulation (EURATOM)3954/87, Euratom Treaty and MEDPOL.

Monitoring in terms of this factsheet is linked with monitoring for other marine elements as follows:

- The majority of the monitoring stations are shared with those proposed for 'eutrophication', 'water column habitats' and 'hydrographical changes'. Offshore monitoring stations are shared with those proposed for 'water column habitats' and 'marine litter'.
- Supporting parameters will be monitored as part of the 'eutrophication' and 'hydrographical changes' monitoring factsheets.
- Samples and supporting parameters for monitoring of contaminants in biota will be collected/measured as part of the Mediterranean International Bottom Trawl Surveys (MEDITS) pursuant to Council Regulation 199/2008 concerning the establishment of a '*Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy*' and Commission Decision 2008/949/EC outlining a multiannual Community programme pursuant to Council Regulation 199/2008. Such monitoring is also linked to monitoring in terms of 'Commercial Fish'.

14. Data collection, storage and dissemination

All data should be collected and stored in accordance with the INSPIRE Technical Specifications listed in this section and/or any other relevant INSPIRE standard as identified through the Marine Pilot Project[80]. Processed data to be uploaded in a geoportal.

- 'D2.8.II/III.7 INSPIRE Data Specification on Environmental Monitoring Facilities – Technical Guidelines'[81];
- 'D2.8.III.15 Data Specification on Oceanographic geographical features – Technical Guidelines'[82];
- 'D2.8.III.16 Data Specification on Sea Regions – Technical Guidelines'[83]

[80] https://circabc.europa.eu/w/browse/bc33dff1-0f8c-467a-8382-7724c5f79d45

[81] http://inspire.ec.europa.eu/index.cfm/pageid/2;

[82] http://inspire.ec.europa.eu/index.cfm/pageid/2;

[83] http://inspire.ec.europa.eu/index.cfm/pageid/2;

15. Responsible organisations

Theme	Sub-themes	Responsible authorities
Contaminants in water, sediment & *Posidonia oceanica*	Sampling and analysis	MEPA
Contaminants in biota	Sampling	Fisheries
	Analysis	MEPA
	Supporting parameters: Fish bioparameters	Fisheries
Contaminants in seafood	Retail Samples	Environmental Health Directorate
	Analysis	Environmental Health Directorate
Sea-based acute events	Data collection	Transport Malta
Contaminant inputs – land-based sources		MEPA, MCCAA

16. Gaps and Research Needs

Gaps	Plans to address gaps
EQS or background concentrations not established for all contaminants/environmental media	Establish, in the longer-term and on the basis of the monitoring results, Environmental Quality Standards for levels of contaminants in sediment and biota
Limited information on sea-based sources of contaminants, hence monitoring is focused on land-based sources of pollution; Transboundary sources are also poorly known.	Define sea-based and transboundary sources of contaminants and where possible, quantify input load characteristics.
This monitoring factsheet does not propose any assessment of contaminants reaching the marine environment through atmospheric deposition (as required by the MSFD)	Engage in research with respect to 'atmospheric deposition' with a view to determine the extent at which contaminants are entering the marine environment through this route and develop methods for its assessment.
Limited knowledge on biological responses to contaminants: cause-effect relationships not adequately known.	Pilot monitoring to apply the use of the biomarker 'lysosomal membrane stability' in a selected mollusc as per UNEP/MAP 2014. Draft Monitoring and Assessment Methodological Guidance, 4th meeting of the EcAp Coordination Group UNEP(DEPI)/MED WG.401/3
No process is currently set up in relation to investigative monitoring of	Process governing investigative monitoring, to determine extent and nature of impacts, to be set up.

potential impacts of pollution events	
There is not sufficient knowledge to enable identification of contaminants which may be of transboundary nature.	Information generated through the implementation of this monitoring factsheet in terms of the presence and levels of contaminants in the marine environment and knowledge on use of contaminants in Malta through monitoring of activities, are used to identify the presence of contaminants in Malta which may be of transboundary nature.

17. Main Sources

- AAE Consortium (ADI Associates Ltd, Ecoserv Ltd and E Cubed Consultants). 2014. Long Term Monitoring Strategy for the Marine Environment of the Maltese Islands under the Marine Strategy Framework Directive. Service Contract for the development of a long-term monitoring strategy for the marine environment, a social and economic analysis of the use of marine waters and costs of degradation, and baseline sediment survey in inland waters (MEPA tender ref: CT3048/2012). ERDF156 - Developing national environmental monitoring infrastructure and capacity. Malta, unpublished report, 252 pp.

- AAE Consortium (ADI Associates Ltd, Ecoserv Ltd and E Cubed Consultants). 2014. Long Term Monitoring Programme for the Marine Environment of the Maltese Islands under the Marine Strategy Framework Directive. Service Contract for the development of a long-term monitoring strategy for the marine environment, a social and economic analysis of the use of marine waters and costs of degradation, and baseline sediment survey in inland waters (MEPA tender ref: CT3048/2012). ERDF156 - Developing national environmental monitoring infrastructure and capacity. Malta, unpublished report, 346 pp.

- CIBM & Ambiente SC. 2013. Development of Environmental Monitoring Strategy and Environmental Monitoring Baseline Surveys – Water Lot 1 – Long-term monitoring – September 2013. ERDF156 - Developing national environmental monitoring infrastructure and capacity