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Second Meeting of the Working Groups of Experts on developing the new Regional Plans on Urban Wastewater Treatment and Sewage Sludge Management, and for updating the Regional Plan on Marine Litter in the Mediterranean

Videoconference, 25-26 May 2021

Agenda item 4: Regional Plan on Sewage Sludge Management

Regional Plan for Sewage Sludge Management

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UNEP/MAP
Athens, 2021

Note by the Secretariat

The 21st Ordinary Meeting of the Contracting Parties (COP-21) to the Barcelona Convention and its Protocols (Naples, Italy, 2-5 December 2019) adopted Decision IG.24/10 which mandated UNEP/MAP (MED POL Programme) to develop the Regional Plan on Sewage Sludge Management (hereafter referred to as the “Regional Plan”).

To this aim, COP21 Decision IG.24/10 requested the establishment of a Working Group of Experts (WG) designated by the Contracting Parties to submit to the MED POL Focal Points Meeting the new Regional Plan. The First Meeting of the Working Group was held on 9 and 10 December 2020. The Meeting reviewed and agreed on the draft Regional Plan on Sewage Sludge Management and recommended a number of changes.

The Meeting also agreed to allow the members of the WG to provide written inputs on the definition of terms; proposed deadlines for implementation of measures included in square brackets in the Regional Plan; technical details of the subject matter addressed in the Regional Plan including tabulated Emission Limit Values and related technical data and information; and scope and outline of contents of the Appendices which were at the drafting stage.

Inputs and comments were received from four Contracting Parties: Bosnia and Herzegovina, Croatia, France and Italy. The following summarizes some of the key issues raised by these Countries. Details are provided within the text of the Regional Plan.

- *Bosnia and Herzegovina* noted under Article 1 the importance of unifying similar definitions between this Regional Plan and the Regional Plan for Urban Wastewater Treatment. Under Article 5 related to the “Measures”, it was indicated that compliance with emission limit values is rather difficult. Accordingly, set deadlines are difficult to comply with and are rather short. Clarifications were also sought on “appropriate treatment steps to limit pathogen contents in biosolids and concentrations of heavy metals” indicating need to address this issue further in the technical annex.
- *Croatia* provided a number of comments under Article 1, noting the need for unified definitions with the Regional Plan for Urban Wastewater Treatment regarding domestic wastewater, industrial wastewater, secondary treatment, tertiary treatment and wastewater treatment plants. Under Article 5 (Measures), Croatia requested clarifications under paragraphs 7 and 8 which stipulate that the Contracting Parties shall meet limit values for pathogen content and for heavy metals in biosolids by 2023. The issue is related to the question of whether these dates are set for adopting the required regulations or for implementing measures to meet these ELVs. Croatia also requested an additional clarification on the “required infrastructure” for use of treated sludge for agricultural land application and/or for energy/nutrient recovery under Article 5.
- *France* questions the reason why the scope of the regional plan covers only sewage sludge from municipal treatment plants, while excluding from the scope sewage sludge from industrial treatment plants, which can also be the subject of agricultural recovery or use in energy recovery. Under Article (4), it was noted that some guiding principles are more restrictive than the provisions of the European directive relating to the use of sludge on agricultural soils (Directive n° 86/278) or contrary to France's strategy to limit the pollution of sludge by micropollutants. Under Article 5 related to treatment of sewage sludge (paragraph 6), France proposed that there is no need for treatment prior to use of sludge in incineration. Therefore, “biosolids” should be replaced by “sludge”. This also applies in paragraph (7) on pathogen contents of sludge whereby it is stated that there is no obligation to treat sludge before spreading according to the EU Directive, which is contrary to the requirement of the Regional Plan. France notes that sludge treatment is required only for specific conditions of use and provides for that purpose a table for the conditions under which sludge can be used. Under paragraph (13) related to sewage sludge use and energy/nutrient recovery, France notes

that sewage sludge can be used in other applications and that the Regional Plan should take into consideration usage further to available local opportunities.

- *Italy* proposed modifications to a number of definitions under Article (1) some of which to align with those in the Regional Plan for Urban Wastewater Treatment. This includes domestic wastewater, industrial wastewater, primary treatment, secondary treatment, tertiary treatment and urban wastewater. Under Article 5, and specifically in relation to the ELVs listed in Table 1 (pathogen contents); Table 2 (heavy metals in biosolids); Table 3 (heavy metals in soils), Italy presented alternative tables with ELVs as per European regulations or national legislation for further consideration. These are included in the text of the Regional Plan. Regarding Table 4 which provides limit values for amounts of heavy metals which may be added to agricultural land, Italy proposed to delete this table as limit values should be left to national provision for soil protection (or to be considered as indicative values).

The present document includes all proposals and inputs provided above. These are categorized as follows:

- Amendments made to the document and agreed by the first Working Group Meeting are highlighted in green, with reference to the paragraph in which the amendments were agreed.
- Segments discussed during the Meeting for which no agreement was reached remain in brackets in “blue typeset”.
- Proposals for amendments or inputs by the Contracting Parties for Articles in the Regional Plan are presented in text as “blue typeset” or as footnotes.
- “Clarifications” provided to respond to the requests of the Contracting Parties on the contents of the measures are provided in footnotes.

The Second Meeting of the Working Group is expected to review the above elements of the Regional Plan and recommend the final version to the MED POL Focal Points Meeting to be held back-to-back with this meeting (i.e. 27-28 May 2021).

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Regional Plan for Sewage Sludge Management

ARTICLE I Definition of Terms¹

[For the purpose of this Regional Plan for the Sewage Sludge Management; hereinafter referred to as the “Regional Plan”]:

- (a) “Anaerobic digestion” is the biological conversion of organic matter to biogas and residual solids at temperatures between 20°C and about 40°C, typically 37°C with a mean residence time of 15 to 30 days (Mesophilic) or that takes place between 49°C and 57°C (thermophilic);
- (b) "Best Available Techniques (BAT)" as defined in Annex IV for the Land-Based Source and Activities (LBS) Protocol;
- (c) "Best Environmental Practice (BEP)" as defined in Annex IV for the Land-Based Source and Activities (LBS) Protocol;
- (d) “Biosolids” are organic-based materials from industrial or municipal wastewater sludge and their derived products, in the form of solids, semi–solids, semi–liquids (pasty), and liquids which have been treated to meet specific standards, guidelines or requirements including the reduction of pathogens, vector attraction and contaminant criteria (ISO 19698);
- (e) "Collecting system" means a system of conduits which collects and conducts urban wastewater;
- (f) “Composting” is the natural aerobic biological process, carried out under controlled conditions, which converts organic material into a stable humus-like product;
- (g) “Domestic wastewater” means wastewater from residential settlements and services which originates predominantly from the human metabolism and from household activities;
- (h) “Industrial wastewater” is wastewater discharge resulting from any industrial or commercial activity (ISO20670);
- (i) “Primary sludge” is sludge from primary settling tanks, typically grayish and slimy in nature, and, in most of the cases, has an extremely offensive odor. Primary sludge can be readily digested under suitable conditions of operation;
- (j) “Primary treatment” means treatment of urban wastewater by a physical and/or chemical process involving settlement of suspended solids, or other processes in which the BOD₅ of the incoming wastewater is reduced by at least 20 percent before discharge and the total suspended solids of the incoming wastewater are reduced by at least 50 percent;^{Error! Bookmark not defined.}
- (k) “Secondary sludge (activated sludge)” is the sludge particles produced in raw or settled wastewater by the growth of organisms in aeration tanks in the presence of dissolved oxygen. The term activated comes from the fact that the particles are teeming with bacteria, fungi, and protozoa. Activated sludge is different from primary sludge in that the sludge particles contain many living organisms which can feed on the incoming wastewater;
- (l) “Secondary treatment” means treatment of urban wastewater by a process generally involving biological treatment with a secondary settlement or other process so that the treatment results in a minimum reduction of the initial load of 70 to 90 percent of BOD₅;
- (m) “Sludge incineration (waste to energy)” is a two-step process involving drying and combustion after a preceding dewatering process, such as filters, drying beds, or centrifuges;

¹ Definitions were not discussed in 1st working group meeting.

- (n) "Tertiary treatment" means treatment of urban wastewater by process generally involving of physical, chemical, biological and other procedures so that the treatment results in reduction of nutrient salts by 80 percent and the initial load of more than 90 percent of BOD₅;
- (o) "Urban wastewater" means wastewater of the mixture of domestic wastewater with industrial wastewater and/or run-off rainwater;
- (p) "Wastewater Treatment Plant (WWTP)" means systems used to treat urban wastewater using physical, chemical and/or biological techniques.]

ARTICLE II

Scope and Objective

1. The area to which the Regional Plan applies is the area defined in accordance with Article 3 of the LBS Protocol, consisting of the Mediterranean Sea Area as defined in Article 1 of the Convention; the hydrologic basin of the Mediterranean Sea Area; waters on the landward side of the baselines from which the breadth of the territorial sea is measured and extending, in the case of watercourses, up to the freshwater limit; brackish waters, coastal salt waters including marshes and coastal lagoons; and ground waters communicating with the Mediterranean Sea.
2. The Regional Plan shall apply to the treatment, disposal and use of sewage sludge from Urban Wastewater Treatment Plants.
3. The objective of the Regional Plan is to ensure effective reuse of **beneficial** substances and **exploitation of** energy potential of sewage sludge, while preventing harmful effects on human health and the environment.

ARTICLE III

Preservation of Rights

4. The provisions of this Regional Plan shall be without prejudice to stricter provisions respecting the management of sewage sludge from urban wastewater treatment plants contained in other existing or future national, regional or international instruments or programs.

ARTICLE IV

Guiding Principles

5. The Regional Plan measures are formulated to ensure the application of the following principles:
 - i. Sewage sludge shall meet the required quality criteria [~~is treated~~] suitable for its intended use **and/or** disposal;
 - ii. Management alternatives are prioritized for beneficial use of sewage sludge in agricultural land applications in order to minimize landfilling and adverse environmental effects;
 - iii. Since sewage sludge can have valuable agronomic properties reducing dependence on fertilizers, its application is encouraged in agriculture subject to appropriate treatment **and quality standards.**
 - iv. **Sewage sludge can be used in other applications such as forests, mine reclamation sites, and other disturbed lands, parks, and golf courses;**
 - v. Use of sewage sludge does not impair the quality of the soil and of agricultural products;

- vi. Use of sewage sludge in agriculture is regulated in such a way as to prevent harmful effects on soil, water bodies, vegetation, animals and humans;
- vii. Sewage sludge may be used as an alternative fuel; energy production; and for incineration and co-incineration and other proven applications.

ARTICLE V Measures

I. Treatment of sewage sludge

6. The Contracting Parties shall ensure that all required sludge treatment processes are carried out [in line with common agreed guidelines] ~~in the wastewater treatment plant and outside the plant,~~ in order to obtain biosolids of quality suitable for their specific use in:
 - i. Agricultural land application as a fertilizer or for land reclamation; and
 - ii. Energy recovery (i.e. incineration).

~~[Treatment processes for sewage sludge stabilization, incineration, drying, thickening, phosphorus removal and storage are provided for in Appendix I.]~~²
7. The Contracting Parties shall apply [adequate treatment]³ ~~[appropriate treatment steps]~~ to limit pathogen contents in biosolids [destined for agricultural applications]. To this aim, the Contracting Parties shall set classes for sludge with limit values for pathogen contents for biosolids to ensure that use would not affect human health and the environment. [The following two “biosolids classes” and corresponding limit values for pathogen content for biosolids shall be adopted by the Contracting Parties at the latest by 2023]:
 - i. [Class ‘A’ biosolids suitable for use as fertilizer for all agricultural crops having met the pathogen reduction requirements set in Table 1 by treatment processes that include composting, heat drying, heat treatment, thermophilic aerobic digestion, beta or gamma ray irradiation and pasteurization
 - ii. [Class ‘B’ biosolids suitable for use as fertilizer for non-food crops having met the pathogen reduction requirements set in Table 1 by treatment processes that include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.]

Table 1: Limit values for pathogen content for biosolids classes				
Class	Faecal Coliforms	Salmonella sp.	Enterovirus	Helminths ova
Class A	< 1000 MPN/g DM	< 3 MPN/4 g DM	1 PFU/4 g DM*	1 viable/4 g DM
Class B	< 2,000,000 MPN/g DM**			

* PFU: Plaque Forming Unit

** Geometric mean of seven samples

² In the views of the Secretariat, Appendix I on “selected treatment methods of sewage sludge” should be deleted and included in common technical guidelines to facilitate the implementation of this Regional Plan.

³ In the views of the Secretariat, replacing “appropriate treatment steps” with “adequate treatment” represents a better formulation.

Alternative proposal by Italy on Limit values for pathogen content for biosolids:

Table 1.bis: Limit values for pathogen content for biosolids as proposed by Italy	
Faecal Coliforms	Salmonella sp.
< 1000 MPN/g DM	0

8. The Contracting Parties shall apply [adequate treatment]⁴ [~~appropriate treatment steps~~] to limit concentrations of heavy metals in biosolids destined for agricultural applications. To this aim, the Contracting Parties shall set limit values for heavy metals to ensure that use would not affect human health and the environment. The following limit values for heavy metals in biosolids (Table 2); heavy metals in soil (Table 3); and amounts of heavy metals which may be added annually to agricultural land (Table 4) [shall be adopted at the latest by 2023].

Table 2: Limit values for concentration of heavy metals in biosolids (mg.kg ⁻¹ DS)							
Soil pH	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
pH < 7	20	1000	1000	16	300	750	2500
pH > 7	40	1500	1750	25	400	1200	4000

Table 3: Limit values for concentrations of heavy metals in soil to which biosolids is applied biosolids (mg.kg ⁻¹ DS)							
Soil pH	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
pH < 7	1	100	50	1	30	50	150
pH > 7	3	150	140	1.5	75	300	450

Table 4: Limit values for amounts of heavy metals which may be added annually to agricultural land, based on a 10-year average biosolids (mg.kg ⁻¹ DS) ⁵						
Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
0.30	6	9	0.10	3	15	30

Alternative proposal by Italy on Limit values for heavy metals in biosolids related to Table 2 (noting that this proposal does not address all heavy metals included in Table 2 (except for Chromium)):

Table 2.bis: Limit values for concentration of heavy metals in biosolids (mg.kg ⁻¹ DS)
Hydrocarbons (C10-C40) ≤1.000 (mg/kg wet basis);
Σ PAH (selected congeners) ≤6 (mg/kg DS);
PCDD/PCDF + PCB DL ≤25 (ng WHO-TEQ/kg DS),
PCB ≤0,8 (mg/kg DS);

⁴ In the views of the Secretariat, replacing “appropriate treatment steps” with “adequate treatment” represents a better formulation

⁵ Based on comments received from the Contracting Parties that ELVs in Table 4 should be set based on national provisions for soil protection, or be considered as indicative values and not limits, the Secretariat recommends to the Meeting the deletion of Table 4.

Table 2.bis: Limit values for concentration of heavy metals in biosolids (mg.kg ⁻¹ DS)
Toluene ≤100 (mg/kg DS);
Selenium ≤10 (mg/kg DS);
Beryllium ≤2 (mg/kg DS);
Arsenic <20 (mg/kg DS);
Total Chromium <200 (mg/kg DS), Chromium VI <2 (mg/kg DS).

Alternative proposal by Italy on Limit values for heavy metals in soil related to Table 3

(noting that all values are identical with the exception of the upper limit of Zinc of 300 instead of 450 mg/l and that no values are given for Chromium. Also noting that the range give corresponds with the low pH for lower limit and high pH for higher limit):

Table 3.bis: Limit values for concentrations of heavy metals in soil to which biosolids is applied biosolids (mg.kg ⁻¹ DS) as proposed by Italy							
Range	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
Lower	1	-	50	1	30	50	150
Upper	3	-	140	1.5	75	300	300

Proposal by France

[8.bis The Contracting Parties shall specify the conditions for use of sludge in its different states (stabilized, treated, untreated) taking into consideration the closeness of various types of human activities and civil structure facilities/natural features as presented in Table 5.]

<i>Table 5: Applications of sludge uses with regards to various human activities/ civil structure facilities and natural features</i>		
Nature of activities to be protected	Minimum isolation distance	Field of application
Wells, boreholes, springs, aqueducts passing water intended for free-flowing human consumption, installations underground or semi-underground used for the storage of water, whether these are used for the supply of drinking water or for watering vegetable crops	35 metres	All types of sludge, slope of land less than 7%.
	100 metres	All types of sludge, slope of land greater than 7%.
Rivers and bodies of water	35 metres from the banks	General case, with the exception of the cases below:
	200 metres the banks	Non-stabilized or non-solid sludge and slope of the land greater than 7%.
	100 metres the banks.	Solid and stabilized sludge and slope of the land greater than 7%.
	5 metres the banks	Stabilized sludge buried in the ground immediately after spreading, slope of the land less than 7%.
Buildings inhabited or usually occupied by third parties, recreation areas or establishments open to the public	100 metres	General case with the exception of the cases below.

<i>Table 5: Applications of sludge uses with regards to various human activities/ civil structure facilities and natural features</i>		
Nature of activities to be protected	Minimum isolation distance	Field of application
	Not applicable	Treated sludge, stabilized sludge buried in the soil immediately after spreading
Shellfish areas	500 metres	All sludge except treated sludge and except derogation related to the topography.
	MINIMUM DEADLINE	
Grassland or forage crops	Six weeks before putting back to the grass animals or harvest fodder crops Three weeks before putting back to the grass animals or harvest fodder crops	General case, except treated sludge. Treated sludge.
Land assigned to vegetable and fruit crops except for fruit tree crops	No spreading during growing season.	All types of sludge
Land intended or assigned to market gardening or fruit trees, in direct contact with the soil, or likely to be eaten raw.	Eighteen months before the harvest, and during harvest season Ten months before harvest, and during the harvest season	General case, except treated sludge. Treated sludge.

9. [The Parties shall set maximum limit values for heavy metals in industrial wastewater effluents discharging to collecting systems and urban wastewater treatment plants in accordance with the provisions of the Regional Plan for Urban Wastewater Treatment.]⁶
 10. [The Parties shall apply [adequate treatment] appropriate treatment steps to reduce quantities of microplastics, pharmaceuticals and personal care products (PPCP) discharged in the raw wastewater.]⁷ [~~Methods for assessment and reduction of microplastics in urban wastewater are presented in Appendix II.~~]⁸
 11. In the event that quality limits set in Tables [1 to 5] cannot be met, the Parties shall apply alternative means to agricultural use including incineration and regulated landfilling ensuring that in both cases, there is no negative impact on the environment, particularly for water sources and that disposal of sewage sludge in coastal areas is prohibited.
 12. The parties shall apply appropriate treatment processes to reduce volatile organic compounds and diminish possible odor emissions in the different stages of sludge treatment, transport and application in agriculture and other suitable uses.
- II. Sewage sludge use and energy/nutrient recovery
13. The Contracting Parties shall [establish] [develop] the required infrastructure for [the implementation of the requirement of this Regional Plan with regards to the use for agricultural

⁶ In the views of the Secretariat, it may be redundant to maintain this Article in the present Regional Plan since it is already included in the regional plan for urban wastewater treatment

⁷ In the views of the Secretariat, it may be redundant to maintain this Article in the present Regional Plan since it is already included in the regional plan for urban wastewater treatment

⁸ In the views of the Secretariat, Appendix II on “assessment of presence of microplastics, pharmaceuticals and personal care products in sewage sludge and methods for reduction at source” should be deleted and included in common technical guidelines to facilitate the implementation of this Regional Plan.

land applications and/or for energy/nutrient recovery at the latest by 2035]. [~~Appendix III provides guidance for treated sewage sludge (biosolids) use in agriculture and land reclamation. Appendix IV provides guidance for sewage sludge use in waste to energy plants (sewage sludge incineration).~~]⁹

III. Considerations for reducing impacts of climate change

14. The Parties shall reduce energy costs and increase water savings during treatment by using BAT and applying BEP including the use of alternative and renewable energy sources based on advanced technologies such as anaerobic digestion, pyrolysis/gasification, mass burning and other technologies.
15. The Parties shall implement technologies targeting energy efficient treatment of sludge such as pretreatment of sludge, solar drying, bio-drying, composting, etc.
16. The Parties shall promote implementation of adaptation measures for climate change protection including:
 - i. Taking advantage of the biosolids as an important source of nutrients and organic matter;
 - ii. Using biosolids as soil amendment to combat desertification; improve infiltration of water (**precipitation or irrigation water**); ensure better drainage in high rainfall areas; and decrease surface water runoff;
 - iii. Increasing on-site carbon sequestration potential.

IV. Monitoring

17. The Parties shall take measures to ensure monitoring of quality of sewage sludge in (i) the treatment plant and (ii) after treatment with the aim of determining sludge class for use in agriculture or for incineration, and accordingly, to select the appropriate monitoring programme [~~as provided for in Appendix V~~].¹⁰

Alternative Proposal by the Secretariat to accommodate a number of concerns raised by the Contracting Parties

[17.bis The Contracting Parties shall take measures to ensure monitoring of the quality of sewage sludge in the WWTP or after treatment outside the WWTP, whichever constitutes the last treatment process before use, with the aim of determining sludge class for use in agriculture or for incineration, and accordingly, to select the appropriate monitoring programme as provided in Table [6] on the frequency of monitoring for pollutants, pathogen densities, and vector attraction reduction in sewage sludge.] [To this aim, the Contracting Parties collaborate to formulate common agreed technical guidelines on routine monitoring of treated sewage sludge.]

Table 6: frequency of monitoring for pollutants, pathogen densities, and vector attraction reduction		
Amount of biosolids [Dry matter] Tons per 365-day period	Tons per day	Frequency

⁹ In the views of the Secretariat, Appendix III on “biosolids use in agriculture and land reclamation” and Appendix IV on “the technical main elements for sewage sludge use in waste to energy plants” should be deleted and included in common technical guidelines to facilitate the implementation of this Regional Plan.

¹⁰ In the views of the Secretariat, Appendix V on “routine monitoring of treated sewage sludge” should be deleted and included in common technical guidelines to facilitate the implementation of this Regional Plan.

> 0 to < 290	> 0 to < 0.80	Once per year
≥ 290 to < 1,500	≥ 0.80 to < 4.10	Once per quarter (4 times per year)
≥ 1,500 to < 15,000	≥ 4.10 to < 41	Once per 60 days (6 times per year)
≥ 15,000	≥ 41	Once per month (12 times per year)

ARTICLE VI

Technical Assistance, Transfer of Technology and Capacity Building

18. For the purpose of facilitating the effective implementation of the measures and monitoring obligations under Article V of this Regional Plan, the Parties are urged to consider the techniques provided for in this Plan and to exchange and share best practices directly or with the support of the Secretariat including BAT, BEP, sustainable consumption and production, **circular economy**, resource efficiency, WEFEX Nexus in the design, construction, operation and maintenance of the urban wastewater treatment plants.

ARTICLE VII

Timetable for Implementation

19. The Parties shall implement the measures included in this Regional Plan as per the timelines associated with these measures.

ARTICLE VIII

Reporting

20. The Parties shall report on implementation of measures stipulated in this Regional Plan in line with the reporting requirement and timelines provided in Article 26 of the Convention and Article 13, paragraph 2(d) of the LBS Protocol.

ARTICLE IX

Entry into Force

21. The present Regional Plan shall enter into force and become binding on the 180th day following the day of notification by the Secretariat in accordance with Article 15, paragraphs 3 and 4, of the LBS Protocol.