



Zero PM

Zero pollution of Persistent, Mobile substances

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Deliverable Work Package Leader: Sarah Hale
Stiftelsen Norges Geotekniske Institutt (NGI)

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Note about contributors

Lead partner responsible for the deliverable:	Stiftelsen Norges Geotekniske Institutt (NGI)
Deliverable prepared by:	Sarah Hale
Partner responsible for quality control:	DVGW Deutscher Verein Des Gas- Und Wasserfaches – Technisch-Wissenschaftlicher Verein EV (DVGW)
Deliverable reviewed by:	Marcel Rigel
Other contributors:	The University of the Aegean, Athanasios Stasinakis Norsk Institutt for Vannforskning, Ian Allan

Project information

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Web-site:	www.zeropm.eu
Project coordinator:	Norwegian Geotechnical Institute, (NGI project no.: 20210423)

Project partners:



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UNIVERSITY OF TECHNOLOGY



Summary

This report describes measures taken by the H2020 ZeroPM consortium to ensure compliance of project activities with ethics requirement No 4 (EPQ – Environment Protection, Health and Safety). It provides information about possible harm to the environment caused by the research, the measures that will be taken to mitigate these risks and the required health and safety procedures.



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1 Summary

This report describes measures taken by the H2020 ZeroPM consortium to ensure harm to the environment is not caused by the research.

2 Health and safety procedures

The health and safety of the staff working in the laboratory or field is ensured through compliance with strict institutional, national and/or international guidelines and legislation. All beneficiaries are committed to adhering to their respective institutional/national rules related to protection of the environment.

Laboratory work will be carried out in WP6 Risk Assessment under tasks 6.3 and 6.5 and in WP7 Technical Solutions under tasks 7.1, 7.2, 7.3 and 7.4. Field work will be carried out in WP7 Technical Solutions under tasks 7.1, 7.2, 7.3 and 7.4.

2.1 Ensuring health and safety of staff and the environment in the laboratory

All laboratory work will be performed in fume hoods and properly ventilated areas when needed. The appropriate protective clothing will be used. The intrinsic properties of the chemicals to be used are considered before handling them. All cell based laboratory work will be performed under Microorganisms Laboratory scale ML-I conditions as a minimum, and under Microorganisms Laboratory scale ML-II conditions if required. Several of the laboratories are accredited according to ISO 17025, the main ISO standard used by testing and calibration laboratories.

Health and safety procedures in beneficiary's laboratories now also include an assessment of risks related to the transmission of Covid-19.

2.2 Ensuring health and safety of staff and the environment in the field

Prior to carrying out field work all beneficiaries will carry out a full risk assessment and job safety analysis. Safety briefings will be given by test site operators the first time new staff work at a ZeroPM test site. All tasks will be carried out by considering the intrinsic properties of the samples taken.

3 Identification of potential harm to the environment

Potential harm to the environment has been identified due to the persistent, mobile substances themselves and the laboratory and field work to be undertaken. In the laboratory experiments will be carried out whereby given concentrations of PM



substances will be added to media. In the field work, PM substances will not be added to any media during the testing to be carried out.

3.1 Persistent and mobile (PM) substances

The PM substances to be used in the work have intrinsic physicochemical properties that mean that if they are not used, handled and disposed of in the correct manner, then they could cause harm to the environment. The persistent nature of the substances means that they are recalcitrant and will not (bio)degrade sufficiently in the environment, even over very long periods of time. In addition, their mobility means that they are capable of travelling very long distances with water. These properties combined results in the potential for accumulation in the environment and the possibility for negative ecological and human health effects.

3.2 ZeroPM laboratory work

The laboratory work carried out has been identified to present the following potential harm to the environment:

- ▼ The water samples and solvent samples (produced during sample work up) may contain amounts of PM substances which have to be treated and disposed of properly.
- ▼ The sludge and the hydrochar produced at the end of different experiments may contain amounts of the added PM substances. Small amounts of solvents, acids or other toxic or corrosive chemicals will be used for the characterization of sludge and hydrochar.
- ▼ The formation of explosive gas mixtures due to improper operation is also conceivable.

3.3 ZeroPM field work

The field work carried out at the ZeroPM test sites: Rastatt, Upper Rhine and Mytilene has been identified to present the following potential harm to the environment:

- ▼ Possible incomplete removal of PM substances from the treatment processes installed at test site Rastatt. Residue PM substance will be released with effluent to the sewer system.
- ▼ Sludge and hydrochar produced at test site Mytilene may contain concentrations of PM substances that are commonly found in the by-products of sewage treatment plants.
- ▼ Waste production, solvent and solvent waste spills when manipulating and setting up instruments in the field.

4 Measures taken to mitigate risks of potential harm to the environment

All members of the ZeroPM consortium will take the necessary procedures to ensure that harm to the environment does not result from the laboratory and field work to be carried out.



4.1 Laboratory work

All laboratories in the ZeroPM consortium will follow their respective institutional and/or national guidelines for safe storage, handling and disposal of chemicals and chemical waste. All staff members will receive training to ensure compliance. Specific risk assessments carried out by all participating laboratories will identify hazards and are updated regularly.

4.1.1 Training

Training will be carried out by responsible persons at the respective beneficiaries to ensure familiarity with storing, handling and disposing of chemicals and biohazardous materials.

4.1.2 Labelling

All chemicals used in ZeroPM are classified and then labelled before use to ensure that they are stored, handled and disposed of properly. The physicochemical properties of all chemicals (including solvents) and materials used are documented via the materials safety data sheet and this information is kept on file by each beneficiary.

All chemicals will be clearly labelled with the following information: Name of substance, hazard class and symbol according to the Global Harmonised System, chemical formula, project reference, name of responsible person. All chemicals will be registered in appropriate partner systems in addition to respective material safety data sheets. All waste is labelled with the following information: Type of substance(s), type of waste, solvent residues, project reference, name of responsible person. In principle all chemical wastes are classified as hazardous waste/goods.

4.1.3 Storage and handling

All chemicals will be stored in accordance to details given in the respective material safety data sheets in ventilated, fire proof chemical cupboards. All chemicals will be stored safely on shelves and in cupboards. Glass bottles will not be stored above head height.

Handling and use of chemicals takes place according to European regulations, e.g. Nagoya protocol to ensure the safety and health of staff and prevent release in to the environment. All chemicals will be handled in accordance to details given in the respective material safety data sheets taking the appropriate precautions (protective clothing etc). Solvent bottles are equipped with ventilation valves or waste bottles with exhaust air filters. All laboratory work will be performed in fume hoods and properly ventilated areas when needed, the chemical properties of compounds are considered before handling chemicals in the laboratory. Dilute solution of chemicals will be prepared to avoid storing large amounts of pure chemicals.



Sludge and hydrochar produced in laboratory experiments will be stored separately in hazardous containers, will be labelled accordingly and will be kept in a specialized freezer before their safe disposal.

Genetically modified organisms (GMO) are registered and used according to European law requirements. Where needed, MLI or MLII regulations are applied for working with GMOs and/or human cells (NB. these are immortalised cell lines and not primary human cells/tissues) in the laboratory.

4.1.4 Final disposal

All waste chemicals and materials will be disposed of according to safe practice. Methods may include, but are not limited to incineration, wet chemical treatment, and/or landfilling. Waste containing hazardous substances will be handled by certified disposal company.

Solid chemical waste is collected in biosafety bins and incinerated. Small quantities of chemicals can be disposed of in their original containers provided they are packaged and sealed correctly and the contents are clearly stated on the label. Solid chemicals without risk of reaction with each other (e.g. some salts) may be packed directly in a cardboard box for hazardous waste, if a list of all contents is attached. Any waste that is contaminated with hazardous substances such as reagents, solvents or neat PM substance standards will be disposed of accordingly. Water samples containing elevated concentrations of PM substances will be treated by activated carbon sorption before being disposed of properly.

The stored amounts of sludge and hydrochar will be transferred periodically to an authorized hazardous waste company for incineration or/and chemical treatment.

4.2 Field work at ZeroPM test sites

All ZeroPM partners will follow their respective institutional and/or national guidelines to ensure harm to the environment does not arise from field work.

4.2.1 Training

All ZeroPM members carrying out field work will receive adequate training to ensure that harm to the environment is avoided. They will receive training about how to operate pilot scale machinery and systems as well as how to perform sampling.

4.2.2 Sampling

All samples will be taken by trained technical personnel using the appropriate protective clothing (gloves etc). Samples will be collected into appropriate, labelled containers that have been properly cleaned and meet the requirements of the parameters that will be investigated. The collected samples will be kept by the sampler or shipped to ZeroPM beneficiaries that will use them. Shipping will conform



to the International Air Transportation Association (IATA) hazardous materials shipping requirements.

4.2.3 Pilot scale testing

The ZeroPM consortium will apply the following procedures at the test sites to ensure that the pilot scale testing does not cause harm to the environment.

- ▼ Rastatt: Concentrations of PM substances in the effluent of the pilot plant will be measured regularly to ensure that no relevant amounts of PM substances enter the sewer system. Electrochemically treated regenerates will be analysed for remaining PM substances. The final disposal method will be decided based on resulting concentrations. Methods include neutralisation, discharge to the sewer system, and disposal via certified disposal company. In order to ensure that explosive gas mixtures are not formed at the test site due to improper operation of the electrochemical degradation plant, the manufacturer of the test plant has designed the control system in such a way that all conceivable mechanical defects or operating errors are detected and the plant is automatically shut down. Only qualified personnel will be allowed to operate the system.
- ▼ Mytilene: The final by-products of the processes (digested sludge, hydrochar) will be transferred to the landfill according to the current practise that is followed by the operators of STP for the produced sludge.

5 Documentation

Copies of relevant documents about the possible harm to the environment and the risk mitigation measures taken to avoid them are kept on file and will be submitted to the REA upon request.





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