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ANALYSIS OF THE ENVIRONMENTAL FACTORS

- ZONES DESIGNATED FOR THE EXPANSION OF THE CHEMICAL INDUSTRY COMPLEX IN PRAHOVO -

At the address: Braće Jugovića 2, PRAHOVO

March 2023

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TERMS OF REFERENCE

In accordance with the Client's request, the Author's task is to prepare an Analysis of the condition of environmental factors in the zones designated for the expansion of the chemical industry complex in Prahovo (hereinafter: the Analysis), in accordance with all relevant regulations of the Republic of Serbia that treat the subject matter. In addition, the Authors of the Analysis are obliged to use other documents of recognized international (WHO, EEA) and national institutions (EPA-USA, ATSDR, OSHA, NEAA-Netherland) etc., which deal with the issue of the condition and monitoring of environmental factors. The zones designated for the expansion of the chemical industry complex in Prahovo are planned by the Second Amendment to the Detailed Regulation Plan for the chemical industry complex in Prahovo.

Investors of new industrial plants and facilities in the planned expansion zones of the chemical industry complex in Prahovo will be subsidiaries of the parent company Elixir Group doo Šabac, the Contracting authority of this Analysis.

The analysis of the condition of environmental factors is done within the previous works of the Commissioner, for the purpose of developing planning and technical documentation for the expansion of the activities of companies that are investors.

The aim of the Analysis is to assess the condition of the environment and evaluate possible needs for interventions to improve that condition.

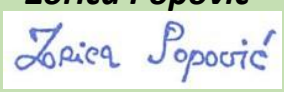
At the same time, the Analysis should provide the basis for the development of the Monitoring Plan in all phases of project implementation (in the preparatory works phase, construction phase, in emergency situations and exploitation phase).

The Commissioner agrees with the following content of the analysis:

1. ***Methodology of Analysis Conduction***
2. ***Overview of relevant regulations***
3. ***Hazard identification***
4. ***Presentation of the results of previous research***
5. ***Presentation of results of targeted research***
6. ***Interpretation of results in accordance with the Tier procedure***
7. ***Need for interventions-protection measures***

DIRECTOR
Zorica Popović

Date: **01/03/2023**



INTRODUCTORY NOTES

The chemical industry complex in Prahovo is located in Eastern Serbia, on the border of Serbia, Romania and Bulgaria. The industry is located along the bank of the Danube (about 100 m away), about 10 km from the city of Negotin and about 300 km from Belgrade.

Figure 1: City of Negotin on the map of the Republic of Serbia

Social enterprise IHP Prahovo (eng. ICP Prahovo) was founded in 1960, first as a factory of superphosphate, i.e. as a chemical part of the Bor basin metallurgical complex.

In August 2012, "Elixir Group d.o.o." Šabac (hereinafter: Elixir Group), privatized part of the property of ICP Prahovo and then founded a member company "Elixir Prahovo – Industrija hemijskih proizvoda d.o.o." Prahovo (hereinafter: Elixir Prahovo), which in the following period (until 2015) successively privatized all industrial facilities belonging to different legal entities of the former holding company ICP a.d. Prahovo (hereinafter: ICP Prahovo).

Figure 2: Situation in the year 2012 (P=100ha)

In 2014, the Municipality of Negotin adopted a Detailed Regulation Plan for the chemical industry complex in Prahovo, which defines the spatial unit "Industrial Complex", designes the expansion and formation of a new zone for the construction of a modern phosphogypsum warehouse. Figure no. 3 displays the new area of the complex increased to a total of 141.91 ha, and Table 1 displays the planned purpose of the areas.

Figure 3: Situation in the year 2014 (P= 141.91ha)

Table 1: Surface areas according to the 2014 DRP

Planned purpose of the areas (DRP 2014)	ha
SPATIAL UNIT - INDUSTRIAL COMPLEX	141.91
ZONE I - Existing industrial complex	75.27
ZONE II - Phosphogypsum Storage	66.64

Within the zone of the existing industrial complex, on a special cadastral plot with a total area of about 3 ha, in the northwestern part of the complex, a new technological unit owned by the French company Phosphea was formed, with all the necessary facilities for the production of mineral phosphate nutrients with a capacity of 100,000 t per year, namely monocalcium phosphate (MCF) and dicalcium phosphate (DCF), which are used as a component for animal feed.

Today, Elixir Prahovo produces about 150,000 tons of phosphoric acid annually (expressed on the basis of the active substance P_2O_5– phosphorus pentoxide), mineral fertilizers with an annual capacity of 300,000 tons and aluminium trifluoride with an annual capacity of 5,000 tons.

Two amendments to the Detailed Regulation Plan (DRP), within the defined limits, with a total area of 316.34 ha, were made in order to create urban, architectural, technical, infrastructural and traffic prerequisites for the expansion of the chemical industry complex in Prahovo in order to adapt to new technological solutions, as well as for the construction of compatible plants and industrial parks. This was done in order to ensure the conditions for long-term development of the subject area, as well as to improve the energy efficiency of current and future facilities and plants.

Amendments to the DRP established new zones for the construction of the Industrial Park, Chemical Park, Energy and Ecological Island intended for the construction of plants for the energy utilization of waste and landfills of non-hazardous waste, zones for the expansion of phosphogypsum storage, as well as the provision of buffer zones of greenery and the relocation of local roads outside the spatial unit of the industrial complex. This ensures the isolation of the agricultural activity zone and residential areas from the impact of the industrial complex and the production process.

Table 2: Surface areas according to the second amendment to the DRP (2022)

Planned purpose of the areas (Amendment of DRP-2 from 2022)	ha
SPATIAL UNIT - INDUSTRIAL COMPLEX	316.34
ZONE I - Existing industrial complex	57.37
ZONE II - Phosphogypsum Storage Facility	135.32
ZONE III - Chemical Park	66.78
ZONE IV - Energy and Ecological Island	26.46
ZONE V - Industrial Park	30.41

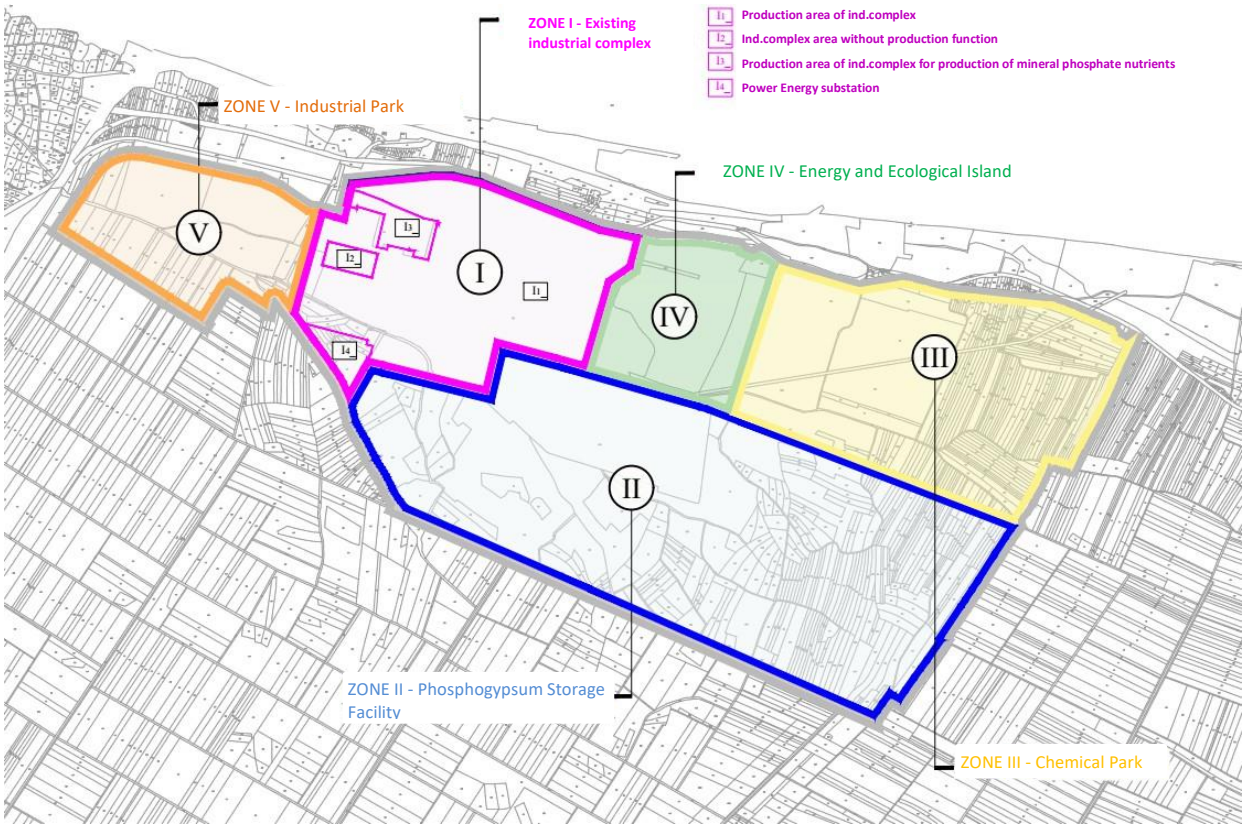


Figure 4: Segmentation of the chemical industry complex in Prahovo into zones/parts of zones (Other amendments to the Detailed Regulation Plan for the chemical industry complex in Prahovo ("Official Gazette of the Municipality of Negotin" no. 17/2022).

In accordance with the Terms of Reference, the Analysis of Environmental Factors is done for the following zones:

- Zone II - Phosphogypsum storage facility (existing and planned), P= 135.32 ha and

- Zone IV - Energy and ecological island (future Eco Energy complex with a plant for energy utilization of waste and a landfill of non-hazardous waste), P= 26.48 ha.

Zone III - Chemical Park, P= 66.78 ha (which is adjacent to Zones II and IV), is not covered by the Terms of Reference, but was considered as part of the area of importance for the assessment of the condition of the environment in Zones II and IV.

Total area of Zones II+III+IV= 228.58 ha.

1. METHODOLOGY OF ANALYSIS CONDUCTION

For the conduction of the Analysis in question, the authors applied the methodology "by research tiers" ***(Tiered approach)***, based on the procedures published by **ASTM 2015**. (American Society for Testing and Materials) in guides **E2081 and E1739**.

The advantage of this methodology is that it maximizes the use of available data and gives authors the opportunity to continue research, if necessary, in order to draw relevant conclusions. The most common 3 tiers of Tier analysis are:

- **Tier 1** - qualitative analysis based on general data and existing results of examinations,
- **Tier 2** - semi-quantitative analysis based on additional examinations and
- **Tier 3** - quantitative analysis based on detailed examinations, with the application of suitable models.

The tiers and their descriptions vary in different international practice, so that Tier 1 can have a fully qualitative approach, based primarily on expert opinion or semi-qualitative, based on a generic screening level.

Tier 1 (screening) is a method based on a limited amount of data by which impacts can be assessed and can be applied when data are difficult to compare due to different approaches and methodologies of previous research. Therefore, experts are required to have a good knowledge of the conditions on the analyzed complex and experience in the application of the aforementioned Tier methodology. A well-conducted Tier 1 analysis must answer the question of whether the first-level analysis is sufficient to conclude on possible impacts, or whether it is necessary to move to higher levels.

Tier 2 (scoping) can vary from semi-quantitative approach to exposure volume calculation with impact modeling.

Tier 3 (modeling) involves performing detailed examinations that will provide data to clearly define the scope of the required remediation. At the same time, in situations where there is a need for rapid prediction of the spread (migration) of pollutants in different media, in order to take urgent remediation measures, modeling is done according to the adopted scenario.

Regardless of the level of analysis, the basic instrument used in the application of the methodology described is the ***Initial Conceptual Site Model - ICSM***, which enables understanding of migration, chemism and fate of identified pollutants.

The values of pollutants of importance for the analysis (maximum permissible concentrations, limit values, remediation values, target values, etc.) are taken from the regulations that treat the subject matter in the Republic of Serbia, but also from the documents of other relevant international and national institutions.

2. OVERVIEW OF RELEVANT REGULATIONS APPLIED IN THE PROCESS OF THE ANALYSIS CONDUCTION WITH A COMMENT

When preparing the Analysis, the authors had in mind the following regulations:

- **Law on Environmental Protection** ("Official Gazette of the RS", nos. 14/2016, 76/18, 95/18 - other law) According to this Law, environmental pollution is the introduction of pollutants or energy into the environment, caused by human activity or natural processes that have or may have harmful effects on the quality of the environment and human health, while the capacity of the environment is the ability of the environment to accept a certain amount of pollutants per unit of time and space so that irreversible damage to the environment does not occur, and the level of pollutants is the concentration of pollutants in the environment, which expresses the quality of the environment in a certain time and space. The remediation plan is adopted when pollution in a particular area exceeds the effects of the measures taken, i.e. when the capacity of the environment is endangered or there is a risk of permanent deterioration of quality or damage to the environment.

- **Law on Environmental Impact Assessment** ("Official Gazette of the RS", nos.135/04, 36/09) - In accordance with the Law, the Request for the Need for Impact Assessment and the Request for Determination of the Scope and Content of the Impact Assessment Study should, among other things, contain a description of the environmental factors that may be exposed to the impact.

- **The Rulebook on the Content of the Environmental Impact Assessment Study** ("Official Gazette of the RS" no. 69/05) stipulates that the Study should contain an overview of the condition of the environment at the site and in the immediate vicinity (micro and macro location).

- **Law on Soil Protection** ("Official Gazette of the RS", no. 112/2015) - Article 30 of this Law defines the obligation of the landowner: -"the owner or user of the land or plant, whose activity may be or is the cause of soil pollution and degradation, shall monitor the land in accordance with this Law, in such a way that:
  1) presents data on the quality of the soil before the start and after the completion of the activity;

2) monitors changes of the soil and in the soil in the prescribed manner in the zone of impact of its activities;
3) the data on changes of the soil and in the soil are submitted to the Ministry and the Environmental Protection Agency (hereinafter: the Agency)".

In accordance with the aforementioned Law on Land Protection, two by-laws have been adopted:

- **The Rulebook on the methodology for the development of rehabilitation and remediation projects** ("Official Gazette of the RS" no. 74/2015), which contains the basic elements of the Project, but not the required scope of works that will provide sufficient data on the required scope of rehabilitation and remediation and
- **The Regulation on Limit Values for Pollutants, Harmful and Hazardous substances in soil** ("Official Gazette of the RS", nos. 30/2018 and 64/2019), which has been applied since 2020 but has not taken into account data on soil characteristics in the Republic of Serbia, so the measured concentrations of Ni, Zn, Cu and V often exceed the limit value, although the identification of pollution sources does not provide data on their presence. The lack of regulations is also that the Regulation does not prescribe concentrations of pollutants according to the purpose of the soil, but the required values are the same for all purposes.

- **The Regulation on the Programme of Systematic Monitoring of Soil Quality** ("Official Gazette of the RS", no. 88/2020), which more closely determines the "content of the Soil Monitoring Program, methodology for systematic monitoring of soil quality and condition, criteria for determining the number and layout of measuring points, list of parameters for a particular soil type, list of methods and standards used for soil sampling, sample analysis and data processing , scope and frequency of measurements, indicators for assessing the risk of soil degradation, deadlines and method of data submission".
  Soil quality monitoring is organized within the state and local quality monitoring network. Article 6 of the Regulation states that: "The degree of threat to the soil from chemical pollution is determined on the basis of the values of polluting, harmful and hazardous substances in the soil given in the regulation setting the limit values of polluting, harmful and hazardous substances in the soil and on the basis of the values of hazardous and harmful substances in groundwater given in the regulation setting the limit values of hazardous and harmful substances in groundwater".

- **The Rulebook on the list of activities that may be the cause of soil pollution and degradation, procedure, data content, deadlines and other requirements for soil monitoring ("Official Gazette of the RS", no. 102/2020),** contains a List of activities that may be the cause of soil pollution and degradation, within Appendix 2, selection of measuring points and sampling for soil research, methods and standards for sampling, preparation of samples and research of physical and chemical properties of soil.

- **Law on Waters** ("Official Gazette of the RS", nos. 101/2016 and 95/2918), is the basic regulation in the field of water protection and applies to all surface and groundwater in the Republic of Serbia.

- **The Regulation on Emission Limit Values for Pollutants in Surface and Groundwaters and Sediment and the Deadlines for Their Reaching ("Official Gazette of the RS", no. 50/2012)** defines the limit values of pollutants in surface waters in relation to the water class, according to the ecological status of the watercourse. Annex 2 of the Regulation provides quality standards for groundwater. The watercourse class is still determined based on **The Regulation on Water Categorization ("Official Gazette of SRS" no. 5/1968).**

- **The Regulation on Emission Limit Values of Pollutants in Waters and the Deadlines for Their Reaching ("Official Gazette of the Republic of Serbia", nos. 67/2011 and 48/2012, 1/2016)** sets emission limit values for certain groups or categories of polluting substances (pollutants).

- **The Regulation on Limit Values of Priority Substances and Priority Hazardous Substances Polluting Surface Waters and the Deadlines for Their Reaching ("Official Gazette of the Republic of Serbia", no. 24/2014)**, provides a definition, among others, of the mixing zone: "is a zone of surface water located near the point of discharge, i.e. the emission of individual priority substances from point sources of pollution in which their dilution and mixing with the receiver's water occurs and within the limit of which the concentration of the given substances may exceed the values for the environmental quality standard".

- **In the Regulation on Monitoring Conditions and Air Quality Requirements ("Official Gazette of the RS", nos. 75/2010 and 63/2013)**, are given the maximum permissible concentrations for the protection of human health in the case of dedicated measurements (Annex XV).

- **The Regulation on Noise Indicators, Limit Values, Noise Indicators Assessment Methods, Annoyance and Harmful Effects of Environmental Noise ("Official Gazette of the RS", no. 75/2010),** limit values for noise indicators are given, where it is stated in Appendix 2 (Table 1) that at the border of the industrial, storage zone and service area and transport terminals, without residential buildings, noise must not exceed the limit value in the zone with which it borders.

- **Law on Planning and Construction** ("Official Gazette of the RS", nos. 31/2019, 37/2019 - other law, 9/2020 and 52/2021), the part related to the Previous Works (Art. 112), for the construction of facilities.

3. HAZARD IDENTIFICATION

Hazard identification is the first phase of any analysis of the condition of environmental factors, which aims to identify and determine the pollutants that can, due to uncontrolled emissions, be found in the environment. A well-done identification of hazards provides sufficient

elements for the development of a monitoring programme, which can cover all elements of the environment. Identification of hazards, in this particular case, was made on the basis of an assessment of the technological production process, types of raw materials and energy sources used, generation of intermediate and by-products, generation of all types of waste and characteristics of the finished products.

Table 3: Potential pollutants

	SOURCES	POTENTIAL POLLUTANTS		
		RAW MATERIALS	**FINISHED PRODUCTS AND BY-PRODUCTS**	**WASTE MATERIALS**
1	FACTORY OF PHOSPHORIC ACID AND MINERAL FERTILIZERS	*PHOSPHATE,* H_2SO_4, Al2(SO4)3*, UREA, AMMONIA, OILS FOR LUBRICATION, POTASSIUM CHLORIDE, POTASSIUM SULPHATE*	*PURIFIED* H_3PO_4*, PHOSPHATE and NPK FERTILIZERS* H_2SiF_6*,* $CaSO_4$	SiF_4*, HF,* NH_3*, HCl PARTICULATE MATTER HEAT*
2	MCP FACTORY (Owned by french company)	$CaCO_3$*,* H_3PO_4	*MONO-CALCIUM PHOSPHATE, DI-CALCIUM PHOSPHATE*	*PARTICULATE MATTER*
3	PHOSPHO GYPSUM STORAGE FACILITY	/	*PHOSPHOGYPSUM*	*PARTICULATE MATTER, PRECIPITATING SUBSTANCES*
4	BOILER PLANTS	*COAL, FUEL OIL, CNG, FURNACE OIL*	*HEAT*	*NOx, CxHy, CO, HCHO,* SO_2*, PM, PRECIPITATING SUBSTANCES*
5	OTHER STORAGE FACILITIES	H_2SO_4*,* NH_3*, TNG, CNG, FUEL OIL, RAW PHOSPHATE, GASOLINE*	H_3PO_4	*PARTICULATE MATTER, VAPOURS AND GASES*

Table 3 did not include the facilities and activities of ICP Prahovo until privatization in 2012, which certainly have affected the condition of the environment, both in the complex itself and outside of it.

4. PRESENTATION OF THE RESULTS OF PREVIOUS RESEARCH

Numerous examinations of environmental factors were carried out at the chemical industry complex in Prahovo in the previous period. Particularly important for the Analysis in question are those related to the privatization process and the assessment of the size of historical pollution, but also those examinations of a more recent date, important for the preparation of technical documentation for the needs of reconstruction of production facilities, reconstruction and upgrading of infrastructure facilities and the construction of storage facility and warehouse premises.

Bearing in mind the adopted methodology for the conduction of the Analysis, the results of the previous research will be used to declare further activities based on the screening of the situation within the Tier 1 qualitative analysis.

This place will list studies, detailed studies and reports that were made in the period from privatization in 2012 until year 2020, within and in vicinity of the zone of the existing industrial complex, as part of the activities of the company Elixir Prahovo and which contain data on soil, groundwater, air and noise research.

For the selection of documents to be used for the conduction of analyses, as well as for the identification of sources of pollution and interpretation of environmental examination results, the 2020 Report on Activities at the Site of the Chemical Industry Complex in Prahovo, prepared by the Elixir Group, was also taken into account. The report covers activities on the existing industrial complex within Phase I (from privatization 2012 to year 2014 when the first DRP was adopted) and activities within Phase II, from 2014-2020, after which targeted environmental examinations were initiated for the needs of new extensions of the chemical industry complex in Prahovo (Phase III).

1) Report on the activities of the subsidiaries of the Elixir Group at the location of the chemical industry complex in Prahovo, Prahovo, 2020.

The area within which activities were carried out at the location of the chemical industry complex in Prahovo in Phase I of operation Elixir Prahovo from 2012-2014 is shown in Figure 2.

In 2012, Elixir Group engaged the City Institute for Public Health Belgrade and "Eko-Tok" d.o.o. in order to prepare a *STUDY OF THE CURRENT CONDITION OF THE ENVIRONMENT AT THE ICP COMPLEX "PRAHOVO",* soon after the privatization was completed. The task of the City Institute for Public Health, Belgrade and the Environmental Engineering and Management Company "EKO-TOK" d.o.o. from Belgrade was to prepare a Study of the current condition of the environment in ICP "PRAHOVO", especially from the aspect of risk to the environment and human health from the so-called historical pollution on the complex.

As part of the assessment of the current condition of the environment at the site in question, the Geoinženjering BGP_3 company was engaged, which carried out geological surveys, terrain probing, soil drilling with the installation of piezometers and provided logistical support

when sampling soil from material drilled. The focus of the planned research is directed towards determining the condition and potential contamination of soil and groundwater, as the substrates most vulnerable to historical pollution caused in the previous period. The selection of parameters and scope of research are defined on the basis of existing legislation, expert practices, prevalent technologies, expected impacts and status on the ground.

After identifying and assessing the amount of comparative pollutants on the complex during 2013, the following activities were initiated within Phase I (until 2014):

1. The quantities of waste found were handed over to authorized operators;
2. The pyrite burn residue was exported to China and "PROJECT OF REHABILITATION AND REMEDIATION OF THE LOCATION OF THE ROASTED PYRITE LANDFILL ON ICP ELIXIR PRAHOVO COMPLEX IN PRAHOVO" was made by the Expert Engineering Company for the location, and the Decision of the Ministry of EP No. 350-02-86/2013-05 of 16.08.2013 was obtained. In this area, the first cassette of the new PhosphoGypsum Storage was later built in accordance with the Environmental Impact Assessment Study; said Study was presented to the Romanian and Bulgarian Ministries of Environmental Protection in accordance with the ESPOO Convention

3. For the existing historical phosphogypsum landfill, the Rehabilitation and Remediation Project was developed and the Approval of the Ministry of Environmental Protection No. 350-02-68/2014-16 dated 24.10. 2014 was obtained. The project was developed by the company "Balbi Inženjering", Belgrade.

The rehabilitation and remediation project also included the necessary works related in particular to the levelling of the landfill body, the construction of perimeter embankments in sections in order to achieve clarification, excavating peripheral channels and recirculating the water used to transport phosphogypsum to the landfill. These works were in the function of securing reclamation areas. In order to prevent the spreading of fine particles from the location of the landfill of phosphogypsum, which is no longer used, rational and sustainable agrotechnical measures of landfill grassing have been defined;

4. A reconstruction of the phosphoric acid plant was also carried out and

5. In order to protect groundwater and soil, the reconstruction of the tanks at the storage facilities for phosphoric, sulfuric acids and ammoniacal spheres was carried out.

In order to enable the realization of new investments and the expansion of the chemical industry complex in Prahovo, the municipality of Negotin has started drafting the first planning document, the DRP for the chemical industry complex in Prahovo. The plan was made for an area covering an area of 141.91 ha. The DRP was adopted at the session of the Municipal Assembly of Negotin under number 350-153/2014-1/08 dated 16.06.2014 and published in the "Official Gazette of the Municipality of Negotin" number 21 dated 19.06.2014.

The area with implemented activities at the location of the chemical industry complex in Prahovo in the second phase of operation Elixir Prahovo from 2014-2020 is given in Figure 3.

The following works were carried out in Phase II:

1. A large number of old facilities have been removed and some existing facilities have been reconstructed in order to establish production of MCF and DCF (mineral phosphate fertilizers), new production of mineral fertilizers of various formulations, production of aluminum fluoride that solves the use of silicofluoric acid as a by-product from the production of concentrated phosphoric acid;

2. The reconstruction of the existing production facility of the production part (wet and dry TPP) was carried out, in order to change the purpose for the production of mineral fertilizers and the construction of accompanying facilities necessary for the completion of production. During the development of the conceptual design, the maximum utilization of existing equipment and installations was taken into account due to the similarity of previous production;

3. The reconstruction of the facility where aluminum fluoride was produced (it was not operational until the reconstruction) was carried out in the aluminum fluoride production plant with a capacity of 5000 t/year.;

4. The newly built plant is a 20 MW coal-fired boiler plant.

5. A new Phospho-Gypsum Storage was built in accordance with EU regulations and

6. Reconstruction and renovation of several infrastructure facilities was carried out, in the function of production and in order to improve the condition of the environment.

2) Environmental Assessment Report in ICP Prahovo, Prahovo, Consortium of companies of which Dekonta Aquatest-Belgrade is a local member, September 2005.

This report was prepared at the request of the Agency for Privatization of the Republic of Serbia, as a client. The report points to the poor condition of the complex and the lack of adequate monitoring of emissions and immissions. Numerous emitters that endanger the environment, primarily air and surface water, have been identified. A number of measures to improve the situation have also been defined, with deadlines for their implementation.

3) Extended environmental investigation Phase II at holding ICP ad Prahovo fertilizer factory in Prahovo, Serbia, Intergeo Environmental Technology, 2008.*

Based on the research results, it was found that the remediation value was exceeded for the following parameters:

Soil

- As in 3 and Cu in 5 samples,
- total hydrocarbons (TPH) in 5 samples,
- aliphatic hydrocarbons in 2 samples.

Groundwater

- As in one, Ni in 3 and Cd in one sample (over the remediation value),
- aliphatic hydrocarbons in 2 samples (over remediation value).

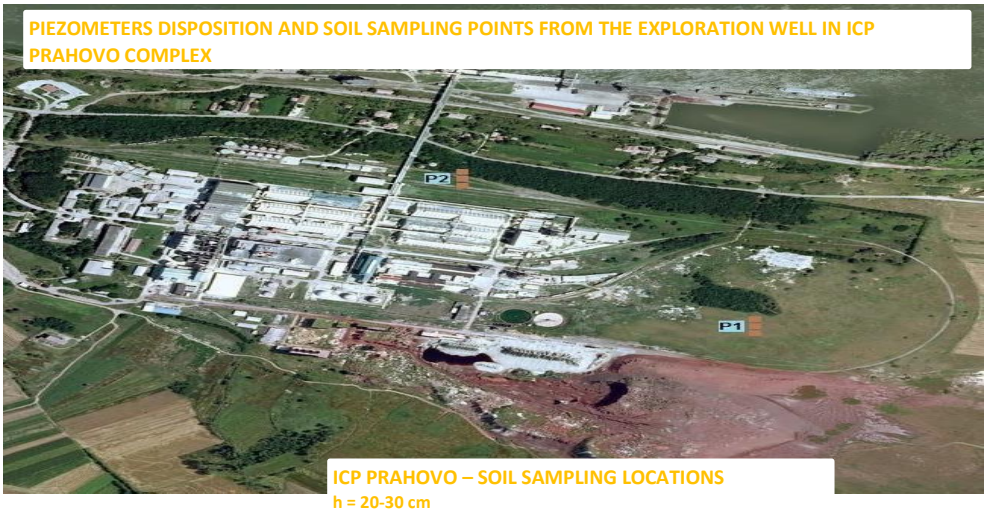
An increased concentration of fluoride, sulfates, nitrates and phosphates was also found in some samples of groundwater.

Surface waters

In most of the examined surface water samples (drainage channels, pipelines, etc.), an increase in the content of sulphates and heavy metals (As, Cu, Ni, Cd, Cr) was found, and in a smaller number of samples, a low pH and an increase in the content of TPH.

*We do not own the original document, the presented examination results are taken as quotations from other documents.

4) Study of the current condition of the environment at the ICP Prahovo complex, City Institute for public health, Belgrade 2012



ICP PRAHOVO – SOIL SAMPLING LOCATIONS
h = 20-30 cm

Based on the expert processing of the examination results of 3 samples of groundwater from the piezometer, the following could be concluded:

- in any sample examined, the concentrations of the examined parameters did not exceed the limit and remediation values of pollutants in groundwater according to the Regulations ("Official Gazette of the RS" 50/2012 and "Official Gazette of the RS" 88/2010).
- the only registered deviation refers to exceeding the concentration of ammonia at 2 locations in relation to the values for III and IV class of waters according to the Rulebook on hazardous substances in waters ("Official Gazette of the the SRS" 31/82),

The general conclusion is that soil contamination at certain sites within the complex ICP Prahovo did not significantly affect the quality of groundwater.

Table 4: The values of the examined parameters by sampling locations for the soil and drilled material

	Unit	Location 1			Location 2			Location 3		
		Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
pH		6.6	8.3	9.1	7.4	8.2	9.3	5.4	7.5	7.2
Total nitrogen	mg/kg	1549.0	1598.0	452.0	1434.0	2114.0	1099.0	890.0	623.0	343.0
Total phosphorus	mg/kg	584.0	434.0	184.0	1340.0	47.0	288.0	2300.0	711.0	624.0
Sulphate	mg/kg	1458.0	1093.0	1011.0	168.0	592.0	20.0	2079.0	7868.0	8487.0
Lead	mg/kg	14.9	10.2	3.0	16.9	9.9	4.6	3.1	5.8	3.9
Cadmium	mg/kg	0.0	0.0	0.0	1.2	0.2	0.0	1.8	0.0	0.0
Zinc	mg/kg	53.8	56.4	12.6	52.0	33.0	15.8	7.6	20.7	13.6
Copper	mg/kg	20.4	17.2	4.7	23.8	14.4	6.4	4.0	9.3	6.3
Nickel	mg/kg	42.3	31.6	10.9	35.2	38.5	15.5	0.7	18.4	21.3
Total chrome	mg/kg	36.7	22.2	11.8	23.2	20.3	12.8	4.6	14.5	17.1
Arsenic	mg/kg	5.7	6.5	0.0	5.2	6.3	2.5	2.3	4.2	2.5
Vanadium	mg/kg	34.0	15.4	8.0	16.1	14.1	9.1	2.1	11.9	8.2
Fluorine	mg/kg	36.0	28.0	8.7	51.0	55.0	13.0	759.0	31.0	28.0
C_{10}-C_{40}	mg/kg	23.5	10.9	16.2	0.0	0.0	13.1	32.7	29.5	18.7
Key:			Limit value exceeded							
			Remediation value exceeded							

Note: pH value, total nitrogen, total phosphate and sulphate values are not normalized, and only the limit value is normalized for fluorides

Table 5: *The values of the examined parameters by sampling locations for the soil from the surface layer*

	Unit	Loc. 1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8
pH		4.8	6.8	6.0	4.7	5.9	2.1	3.7	4.7
Total nitrogen	mg/kg	2612.0	2209.0	2832.0	2440.0	2555.0	165.0	1690.0	3027.0
Total phosphate	mg/kg	2160.0	73900.0	13400.0	36200.0	6520.0	363.0	2060.0	19500.0
Sulphate	mg/kg	3568.0	2256.0	1373.0	3568.0	3568.0	2779.0	5086.0	3568.0
Fluorine	mg/kg	26.0	55.0	139.0	2933.0	114.0	8.4	1195.0	899.0
Lead	mg/kg	209.0	43.5	21.9	260.0	23.6	358.0	47.0	228.0
Cadmium	mg/kg	0.7	4.6	1.0	5.0	2.1	0.3	0.2	2.1
Zinc	mg/kg	78.2	209.0	97.3	377.0	162.0	14.8	4.9	114.0
Copper	mg/kg	2230.0	186.0	83.4	395.0	43.5	186.0	10.5	183.0
Nickel	mg/kg	43.4	28.7	32.9	20.7	29.2	1.6	1.3	19.5
Total chrome	mg/kg	48.4	100.0	46.9	70.9	38.9	4.8	6.1	45.5
Arsenic	mg/kg	43.0	42.2	14.9	97.6	6.3	40.9	3.2	41.5
Vanadium	mg/kg	97.7	84.3	40.2	52.8	25.7	6.1	2.1	32.6
Molybdenum	mg/kg	14.3	6.7	1.0	12.2	1.0	1.9	1.1	17.6
PAH	mg/kg	0.4	0.4	0.1	20.2	0.9	0.3	0.6	15.5
C_{10}-C_{40}	mg/kg	64.9	114.2	60.2	1598.3	71.8	15.5	574.7	1303.4
Nitrophen (prazilin)	mg/kg	0.0	0.0	0.0	103.8	0.0	0.0	0.0	0.0
Key:		Limit value exceeded							
		Remediation value exceeded							

Note: pH value, total nitrogen, total phosphate and sulphate values are not normalized, and only the limit value is normalized for fluorides

For the interpretation of the results of the analyses, the values listed in the Regulation on the programme of systematic monitoring of soil quality via indicators for assessment of soil degradation risk and methodology for creation of remediation programmes were used as a reference standard ("Official Gazette of the RS" no. 88/10).

Based on the expert processing of the results of soil examination from the surface layer, the following were established:

- in a large number of soil samples, it was found that the limit value of one of the parameters examined according to the Regulation was exceeded,
- the most common deviation refers to an increase in the content of some of the heavy metals and total hydrocarbons (C10-C40), which in a large number of locations also exceeded the remediation value,
- in only one soil sample, the presence of pesticides was found in increased concentrations (site 4 in front of the Prazilin storage). The content of prasilin (nitrophen) in sample given is over 100 mg/kg, which is a very high value,
- concentrations of total nitrogen, total phosphates and sulphates, although not standardized, reached high concentrations at some locations, according to expert opinion,

- the pH value of the soil was most altered at the location behind the sulphuric acid tank where it was pH 2.1,
- significant concentrations of polycyclic aromatic hydrocarbons (PAHs) were registered only at 2 locations (site 4 and site 8),
- no presence of polychlorinated biphenyls (PCBs) and mercury was recorded in the examined samples. Generally speaking, the most significant contamination of the superficial soil layer within the factory area was registered at site 4 - in front of the prazilin storage (between the concrete plateau and the railway), where the highest concentrations (of all samples examined) of a number of parameters were found: cadmium, zinc, arsenic, fluorine, polycyclic aromatic hydrocarbons (PAHs), total hydrocarbons (C10–C40), and prazilin (nitrophen). In addition, the content of lead, copper, chromium and phosphate is high (second in value compared to other locations).

5) Rehabilitation and remediation project for the location of the roasted pyrite landfill at the "ICP Elixir Prahovo" complex in Prahovo, "EXERT-INŽENJERING DOO" Šabac, March 2013.

For the assessment of the condition of the environment given in a specific book of the Project for the rehabilitation and remediation of the location of the roasted pyrite landfill (book IV), the research data from 2012 were used within the **Study of the existing condition of the environment at the ICP Prahovo complex, City Institute for Public Health, Belgrade.** Location data (Book III) were used from the Rehabilitation and Remediation Project for the location of the roasted pyrite landfill.

6) Study on Environmental Impact Assessment of the Phosphogypsum Storage Project at the Elixir Prahovo Complex, University of Belgrade, Faculty of Mining and Geology, Aug. 2014.

The Faculty of Mining and Geology used research performed by Intergeo Environmental Technology, 2008 and the City Institute for Public Health in 2012 to assess the condition of soil and groundwater. To model the spread of pollution from the planned phosphogypsum storage, a quality diffusion model Aermod was applied.

7) Environmental impact assessment study of the construction of an energy plant for own needs with a power of 20 MW on solid fuel (coal) on cadastral parcel no. 2300, at the complex of the Company Elixir Prahovo, in Prahovo, PRO-ENERGO doo, Novi Sad, 2014.

This study also uses examination data from 2008 and 2012

8) Report on the condition of the environment in the vicinity of the new phosphogypsum storage facility, Elixir Prahovo ICP doo, Prahovo, December 2016

Concluding observations based on the 2016 research results

"The report was made in order to obtain relevant data on the condition of the basic substrates of the environment in the zone of possible impacts of the facility of the planned

Storage, in order to prospectively monitor possible changes through designated monitoring process. This will, in case of need, provide conditions for timely taking of protection measures.

The content and scope of the Report are based on the regulations that treat the subject matter, in particular: The Law on Environmental Impact Assessment, the Rulebook on the Content of the Environmental Impact Assessment Study and the Rulebook on the National List of Environmental Indicators.

The choice of measuring points and examined parameters is determined in accordance with the recommendations given in the documents of recognized national institutions (EPA) and international organizations (WHO and EEA), according to which the impact assessment of a particular activity or facility is performed by analyzing the following phases of life of each pollutant: identification of hazards-distribution and distribution of pollutants-transformation-effect. In doing so, the vulnerability analysis was also taken into account, i.e. the identification of all sensitive substrates of the environment and facilities that are potentially endangered (residence, agricultural areas, groundwater and surface water).

As part of the examination for the conduction of the Report, the basic substrates of the environment were taken: air, soil and groundwater. The choice of measuring points is selected so that the distribution of pollutants into the environment can be monitored in the event that all the envisaged protection measures are not implemented. At the same time, for comparison, samples were taken from agricultural areas south of the planned Storage.

Parameter selection is determined based on hazard identification. In doing so, the results of previous research were also taken into account. Earlier research found that the soil in the area within ICH Prahovo was contaminated. This is historical pollution caused by inadequate handling of raw materials, products and waste. It was also noted that the existing level of contamination would not be increased due to the exploitation of the new Storage facility.

New examinations have shown that in the vicinity of the planned Storage, the concentrations of several pollutants are above the normed values, but below the remediation values. The generally observed condition of the basic substrates of the environment in the vicinity is significantly more favorable than that of the factory complex, according to research from 2008 and 2012. Considering that the concentrations of identified pollutants cannot be associated in all cases with historical pollution, such findings should be investigated more closely in the monitoring process.

An important observation is that the activity at the new Storage facility will not increase the overall level of identified pollutants. At the same time, possible occurrences of any pollutant in water, air and soil related to phosphogypsum storage can be monitored by implementing the adopted monitoring programme and prevented, bearing in mind the results of this research.

9) Environmental Impact Assessment Study of the project: Factory for the production of mineral phosphate nutrients for animal nutrition at CP 2300 CM Prahovo, "Elixir

Prahovo", April 2017.

Drilling and soil examination were carried out in January 2017 at the location of the MCF and DCF plants (more detailed data on the examination results are given under item 12).

10) Report on research of the content of hydrofluorocarbons in ambient air, City Institute for public health, Belgrade 21-27.07.2017

At the location of the elementary school in Prahovo, the content of hydrogen fluoride was examined for **7** days. Averaging period was 24 h. All measured HF concentrations were lower than 1.0 microgram/m3.

LV=3 micrograms/m3/day (Law on Air Protection "Official Gazette of the Republic of Serbia" no. 10/2013 and The Regulation on Monitoring Conditions and Air Quality Requirements "Official Gazette of the Republic of Serbia" nos. 57/10 and 63/2013).

11) Environmental and social due diligence of Elixir Prahovo, Serbia, Dekonta-Belgrade, May 2019.

Environmental and social due diligence was done for the purpose of obtaining a bank loan. In the document, a significant place is taken by the analysis of social risks related to the work of the company. The focus of the environmental aspect is placed on the compliance of environmental management with relevant regulations and international documents. The results of previous measurements of emissions to air and water were used to assess emissions. Special measurements of the condition of environmental factors have not been performed.

12) Physical and chemical analysis of groundwater samples from piezometers X-4, X-2 and X-1, Institute for prevention, Branch 27 January, Niš, 05.12.2019.

Location: in the vicinity of the planned expansion of the phospho gypsum storage facility. A total of **3** samples.

The examination results are below the average annual concentration of the parameters examined prescribed by the Regulation on Limit Values of Pollutants in Surface and Groundwater and Sediment and Flows to Their Reach ("Official Gazette of the RS" no. 50/2012) and below the remediation values of polluting, harmful and hazardous substances in the soil according to the Regulation on Limit Values of Polluting, Harmful and Hazardous Substances in the Soil ("Official Gazette of the RS" nos. 30/2018, 64/2019).

Comment: Parameter values in piezometers differ in pH, temperature and BOD. The results, in terms of concentration of pollutants examined, are similar to those from 2016. (Report on the condition of the environment in the vicinity of the new phosphogypsum storage facility, "Elixir" Prahovo, 2016).

13) Environmental impact assessment study for the reconstruction and change of purpose project of the existing TPP for facility for production of mineral fertilizers within the Elixir

Prahovo complex, at CP 2300/1 KO Prahovo, "Elixir Prahovo", Prahovo, May 2020.

For this Study, the results of drilling and soil examination performed in January 2017 at the location of the MCF and DCF plants by MOL-Laboratory from Belgrade were used. Soil samples for research were sampled from 2 (two) wells, with three different depths. The limit value, remediation value and value that may indicate significant soil contamination (except for phenol, molybdenum, antimony, selenium, silver, fluorides, bromides and PAH) are given as corrected values in relation to the organic matter content and/or clay content according to the Regulation on the programme of systematic monitoring of soil quality via indicators for assessment of soil degradation risk and methodology for creation of remediation programmes ("Official Gazette of the RS" no. 88/2010):

Sample 1: Well MW-1

In the examined soil sample MW-1-1 sampled from a depth of 0.5 m, the concentrations of arsenic, selenium and metals of chromium, nickel, lead, copper, zinc, cadmium, mercury, molybdenum, cobalt, antimony and vanadium are lower than the limit values prescribed by the said Regulation. The concentrations of tin and silver are lower than the detection limits of the methods, as well as the values that can indicate significant soil contamination. Concentrations of fluoride, bromide and phenol are lower than the limit values prescribed by the said Regulation.

Concentrations of organic pollutants – mineral oils C10 - C 40, polychlorinated biphenyls (PCBs), total polycyclic aromatic hydrocarbons (PAHs), aromatic hydrocarbons (benzene, xylene, toluene and ethylbenzene), chlorinated hydrocarbons (chloroform, 1,2-dichloroethane, trichloroethylene and tetrachloroethylene) and organochlorine pesticides are lower than the detection limits of the methods, as well as from concentrations that may indicate significant soil contamination.

In the examined soil sample MW-1-2 sampled from a depth of 1.2 m, the concentrations of arsenic, selenium and metals of chromium, nickel, lead, copper, zinc, cadmium, mercury, molybdenum, cobalt, antimony and vanadium are lower than the limit values prescribed by the said Regulation. Tin and silver concentrations are lower than the detection limits of the methods, as well as values that may indicate significant soil contamination.

In the examined soil sample MW-1-3 sampled from a depth of 7.5 m, the concentrations of arsenic, selenium and metals of chromium, nickel, lead, copper, zinc, cadmium, mercury, molybdenum, cobalt, antimony and vanadium are lower than the limit values prescribed by the said Regulation. Tin and silver concentrations are lower than the detection limits of the methods, as well as values that may indicate significant soil contamination. Concentrations of fluoride, bromide and phenol are lower than the limit values prescribed by the said Regulation.

Concentrations of organic pollutants – mineral oils C10 - C 40, polychlorinated biphenyls (PCBs), total polycyclic aromatic hydrocarbons (PAHs), aromatic hydrocarbons (benzene, xylene, toluene and ethylbenzene), chlorinated hydrocarbons (chloroform, 1,2-dichloroethane, trichloroethylene and tetrachloroethylene) and organochlorine pesticides are lower than the detection limits of the methods, as well as from concentrations that may indicate significant soil contamination.

Sample 2: Well MW-3

In the examined soil sample MW-3-1 sampled from a depth of 0.3 m, the concentrations of arsenic, selenium and metals of chromium, nickel, lead, copper, zinc, cadmium, mercury, molybdenum, cobalt, antimony and vanadium are lower than the limit values prescribed by the said Regulation.

Tin and silver concentrations are lower than the detection limits of the methods, as well as values that may indicate significant soil contamination. Concentrations of fluoride, bromide and phenol are lower than the limit values prescribed by the said Regulation.

Concentrations of organic pollutants – mineral oils C10 - C 40, polychlorinated biphenyls (PCBs), total polycyclic aromatic hydrocarbons (PAHs), aromatic hydrocarbons (benzene, xylene, toluene and ethylbenzene), chlorinated hydrocarbons (chloroform, 1,2-dichloroethane, trichloroethylene and tetrachloroethylene) and organochlorine pesticides are lower than the detection limits of the methods, as well as from concentrations that may indicate significant soil contamination.

The results of the analysis of the content of radionuclides in the soil sample marked MW-3-RA (1m) show that their content is below the limits of radioactive contamination prescribed by the Rulebook on the Limits of Radioactive Contamination of Persons, Working and Living Environment and the Manner of Performing Decontamination ("Official Gazette of the RS" no. 38/2011) and is within the value of the content of radionuclides in soil samples on the territory of the Republic of Serbia obtained by measurements within regular monitoring.

The subject Study also presented the results of soil examination in the vicinity of the new location of the phosphogypsum storage facility in 2016, done by the Anahem Laboratory. The sample was taken from a depth of 0.0-0.6 m, as a composite from an area of 200m^2. The research results showed that only the concentration of Cu exceeded the limit values.

4.1. INTERPRETATION OF RESULTS IN ACCORDANCE WITH TIER 1 PROCEDURE

The authors started the process of analyzing the condition of environmental factors with the Tier 1 procedure, which involves a detailed consideration of the existing data using a qualitative method that requires a comprehensive approach to the subject matter. This method is expected to provide information that gives a broader and comprehensive picture of possible sources of pollution, impacts and consequences for the environment. In doing so, it was taken into account that data on the applied technologies are available, that the factory has existed at the location in question for several years, that sources and routes of pollution have been identified in the previous period and that numerous examinations of environmental factors have been carried out in the meantime.

After reviewing the largest number of studies, detailed studies and reports that were done for the purpose of monitoring the environmental condition and protection at the chemical industry complex in Prahovo, the authors concluded that the application of the Tier 1 procedure alone is not sufficient for this Analysis, since it does not provide enough elements to conclude on the condition of the environment and the possible application of protection measures, for the following reasons:

- 5 years have passed since the last detailed environmental research, which would meet

the needs of the Analysis in question,

- the largest number of examinations does not cover the zone planned for the expansion of activities,
- since the privatization until 2021, numerous activities have been implemented at the site, which have significantly changed the scope and characteristics of environmental pollutants. This primarily refers to the reconstruction of production facilities, the reconstruction and construction of infrastructure facilities, the improvement of technological processes, the removal of waste (especially hazardous), the purification of the terrain where pyrite burning was deposited, the rehabilitation of the old phosphogypsum landfill and the construction of a new storage facility, etc.

Bearing in mind that the screening of the condition of the environment at the site in question was not sufficient for the relevant conclusions, the authors proposed to approach additional-targeted studies.

5. PRESENTATION OF RESULTS OF TARGETED RESEARCH

The authors of the Analysis concluded (point 4.1) that the conducted Tier 1 procedure did not provide enough elements to conclude on the condition of the environment and the possible application of protection measures in the area intended for the expansion of the chemical industry complex in Prahovo. Given that the process of screening of the condition of the environment at the site in question was not sufficient for the relevant conclusions, the authors suggested that additional targeted research within the Tier -2 procedure should be applied.

Targeted research of the zones designated for expansion, as well as in the surrounding area, were approached on the basis of identification of sources of pollution, results of previous research, environmental characteristics (orographic, edaphic/hydrogeological and microclimatic) and vulnerability analysis. Identification of the source of pollution is shown earlier in the text. Targeted research were carried out in 2020, 2021 and 2022, as part of studies, detailed studies and reports for the purpose of expanding the chemical industry complex in Prahovo (Phase III of activities at the complex).

Figures 5 and 6 show the boundaries of the chemical industry complex in Prahovo within all three phases of activities at the complex, with the locations of soil and groundwater research. The figures show at which locations the samples were repeated in the period from 2012, as well as that a number of samples within Phases I and II were taken in zones belonging to Phase III of the activity at the complex, according to the second amendment to the DRP (2022).

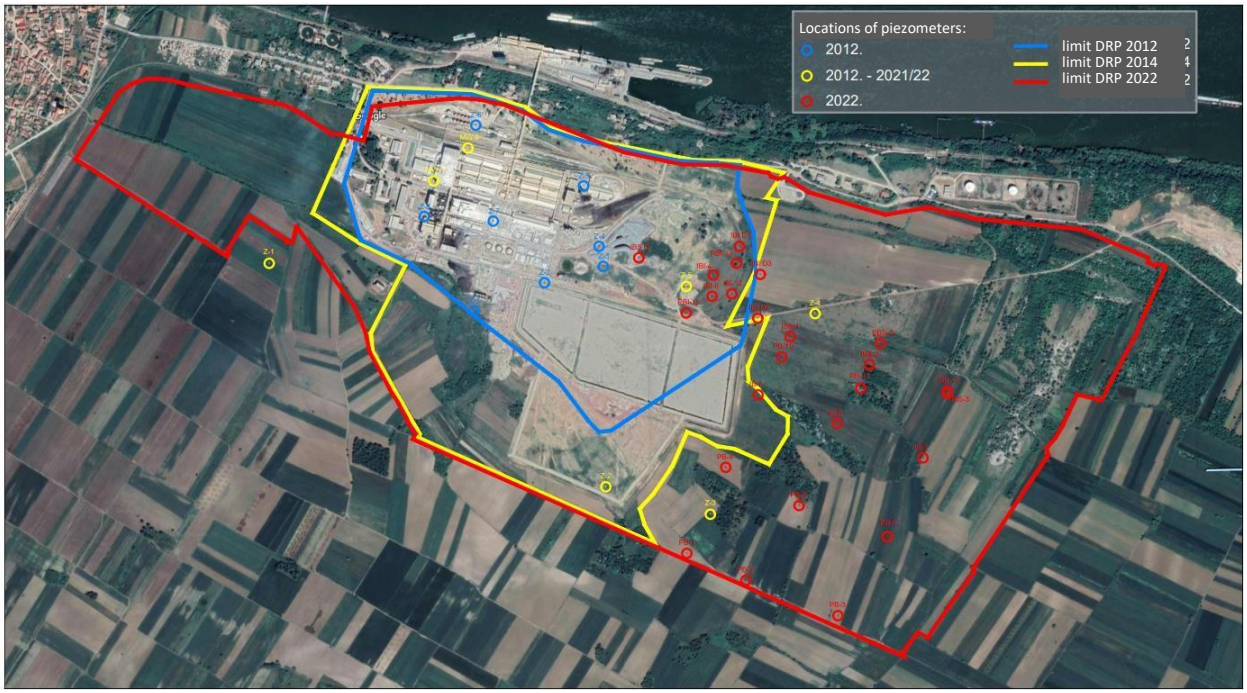


Figure 5: Soil study sites

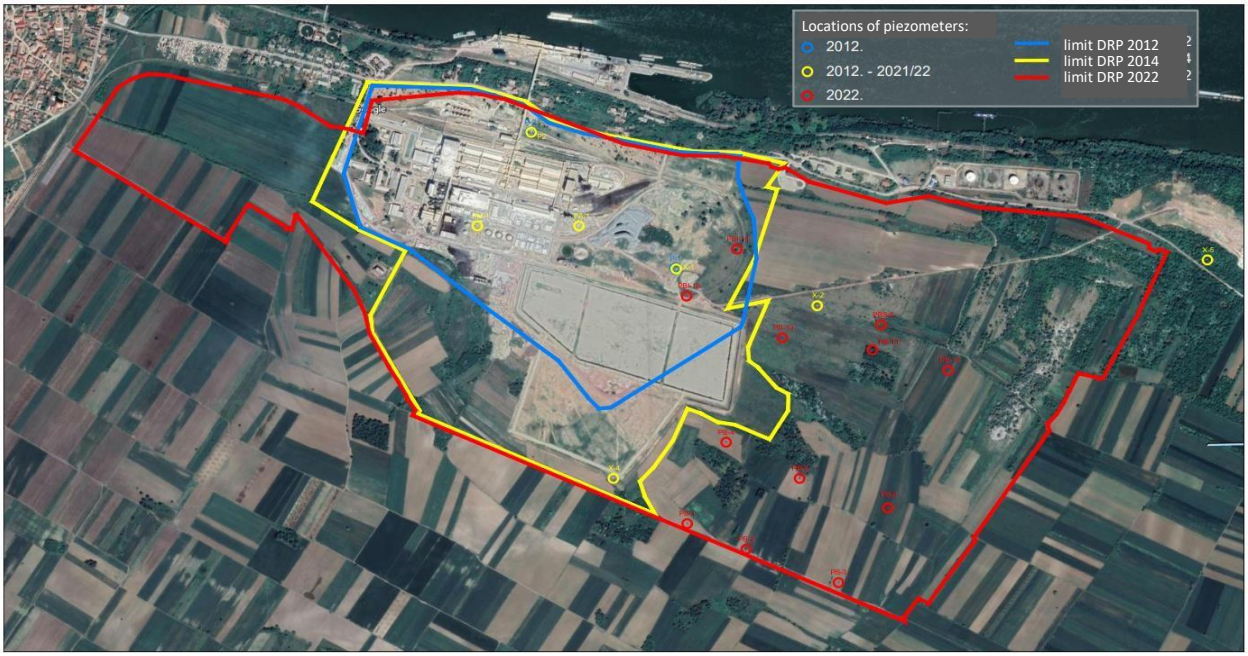


Figure 6: Locations of piezometers and groundwater sampling sites

Sampling of soil and groundwater in zones intended for the expansion of phosphogypsum storage was performed at locations designated within the network according to the chess field model (40x40m), while for the selection of sampling points in the zone intended for the construction of an energy and ecological island with a landfill of non-hazardous waste, a random method was used. This last method of selecting the sampling point was applied since a larger number of facilities were planned within the zone in question and it was necessary to take samples from the locations of future facilities.

As part of the research, composite samples of the surface layer of the soil were taken, as well as samples of deeper layers (from the identified geological layers), up to the groundwater

level. A part of the wells was used for the installation of piezometers, from which water samples were taken for laboratory analysis.

In addition to groundwater, surface water samples of the Danube, upstream of the chemical industry complex in Prahovo, were also analyzed.

Targeted research also include the measurement of air pollution and noise level research, at the complex and in the nearest settlements.

Orographic characteristics of the terrain

The observed area is practically leveled (mean absolute terrain elevation ≈49 masl), formed by the work of the river during the Pleistocene period, when quaternary sediments were formed. The maximum height denivelations in the entire observed area are about 2.5 m.

Edaphic Characteristics

Humified soil builds the surface of the terrain throughout the exploration area and represents old agricultural arable land. It has a dusty composition, loose and extremely macroporous, well permeable and water-treated soil. It contains a lot of organic matter (it is infused with roots and veins of plants). The humus layer is generally of a small thickness of 30cm-40cm. The filled soil dominates in the eastern part of the complex, over a layer of humus, with an average thickness of 20 cm.

Geological/hydrogeological characteristics (location of IBs and PBs)

- *Dusty clay*: 3.70-5.00 m thick, (contains 10-22% clay, 67-80% dust and 9-13% sandy fraction),
- *Sand, dusty*: 1.00-1.80 m thick, (contains 2-14% clay, 21-50% dust and 35-76% sandy fraction and 1-6% gravel),
- *Clay gravel*: 1.9 m thick, (contains 3-16% clay, 17-34% dust and 8-49% sandy fraction and 15-57% gravel),
- *Gravel*: 9.8-11.0 m thick, (contains 0-2% clay, 3-16% dust and 9-31% sandy fraction and 37-73% gravel),

In hydrogeological terms, this environment is an HG collector that is directly hydraulically connected to the Danube, so all the fluctuations of the Danube level are very quickly reflected through changes in the groundwater level in the gravel layer. In terms of water permeability, this gravel is a well-permeable environment.

- *Marl-clay complex*: represents a hydrogeological insulator. It occurs at depths of over 17.8m and has a significant thickness, which is estimated at over 10m on the basis of documentation.

Microclimate characteristics

The microclimatic specificities of the observed area are the highest determined exposure of the area to dominant north-west and east winds, lower mean air temperatures (≈10^{o}C) and the proximity of the aquatorium that influences higher air humidity.

Vulnerability analysis

Vulnerable (injurious) are all those facilities and environmental factors that may be affected by the activities on the subject complex. Vulnerable objects include created and acquired characteristics of the space, flora and fauna and people in the environment. The basic environmental factors of water, air and soil were analyzed separately.

Table 6: Vulnerable objects

Distance		**distance measured from boundaries of the complex**
Facility	**Cardinal direction in relation to the industrial complex**	**Approximate distance**
Phosphea	northwest	0
Agricultural land	south-east	0
Paved road Prahovo - Radujevac	north	80 m
NIS OU for fuel and oil storage	east	200 m
Residential buildings for employees of "ICP Prahovo"	west	250 m
Port of Prahovo on the Danube	north	300 m
Danube River	north	300 m
Border with Romania (in the middle of the Danube River)	north	730 m
Prahovo Primary School	northwest	780 m
Settlement Prahovo	west	850 m
Settlement Radujevac	east-southeast	4 km
City of Negotin	southeast	10 km

I) SOIL RESEARCH RESULTS

14) Physical and chemical analysis of soil samples, disturbed samples from a depth of 0.30 m, Institute for Prevention, Niš, 22.01.2020.

Location:

- Sample 0004.S from the green area, north of the phosphogypsum storage, at a distance of 200 m,

- Sample 0005.S from arable area outside the factory perimeter, southeast of the phosphogypsum storage facility, at a distance of 250m,
- Sample 0006.S from the arable area outside the factory perimeter, south of the phospho gypsum storage facility, at a distance of 500 m,
- Sample 0007.S from the arable area outside the factory perimeter, west of the phosphogypsum storage facility, at a distance of 800m,
- Sample 0008.S from the green area within the factory perimeter, north-east of the phosphogypsum storage facility at a distance of 400m.

Results (in micrograms/kg):
0004: cobalt (6.09), mercury (0.45), copper (83.27) >LV (higher than limit value)
0005: cobalt (9.47), copper (57.10) >LV
0006: (/)
0007: cobalt (9.47) >LV
0008: copper (33.90), cobalt (9.20) >LV.

15) Soil Analysis Report (ZO11) Institute for Occupational Safety and Health N.Sad, composite samples up to a depth of 0.30 m, at the location of the expansion of the storage facility (at the location of PB 1-6 and PB 10, 11 and 12 and IB 7.8 and 9), dated 12.04.2021.

- Sample PB-4: closest to existing storage, Ni, Cu, Co (11,7) >LV,
- Sample PB-5: Ni, Cu, Co(11.6) >LV,
- Sample PB-6: Ni, Cu, Co (10.5) >LV,
- Sample PB-1: C10-C40, Ni, Co (10.3) >LV,
- Sample PB-2: Ni, Co (9.31) >LV,
- Sample PB-3: the furthest sample, Ni, Co (10.3) >LV,
- Sample IB-7: next to the existing storage C10-C40, Ni, Co, Cd +LV, As, Cu >RV (more than remediation values)
- Sample IB-8: Ni, Cu, Co >LV,
- Sample IB-9: toluene, Ni, Cu, Co 11.1 >LV,
- Sample PB-12: Cu, Co (5.6) >LV,
- Sample PB-11: Ni, Cu, Co (9.98) >LV,
- Sample PB-10: (Cu, Co 8.72 +LV).

A total of **12** samples were taken and analyzed.

Comment: higher soil acidity, Ni concentration uniform, Cu higher concentrations closer to the former pyrite burn landfill, C10-C40 only in samples PB-1 and IB-7, only sample from IB-7 is above RV due to conc. Cu and As,

Proposal for IB-7: examine in more detail, set boundaries and, if necessary, collect land, or during preparatory works for construction, collect the surface layer, separate/protect and examine.

16) Report on soil research by depth, Institute of Occupational Health and Safety, N. Sad, dated 12.04.- 09.05.2021 (with three depths of 1.7-7.0m) (locations as with the Report under 2.)

A total of **34** samples were taken and analyzed. Deviations regarding the content of the examined pollutants were found only in:

- Sample PB-6, from a depth of 2.7-3.0m: due to the presence of C10-C40 in concentrations greater than the corrected limit value and
- Nickel in 5 samples: due to concentrations higher than the tabulated limit values.

Comment: nickel values in most samples corresponded to the values found in composite samples, but due to the higher representation of clay in the deeper layers of the soil, higher corrected limit values were found. This indicates, among other things, the geological origin of Ni.

The soil has a neutral to slightly alkaline chemical composition.

17) Soil Analysis Report, Institute of Occupational Safety, N.Sad, dated 09.05-19.05.2021.

Samples were taken: IBS 1-4 with 3-4 depths, (4 X composite from an area of up to 0.3 m, 2 samples each (IBS 1, 2 and PBS 4) from a depth of 1.1-4.6 m and from the location of IBS 3 a total of 3 samples from a depth of 1.4-4.4 m. A total of **13** samples were taken and analyzed.

The location of the exploration wells is north of the boundary of the planned storage facility, in zone IV. IBS 1 and 2 are the closest to the border to which the new storage reaches, and IBS 3 the furthest east (zone IV).

- Sample IBS 1: 0.30 m C10-C40, gamma-BHS 0.000214, Ni, Cu, Cd, >LV,
- Sample IBS 1: 1.6-1.9 m C10-C40 >LV,
- Sample IBS 1: 3.0-3.5 m Ni >LV,
- Sample IBS 2: 0.30 m Cu, Cd >LV,
- Sample IBS 2: 1.4-1.7 m Ni, Cd >LV,
- Sample IBS 2: 4.3-4.6 m Ni >LV,
- Sample IBS 3: 0.30 m C10-C40, Cu >LV,
- Sample IBS 3: 1.4-1.7 m C10-C40 >LV,
- Sample IBS 3: 3.0-3.3 m (/),
- Sample IBS 3: 4.3-4.6 m (/),
- Sample PBS 4: 0.30 m Ni, Cu >LV,
- Sample PBS 4: 1.1-1.3 m Ni >LV,
- Sample PBS 4: 4.2-4.5 m Ni >LV.

Comment: the results do not differ significantly from those of the Report under 3.

18) Soil Analysis Report, Institute of Occupational Safety, N.Sad, dated 20.05.-02.07.2021

A total of **17** samples were taken from 3 locations: IBI (4, 6 and 12) and 2 locations: PBI (14 and 15). The investigated land is within the area intended for the energy-ecological zone of the complex, north of the boundary of the planned phosphogypsum storage facility. The northernmost point is PBI-14.

Depths: 4X composite, 0.30 m (IBI 4, 12 and PBI 14 and 15). From the boreholes (PBI 14 and 15 from a depth of 1.2- 4.6 m) two samples each, or three more samples from IBI 4, 6 and 12, from a depth of 1.5-5.6 m.

- Sample IBI-4: 0.30 m C10-C40, Ni, Cu >LV,
- Sample IBI-4: 1.6-1.9 m (/),
- Sample IBI-4: 3.4-4.0 m benzene, ethylbenzene, xylene >LV,
- Sample IBI-4: 5.3-5.6 m Ni >LV,
- Sample IBI-6: 1.5-1.8 m toluene, Ni > LV,
- Sample IBI-6: 3.6-3.9 m C10-C40, Ni >LV,
- Sample IBI-6: 5.3-5.6 m C10-C40, Ni >LV
- Sample IBI-12: 0.30 m C10-C40, cumulative DDD, DDE and DDT 0.0353, benzene, Ni, Cu >LV,
- Sample IBI-12: 1.2-1.5 m Ni +LV,
- Sample IBI-12: 3.3-3.6 m (/),
- Sample IBI-12: 5.0-5.3 m Ni >LV,
- Sample PBI-14: 0.30 m cumulative DDX, toluene, Ni, Cu >LV,
- Sample PBI-14: 1.2-1.5 m C10-C40, benzene, ethylbenzene toluene, xylene, Ni >LV,
- Sample PBI-14: 4.0-4.3 m toluene, Ni>LV
- Sample PBI-15: 0.30 m C10-C40, benzene, toluene, Cu >LV,
- Sample PBI-15: 1.2-1.4 m benzene, toluene, Ni >LV,
- Sample PBI-15: 4.3-4.6 m C10-C40, Ni >LV.

Comment: Greater pollution is observed with organic pollutants, probably petroleum products and pesticides in 2 samples, predominantly in the upper layers of soil, all determined conc. are <RV.

19) Soil Analysis Report (ZO42), Institute of Occupational Safety, N.Sad, 23.09.2022

Samples taken in the zone of the planned energy-ecological island with a landfill of non-hazardous waste. A total of 14 samples were taken from 4 locations (IBI D1-D3 and IBS D).

- Sample IBI D1: 0.30 m gamma-BHC, Cu, Co >LV,
- Sample IBI D1: 1.8-2.0 m gamma-BHC >LV,
- Sample IBI D1: 5.1-5.4 m (/),
- Sample IBI D2: 0.30 m gamma-BHC, Ni, Cu, Co, Cd >LV,
- Sample IBI D2 /dusty clay: C10-C40, Ni, Co >LV,
- Sample IBI D2 /dusty clay: total DDX >LV,
- Sample IBI D2: 5.0-5.2 m Ni, Co >LV,

- Sample IBI D2: 7.0-7.3 m Ni, Co >LV,
- Sample IBI D3: 0.30 m gamma-BHC, total DDX, Co >LV,
- Sample IBI D3: 1.8-2.0 m (/),
- Sample IBS D: 0.30 m gamma-BHC, Cu, Cd >LV,
- Sample IBS D: 2.2- 2.4 m Ni, Co >LV,
- Sample IBS D: 4.0-4.2 m (/),
- Sample IBS D: 5.6-5.8 m gamma-BHC >LV.

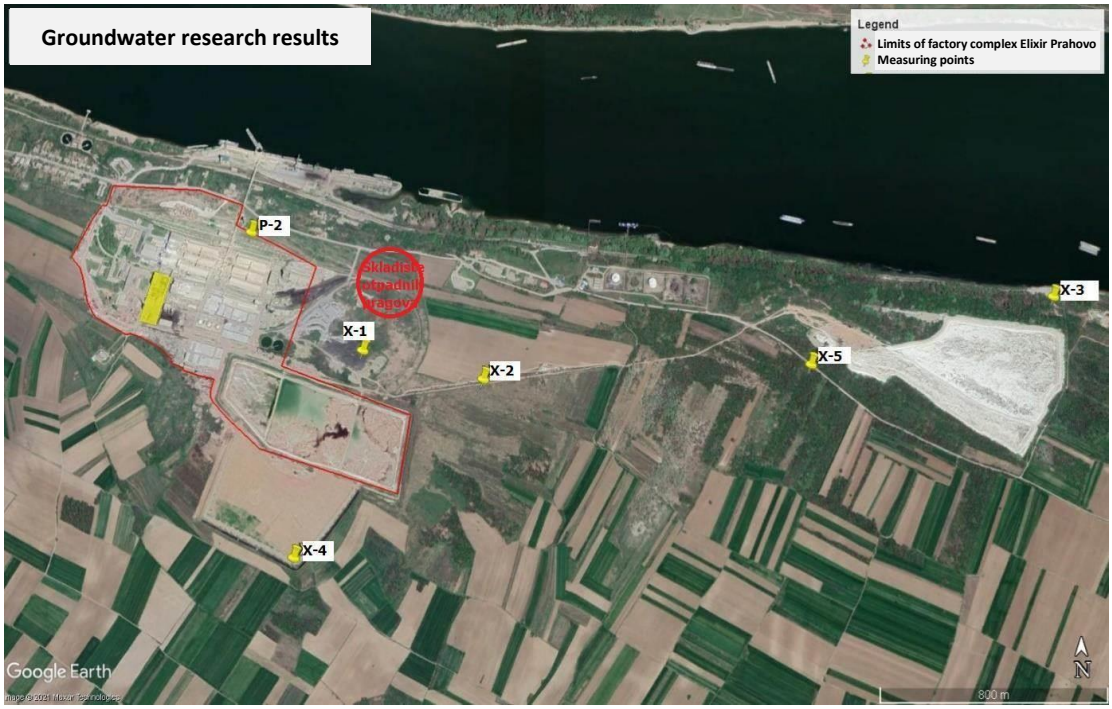
Comment: Similar results as in the Report under 5, with slightly lower hydrocarbon concentrations and a higher concentration of pesticides, especially Lindane in the surface layer of soil. All results are <RV.

II) GROUNDWATER RESEARCH RESULTS

20) Physical and chemical analysis of groundwater samples from piezometers X-1, X-2 and X-4, dated 25.01.2021 and X-3 and X-5 dated 29.4.2021, Institute for Prevention, Branch 27. January Niš

Sampling and examination of groundwater quality in the complex and the wider area in 2021 were performed at **5** measuring points.

- X-1 – In the vicinity of the new phosphogypsum storage facility;
- X-2 – In the vicinity of the new phosphogypsum storage facility;
- X-3 – In the vicinity of the old phosphogypsum landfill;
- X-4 – In the vicinity of the new phosphogypsum storage facility;
- X-5 – In the vicinity of the old phosphogypsum landfill.



According to the groundwater research reports in 2021, the **concentrations of pollutants in groundwater were below the average annual concentration (AAC)** prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwaters and Sediment and the Deadlines for Their Reaching ("Official Gazette of the RS", No. 50/2012), Appendix 2, Table 1, and **below remediation values (RV),** prescribed by the Regulation on Limit Values of Pollutants, Harmful and Hazardous Substances in Soil ("Official Gazette of the RS", nos. 30/2018, 64/2019).

Comment: the results obtained do not differ significantly from those of 2019 (4/12).

21) Report on the analysis of water from piezometers, Institute of Occupational Safety, N.Sad, 19.5.2021

Samples were taken from piezometers PB 1-5 and PB 6-12 a total of **9** samples. The locations are east of the existing phosphogypsum storage facility, i.e. in the zone where the expansion is planned.

Registered groundwater level in piezometers from further to those closer to the bank of the Danube.

- PB1: g.w.l. 12.40 m
- PB2: g.w.l. 12.60 m
- PB3: g.w.l.13.20 m
- PB4: g.w.l. 13.30 m
- PB5: g.w.l. 13.20 m
- PB6: g.w.l. 14.40 m
- PB10: g.w.l. 15.00 m
- PB11: g.w.l. 14.20 m
- PB12: g.w.l. 15.40 m

All samples of groundwater in terms of concentrations of the examined parameters correspond to the values prescribed by the Regulation on LV of polluting, harmful and hazardous substances in soil ("Official Gazette of the the RS", nos. 30/2018 and 64/2019) and the Regulation on LV of pollutants in surface waters and groundwater and sediment and deadlines for their reaching ("Official Gazette the RS", no. 50/12).

Comment: significantly lower concentrations of pollutants in water, compared to the values obtained through analysis of soils from the same locations. It can be assumed that these are poorly soluble compounds, especially when it comes to metal compounds, as well as that the physicochemical characteristics of the environment affect reduced mobility and transformation of pollutants. Limited migration of pollutants is to some extent the result of the existence of a clay layer at depths of about 15-30m. A relatively high level of pH of samples from PB2 and PB4 was found.

22) Physical and chemical analysis of the groundwater sample from the PA-1, P-2 and PM-1 piezometers, Institute for Prevention, Branch 27 January, Niš, 24.9.2021

- Sample PA-1: taken next to the phosphoric acid factory,
- Sample P-2: taken next to sulphuric acid storage and
- PM-1 sample: taken east of NH_3 spheres.

The assessment of the compliance of groundwater samples was carried out according to the requirements prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwater and Sediment and the Deadlines for Reaching Them ("Official Gazette of the RS" no. 50/2012, Appendix 2, Table 1) and the Regulation on Limit Values of Pollutants, Harmful and Hazardous Substances in Soil ("Official Gazette of the RS", no. 30/2018), without taking into account the measurement uncertainty in accordance with the decision-making rule defined by the Laboratory Rule - Rule 1.

The results of groundwater research show that the values of the examined parameters comply with the average annual concentrations prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwater and Sediment and the Deadlines for Reaching Them ("Official Gazette of the RS", no. 50/2012, Appendix 2, Table 1) and remediation values prescribed by the Regulation on Limit Values of Pollutants, Harmful and Hazardous Substances in Soil ("Official Gazette of the RS" no. 30/2018).

Comment: good water quality was noted, probably due to the presence of insoluble oxides of pollutants in the soil, due to relatively small concentrations of pollutants in the deeper layers of the soil, and also due to communication with surface water from the Danube.

23) Research report on physical and chemical analyses of water samples from piezometers PBI-14 and PBI-15, *Institute for Prevention,Branch 27.January Niš, Niš, 22.06.2022*

Samples were taken in Zone IV Energy and Ecological Island, which is planned for the construction of a waste energy recovery plant and a non-hazardous waste landfill.

The results of groundwater research from piezometers show that the values of the examined parameters comply with the average annual concentrations prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwater and Sediment and the Deadlines for Reaching Them (Official Gazette 50/2012) and remediation values of groundwater prescribed by the Regulation on Limit Values of Pollutants, Harmful and Hazardous Substances in Soil ("Official Gazette of the RS", nos. 30/2018, 64/2019).

24) Research report on physical and chemical analyses of water samples from PBS-4 piezometers, Branch 27. January Niš, Niš, 22.06.2022

Samples were taken in the zone planned for the construction of the chemical park.

The results of groundwater research from piezometers show that the values of the examined parameters comply with the average annual concentrations prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwater and Sediment and the Deadlines for Reaching Them ("Official Gazette of the RS" no. 50/2012) and remediation values of groundwater prescribed by the Regulation on Limit Values of Pollutants, Harmful and Hazardous Substances in Soil ("Official Gazette of the RS", nos. 30/2018, 64/2019).

III) SURFACE WATER RESEARCH RESULTS

25) Physical and chemical analysis of surface water samples, Institute for Prevention, Institute for Prevention, Branch 27. January, Niš, 02.02.2023,

A sample of the surface water of the Danube River was taken, upstream of the existing and planned facilities at the chemical industry complex in Prahovo.

Results of examined samples of the Danube River (Class II, Regulation on the Categorization of Watercourses, "Official Gazette of the SRS" 5/68), show that the concentrations of the examined parameters COMPLY with the limit values (LV), prescribed by the Regulation on Emission Limit Values for Pollutants in Surface and Groundwater and Sediment and Deadlines for Their Reaching and "Official Gazette of the Republic of Serbia", no. 50/2012 and The Regulation on limit values of priority substances and priority hazardous substances polluting surface waters and the deadlines for their reaching ("Official Gazette of the RS", no. 24/2014), except for the content of phosphate, ammonia, total nitrogen and iron.

IV) RESULTS OF THE AIR POLLUTION RESEARCH

26) Ambient air research report, Institute for Occupational Safety and Health N. Sad of 24.02-09.03.2020

Location: across the street from Vuk Karadžić Elementary School. Length of study: **14 days.** No conclusion was given according to Law on Air Protection ("Official Gazette of the RS" nos. 36/09 and 10/13).

If the criteria for assessing air quality for Belgrade are applied, the air is: Good - Acceptable.

27) *Environmental Air Quality Monitoring Report, City Institute for Public Health, Belgrade, 11-15.6.2021*

Air quality research was performed at **2** measuring points, for a period of **15** days (MP 1: Gugić Vojislava household, Vuka Karadžića street, no. 47, Prahovo and MP 2: Popović Voislava household, Nušićeva street no. 8, Radujevac).

Results of measurements:

- MP1: in the period 11-25.6.2021, the measurement results show the following: the mean 24-hour values of suspended PM10 particles exceeded the limit value, namely

in **3** measurements.

- MP2: in the period 11-25.6.2021, the measurement results show the following: the mean 24-hour values of suspended PM10 particles exceeded the limit value, namely in **3** measurements.

The results of the analysis of other parameters within the required scope of research corresponded to the limit values defined by the Regulation on monitoring conditions and air quality requirements ("Official Gazette of the RS", nos. 11/2010, 75/010 and 63/2013).

Comment: PMs are a nonspecific indicator of air pollution, indicating a number of different sources (traffic, furnaces, etc.).

28) Report on the measurement of mass concentrations of dioxins and furans (PVDDS/PCDFS) in ambient air in the vicinity of the production plant "Elixir Prahovo" in Prahovo, "Aerolab" doo, Belgrade, 21-24. 06.2021

Number of measuring points **2**, south-west and north-east of the production facilities of the factory. At the distance of about 200m. Measurement period: 21.6 -24.6.2021 (**2** measurements at each point).

Measurement results: individually measured mass concentrations of all 17 toxic dioxins and furans, in all four samples and four blank trials, were below the detection limits of the analytical method. Also, the calculated mass concentrations of dioxins and furans expressed over the toxic equivalent of the mixture (Toxic Equivalency) were below the detection limits of the analytical method (less than 0.3 pg/m3).

29) Report on the measurement of pollutant emissions at the phosphorus acid production plant

Measurement results: Comparing the measured emission values of pollutants at the subject plant in Prahovo with ELV, the following can be concluded:
The plant for the production of phosphoric acid-E1, through its operation, did not lead to exceeding the ELV for the given parameters (fluorides expressed as HF fluoride and particulate matter) according to the Regulation on limit values of air pollutant emissions from stationary sources of pollution, except from combustion installations ("Official Gazette of the Republic of Serbia", nos. 111/2015 and 83/2021).

30) Report on measuring the emission of pollutants in the air of the emitter of the final scrubber of the fertilizer company Elixir Prahovo, "Aerolab" doo Belgrade, 02.12.2022.

Measurement results: Based on the results of measuring the emission of pollutants into the air from the emitter of the final tower – scrubber, factory for the production of artificial fertilizer "Elixir Prahovo doo" Braće Jugovica 2, Prahovo, on 2.12.2022 and their comparison,

according to the decision-making rule described in item 6 of this Report, with emission limit values, defined in the Regulation on limit values of air pollutants emissions from stationary sources of pollution, except from combustion installations ("Official Gazette of the RS" nos. 111/2015 and 83/2021), we make the following statement of compliance:

- The maximum value of the measured mass concentration of gaseous fluorine compounds expressed as hydrogen fluoride (and without reducing the value of the measurement uncertainty) is lower than the emission limit value defined by the Regulation, on the basis of which it is considered that the stationary source of air pollution in question complies with the requirements prescribed by the said Regulation regarding the emission of gaseous fluorine compounds expressed as hydrogen fluoride;
- The maximum value of the measured mass concentration of chlorine gaseous compounds expressed as hydrogen chloride (and without reducing the value of the measurement uncertainty) is lower than the emission limit value defined by the Regulation, on the basis of which it is considered that the stationary source of air pollution in question complies with the requirements prescribed by the said Regulation regarding the emission of chlorine gaseous compounds expressed as hydrogen chloride;
- The maximum value of the measured mass concentration of ammonia (without reducing the value of measurement uncertainty) is lower than the emission limit value defined by the Regulation, on the basis of which it is considered that the stationary source of air pollution in question complies with the requirements prescribed by the said Regulation regarding ammonia emissions;
- The maximum value of the measured mass concentration of powdery substances (without reducing the value of measurement uncertainty) is lower than the emission limit value defined by the Regulation, on the basis of which it is considered that the stationary source of air pollution in question complies with the requirements prescribed by the said Regulation regarding the emission of powdery substances.

Based on the results of the measurement of air pollutant emissions from the final tower emitter – scrubber, fertilizer production plant "Elixir Prahovo doo" Braće Jugovića 2, Prahovo, on 02.12.2022 and their comparison, according to the decision-making rule described in item 6 of this Report, with the emission limit values, defined in the Integrated Permit for the plant "Elixir Zorka-mineralna fertilizer"d.o.o., Šabac and obtained by applying the Best Available Techniques (BAT) listed in the Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals- Ammonia, Acids and Fertilisers, European Commission, August 2007, Chapters 7 and 10, Part 7.5 and 10.5, the following declaration of conformity is given:

- The highest value of the measured mass concentration of gaseous compounds of fluorine expressed as hydrogen fluoride (and without reduction for the value of measurement uncertainty), chlorine expressed as hydrogen chloride (and without reduction for the value of measurement uncertainty), ammonia concentration (and without reduction for the value of measurement uncertainty) and mass concentration of powdery substances (without reduction for the value of measurement uncertainty) are less than the emission limit values defined by "BAT" on the basis of which it is considered that the stationary source of air pollution in question complies with the requirements prescribed by the aforementioned "BAT".

V) NOISE LEVEL RESEARCH

31) Research report - measurement of environmental noise in the vicinity of the "Elixir Prahovo" plant, Institute for Prevention, Niš Branch, Niš, 16.04.2021

Measurements were taken at **3** measuring points, on three occasions during the day, in the evening and at night.

Locations of measuring points:

- MP1: in open space, northwest of the production facilities,
- MP2: in open space, about 100m from the administrative building and the settlement of the Colony (Kolonija) and
- MP3: in open space, on a green area, in front of the settlement Prahovo, about 0.5 km from production facilities and about 70 m from residential buildings.

For the purpose of measuring, all noise sources on the complex were identified.

Conclusion: the relevant noise level at the selected measuring points does not exceed the LV of noise during the day, evening and night (for day and higher up to 60 dB/A/, and for night 50 dB/A/), according to The Regulation on noise indicators, limit values, noise indicators assessment methods, annoyance and harmful effects of environmental noise ("Official Gazette of the Republic of Serbia" no.75/2010)

VI) DETAILED STUDIES AND STUDIES MADE FOR THE PURPOSE OF EXPANDING THE ACTIVITY

32) Geotechnical study on the conditions for the construction of phosphogypsum storage facilty in the COMPANY complex "ELIXIR PRAHOVO" DOO ICP, Prahovo, GT Soil Inženjering doo, March 2021

For the purposes of this geotechnical study, the following research was used in order to examine the geotechnical structure of the terrain in as much detail as possible:

1. OGK L34-142, sheet Negotin R=1:100,000
2. Geotechnical study for the purpose of forming a landfill of non-hazardous and inert waste in the ICP ELIXIR Prahovo d.o.o. complex in Prahovo. GT Soil Inženjering d.o.o. 2021 Belgrade.
3. Geotechnical study for the development of the main design of the phosphogypsum open storage in the complex ELIXIR PRAHOVO ICP DOO in Prahovo GT Inženjering 2014 Belgrade.
4. Geotechnical study for the purpose of developing the preliminary design of the phosphogypsum storage facility in the ELIXIR PRAHOVO ICP DOO complex in Prahovo, GT Inženjering, 2014 Belgrade.

5. Geotechnical study for the construction of an incineration plant in the ICP ELIXIR Prahovo d.o.o. complex in Prahovo. GT Soil Inženjering d.o.o. 2021 Belgrade.
6. Geotechnical study for the rehabilitation of facilities, halls 1-7, tanks and phosphoric acid facility, and for the construction of a new packaging facility in the Elixir Prahovo ICP d.o.o. complex in Prahovo, GT Inženjering 2013 Belgrade.
7. Extended environmental investigation Phase II at holding ICP AD PRAHOVO fertilizer factory in Prahovo-Serbia, INTERGEO, Salzburg 2008.

Excerpt from the detailed study of importance for the interpretation of the results of soil and ground water research, as well as the permissible soil load:

Marl-clay complex (Lgl)

Dusty-clay composition, brownish-brown color, in the wafer structure with a lot of admixtures of hydroxide Fe and Mn oxide. It represents the crust of decomposition of the Neogene complex.

In the surface layer zone (about 1.0 m thick), it occurs as dusty clay of soft to hard plastic state of low to medium plasticity consistency.

It contains 9-31% clay, 66-83% dust and 4-8% sandy fraction.

It is a well consolidated, medium to poorly compressible medium. With the increase of depth, it quickly turns into a homogeneous, massive dusty-clay marl of dark bluish-green color with high plasticity, hard-plastic to hard-consistent state.

Well-consolidated, (and with the exception of degraded wafer layer up to 1.50m thick) extremely poorly compressible environment. **It is a hydrogeological insulator**. It occurs at depths of over 14.8 m (17.80) and has a significant thickness, which is estimated at over 12 m (it reaches a depth of over 30 m) on the basis of documented findings.

Hydrological properties of the terrain

During exploratory drilling in April 2021, UWL was determined at a relative depth of UWL= 12.0.0m - 14.70m, i.e. at an absolute level of UW ~32.55masl – 34.00masl. It was determined that it was of the compacted type. Due to the lithological composition and the proximity of the Danube, this aquifer is in constant hydraulic connection with the Danube, through a layer of gravel so that all seasonal oscillations related to the flow of the river are transferred to the aquifer. Due to this, a significant oscillation of the UWL can also be expected. It is noticeable that due to the proximity of the Danube at the location in question, the direct impact of the Danube and the "meniscus" phenomenon is felt. Namely, with the approach of the Danube, the groundwater level drops and approaches the level of the water mirror of the Danube itself. Given the depth of the UWL and the characteristics of the planned phosphogypsum landfill, it can be concluded that the groundwater level will have no impact either in the construction phase or in the later exploitation phase.

In order to accurately determine the fluctuation of the UWL, it is necessary to observe the UWL through a network of piezometers during one hydrological year.

Based on the data of the performed seismic rezoning conducted for the wider zone of

Negotin and Prahovo, the terrain is classified into terrains with the VIII degree of seismic intensity according to the MCS scale, for a period of 500 years, with a seismicity coefficient of Ks= (0.031-0.033). By analyzing the permissible load capacity, it can be concluded that the planned landfill will be safe from the aspect of the permissible load. The geostatic calculation obtained the results of the permissible bearing capacity of the subsoil of Qa= 1306.95 kPa".

33) Geotechnical study for the purpose of forming a landfill of non-hazardous and non-reactive waste in the complex of the COMPANY "ELIXIR PRAHOVO" DOO ICP,Prahovo, GT Soil Inženjering doo, September 2021.

This Study was made for the previous location of the non-hazardous waste landfill, in accordance with the amendments of DRP, which according to the second amendment to the DRP now belongs to Zone II.

Excerpt from the Detailed Study

"The examined terrain of the ICP Prahovo complex is a terrace and is built in the surface part of sediments of Quaternary age represented by humified and partly filled with deposits, marsh-terrestrial dusty clays and underlying alluvial dusty-sandy, sandy and gravelly sediments. The thickness of these sediments is up to 18.0m. The base of the aforementioned deposits consists of a poorly compressible lithologically very diverse Pliocene complex that is in the zone of the location in question is represented by a complex of marly-clay sediments, in the surface layer and solid poorly compressible marls in the floor of the complex. Sand, gravel, clay and weakly connected sandstones also occur within the complex. During the investigation drilling, UWL was determined at a relative depth of UWL ~- 13.70 m-14.20 m, i.e. at an absolute elevation of UW~32.40masl–34.20masl. The observed aquifer is of a compact type, in constant hydraulic connection with the Danube, through layers of sand and gravel, so that all seasonal oscillations related to the flow of the river are quickly transferred to the aquifer. Considering the depth of the UWL and the characteristics of the planned landfill, it can be concluded that the groundwater level will not have an impact at the stage of construction of the landfill, nor later at the stage of its exploitation".

34) Report on Strategic Environmental Impact Assessments:

- ✓ ***IDPGR of Prahovo settlement, April 2021***

The study was made for the conduction of amendments to the GRP.

- ✓ **Amendments of DRP for the chemical industry complex in Prahovo, March 2021**

The study was made for the conduction of amendments to the DRP.

- ✓ **Opinion on the non-adoption of the Strategic Environmental Impact Assessment of the second amendment to the Detailed Regulation Plan for the Chemical Industry Complex in Prahovo, in accordance with Article 9, paragraph 4 of the Law on**

Strategic Environmental Impact Assessment, February 2022.

No specific research of environmental factors has been performed for the Studies.

35) Study of the impact of the plant for energy utilization of waste on air quality of the wider location of the chemical industry complex in Prahovo, University of Belgrade - Faculty of Mechanical Engineering, July 2022.

Study excerpt

By analyzing the obtained results, it can be concluded that when it comes to components that are currently emitted (CO, SO_2, NO_2, PM10, PM2.5, HF, HCl, NH_3) and which will also be emitted from the emitters of the future incineration plant, the dominant influence is on the existing emitters or, in the case of dusty substances, surface sources for both the current and future conditions, while the impact of the future incineration plant, whose all emissions will be harmonized with the relevant *BAT conclusions2*, is practically negligible. It was found that in the case of some components (SO_2, PM10 and HF), there is a possibility of episodic high concentrations in the case of extremely unfavorable, from the point of dispersion, meteorological conditions, but that the number of hours/days with these concentrations is extremely small, i.e. there is little likelihood of this happening at all. It has been established that the cause of these potential episodic elevated concentrations are the existing SO_2 and HF emitters, i.e. phosphogypsum landfills in the case of PM10, both for the current and future condition. Also, potential zones with exceedances of the limit values of these components occur on uninhabited areas in the immediate vicinity of the factory property limit".

"When it comes to components that are currently not emitted and that will be emitted only from the emitters of the waste combustion plant in the future, they refer to **Hg** and ***PVDDS /PCDFS***, the modeling results indicate that the concentrations of these pollutants will be far below the prescribed limit values".

6. INTERPRETATION OF RESULTS IN ACCORDANCE WITH TIER 2 PROCEDURE

In order to interpret the results obtained in accordance with the Tier-2 procedure, it is necessary to apply the Initial Conceptual Site Model (ICSM), which also takes into account potential migration pathways of pollutants. Bearing in mind the data on historical pollution on the complex, the characteristics of the emitters, as well as the types of pollutants, the greatest attention was paid to the migration of pollutants in the soil, to the level of groundwater.

Possible pathways of migration of pollutants

The fate of soil pollutants, especially heavy metals, is influenced by numerous and complex physical-chemical and biological processes. These processes reduce or increase the mobility of pollutants and depend on factors such as soil pH, redox potential, the presence of other solutions with which they can react (amount of dissolved minerals), sorption capacities and ion exchange of geological material and organic matter content.

The presence of inorganic anions (carbonates, phosphates and sulphides) in soil water affects the ability of the soil to chemically fix metals. These anions can form as relatively insoluble complexes with metal ions and cause metal to desorb and/or precipitate in their presence.

The soil structure can affect the mobility of pollutants by limiting the degree of contact between groundwater and pollutants, especially in the case of different particle size distribution in individual soil layers. The finer particles (<100 micrometres) are more reactive and have a larger surface area than the coarser material. As a result, the fine fraction of soil often retains most of the contamination on itself.

In general, migration is promoted by higher environmental acidity, larger soil granulation, reduced presence of organic content and higher presence of water. Direct indicators indicating the possible behavior of pollutants in the soil can only be obtained by applying specific examination methods that identify and quantify specific forms of compounds of importance, and that these methods are not routinely carried out and are not regulated. Atomic absorption spectrophotometers (AA) and ICP mass spectrophotometers are commonly used to determine the concentration of metals in soil solutions. Both techniques measure the total metal concentration in the solution, without distinguishing the specific forms of the tested elements and compounds.

Bearing in mind the above, the results of the performed GT and other targeted laboratory tests will be used for this occasion, especially pH, granulomeric composition, concentrations of pollutants by depths and groundwater levels. It was noted that the pH values of the samples (water and soil), located near the former pyrite burn landfill, are more acidic, compared to the pH values in the samples closer to the current phosphogypsum storage facility.

Groundwater levels change and directly depend on the height of the Danube, with a slight increase in levels closer to the river bank.

The content of organic matter is the highest in the surface layer of soil.

Slightly higher concentrations of pollutants are registered in the surface layer and in the higher layers of soil, up to the groundwater level.

The marly-clay complex occurs at depths of over 15m and is of significant thickness which is estimated at over 12m on the basis of documentation findings. This complex represents a hydrogeological insulator.

Studies have shown that higher concentrations of Ni occur regularly in samples, but at concentrations lower than RV. This occurrence of Ni, regardless of the location and depth of the samples taken, indicates the geological origin of this metal, which coincides with the results of soil examinations at several other locations in Serbia.

The increased concentrations of Co are probably the result of surface contamination occurring in the period when a phosphate with a higher cobalt content was used in the phosphoric acid production plant, prior to privatization. Otherwise, concentrations of Co are not >RV in any location.

It is certain that the migration of pollutants in the previous period, in the deeper layers of soil (up to the marl-clay complex), was also the result of groundwater and surface water communication. It partly affected the relatively low concentration of pollutants, with low sorption properties of the environment and a higher degree of solubility of the pollutant. It is primarily about historical pollution, which can be concluded on the basis of a comparison of the results of earlier and targeted research. Migratory movement takes place from south to north-

northeast.

In the surface layer of the soil, higher concentrations of pollutants were found in relation to the deeper layers, especially those of organic origin (hydrocarbons and pesticides >LV, <RV) in several samples taken in the Energy and Ecological Island Zone. In only one sample, taken next to the phosphogypsum storage facility, the values of As and Cu >RV (Zone II) were determined.

Slightly higher concentrations of pesticides in Zone IV are probably the result of historical pollution caused by poor waste management from the time of pesticide production, which has not been performed on the complex for more than 15 years. The long half-life of these pollutants, increased concentrations of organic matter in the surface layer of the soil and probably weaker leaching of soil by atmospheres, influenced the longer retention of pesticides in the soil. Due to the observed increased concentrations of pesticides and hydrocarbons, no special interventions are required, except for soil and groundwater monitoring, especially during preparatory works for the construction of facilities.

Increased concentrations of As and Cu are likely to have occurred as a result of the deposition of pyrite combustion over a longer period. The finding of As in one sample next to the phosphogypsum storage requires additional examinations, before raising the soil layer for expanding the storage, or after moving it at the stage of preparatory works for construction.

Initial Conceptual Site Model (ICSM)

The qualification of identified sources of pollution and migration of pollutants is based on the likelihood of exposure to pollutants and possible impacts.

Table 7: Probability and Impact Classes

CLASS	PROBABILITY	SCORE	CLASS	IMPACT	SCORE
1.	Not likely	**>1-<2**	1.	Very small	**>1-<2**
2.	Possible	**>2-<3**	2.	Small	**>2-<3**
3.	Likely	**>3-<4**	3.	Medium	**>3-<4**
4.	Very likely	**>4-<5**	4.	High	**>4-<5**
5.	Highly likely	**>5-<6**	5.	Very high	**>5-<6**

Table 8: Probability and Impact Classes for Identified Sources

SOURCE	MIGRATION		EXPOSURE HUMAN		EXPOSURE ECOSYSTEM	
	P*	I**	P	I	P	I
PRIMARY SOURCES: **1.** Emitters of waste gases, dust and wastewater from facilities in operation,	**2**	**1**	**2**	**2**	**1**	**1**
SECONDARY SOURCE: **2.** Land on which waste pesticides and min. oils were deposited until privatization	**2**	**2**	**1**	**2**	**1**	**2**
SECONDARY SOURCE: **3**. Contaminated surface layer of soil where an increased concentration of As was found over RV was found.	**2**	**2**	**1**	**2**	**1**	**2**
SECONDARY SOURCE: **4**. Contaminated groundwaters.	**2**	**2**	**1**	**1**	**1**	**1**

P*-probability I**-impact

Pollution sources are qualified by multiplying the estimated Probability and estimated Impact: P x I. Any product of multiplying estimated probability and impact equal to or greater than number 8 requires the application of certain protection measures or restriction of activities, with enhanced monitoring.

1. Emitters of waste gases, dust and wastewater from facilities in operation: 2 x 1 + 2 x 2 + 1 x 1 = 7
2. Soil with concentration As above RV: 2 x 2 + 1 x 2 +1 x 2 = 8
3. Soil on which waste was deposited: 2 x 2 + 1 x 2 + 1 x 2 = 8
4. Contaminated groundwater: 2 x 2 + 1 x 1 + 1 x 1 = 6

Based on the obtained score, it can be concluded that potential sources of environmental pollution at the complex in question, under nos. **2** and **3** belong to the category for which it is necessary to plan certain protection measures, or restrict activities with appropriate monitoring of exposure.

Conclusions based on Tier 2 procedure

By applying the Tier-2 procedure, the following can be concluded:

- ***The work of the industry on the ICP Prahovo complex until privatization in 2012 resulted in the occurrence of "historical pollution", with negative consequences for the environment;***
- ***As a result of major construction-technical and technological interventions at the* chemical industry complex in Prahovo *after the privatization in 2012, including the rehabilitation of sites where hazardous waste was inadequately disposed of, but also due to the process of migration of pollutants over time, along with physical-chemical and biological processes in soil and groundwater, today only point pollution, uneven in terms of origin and type, is registered in the part of the complex intended for expanding the activities of the company;***
- ***The evaluation of the results of the examinations performed in the previous period and targeted for the purpose of expanding the activities at the complex enabled the basic processes in environmental factors of importance for the assessment of the condition of the environment in the area covered by the planned expansion and beyond and the need for possible interventions to be considered;***
- ***The implementation of general environmental protection and improvement measures should limit any new emissions of pollutants that may cumulate with existing sources and thus adversely affect the condition of the environment;***
- ***Qualification of identified sources of pollution and migration of pollutants using the Initial Conceptual Site Model (ICSM), has shown that potential sources of pollution under nos. 2 and 3, belong to the category for which it is necessary to plan special environmental protection and improvement measures, which include the restriction of certain activities, with appropriate exposure monitoring and***
- ***Exposure monitoring should provide relevant data in order to take preventive and/or if necessary remedial protection measures.***

7. ENVIRONMENTAL PROTECTION AND IMPROVEMENT MEASURES

7.1 GENERAL PROTECTION MEASURES

General measures should ensure environmental protection and improvement conditions at the complex of chemical industry in Prahovo in accordance with the planned expansion of activities:

1. The planned facilities and activities must not emit pollutants into the air to the extent that, due to the possible cumulative effect with existing sources, it may affect the increase in the level of pollutants in the air above the permitted values;
2. Collective technological wastewater from existing and new production must comply with the emission limit values in accordance with current regulations, i.e. must not endanger the quality of the recipient;
3. Waste management, especially hazardous waste, must be fully compliant with regulations governing the subject matter;
4. It is necessary to level all free surfaces in the expansion zones, in order to prevent the retention of atmospheric precipitation and accelerate its runoff towards the rain sewer;
5. Where necessary, earth surfaces covered with solid, waterproof materials and build appropriate gutters with a fall towards the rain sewer and further towards the precipitator-separator;
6. Grass and green all free surfaces and level them with a fall towards the recipient;
7. Develop a Plan for regular monitoring of soil and groundwater at the complex, which should define the types of examined parameters, the number of samples and the sampling dynamics;
8. As part of the preparatory works for the construction of facilities, envisage a space for the disposal of humus material from the surface of the land, which will be used for the greening of surfaces.

7.2 SPECIAL MEASURES

1. At the place where the IB-7 soil composite sample was taken, it is necessary to:

   -repeat sampling and analysis of the sample from the point in question and with several renders of the points taken within a square of 20x20m or

   - during the execution of preparatory works for the expansion of phosphogypsum storage, raise the surface layer of soil in the immediate vicinity of the IB-7 site (15x15x0.30 m), dispose of it, protect and sample it. Treat the soil in accordance with the examination results.

2. The preparatory works in the zone envisaged for the formation of the energy and ecological island should be carried out in such a way to minimize interventions on land that is not planned for the construction of facilities.

LIST OF APPENDICES

1. Soil Analysis Report (ZO11) Institute for Occupational Safety and Health Novi Sad, (PB 1-6, PB 10, 11 and 12 and IB 7,8 and 9), report no. 02-99-VII/1 dated 07.07.2021;
2. Soil Test Report, Institute of Occupational Health and Safety Novi Sad, no. of report 02-128-VII/1 dated 08.07.2021;
3. Soil Analysis Report, Institute of Occupational Health and Safety Novi Sad, no. of report 02-28-VIII/1 dated 03.08.2021;
4. Soil Analysis Report, Institute of Occupational Health and Safety Novi Sad, no. of report 02-26-VIII/1 dated 03.08.2021;
5. Soil Analysis Report (ZO42), Institute of Occupational Safety and Health Novi Sad, no. of report 02-537-X/1 dated 31.10.2022;
6. Physical and chemical analysis of groundwater samples from piezometers X-4, X-2 and X-1, Institute for prevention, Branch 27. January Niš, report no. 15/21 dated 25.01.2021;
7. Water Analysis Report (PB1-PB5), Institute for Occupational Safety and Health Novi sad a.d., report number 02-102- VII/1 dated 08.07.2021;
8. Groundwater Analysis Report (PB6-PB12), Institute for Occupational Safety and Health Novi Sad, no. of report 02- 103-VII/1 dated 08.07.2021;
9. Physical and chemical analyses of the groundwater sample from the PA-1, PM-1 and P-2 piezometers, Institute for prevention, Branch 27. January Niš, no. of reports 694/21, 695/21 and 696/21 dated 24.09.2021;
10. Physical and chemical analysis of groundwater samples from the PBS-4 piezometer, Institute for Prevention, Branch 27. January Niš, No. 561/22 dated 22.06.2022;
11. Physical and chemical analysis of groundwater samples from piezometers PBI-14 and PBI-15, Institute for Prevention, Branch 27. January Niš, report no. 562/22 dated 22.06.2022;
12. Physical and chemical analysis of surface water samples, Institute for Prevention, Institute for Prevention, Branch 27. January Niš, No. 87/23 dated 02.02.2023;
13. Environmental Air Quality Monitoring Report, City Institute for Public Health, Belgrade, August 2021;
14. Report on the measurement of mass concentrations of dioxins and furans (PVDDS/PCDFS) in ambient air in the vicinity of the production plant "Elixir Prahovo" in Prahovo, "Aerolab" doo Belgrade, no. 110/21-8 dated 20.07.2021;
15. Measurement of pollutant emissions at the phosphoric acid production plant (final emitter), Prevention Institute, Branch 27. January Niš, 1009/22 dated 04.11.2022;

16. Report on measuring the emission of pollutants into the air from the emitter of the final scrubber of the fertilizer company "Elixir Prahovo doo Prahovo", Aerolab doo Belgrade, no. 440/22-4 dated 26.12.2022;
17. Report on examination - measurement of environmental noise in the vicinity of the "Elixir Prahovo" plant, Institute for Prevention, Branch 27. January Niš, no. of report 260/21 dated 16.04.2021.

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