1. GENERAL DATA

1.1. Project Owner Information

Cernavoda NPP Units 3 and 4 belong to the Nuclearelectrica National Society (SNN) having its headquarters in Bucharest, Polona Street, no. 65, District 1, as the Project Owner and Beneficiary (Ref. 1-4, 1-5).

Designer of the works: design and engineering management consortium (traditional participants: AECL-Canada, ANSALDO-Italy, SITON-Romania).

Project Owner: Project Company (PCO) created for the S.N. Nuclearelectrica S.A. along with the private investors in the country and from abroad.

1.2. Information about the Environmental Impact Assessment Report Author

The environmental impact assessment is carried out by ICIM on the basis of the documentation provided by SITON and other investigations and reports, including specialized studies. This report includes some data and information from them.

ICIM is certified by the Ministry of Environment and Waters Management for performing Environmental Impact Assessment Studies and Environmental Assessments for all activity domains (see attachments at the end of this Report).

ICIM has carried out monitoring activities continuously (since 1985) for the International Commission for the Protection of the Danube River (ICPDR).

Beginning from 1994, ICIM prepared many documentations for Cernavoda NPP, necessary for the authorization of its activities by the environmental protection authorities.

1.3. Project

Cernavoda Nuclear Power Plant - Units 3 and 4 (Cernavoda NPP - U3, U4).

1.4. Design Description and it Stages (construction, operation, decommissioning)

Cernavoda NPP is located at 160 km east from Bucharest and is situated in Constanta county, at about 2 km south-east from the Cernavoda town boundary, and at about 1,5 km north-east from the first lock on the Danube-Black Sea Canal (DBSC). The plant was designed to operate with 5 Units CANDU type of 700 MWe each.

Characteristic for Cernavoda NPP Units is the inline placement of the NPP reactors centers of the Units 1 ÷ 4, at 160 m distance center to center and the fact that the 5 units are independent.

Units 3 and 4 will have the Unit 2 design as a reference design in respect of the design solutions and will include possible feasible improvements applied to similar NPP units as Wolsong 3 and 4. The latest editions of the design standards, quality assurance and nuclear safety standards will be adopted.

Each the unit, designed to operate at the base of the load curve, has a turbo-generator that provides gross electrical power of 720 MWe, using the steam produced by the nuclear energy of a nuclear reactor CANDU-PHWR-6 type (Canadian Deuterium Uranium-Pressurized Heavy Water Reactor).

This type of reactor is using heavy water both as moderator and coolant, in two separate systems. The fuel is natural uranium in form of uranium dioxide sintered pellets in zircaloy sheath forming fuel elements (pencils), and assembled in fuel bundles which contain 37 fuel elements each. The ceramic pellets have the property to confine the fission products within themselves.

The reactor fuel loading and unloading is continuous, bi-directional and with the reactor at power. The reactor is provided with a heat transport system with two independent loops which transfer the heat generated in the fuel during the controlled fission reaction, to four steam generators with light water. The saturated steam from the steam generators is expanding into the turbine, developing mechanical work and afterwards, passing through the condenser, the steam is cooled with water taken from the Danube River via an open intake duct connected to Race 1 of the Danube - Black Sea Canal (DBSC).

For cooling water supply, are considered the works for improvement of water intake from the Danube River into the Cernavoda Hydro Scheme, performing hydro-constructions in Bala area and Race 1 of Danube - Black Sea Canal.

Cernavoda Site was initially designed and developed to include 5 units of CANDU 6 type. The land elevation of the Units 3 and 4 enclosure is + 16.00 mBSL, at the same elevation with the Cernavoda NPP platform (5 Units).

The buildings for the 5 reactors have already been constructed and for Units 3 and 4, some of the components and services are common to the other units as well.

It is estimated that the civil work finalization degree for the NSP & BOP (without the hydro works) for Unit 3 is about 52 % and for Unit 4 is about 35 %.

It is estimated that the hydroworks, water supply and sewage are finalized 49 % for Unit 3 and 30 % for Unit 4.

The works required for the Unit 3 and 4 finalization consist of:

- civil works;
- equipment and pipe installation works;
- electrical, instrumentation and control equipment works;
- clearing & flushing of the process systems and their hydraulic testing;
- commissioning tests.

The construction period is estimated to be 64 months and the commissioning scheduled for middle of 2013 for Unit 3 and first half of 2014 for Unit 4.

Operation conditions and regimes for each system and for the entire nuclear power plant are presented in chapter 2.2. The design life for each nuclear unit is 30 years.

The time period for a nuclear power plant decommissioning depends on the radioactive inventory, the selected option for decommissioning and the decommissioning techniques used, and it can vary from several years to decades.

The decommissioning plan is usually produced in three stages: initial, ongoing and final.

The decommissioning plan will be periodically reviewed in compliance with National Commission for Control of Nuclear Activities regulations, taking the opportunity to adopt the decommissioning techniques and technologies made available due to the worldwide experience in the field up to that moment.

1.5. Design Alternatives

The opportunity for constructing Unit 3 at Cernavoda started from the possible evolution of the electric power demand in Romania (Ref. 1-1, 1-2, 1-3) until the year 2025. The possible evolution of such a demand is based on the following official documents:

- the strategy for the increase of power efficiency in Romania;
- the „Road Map in the power field of Romania's adherence to the European Union".

For the estimation of the probable electric and thermal power demand evolution in the year 2025, the followings were considered:

- the predicted evolution of the gross domestic product (GDP) as well as the "minimal" and "freezing" hypotheses;
- the evolution of the energy demand in the main categories of consumers (industry, residential, agriculture, transport, etc.);
- energy intensity and its reduction to values closer to the values in EU countries;
- available internal and external energy resources;
- evolution of the country population;
- requirements to improve the environment protection including the harmonization with the EU standards and the commitments under the Frame Convention on Climatic Changes;

- the annual primary energy consumption per inhabitant and its evolution;
- the regional and European context determined by Romania position versus the energy resources, the requirements on energy systems interconnection to EU and the energy status of the countries in the area.

Starting from the probable evolution of the power demand in the period until the year 2025, the followings were accomplished:

- a basic scenario on basis of the predicted GDP evolution as per the Road Map, with an annual average increase of 5.46 %;
- a pessimistic hypothesis-based scenario considering the power consumption "freezing" at the value of the year 2005;
- a minimal hypothesis-based scenario according to which failing to reach the targets on GDP increase/decrease and energy intensity, a more moderate GDP annual increase of 3.5 % and an average annual energy intensity reduction of 3.7 %, as to 4.3 % in the Road Map, were accepted.

As regards the satisfaction of the power demand, the three scenarios share a common part and one part that differentiates them.

The commonly shared part includes:

- 8040 MW resulted from the evolution of the existing capacities (hydro groups, lignite - and pitcoal - based groups, hydrocarbon-based groups and Cernavoda NPP Unit 1);
- 1222 MW resulted from renewable sources (biomass groups, wind-power groups, small hydro groups and solar groups);
- 947 MW as per the Road Map (power increase of "Iron Gates" Hydro Scheme Unit 1, of "Paroseni" co-generation group no. 4 and of Cernavoda NPP Unit 2);
- 9435 MW required to be installed in co-generation groups (lignite- and bituminous -coal based groups and combined cycle groups).

The part which differentiates the scenarios among themselves is referring to the possibility to cover the balance of power by Craved-NPP Unit 3, by units with fluidized bed burning at atmospheric pressure, by recycling units on lignite and pitcoal, as alternatives without Cernavoda Unit 3 but covered by different available technologies, groups on combined natural gas turbine -steam turbine cycle and groups with fluidized bed burning at atmospheric pressure with re-circulation and lignite and pitcoal operation.

The analysis, comparison and selection of the optimum scenario for the long-term development of energy field were done by selecting one optimum scenario out of many scenarios for a multi-attribute type issue.

The made-up scenarios were compared as per the criteria grouped in the following categories:

- technical-economic criteria;
- environmental impact criteria;
- social impact criteria.

Besides the comparison of the scenarios as per the above criteria, a multi-criteria analysis was also conducted. For that purpose, a relative importance was assigned to the criteria, the most important criterion being quoted by 4 points, the next one by 3 points, etc. The sequence of the criteria was obtained by measuring the normalized and weighted values of each criterion.

When developing the analysis considering the technical-economic criterion, the total updated costs (CTA) on the analyzed period for the 2005–2025 scenarios were compared. The comparison was developed by:

- including the total updated costs related to the investments in the new groups installed to cover the energy demand and the annual fixed and variable costs;
- considering the income obtained with selling the produced energy as equal for all the scenarios;

- considering constant the tariffs of all the employed fuels on the analysis period. For the natural gas the considered tariff was 269 EURO/1000Nm^3 corresponding to the estimations for the 2010-2012 interval when Cernavoda Unit 3 is expected to be commissioned and produce;
- including the required new investments in the environment protection, also satisfying the current Romanian standards till the year 2007, the year of Romania possible accession to EU, and the EU standards and laws, after the year 2007;
- considering the implications of the environment protection installations in the increase of the operation and maintenance costs, in the decrease of the net output and power, in the increase of emergency ratios, etc.;
- updating the costs on January, 1st, 2004, by a 10 % annual rate, according to the level considered the proper one in the system analysis, for Romanian economy.

Considering the hypothesis accepted in the Roadmap for the increase of the natural gas tariff up to 350 EURO/1000 Nm^3 provided that tariffs for coal and nuclear fuel are maintained constant, an analysis on the variation of CTA criterion with the increase of the natural gas tariff was conducted.

Also within CTA criterion, some criteria considered as safety criteria in the fuel supply and the weight of the stationary means that may be re-used in case that the initial investment plan is modified, have been analyzed.

When considering the environment impact criterion, the comparative analysis considered the followings:

- impact on surface waters;
- impact on soil, sub-soil and underground waters;
- impact on health;
- impact on agriculture and materials;
- impact of greenhouse effect emissions.

Besides the environmental impact criteria, the analysis employed other methods as well, namely the Word Health Organization method to express the “years of lost lives” (YOLL), in values, for the economic and environmental analysis expressed in financial losses (updated values).

In respect of the social impact, the analysis started from the fact that in Romania the weight of the coal mining sector is very representative, with a large number of employees, and the public acceptance on is quite small (10 %).

Details on GDP evolution, on the energy demand, on the scenarios in respect of the comparison as per each criterion, are presented in Chapter 5.

The multi-criteria analysis that offers an overall image on the considered scenarios has finally indicated “C Scenario” which includes Cernavoda NPP Unit 3, as favorite, followed by “B Scenario” and “A Scenario”. Note that this conclusion becomes more evident the expected natural gas tariff and pressure upon its increase in future, become higher.

Although the study of alternatives elaborated for Unit 3 finalization has not been resumed, analyzing the criteria considered for U3 and U4 finalization, one may draw the conclusion that:

- in point of total updated costs criterion, the consideration of U4 along with U3 will result in an increase of the discrepancy between Scenario B and Scenario C, in favor of Scenario C which took into consideration both U3 and U4;
- in point of environmental criterion, irrespective of the value of the fee for greenhouse gas emissions, U4 finalization will increase the difference between Scenario B and Scenario C in favour of Scenario C;
- considering both the technical – economic criterion and the environmental one, irrespective of the value for the greenhouse gas emission fee, the difference between Scenario B and Scenario C is setting bigger in factor of Scenario C which considered the finalization of both Cernavoda U3 and U4.

1.6. Information Regarding the Production and Energy Resources Requirement

Each of the power plant units, designed to operate at the base of load curve, has a turbo-generator that provides gross electrical power of 720 MWe, using the steam produced by the nuclear energy of a nuclear reactor CANDU-PHWR-6 type (Canadian Deuterium Uranium Pressurized Heavy Water Reactor).

In the Table 1.6-1. are presented production and energy resources the annual requirement for one unit operation (Ref.1-4).

Table 1.6-1. Production, and energy resources the annual requirement for one unit operation

Production		Resources used for production		
Name	Annual quantity	Name	Annual quantity	Purveyor
Electrical power	5.239 TWh	Nuclear Fuel UO_2 / (U)	108 t/96 t	RAAN-SCN Pitesti
		Motor oil	400 t	PETROM or another supplier

Uranium for the fabrication of the nuclear fuel required for Cernavoda NPP U3 and U4 operation, for an estimated NPP Unit 3 and Unit 4 service life of 30 years, can be produced in the country from:

- the stock of technical uranium concentrates in the form of U_3O_8 existing in the National Company of Uranium;
- the certain uranium resources known today;
- the estimated uranium resources.

In the perspective of Romania Accession to EU, to provide uranium from external sources in an alternative that need to satisfy the provisions of EURATOM Treaty.

The legal framework in EU for supplying the required uranium and services, for nuclear fuel, is stating that all uranium purchase and exchange contracts need to be implemented via Euratom Supply Agency (ESA) which is empowered to manage all trades in respect of uranium and service supply associated to nuclear fuel, the beneficiary of which is a EU member country.

Moreover, ESA is also responsible for defining a unitary policy on the uranium resource distribution so that all beneficiaries in EU may be supplied with the fuel and/or have the resources on a fair and regular basis.

Such politics are implemented by ESA exclusive right to decide upon the contracts regarding the supply of uranium, resources and special fissile materials from inside the EU or imported (EURAOTM Treaty Art. 52).

Fabrication of nuclear fuel shall be SNN responsibility -Nuclear Fuel Factory (FCN) - Pitesti, licensed by ZPI Canada for CANDU-PHWR type NPP fuel fabrication.

At present, FCN-Pitesti is the supplier of the nuclear fuel required for Cernavoda NPP-Unit 1 operation and starting with the year 2007 will supply the nuclear fuel for Cernavoda NPP-Unit 2, and starting with 2013 respective 2014 FCN will also supply the nuclear fuel for Cernavoda NPP-Unit 3 and 4 as well. Note that the increase of FCN capacity will enhance the efficiency of the factory and consequently lower the costs related to nuclear fuel.

1.7. Information on Raw Materials and Chemical Substances or Products

The main materials and material types utilised in the Unit 3 and 4 construction period are: cement, lime, wood, textiles, materials and metal work, paper, board, polystyrene, plexiglass, polyethylene, polyvinyl materials, electrical and electronics parts, rubber materials, alumina, glass fibres, cellulosic fibres, mineral wool, mineral and vegetal oil (turbine oil, polishing oil, penetrant oil, texguard oil, hydraulic oil, motor oil, transformer oil), grease remover (white spirit, methanol, degreasing salt, technical ethanol, spray type degreasing, acetone), paints (various type based on solvents, acrylics, smalt, paints with toluen, various grounds, epoxide), lubrificants (vaseline, lubricant multipurpose), solvents (toluen, xylol, etc.), detergents (industrial alkaline detergent, liquid detergent, etc.), oil hydrocarbons, aliphatic hydrocarbons, lamp oil, diesel oil, benzine, polyurethanes, silicone mastic, hydrazine hydrate, morpholine, biocide, gadolinium nitrate, hydroxide sodium, potassium, ammonia water, acide (sulphuric, citric, hydrochloric, phosphoric, acetic, based on methyl-ethyl-cetone, nitric), adhesive, polyester resins, epoxidic resins, alkydals, laked substances, glycol, industrial borax, encapsulate gel based on distillation product of petroleum.

The nuclear fuel and the heavy water moderator represent the main raw materials employed for the Plant operation (Ref. 1-5).

The nuclear fuel used in Cernavoda NPP consists of natural sintered and compacted UO_2 pellets.

Heavy water D_2O is both moderator and coolant used in the Moderator System and its related systems, the Primary Heat Transport System and its associated systems, in the fuel handling systems and the heavy water supply system.

Among the chemical substances approved to be used in the Plant, from the point of view of their environmental impact, the relevant chemical substances are the ones employed for the conditioning (treatment) of the water resulted from the thermal cycle. Other substances, e.g. ammonia, natrium nitrite, glycol, hydroquinone, potassium hydroxide, sodium hypochlorite, citric acid, EDTA, etc., are used in small quantities and generally for laboratory purposes.

In the Table 1.7-1 are shown a list of the relevant chemical substances, the annual quantities, their hazard category, their hazard degree and the risk phrase for one unit Cernavoda NPP.

Table 1.7-1. Informations about raw material and relevant chemical substances or products from Cernavoda NPP for one unit.

Name of raw material, chemical substance, product	Annual quantity	Classification and labeling of chemical substances/products (as per OU 200/2000 with subsequent modifications)		
		Hazard/non-hazard category (P/N)	Hazard degree	Risk phrase
UO_2 / (U)	108 t/96 t	-	-	-
D_2O	system inventory: 456,9 t annual losses: about 5 t	-	-	-
Hydrogen	108 flask	P	F+	R12
Helium (He)	500 flask	-	-	-
CO_2	54 flask	-	-	-
Nitrogen	54 flask	-	-	-
Oxygen	36 flask	P	O	R8
Acetylene	36 flask	P	F+	R5 R6 R12
Carbide	10 flask	-	-	-
Morpholyne	7450 kg	P	Xn C	R10 R20/21/22 R34
Cyclohexylamine	505 kg	-	-	-
Hydrazine	1900 kg	P	Cat. 2 T C N	R 10 R45 R 23/24/25 R34 R 43 R 50-53
Flomate 537	42 kg	-	-	-
Lithium Hydroxide	16 kg	-	-	-
Sodium Hydroxide	111 500 kg	P	C	R35
Hydrochloric Acid (HCl)	101 500 kg	P	T C	R23 R35
Ferrous Chloride	33500 kg	-	-	-
Limestone	220000 kg	-	-	-
MB-25 (biocide)	5950 kg	-	-	-

The storage of chemical substances is performed as follows:

- hydrazine, morpholyne, flomate 537 and MB25 compounds are kept in the special deposit, in the packages given by supplier, metal and plastic drums of 200 l and containers of 1000 l for biocid;
- lithium hydroxide is stored in the chemical laboratory, in the package provided by supplier;
- the limestone is kept in the storage silos located in Water Treatment Plant;
- hydrochloric acid, sodium hydroxide and the ferrous chloride are stored in storage cisterns located in Water Treatment Plant. The cisterns are grouped on a platform of vat type, acid-proof plated, collecting the accidental leakage of chemical substances, allowing their transfer to the waste water tanks. Also, the platform for unloading the chemicals from the railway tanks is acid-proof plated and provided with transfer facilities of waste waters for neutralization;
- during the completion period of the construction of Units 3 and 4, the materials procured by constructors will be stored in the warehouses and deposits belonging to the site temporary buildings.

The chemical products are kept in the manufacturer's packages, procedural requirements for ordering, receipt and periodic inspections being met, observing the integrity and waterproofing of packages, the correct labeling with data regarding a correct product description, plant trademark and manufacturer's denomination, manufacturing date, warranty term, strictly necessary data, in order to avoid chemical hazards, first aid residual products removal, and whenever necessary, restrictions of product application.

The working places adhering to the laboratories physico-chemical determinations are provided with the necessary supply of risks diminishing, associated to chemical substances application (ventilating niches, emergency showers, ventilation corresponding to chemical substances preservation, panels with safety closing systems).

The use of chemical substances, especially of the toxic and dangerous ones will be performed with equipments and supplies regarding labour safety as per norms in effect. The personnel handling, depositing, transporting and using chemical substances is trained by such activities, as per legislation in effect and the specific loads, as described by the Position Flowsheet.

Chemical substances management will be performed, meeting the provisions of Law No. 360/2003 with subsequent modification, of Law No. 300/2002 regarding the juridical regime of the forerunners used at drugs illicit manufacturing, modified and completed by Law 505/2004 and of Law No. 451/2001 for approval of the Emergency Order No. 200/2000 regarding classification, labeling and packing of substances and dangerous chemical preparations, and also the provisions of the subsequent regulations.

1.8. Information Regarding the Activity Generated Physical Pollution

During Cernavoda NPP Units 3 and 4 operation, various chemical substances will employed (Chapter 1.7, Table 1.7-1) and radioactive substances likely to be realized to the environment are generated (Ref. 1-5).

Table 1.8-1 presents information about physical pollution generated by the Cernavoda NPP each unit operation, the polluting sources, the type of generated pollution (radioactive or non-radioactive), the estimated pollution and the main measures taken for eliminate or reduce the generated pollution.

Table 1.8-1. Information about physical pollution generated by the each unit operation

Part A – Ionizing radiation

Pollution type	Radiation source	Dose limit for population	Commitment Dose from Background Radiation	Predicted dose for one member of the critical group	Actions to eliminate/ reduce pollution
Ionizing radiation	Reactor core, PHTS Cooling System, Moderator System, F/M System, SFB, Purification Systems, Radwaste Storages, Ventilation System, etc.	1 mSv/year	1.55 mSv/year	0.0197 mSv/year	Source control Effluent control Effluent monitoring Environment monitoring Emergency Plan

Table 1.8-1. Information about physical pollution generated by the each unit operation (continued)

Part B Non-radioactive pollution

Pollution type	Pollution source	No. of pollution source	Max. allowable pollution (max. allowable limit for population and environment)	Background pollution	Calculated activity-generated pollution			Measures to eliminate/reduce pollution
					Within the objective area	Within the protected/ restricted area associated to the objective as per laws in force	Within residential/recreation or other protected areas considering the background pollution	
Physical - Water temperature	Cooling Water System	1	t max = 35 ºC NTPA 001/2002	-	-	-	local increase of water temperature in the receptor	Supply of design cooling flow
Physical – noise	Transformers (self-services and power discharge)	6	87 dB(A) * for 8 hours of working 65 dB(A) at the site limit (cf. STAS 10009/88)	< 60 dB (A)	< 75 dB at 1 m. Insignificant exposure times. Non-permanent work places.	-	< 50 dB (A) in Cernavoda town	By the design and fabrication as per ANSI S-1.4 and IEC 34 – 9 standards
	< 50 kW motors power	350	87 dB(A) * for 8 hours of working 65 dB(A) at the site limit (cf. STAS 10009/88)	< 60 dB (A)	< 95 dB at 1 m. Insignificant exposure times. Non-permanent work places.	-	< 50 dB (A) in Cernavoda town	By the design and fabrication as per IEC 34 – 9 standards
	> 50 kW motors power	2 400	87 dB(A) * for 8 hours of working 65 dB(A) at the site limit (cf. STAS 10009/88)	< 60 dB (A)	< 108 dB at 1m. Insignificant exposure times. Non-permanent work places.	-	< 50 dB (A) in Cernavoda town	By the design and fabrication as per IEC 34 – 9 standards

Table 1.8-1. Information about physical pollution generated by the each unit operation (continued)

Part B Non-radioactive pollution

Pollution type	Pollution source	No. of pollution source	Max. allowable pollution (max. allowable limit for population and environment)	Background pollution	Calculated activity-generated pollution			Measures to eliminate/reduce pollution
					Within the objective area	Within the protected/ restricted area associated to the objective as per laws in force	Within residential/recreation or other protected areas considering the background pollution	
Physical-noise	Turbine engine	1	87 dB(A) * for 8 hours of working 65 dB(A)at the site limit (STAS 10009/88)	< 60 dB (A)	Data – unavailable. To be submitted by supplier.	-	-	Noise dampers
	Power generator	1	87 dB(A) * for 8 hours of working 65 dB(A)at the site limit (STAS 10009/88)	< 60 dB (A)	Data – unavailable. To be submitted by supplier.	-	-	Noise dampers
	Stand-by and emergency Diesel units	4	87 dB(A) * for 8 hours of working 65 dB(A)at the site limit (STAS 10009/88)	< 60 dB (A)	Data – unavailable. To be submitted by supplier.	-	-	Noise dampers

Table 1.8-1. Information about physical pollution generated by the each unit operation (continued)

Part B Non-radioactive pollution

Pollution type	Pollution source	No. of pollution source	Max. allowable pollution (max. allowable limit for population and environment)	Background pollution	Calculated activity-generated pollution			Measures to eliminate/reduce pollution
					Within the objective area	Within the protected/ restricted area associated to the objective as per laws in force	Within residential/ recreation or other protected areas considering the background pollution	
Physical-noise	Live Steam System Steam Relief	16 MSSV (Main Steam Safety Valves).	87 dB(A) * for 8 hours of working 65 dB(A)at the site limit (STAS 10009/88)	< 60 dB (A)	Data – unavailable. To be submitted by supplier.	-	-	Noise dampers
		3 CSDV (Condenser Steam Discharge Valves).			Data – unavailable. To be submitted by supplier.	-	-	
		4 ASDV (Atmospheric Steam Discharge Valves).			90 dB(A) at 1m distance of system	-	within limits of usual noise level in Cernavoda town	

Table 1.8-1. Information about physical pollution generated by the each unit operation (continued)

Part B Non-radioactive pollution

Pollution type	Pollution source	No. of pollution source	Max. allowable pollution (max. allowable limit for population and environment)	Background pollution	Calculated activity-generated pollution			Measures to eliminate/reduce pollution
					Within the objective area	Within the protected/ restricted area associated to the objective as per laws in force	Within residential/ recreation or other protected areas considering the background pollution	
Physical – electromagnetic radiation	Power discharge transformers	2	14 kV/m* for 8 h exposure/day	N/A	< 10 kV/m. Insignificant exposure. Non-permanent work places	<< 10 kV/m	<< 10 kV/m	Design and fabrication as per standards in force
	Self-service transformers	4	14 kV/m* for 8 h exposure/day	N/A	< 10 kV/m. Insignificant exposure. Non-permanent work places	<< 10 kV/m	<< 10 kV/m	Design and fabrication as per standards in force
	110/10.5/6.3 kV self-service supply lines. Suspended power lines for discharge to 400 kV power system	4 2	14 kV/m* for 8 h exposure/day	N/A	< 10 kV/m. Insignificant exposure. Non-permanent work places	<< 10 kV/m	<< 10 kV/m	Design and fabrication as per standards in force

* As per General Norms for Working Protection (Ed. MMSS /MSF - 2003)

1.9. Territorial Planning in the Site Area

The Cernavoda NPP site was arranged according to the plan elaborated for this area, taking into account all the aspects related to the specific activities of the Cernavoda Nuclear Power Plant and its auxiliary installations.

1.10. Information on Existing Infrastructure and Connecting to It

The network of roads developed in this area consists of:

- Bucharest-Constanta highway A2, section Cernavoda - Constanta (in perspective);
- National road 22C Cernavoda - Basarabi;
- Districtual road 223, parallel with Danube river between villages of Cochirleni, Cernavoda and Seimeni;
- Village roads DC60 and DC61, in NNE and respectively NE sectors; the distances towards Cernavoda NPP are greater than 5 km.

Vehicle access to Units 3 and 4 site is through Medgidia Street, via the secondary access road of the NPP and via the road along the front of Unit 1 ÷ Unit 4 reactors. Cernavoda town (Units 3 and 4 implicit) was connected, by the bridge over race 1 of the DBSC, to the national road between Fetesti, Cernavoda and Constanta.

The roads and truck platforms within the Units 3 and 4 enclosure are sized for both the circulation of the transport vehicles and the equipment required for the Plant systems and of the fire fighting vehicles.

The road in front of Units 3 and 4 is a segment of the access road along the front of the Unit 1÷Unit 4 reactors. The road provides conditions for safe transport of the spent fuel from the Spent Fuel Bay of each unit to the Interim Spent Fuel Storage Facility (DICA), by trailer. The road is 8 m wide.

The road between the nuclear units is 6.00 m wide and is used for transport during the construction-installation work periods as well as during operation.

The road curvatures are calculated taking into account the sizes of the vehicles travelling inside the NPP enclosure during the construction - installation works and operation.

The Bucharest – Constanta railway has the nearest station at Cernavoda Bridge. In the influence area there is the secondary railway Saligny – Cernavoda town; hazardous substances and other materials and equipments on this railway are used only for the Cernavoda NPP Units 3 and 4.

The waterways nearby Cernavoda NPP are the Danube river and the Danube - Black Sea Canal.

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