ENVIRONMENT IMPACT ASSESSMENT

Non-technical Review

Object: COMBINED CYCLE GAS TURBINE POWER PLANT CCGT-410 of NEVINNOMYSSK GRES

LIST OF ABBREVIATIONS

Nevinnomyssk GRES – Nevinnomyssk State District Power Station

CCGP – combined cycle gas turbine power plant

STP – steam-turbine plant

WHRB – waste heat recovery boiler

GTP – gas turbine plant

MCP – mail control panel

DMTS - department of material and technical supply

GCU – gas control unit

GDS – gas-distribution station

GCP – gas control point

CACI - complex air-cleaning installation

CI&A – control instrumentation and automation

APCS - Automatic Process Control System

GPF – gas processing facility

CSG – complete switchgear with sulfur hexafluoride circuit breaker of medium voltage

ISG – indoor switchgear

GSPU – gas separator pump unit

EBRD –The European Bank for Reconstruction and Development

EIA –Environmental Impact Assessment

ESIA – Environmental and Social Impact Assessment

EU – European Union

IPPC – Integrated Pollution Prevention and Control

OVOS – Russian EIA Process

INTRODUCTION

This Non-technical review of building the new power-generating unit at Nevinnomyssk GRES is made under the investigations conducted within the Environmental Impact Assessment of the new power-generation unit construction at Nevinnomyssk GRES.

The construction of this new and unique power-generating unit is planned for 2009-2011 by the management of OGK-5 (owner of Nevinnomyssk GRES). The new unit of GRES is designed to generate electric power necessary for the region rapid development.

The project management has set an ambitious and in many aspects unique goals before the designers and builders of the new unit:

The project must be "green"

After the new unit to be put into operation the negative impact of GRES on the environment is to be significantly reduced, due to the withdrawal from production of the old facilities.

Maximum energy efficiency

The modern technologies application allows achieving the maximum efficiency coefficient.

Social responsibility

The information about the projecting and building is available to the public. The interested parties have all opportunities to discuss the design decisions.

An optimal labor conditions are to be created at the new unit including the construction stage.

Thus:

This Non-technical review aims at disclosing the key information about the new unit as well as reflecting the uniqueness of this project from the aspect of the environment, energy supply and social advantages.

NON-TECHNICAL REVIEW

Nevinnomyssk GRES is designated for electric power delivery into consolidated power system of Ciscaucasia and provision consumers with hot water and steam. The installed electric power of the existing GRES is 1290 MW; thermal power – 729 Gcal/h. Nevinnomyssk GRES had been put into operation step-by-step from 1959 till 1973.

The power station consists of a non-unit-type part (a part of combined heat and power plant (CHP)), a unit-type part and CCGT-170.

GRES includes the next main facilities:

THE NON-MODULAR UNIT:

Group 90 bara units:

- power-generating boilers TP-15 st. No. 1, 2, 3, 3A;
- turboset PT-30/35-90/10-5M st. No. 1
- turboset PT-25/30-90 st.№2

Group 130 bara units:

- power-generating boilers TGM-96 st. No. 4, 5, 5A;
- turboset PT-80/100-130/13 st. No. 3;
- turboset R-50-130-1 st. No. 4;
- turboset R-30(100)-130/15 st. No. 5.

THE MODULAR UNIT:

- power-generating boilers TGM-94 st. No. 6, 7,8, 9, 10, 11;
- turbosets K-150-130 st. No. 6, 7, 8, 9, 10;
- turboset K-160-130 st. No. 11.

CCGT-170:

- high-pressure steam generator HSG-450 st. No. 12;
- turboset K-145-130 st. No. 12;
- turboset GT-25-710 sr. No. 13.

The maximum installed thermal load of the residential area and the industry consumers of combined heat and power plant (CHP) includes:

- hot water for heating, ventilation and hot water supply 180 Gcal/h;
- steam of the manufacturing parameter 549 Gcal/h.

Annual product supply of Nevinnomyssk GRES includes:

- electric power - 6215 ths. kW·h;
- thermal energy - 1680 ths. Gcal.

The main fuel of Nevinnomyssk GRES is natural gas, the standby one – mazut.

The annual consumption of fuel equivalent comprises 2 320.0 ths. t.f.e.

The output of electric power is made through OSG-330 kV, ISG-110 and 35 kV, GCU-6 kV.

The land plot of Nevinnomyssk GRES is owned by OAO OGK-5 (closed joint stock company).

The investment project of the main unit CCGT-410 construction in the area of the power station is to be financed among others by the European Bank for Reconstruction and Development (EBRD). In line with the Lenders requirements, and EIA needs to be undertaken in accordance to best practice.

It is required to make the full and detached assessment of all potentially social impacts and the impacts on the environment by planning such projects.

This work was made by the specialists of EcoStandard Group additionally to the work of material development on Environmental Impact Assessment (EIA) according to Russian legislation.

This Non-technical review about the environmental aftermath of the project reflects the results and the conclusions of the project impact assessment on the surrounding social and nature environment. The main purpose of this work is to provide the respective basics for decision making that concerns the appropriateness of financing the assumed object construction works.

Non-technical review:

Contains the description of the assumed object and the existing condition of the environment in the area of the assumed project site location;

Gives the assessment of the assumed object impacts on the environment with account of its existing condition;

Gives recommendations on activities aimed at the reduction of these impacts;

Identifies the degree of residual impacts on the environment, which may occur after the accomplishment of the proposed activity realization.

General information about the proposed project

The main unit CCGT construction at the area of the power station is provided by means of the Nevinnomyssk GRES extension project. The facility of the combined-cycle two-shaft power-generating unit CCGT-410 with the capacity of 400-450 MW is established at the main unit.

The main and standby types of fuel are natural gas.

Beginning from the preconstruction stage optimal layout and necessary technologies are to be determined by the project to install CCGT with the capacity of 400-450 MW at the above mentioned area with account of the location in immediate proximity to the eastern section of mazut unit No. 2, the nitrogen oxygen station, the pressure conduit crossing the site.

The maximum applications of the existing engineering services are accepted.

The combined cycle gas turbine power plant construction is assumed to be on the base of the foremost gas turbine plant that provides the efficiency coefficient of electric generating at the level of 57%.

The deteriorated capacities of about 330 MW is planned to be withdrawal from production after CCGT with the capacity of 410 MW to be put into operation. With CCGT-410 putting into the operation the increase of installed capacity of the station will not lead to the growth of gas limit for the power station on the whole because of the old facilities will be withdrawal from production.

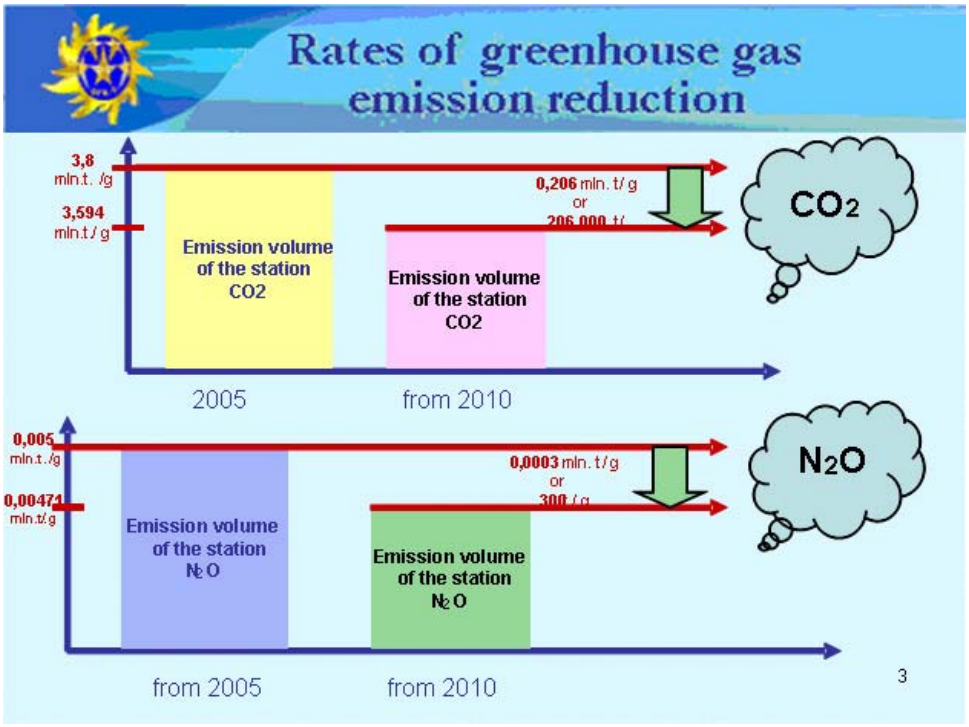

Figure 1. Rates of greenhouse gas emission reduction

Table 1. Rates of energy efficiency

Rate	Capacity output	Capacity input
Rated capacity, MW	330	410
Operational specific consumption of fuel equivalent, g/kW·h	345	215
GRES capacity increase, MW	80	
Reduction of specific consumption of fuel equivalent, g/kW·h	130	

Thus:

Nevinnomyssk GRES energy efficiency with CCGP-410 putting into operation:

- Increase of GRES installed capacity per 80 MW
- Saving of fuel equivalent consumption about 25 t.f.e./h
- Reduction of greenhouse gas emissions: 206000 t/g –CO_2 ,300 t/g –NOx
- Power generation coefficient of efficiency will make 57%.

Constructions and facilities

Since the area of Nevinnomyssk GRES within the bounds of the outward enclosure was developed and designed earlier, the works at the preconstruction stage are connected to the removal (disassembly) of separate constructions, pipelines and highways getting into the zone of the new construction. The design of the construction site surface is determined with account of the earlier designed area benchmarks and the marks in the area of reserved constructions, highways. Microdesigning of the site relief is to be made after the end of the construction.

It is provided for establishing the new section of the drinking, domestic and fire-prevention water supply system, the gulley и domestic sewage system, the sewage system for oil-bearing flow, the heating system, bridges of industrial pipe-lines.

It is provided for removing the existing cable tunnel from the area of the eastern section.

It is provided for establishing transformers in the open way, the location of which is to be chosen depending on the layout decisions under the results of projecting.

Engineering communications between the buildings and constructions are brought into effect by means of pipelines, built in the underground and overground ways (on the bridges).

The power-generating unit CCGT with the capacity of 400-450 MW includes the next main equipment:

- gas turbine plant (GTP) SIEMENS SGT5-4000F with a suit of auxiliary equipment, an air cooling turbogenerator and a complex air-cleaning installation SGen5-1000A (CACI);
- waste heat recovery boiler **HRSC** with three pressure levels, a reheat, a gas flue compensator and a smokestack;
- steam-turbine plant (STP) SIEMENS SST-900DRH with a suit of auxiliary equipment and an air cooling turbogenerator SGen5-100A-2P 100- 40

A power-generating unit must be completed with an automatic process control system (APCS) on equipment platform SIEMENS.

The unit CCGT will be also furnished with an auxiliary equipment and a control system, which includes:

- facilities and materials for preoperational cleaning of WHRB water-steam circuit and the unit facilities;
- facilities and materials for preoperational cleaning of turbine lubrication systems;
- in case the application of the oil for bearing lubrication systems, for control systems, not used at Nevinnomyssk GRES, takes place, it will be provided for the installation of additional oil tanks with a system of pipelines and pumping outfit at the existing oil unit in order to indemnify loss and oil pumping down from CCGT by repairs;
- the full amount of all electrotechnical equipment (current distributors of generators, generator switches, a system of earthing and lightning protection, a switchgear of middle-voltage, a switchgear low-voltage, accumulator batteries, charging devices, dc transducers, distribution switchboards, unit-type transformers, auxiliary transformer of GT, transformers of low-voltage, locking, protection of generators and transformers, connection protection of switchgears of middle- and low-voltage, CI&A, force and control cables, control cables, lighting, fire-extinguisher system, communications system);
- APCS facility;
- facility of technological and operative communication;
- an accumulator battery with a dc panel.

Nowadays Nevinnomyssk GRES plans the realization of GCP-1A construction project for GCP-1 to be taken out of the operation, as it does not respond to the existing requirements of NTD. According to the existing GCP-1A construction project its throughput is 360 ths. nm^3/h, its design input pressure – 1.25 MPa (12.5 kgf/cm^2) abs. Laying the gas pipeline, which supplies CCGT-410 with gas, will be determined after a new project of laying the gas pipeline from GDS-1A to GCP-1A to be reconciled by Stavropolkraigas. Under the General Plan, provided by ENEL, an individual gas supply of CCGT-410 from the gas pipeline of Dy 800 GDS-1A- GCP-1A will be realized.

The main gas supply of CCGT with the capacity of 400-450 MW is assumed to be brought into effect from the reassembled line on GCP-1A from GDS-1A in the area of the existing CCGT-170, with the assembly of gas processing facility and the installation of two GSP. The mounting of a lock from the existing gas pipeline of CCGT-170 (the diameters not less than 530 mm, the length is about 50 m) will give an opportunity to use this gas pipeline and to have an available standby input from the trunk GDS.

As far as the emergency fuel supply of CCGT is concerned gas is applied.

In order to supply CCGT with main and standby quantities of gas of the required quality and criteria within the volume of delivery, the gas processing facility is provided. It

includes the installation of a cleaning unit and a gas consumption measurement one, a reduction unit, three gas separator pump units with receiver sets, if it is needed, and control blocks.

GPF must be accomplished with the condition that all components are fully (100%) reserved in order to take it into the repair without the shutdown of GTP. GPF must include a unit of preliminary coarse and fine gas cleaning.

GPF facility is located in the special building, taken out of the bounds of the main unit of CCGT-410. GSPU will be in the detached building.

Construction work realization

Load and facility delivery, including the heavily-loaded and the long-length ones, will be made by means of motor and rail transport when the new main unit is constructed and assembled.

Engineering communications between the buildings and constructions are brought into effect by means of pipelines, which are laid in the underground and overground ways (on the bridges).

The site of the existing Nevinnomyssk GRES has a connection to the external railway network.

The nearest railway station is Nevinnomyssk STRW.

The distance from the sorting station to the area of Nevinnomyssk GRES branch is 4 km.

The existing approaches to Nevinnomyssk GRES provide linkage with the external highway network and are preserved.

The highway network over the area of the industrial site of Nevinnomyssk GRES is determined by the technology process, production and fire-protection requirements. The motorroad and the grounds to the buildings, which are fire driveways at the same time are provided to all buildings and constructions.

The road surface is asphalt concrete, the type of cross-section is urban with curbing.

There is OOO TH Zhelezobeton (Limited Liability Company) at the distance of not more that 5 km from the construction site. This company produces precast concrete units, ready-mixed concrete, mortar sets and has the production capacity of 300 m^3 of ready-mixed concrete per shift. There are three production lines at this enterprise: two of them manufacture reinforced concrete, one - ready-mixed concrete. There is also an opportunity to produce ready-mixed concrete by two lines. It allows to use the

production of this enterprise and reduce the amount of construction material shipping operations to the construction site.

The next types of construction work will be executed within the framework of the project:

- making excavations under the buildings and constructions;
- poling and mounting concrete bottoms;
- erection of steel constructions and wall covering;
- facility installation;
- making connections of the necessary communications;
- building finish;
- putting into the operation.

The construction work within this project will be carried out by the company ZAO Atomstrojeksport (closed joint stock company). This construction work is to be in progress for 33.5 months, and the maximum number of construction workers is going to be 500 people during the stress period of the construction. Builders and workers will be attracted to the construction work only from Russia. Engineers and contract supervision specialists will be from SIMENS, CMI.

In order to provide comfort labor conditions a construction camp will be mounted near the construction site (within the area of mazut-pumping unit No. 2). Standard living carriages designated for workers' rest and change of clothes and furnished with shower cabins are to be installed on the concrete ground.

Hot food for workers will be delivered to the construction site by the specialized company.

Workers dwelling will be organized in the town area at dormitory accommodations due to the object security measures. Special transport will deliver the workers to the job.

Medical assistance will be provided to builders, workers and engineers at the medical post of Nevinnomyssk GRES.

Used projecting standards

The Project of Nevinnomyssk GRES extension will be realized according to the environmental requirements: Russian (Codes, Federal Statutes, Government Regilations, SanPiN, SN, GOST, etc.) and international standards (International Conventions and Directives) as by the construction so as by the object operation.

According to the key conclusions of EIA, the project of the suggested object corresponds to the general requirements of Russian environmental legislation, the

standards of the European Bank for Reconstruction and Development, International Finance Corporation and other financial organisations, which endorse the Principles of Equator.

Object location

Nevinnomyssk GRES is located at the north-eastern outskirts of Nevinnomyssk, on the right bank of the Kuban. The nearest large population centre is Stavropol, the territorial centre of Stavropol Territory, which is situated 50 km off to the north-east from Nevinnomyssk. There is OAO Nevinnomyssk Azot (open joint stock company) in immediate proximity to GRES. It is one of the main consumers of thermal energy from Nevinnomyssk GRES. The Great Stavropol Canal and the Nevinnomyssk Canal, that take water from the Kuban, are the sources of the water supply for GRES.

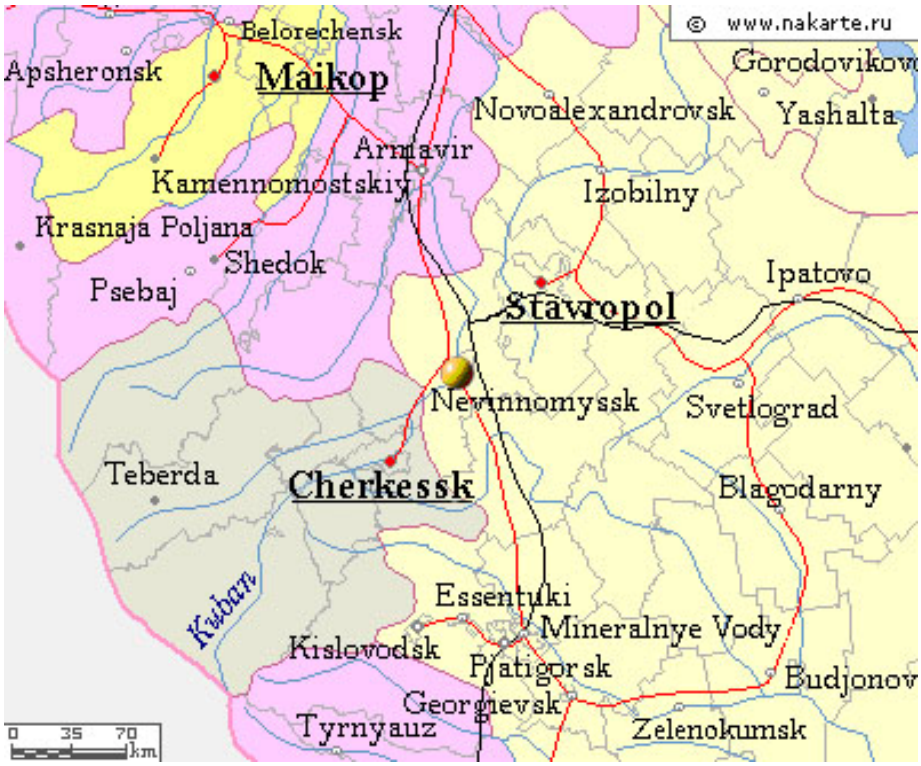

Figure 2. Object location

Existing state of the environment

The territory within the area of the former warehouse and the construction site is supposed to be used for the location of CCGT with the capacity of 400-450 MW at Nevinnomyssk GRES. The general area of the territory, that is possible to be used for the CCGT construction, comprises about 2.1 ha. This territory is conventionally divided into two sections, territorially disposed at the both sides, the eastern and the western ones, from CCGT-170.

All warehouses are demolished at the present time, and the site is ready for the construction.

Figure 3. The existing condition of the site for the construction of CCGT-410

There are the next facilities in immediate proximity to the eastern section:

From the eastern part – parallel to the enclosure:

- the cable tunnel from MCP to OSG-330 kV;
- flexible connections of 330 kV of the unit-type part of Nevinnomyssk GRES;
- the construction of the underground gas pipeline is planned from GDS-1A to GCP-1A.

From the southern part:

- the nitrogen and oxygen station (Picture 4.5);
- the switching port of Barsuchkovsk water-diverting structure (Picture 4.5);
- the flexible connection of CCGT-170 and power-generating unit No. 11 – FC-6;
- underground pressure conduits CCGT-170.

From the western part:

- Transformers and the suction chamber of the existing CCGT-170.

From the northern part – mazut pumping station No. 2 with three tanks-storages of mazut each of them has the capacity of 20000 m^3.

*Figure 4. T*he nitrogen and oxygen station *(open recipient arranging)*

*Figure 5. T*he switching port of *pressure* conduits

The area for the construction of the additional unit CCGT-410 is not any environmentally significant object.

Kinds of impact exercised

Potential project impacts which are provided for the consideration within the investigation of scale identification and the composition of impacts on the environment include the next aspects:

Air quality: The investigation on modelling the dispersion pollutants in the atmospheric air was carried out with the purpose of the assessment of the supposed emission levels. The basic question, which would be considered within the framework of this investigation, will be an identification of the levels of possible pollutant impacts on the atmospheric air condition at the boundary of the estimated sanitary protection zone of the enterprise.

Waste: The organisation scheme assessment of waste management with the purpose of providing the maximum reduction of the impact level connecting with generation and disposal of wastes.

Energy resources and greenhouse gas emissions: The questions connecting with energy resources consumption and generation of greenhouse gas emissions.

Acoustic regime: The noise impact assessment connecting with the object operation, in the context of the existing regulatory requirements.

Social factors: The questions of population employment, labor conditions and the proposed object impacts connecting with it.

Soil cover. The investigation of the project impacts on the soil condition determines the possibility for mechanical breaking of the soil condition in the course of the construction, as well as for the threat of polluting by the object operation.

Vegetable cover. General characteristic of the vegetation, typical to this area (the realization of the project will not lead to the change of vegetable cover of this area, as there is no vegetation on the site).

Fauna. The characteristic of the fauna in this area and the assessment of the object impact on the wildlife habitual area.

Surface-water. The assessment of the projected object impacts on the surface-waster objects by taking out them for the production needs.

Geological environment and groundwaters. The investigation of the projected activity efficiency intended for the prevention of leakages and occurrence of erosion, karstic and other things on the pipeline routes.

Impact at the construction stage

The main impact at the stage of construction will be bound to dusting in the course of the construction work. However, with taking into consideration the fact that the nearest dwelling houses are situated at the distance of 680 m, the main type of risk is the dust emission impact on the health of the manufacturing personnel, working at the site. In order to decrease this impacts the activities on dust emission control and its exclusion will be implemented together with the measures that guarantee the permanent usage of the respective personal protective equipment.

As a result of the estimation of transport emissions it was established that the degree of automobile exhaust gas impacts is insignificant.

- **Pollutants emissions into the atmosphere in the course of the construction will not influence on the health of the residents living near Nevinnomyssk GRES and, as a result of providing the protective measures, on the health of the personnel.**

Groundwater pollution at the construction site may turn out to take place under the migration of the existing polluting compounds presenting in the earth or/and as a result of the entrance of the materials used in the course of the construction work. The reduction of the risk degree will provided by means of cleaning the extremely polluted grounds in the proportion to their identification with the subsequent disposal of the extracted polluted earth at the specially equipped areas for dangerous waste disposal outside the enterprise territory. In order to reduce the risk of polluting as a result of spillage and leakage the storage of potentially dangerous materials will be provided in the special containers.

- **The stipulated control system of dangerous substances storage and the liquidation of pollutants entrance into the soil will make it possible to avoid polluting groundwaters by the construction.**

The extraction of the old construction elements: underground communication, basement parts, polluted and technogenic soil will lead to the earth decompaction and the loss of groundwater protection. The minimization of these negative impacts is possible at the expense of the construction term acceleration and the observation of the recommendations from the EIA section, excluding the entrance of pollutants into the open trenches and pits.

The oversite excavation is evidently projected as the minimum one. Significant impacts on the geological environment ought not to be expected within such conditions.

Driving pits under the buildings and engineering constructions determines the most significant impacts on the geological environment. The depth and the size of these pits are designed in such a way that almost the whole thickness of the aeration zone rocks will be blocked by the underground part of the constructions. Therewith a rather weak decompaction of the rocks of the future basement and a possible lowering of the groundwater level by dewatering are predicted.

- **The construction of the new power-generating unit CCGT-410 is planned to be carried out within the earliest possible time with the application of the developed nature-oriented technologies, that will make it possible to minimize the impact on the geological environment.**

Thus:

The impact on the environment at the stage of the construction will be short-term and, according to the estimates carried out will not exceed the established acceptable levels.

The developed program of the nature-oriented activity will allow to minimize the impact on the environment.

Impact at the operation stage

Impact on the atmospheric air

Nowadays pollutant concentration in the atmospheric air of the enterprise location area is big enough. Besides, under the results of the long-term monitoring of the atmospheric air it was determined that the concentration of dust, nitrogen dioxide and carbonic oxide has increased three times for 18 years.

- **There is a stable tendency of the significant deterioration of the atmospheric air quality over the years. Rejecting the facility replacement with a new, more producible and environmentally friendly one will preserve this tendency and worsen the environmental situation in the region.**

Within the framework of the investigation made by the specialists of EcoStandard Group a detailed modelling of pollutant dispersion was carried out to estimate the possible level of the air quality change taking place as a result of the proposed project realization.

The estimation of pollutant dispersion in the atmosphere was made with the application of the software module “PRISMA” of ARE LOGUS (academic and research enterprise), implementing the GND-86 method, designated for estimating the worst variant of pollutant dispersion in the atmosphere.

The estimation of the pollutant concentration in the atmosphere are made under the three scenarios:

A Existing condition

B Maximum development (the projected power-generating unit sources are added to the existing emission sources)

C Taking the old capacities out of the operation (the projected power-generating unit sources are added to the existing emission sources, but the part of the facilities is taken out of the operation – CCGT-170 and power-generating unit No. 11)

It is necessary to mention, that the estimation is made for the situation when all units work with peak load, that extremely rare happen in practice. At the next stages of projecting operation conditions of facilities will be specified and the probability of such a situation will be estimated.

- **The carried out estimation shows that the scenario C is the most reasonable one from the point of view of affecting the atmospheric air (with the replacement of the old facilities with the proposed project).**

Changes in the greenhouse gas emission levels

Under the existing capacity of 310 MW Nevinnomyssk GRES emits dangerous greenhouse gas into the atmosphere. Carbonic acid is emitted within 3.8 mln. t per year; nitrous oxide is emitted in the amount of 0.005 mln. t per year. Therewith the operation consumption of fuel equivalent comprises 337 g/kW·h, and rated consumption of fuel equivalent comprises 111.6 t per hour.

The projected combined cycle gas turbine power plant CCGT-410 is characterized by a significantly lower emission rates. Carbonic acid will get into the atmosphere in the amount of 3.594 mln. t per year (or by 206 thousand tons per annum less, than at the present time); nitrous oxide – 0.00471 mln. t per year (or by 300 tons per annum less, than at the present time). Upon that the operational specific consumption of fuel equivalent will significantly decrease and reach the quantity of 215 g/kW·h that is by 130 t/kW·h; and the rated consumption of fuel equivalent will decrease up to 86.6 t per hour, that is by 25 t per hour.

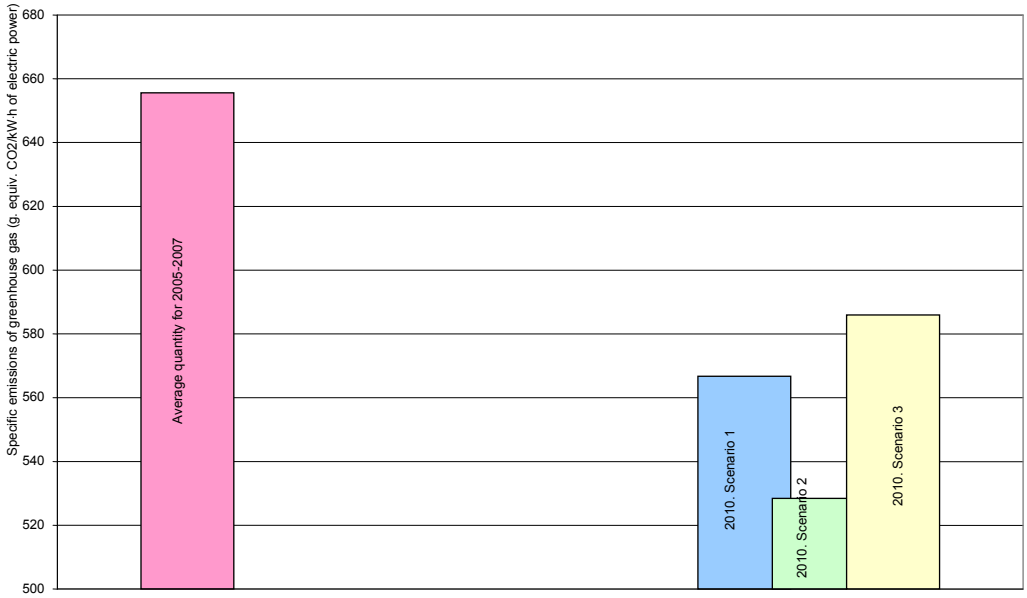

Figure 5. Specific emissions of greenhouse gas of Nevinnomyssk GRES in 2005-2007 and the forecast variants for 2010 after CCGT-410 to be put into the operation

Figure 6. Specific emissions of greenhouse gas of Nevinnomyssk GRES in 2005-2007 and the forecast variants for 2010 after CCGT-410 to be put into the operation

***Scenario 1**: CCGT-410 works at the rated capacity 6500 hour/year, the capacity of power-generating unit No. 11 and CCGT-170 are taken out of the operation, the rest of the capacities work under the regime of 2005-2007.*

***Scenario 2**: CCGT-410 works at the rated capacity 6500 hour/year, the capacity of power-generating unit No. 11 and CCGT-170 are taken out of the operation, the rest of the capacities work under the regime which provides electric power supply of Nevinnomyssk GRES at the level of 2005-2007.*

***Scenario 3**: CCGT-410 works at the rated capacity 6500 hour/year, the capacity of power-generating unit No. 11 and CCGT-170 are taken out of the operation, the rest of the capacities work under the regime which provides the natural gas consumption of Nevinnomyssk GRES at the level of 2005-2007.*

- **The facilities of the new CCGT-410 are based on the application of the modern technologies and correspond to the latest achievements of the world energy and mechanical engineering. The usage of such a plant allows to significantly reduce the greenhouse gas emissions into the atmosphere that creates, as known, the greenhouse effect.**

Thus:

From the point of the impact on the atmospheric air, putting CCGT-410 into the operation and taking the old facility out of it will give the opportunity to significantly improve the environmental situation, as with account of greenhouse gas emission reduction so as with account of near the ground concentration reduction of the rest of the pollutants.

Acoustic regime impact

As it generally known, there is an acoustic discomfort zone for any fuel combusting enterprise. The estimation made shows, that the acoustic discomfort zone for the enterprise does not exceed 180 m that is much lower sanitary protection zone of the enterprise which comprises 500 m.

In order to reduce the noise level made at the projected plant it is planned to introduce a number of activity, among which are:

- Sound levels, created by CCGT facility, must not exceed 80 dB A within one meter of coating.
- The sound-deadening system of GTP air intake duct must provide the reduction of the sound level up to до 80 dB A at the distance of 1 m from the surface of air intake.
- The installation of sound attenuators into ventilating systems, serving the rooms with the permanent people stay.
- The application of sound protecting enclosure inside the room.
- The installation of ventilators with vibration isolators.
- Connecting ventilator sets with air duct through flexible connectors
- etc.

Thus:

The application of modern technologies will allow to reduce the level of sound and vibration. The optimization of facility location and orientation, being the source of noise, the application of sound protecting facilities and technologies as well as good technological plant maintenance allows to reduce the acoustic impact of the projected plant.

Landscape and visual changes

There were warehouses earlier at the side singled out for the construction.

The block of the installed CCGT, as well as the existing Nevinnomyssk GRES is situated at the distance of more than 600 m from the nearest dwelling houses.

The exterior view of the complex will correspond to the character of the other production constructions.

The planning activity is not connected to the deforestation of woody shrubby vegetation, the elimination of greenery and will not lead to the reduction of green plantation size within the region of the object location, and will even allow to increase the green plantation size within the green space work.

Thus:

Putting the new plant into the operation will give an opportunity not to worsen the landscape change, but significantly improve and plant with trees the territory, representing a technogenic zone with warehouses before the construction.

Material utilization and waste management

The waste products generated in the course of the CCGT-410 operation will be similar to the waste of the existing Nevinnomyssk GRES by properties and composition.

However, the frequency of transformer fluid, accumulator battery change will be reduced with putting the new facility into the operation, as the performance life of the new plant transformers is 40 years without oil change, and the performance life of accumulator batteries is 25 years.

The opportunities for minimization the quantity of waste generation will be searched out in the course of organizing the management system of waste that are generated under CCGT-410 operation:

- Sorting out is made according to the classes of danger with the subsequent division of waste products which depends on the type (this division makes the waste management procedure easier as well as the process of recycling more economical).
- All actions on the collection and storage of waste shall be done according to the Project of Standards on Waste Generating and Disposal Limits (PSWGDL) for Nevinnomyssk GRES as well as applicable requirements of regulatory legal acts.
- Location, projecting and operating of objects are to be organized in such a way that provides work condition security as well as minimization of potentially unfavorable impact of stored waste on the environment, constructions and public health.
- Sorting out waste products is to be made according to their class of danger, their physical and chemical properties when collecting and storing them.
- Operations of waste collection and storage are to be provided with containers of appropriate size and for the waste which has a relevant danger class, adequate physical and chemical properties.
- Marking of containers, used for waste collection and storage, as well as registration in respective documents of such data as a source of waste products, their quantity, a danger class, a collection date and a date of disposal at the production facility with the purpose of storage are to be made.
- Sorting out and storage of waste products are subjects to take into account the way of their final application (i.e., the waste for recycling is provided to be stored separately from the waste for neutralization and disposal).
- Collection of household rubbish in plastic packages, washing and disinfecting the containers which were subject to rupture or damage are to be provided.

- etc.

Thus:

Putting CCGT-410 into the operation will not lead to the generation of new waste. Moreover, the volume of generation of some kinds of waste will be reduced.

The organization of collecting, storage, transportation and utilization of waste according to the current normative standards as well as application of different activities on reducing the volume of generating waste and its toxicity allows to decrease the level of waste impact on the environment.

Impact on the surface-waters

Water withdrawal for the plant will be made from the Barsuchkovsky Discharge of the Great Stavropol Canal. The Nevinnomyssk Canal is a standby one.

The volume of the surface-water withdrawn remain at the same level.

Separate collection of sewage allows to guarantee a high quality of sewage treatment.

Foul drainage from the sanitary sewage system will be made into the available sewage system of the enterprise, and further into the municipal sewage system.

Rainy and industry storm drains are to be exported by a net of gulley into the industrial storm sewage system. An opportunity is provided for making laboratory tests that check the quality of water to ascertain whether it is necessary to establish a water treatment systems before the water drainage into the common sewage system. Than the water is exported into the sewage disposal plants of OAO Nevinnomyssk Azot for treatment.

Drains dirty with mazut and oil are exported into the oil and mazut drain tanks for the subsequent treatment. The treated sewage are directed into the cycle of water processing, oil-slime is drained into the oil-slime storage unit.

Thus:

The application of the existing at the enterprise water treatment systems as well as putting new systems into the operation together with organizing permanent control of sewage quality allows to exclude the possibility of negative impacts on the surface-water.

Impact on the groundwaters

A significant impact on the groundwaters is not expected in the course of operation. Effective measures against leakage out of reservoirs and the underground water-bearing communications must be developed within the project.

The leakage and soakage of polluting substances from the adjacent areas are probable negative factors worsening the quality of the groundwaters.

Organized permanent monitoring of the groundwaters allows to identify and eliminate the probable entrance of the polluting substances.

Thus:

The developed activity on the prevention and control of oil product and other polluting substances leakage into the groundwaters as well as the permanent monitoring of the quality allows to minimize the probability of groundwater pollution.

Impact on the soils

The most significant impacts on the site soils are mechanical movements, warehousing into piles and clamp as well as soil replacement.

These impacts may be positive by the renewal of earlier polluted soil cover.

The impact may occur in the course of operation when oil products may leak. For this case an activity complex is provided for the protection from leakage which includes:

- application of special anticorrosive coats;
- technical examination, diagnosis and testing;
- computation of wall thickness on the basis of providing strength and safe operation by the working temperature range;
- periodic examination and control;
- etc.

Dangerous waste storage on the open soil is precluded as it may cause the entrance of polluting substances into the soils.

Thus:

The waste treatment system and the application of activities on reducing the possibility of pollution with oil products allow to minimize the probability for pollutants to get into the soils. The replacement of the existing, polluted soil layer with the clean one will have an extremely positive effect.

Impact on the geological environment

Construction yielding by building and construction operation is expected to be minimum and short-term.

Vibration attending the machinery work will not have a negative impact on the foundation soil. These soils do not have such a negative feature as thixotropy and will nit reduce their bearing value.

Watering the green plants by landscaping is projected within the consumption that is not enough to provoke underflooding the area.

Thus:

The negative impact on the geological environment in the course of CCGT-410 operation will be insignificantly small.

Impact at the stage of the object taking out of the operation

Nowadays the detailed assessment of impacts on the environment, which are connected to the process of the object taking out of the operation, does not seem to be posiible.

The object operation life provided by the project comprises more than 50 years, and only common principles can be determined at the very stage.

Generally the impacts that may appear in the course of putting the object into the operation will be similar to the impacts that occur at the stage of construction.

it is provided that the applicable procedures and methods of the work executed while the object is put into the operation will correspond to national and international standards being in force at the moment of this work realization.

The process of taking the object out of the operation will include the next kinds of work:

- dismantling the whole facility and construction, established on the site surface;
- possible excavation of the compacted soil and the surface layer;
- preserving the underground constructions, the dismantling of which does not seem to be reasonable, or covering them and preserving to the extent of its necessity;
- restoration of the site and all project grounds together with the restoration of those conditions which existed before the beginning of construction work.

Then at the stage of the execution project preparation the development of the block closing plan will be carried out and that will guarantee the realization of the activity provided by this plan within the whole operation life of the object. This plan must include the activity on preventing the environment pollution in the course of the object taking out of the operation and the site restoration to the acceptable condition. Besides, the plan of the activities on taking the object out of the operation must take into account the social economic impacts and provide the respective cushion activities.

Thus:

In the whole the work on taking the object out of the operation is temporary, and the expected degree of this work impact on the environment will be insignificant.
The detailed plan of CCGT-410 taking out of the operation will be provided at the next stages of the project development.

Impact on the social and economic conditions

The main impact of the construction and CCGT operation project on the economy of the town and the Territory on the whole will be connected to the disposition of the contracts for building and for procurement of construction materials. It is also planned to conclude contracts with local companies for execution of work on transportation and disposal of solid domestic waste, delivery of necessary materials and facilities.

The impact on Stavropol Territory revenue under this project realization will be at the expense of tax payment from the GRES operator as well as at the expense of tax payment by contractors and subcontractors (indirect impact).

The impact of the construction and CCGT operation project on the social economic conditions of Nevinnomyssk is positive, and, first of all, infers creating additional job positions, increasing the income of workers and purchasing activity of the population due to material purchases and service providing for the construction needs.

The important impact of the project realization must become the growth of the work position amounts as in the town so as in the region. Industrial sectors where power industry plays the essential role intensively develop in the Territory and adjacent regions in recent years. In connection with this project realization there will also appear an opportunity that encourages the growth of electric and thermal power supply for domestic needs of the developing town, for social and commercial economy sectors of the town, the Territory and the whole region, the growth of salaries, the migratory population increase and the improvement of other social rates. Owing to the project realization all mentioned above rates either stabilize the social situation in the Territory, or make it better.

In the course of the project realization the industrial capacities will be provided by thermal or electric power from the captive production (GRES) that will not negatively affect the electric power generation, energy supply of the town.

The construction and operation of CCGT-410 will not make any pressure on the existing health service in the town, as the town has the necessary capacities to render such kind of services.

As new land allotment for the new object construction is not required, this will not influence on agriculture, resort territories. In whole a positive impact of this project is expected on the social economic situation in Nevinnomyssk.

Thus:

The construction and operation of the new unit will have a positive impact on the social sphere. The project realization will lead to the employment generation, the improvement of labor conditions as well as the increase of electric and thermal energy supply for the everyday necessities of the town.

THE DESCRIPTION OF ALTERNATIVE VARIANTS FOR THE ACHIEVEMENT OF AIM OF THE PROJECTED ACTIVITIES – THE SUGGESTED AND "ZERO OPTION"

With the current capacity of 310 MW, NGRES emits hazardous greenhouse gases. It produces 3.8 million tones of carbon dioxide per year as well as 0.005 million tones of nitrogen dioxide. In such a case the equivalent fuel maintenance cost is 330 grams per kilowatt-hour and the rated consumption of equivalent fuel is 111.6 tons per hour.

The projected closed-cycle gas turbine 410 MW CCGT unit is characterized by significantly lower emission indexes. Carbon dioxide will be emitted into the atmosphere in the amount of 3.594 million tons per year (or 206 thousand tons a year less than at the present moment); nitrogen dioxide – in the amount of 0.00471 million tons per year (or 300 tons a year less than at the present moment). Thus, specific reference operational fuel consumption will substantially decrease and will amount to 215 grams per kilowatt-hour, i.e. by 115 tons per kilowatt-hour, while the rated consumption of equivalent fuel will decline to 94.3 tons per hour, i.e. by 17.3 tons every hour.

In this regard we should take into account that plant capacity will increase by 100 MW. The new facility efficiency coefficient is 57% – it is a rather advanced engineering achievement.

Consequently, comparing 410 MW CCGT unit construction project proposal with the present situation, the so-called "zero option", we can acknowledge the distinct advantages of the project.

These advantages are directly connected with energy efficiency – plant capacity at the same areas increase by 100 MW in case of gas consumption decrease; the advantages are also connected with environmental load reduction – greenhouse gas emissions decline considerably. The other NGRES key figures do not change.

COMPARISON WITH THE BEST AVAILABLE METHODS

Title of BAT	Application of BAT at the site	Plant correspondence to BAT	Environmental effect
Application of measures on precleaning gas treatment	Presence of the gas processing facility, including, in addition, filters of coarse and fine cleaning and performing the functions: - gas cleaning from the mechanical and liquid crud; - gas dewatering; - measurement of commercial registration of gas consumption through CCGT; - automatic measurement of gas calorie content ($Q^p_н$); - compression till the pressure, necessary for GTP; - maintaining gas pressure and temperature, necessary for GTP, within the given range in the automatic regimes	Correspond to the requirements of the Best Available Technologies	Reduction of dust emissions
Permanent monitoring	Presence of the chemical control system, - gauges of concentration of nitrogen oxide within the calculation on NO_2 in	Correspond to the requirements of the Best Available Technologies	Emission control that allows efficiently to take decisions aimed at the emission reduction

Title of BAT	Application of BAT at the site	Plant correspondence to BAT	Environmental effect
	smoke fumes in the output of waste heat recovery boiler; - gauges of concentration CO in the output of waste heat recovery boiler		
Application of wells/ sediment basins for the separation of oil in the wash water	Presence of the cleaning ground of oily and dirty with mazut drains	Correspond to the requirements of the Best Available Technologies	Significant reduction of the impact on water resources
Application of combined cycle	Provided combined cycle gas turbine power plant (the system of combined cycle) allows to increase the efficiency coefficient of the plant	Correspond to the requirements of the Best Available Technologies	Increasing the efficiency coefficient of the plant
Steam reheat	Steam reheat is provided	Correspond to the requirements of the Best Available Technologies	Increasing the efficiency coefficient of the plant
Application of air cleaning system	Application of mechanical clearing of waste gas	Correspond to the requirements of the Best Available Technologies	Redaction of pollutant emissions in the atmosphere
Using new computerized control systems for gas turbine and waste heat recovery boilers	The local system of automatic regulation, management, protection, control and examination is provided (SAM GTP). It also includes operator stations, an engineering station, a monitoring	Correspond to the requirements of the Best Available Technologies	Control that allows efficiently to take decisions aimed at the protection of the environment

Title of BAT	Application of BAT at the site	Plant correspondence to BAT	Environmental effect
	system, a complete set for fuel gas consumption measurement (diesel oil)		
Placement of a noisy plant or its components into the sound absorption structures	Installation of sound attenuators into ventilating systems, serving the rooms with the permanent people stay Application of soundproof enclosure inside the room	Correspond to the requirements of the Best Available Technologies	Reduction of generated by the plant noise level till the level of permissible quantities
Using antivibrational support and equipment connections	Installation of ventilators at vibration isolators;	Correspond to the requirements of the Best Available Technologies	Reduction of generated by the plant noise and vibration level till the level of permissible quantities
The connection between the facility must be organized in such a way that it will be possible to minimize the noise level	Connecting ventilator sets with air duct through flexible connectors	Correspond to the requirements of the Best Available Technologies	Reduction of generated by the plant noise and vibration level till the level of permissible quantities
Identification main sources and ways of noise transmission	SAM GTP must include automatic system of vibration control and bearing supports and GTP shaft diagnosis.	Correspond to the requirements of the Best Available Technologies	Control that allows efficiently to take decisions on reduction of noise and vibration level
Application of the technologies of power plants	Sound levels, created by CCGT facility, must not exceed 80 dB A within	Correspond to the requirements of the Best Available	Reduction of generated by the plant noise and

Title of BAT	Application of BAT at the site	Plant correspondence to BAT	Environmental effect
with a low level of noise and vibration	one meter of coating. Sound levels, created by GTP facility, must not exceed 80 dB A within one meter of coating. The sound-deadening system of GTP air intake duct must provide the reduction of the sound level up to до 80 dB A at the distance of 1 m from the surface of air intake.	Technologies	vibration level till the level of permissible quantities
Application of identification systems of fuel gas leakage and alarm signaling	Furnish the system with gauges to reveal gas leakage (1% from the low threshold of explosive concentration) and fire-preventing alarming signaling	Correspond to the requirements of the Best Available Technologies	Control and response at the possible emergencies at the proper moment Control of inappreciable emissions.
Tempering fuel gas at the expense of the waste-gas-heat	Tempering fuel gas at the expense of gas separator pump unit. Additional gas heating is technologically impossible.		Increasing the efficiency coefficient

ENVIRONMENTAL MONITORING AND PRODUCTION CONTROL

According to the definition and the determined goal. monitoring must reveal the construction effect on atmospheric air, surface flow, groundwaters, geological engineering processes, soils.

The functional monitoring system of Nevinnomyssk GRES includes the determination of actual state of the environment.

Thus, the control of sources of pollution from the CCGP on construction and operation stage, will be included in monitoring system of Nevinnomyssk GRES.

Groundwater monitoring

The groundwater monitoring will be based on using of the pressure observation wells of NGRES.

The frequency of monitoring measurements and selecting probes shall correspond to the nature of temporary variability of tracing dimensions. Upon that the frequency may significantly change. Variability of water levels is higher during the flood time and lower in the low-water season. The same thing can be noticed with respect to the chemical composition variability of water. The frequency is chosen so that decline, ascent or stabilization periods of the measured quantities are shown by at least three sample probes.

The monitoring observations include the measurement of the groundwater level, their temperatures and tracking after change of chemical composition figures.

Directly at the water station the next features are defined: pH, organoleptic, temperature (by fine graduation mercurial or inertial water thermometers), the content of iron, oxygen, hydrogen sulfide, ammonium ion and nitrite ion.

The next components are identified in the probes:

- Macrocomponents – chlorides, sulfates, hydrocarbonates, calcium, magnesium (sodium is identified by difference);
- Nitrates, oxidability, biochemical oxygen demand (BOD), chemical oxygen demand (COD), phenols, oil products;
- Toxic heavy metals, the list of which is identified in the course of engineering and environmental investigations.

Overground water monitoring

The overground water monitoring is planned to be realized by periodic control of effluent, according to the legislation of Russian Federation.

The obligatory components to be analized in control section are the temperature and the chemical elements.

Oil products, pH, suspended matter, Fe, Cl-, SO42-, Al, PO4 3- should be analized in industrial wastewater manholes.

Soil cover monitoring

Soil contamination changes quite slowly, that is why it is reasonable to repeat lithochemical survey over the constant mesh with the step of 100x100 m and the frequency of 10 years. The content of heavy metals and oil products has to be analyzed.

Making any managerial decisions on the results of soil monitoring may comprise technology improvement and soil cover replacement over the most polluted areas.

Atmospheric air monitoring

The atmosphere air monitoring includes the control of pollutant emission into the atmosphere, the control of near the ground concentrations at the border of sanitary protection zone and at the checkpoints in the zone of CCGT-410 influence.

With the account of the project stage (preproject grounds) only general requirements and suggestions on organisation of sanitary and health control at the border of Sanitary Protection Zone (SPZ) and within adjusted dwelling zone are represented in this Section. The specific work time schedule of control organisation after the negative impact of the object on the environment and public health are to be made at the next stages of design and realization of the Project.

Control is recommended under unfavorable wind directions (from projected GRES to the checkpoint).

Option of control method and controlling organisation is made at the next stages of projection and putting the object into the operation.

Along with control after the observation of source quantities of air pollution for GRES it is reasonable to take up also the control after observation of established MPD norms at the checkpoints.

The control after the observation of standard levels of atmospheric air pollution is recommended to be carried out under the quantity – maximum one-time concentration of the pollutant. The pollutants, near the ground calculated concentration of which is

maximum, are included into the control schedule. As follows from the results of calculation nitrogen dioxide is such a pollutant for Nevinnomyssk GRES.

Waste management monitoring

The waste management monitoring will be incuded in general monitoring system of NGRES. After putting into operation the CCGT, the new limits of waste disposal will be adjusted and controlled for all the Power Station.

The control is made after the execution of sanctioned norms by means of organisation of various observation after the places of waste generation and accumulation. With all that it is controlled:

- Differentiated waste collection according to certain types and classes of danger.
- The amount of generated solid and liquid waste.
- Good condition and well-time discharge of accumulated containers for waste products.
- Preparation the records of collection and disposal of waste.
- Making actions to reducing the amount and the danger class of waste
- Observation of instructions on safe waste management.

List of concrete procedures in control organisation and implementation

Control is executed after all constructions, equipment and staff activity, connected with collection and temporary storage of waste, its transportation, recycling and disposal.

The control after waste management is made by:

- Nevinnomyssk GRES staff, directly engaged into waste management.
- Representatives of nature protection control agencies terminally inspect production sites and industrial communities of the project.

Different types of control are used:

- Visual examination of the objects, associated with waste management.
- Checking work paper, instructions, workbooks.
- Device control, probe selection and analysis at the specialised laboratories, etc.
- Internal and external auditing.

There are concrete objects and procedures in waste management in Table 2 which are to be controlled at the area of the production site.

Table 2. Control frequency and responsible people

Control Object	Method, control direction and its stages	Control Frequency	Responsible people
Composition and dangerous propertities of generated waste products	Probe selection, express-analysis on generated waste site, probe analysis at the special laboratories	With account of requirements of nature protection controlling agencies	Production and technical department (PTD)
General procedures of waste collection and disposal	Assessment (including separete waste collection and placing them into containers/storage prosedure, waste loading prosedures/unloading, waste marking prosedures, etc.)	Daily	PTD (or specially trained, specially assigned specialist)
Constructions for waste collection and temporary storage	Visual examination (assembly /construction, operation and disposal)	Weekly and as the need arises	PTD
Construction/waste storage zone	Visual examination and assessment (including separete waste storage, safety of zone/construction, integrity and marking of containers, warning marks, presence of and handling inventory)	Weekly and as the need arises	PTD (or specially trained, specially assigned specialist)
Waste transportation	Assessment (including calculations of the automobile quantity, a number of documentation, notices and warning boards, type of accessories for storage of dangerous liquids waste, etc.)	By every waste transportation	PTD (or specially trained, specially assigned specialist)

Acoustic regime level monitoring

Noise level monitoring includes noise level control at the border of sanitary protection zone and in the zone of CCGT-410 influence.

Thus:

Creating monitoring system will give an opportunity to reveal the plant impact on the atmospheric air, surface water flow, groundwaters, soils and allow to undertake the activity on preventing an negative impact in proper time.

Conclusion

To sum up all said above it is necessary to mention the next points once again:

- This Project is a real model of environmentally responsible, “green” construction. After completing the new unit construction and dismantling the old capacities, the negative impact of GRES on the environment will decrease several times.

- The Project has a unique energy efficiency due to the application of an advanced gas turbine plant, that guarantee for the efficiency coefficient of electric power generation to be at the level of 57%.

- Optimal labor conditions at the new power-generating unit and the possibility for the community to take part in the project decision discussions show the high social responsibility of the Project.

- Construction CCGT-410, with increase in the established capacity of power station, is directed on increase of reliability of power supply of consumers of region and maintenance of its economic development.

Thus:

The project is to become one of the models of responsible, high-technology industrial building construction in the Russian Federation.

SUMMARY OF IMPACTS

Construction stage

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
Impact on the landscape and the exterior view	None of activities are suggested, as the surrounding landscape is the industrial one. The time of construction is limited.	No	Insignificant positive impacts
Impact on the atmospheric air	Development of procedures on irrigation of road surface before the construction work begins; material storage in piles to minimize dusting. As far as necessary use closed trucks to transport discrete materials from the CCGT site in order to prevent dispersion by transportation.	Dusting in the course of construction work The impact is significantly reduced	Insignificant negative impacts
Water pollution as a result of possible leakage of fuels and lubricants and chemical substances in the course of the construction work.	To allot a special ground with a protection from leakages for the purpose of storing potentially polluting substances. Development of working instructions to guarantee the right treatment of these materials.	Impact risk is significantly reduced	Insignificant negative impacts

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
Waste generation by the construction work	Development of procedures of waste control and storage to guarantee the right identification of waste, rules of storage safety, reuse or recycling, where the transportation to the special site is possible.	Generation of construction waste Reducing waste volumes which are to be buried in the course of the assumed activities.	Insignificant negative impacts
Noise	Development of the plan to control noise. It may include: - Switch off plants and facilities when they do not work. - Determine the site working hours. - Develop a work program to minimize the work during the non-working hours (not daytime). - A brief instruction of all workers about the noise control measures. - Use temporary screens or partial enclosure of the territory, where the activity takes place.	Reducing the level of noise impact.	Insignificant negative impacts

Operation stage

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
Impact on the atmospheric air	Putting the new unit CCGT-410 into the operation together with taking the old facilities out of the operation, with the increase of aggregate capabilities will allow to decrease emissions of a number of components. Development of normative standards of maximum permissible emissions for the sources of all pollutants, providing the correspondence of near the ground concentrations at the bounds of sanitary protective zone to the maximum permissible concentrations. Development of activity on the emission regulation during the period of unfavorable meteorological conditions. Organisation of permanent control after pollutant emissions into the atmosphere with the application of the results of planned observations.	After CCGT-410 putting into the operation the concentration of most pollutants in the atmospheric air (at the border with SPZ and the dwellings zone) remain the same or decrease. The emission of green greenhouse gases decrease.	positive impact

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
	Surface air monitoring at the bound of the sanitary protective zone and the zone of GRES influence.		
Possibility of emergency developing	Investigation of the whole range of possible measures and means, which may be opposed to the dangerous factors with the purpose of their parrying within the advantages of the environmental safety. Quantitative analysis of the possibilities for one or another situation to appear, of effectiveness of different measures and means of their parrying. Creating the system of a complex monitoring and management of environmental safety. Taking a complex of decisions, that excludes depressurization of facilities and preventing emergency emissions of dangerous substances as well as reducing corrosive attacks of pipelines and shut-off-and-regulating fixtures. Proving disclosure means to	CCGT-410, within Nevinnomyssk GRES, is an object of increased danger. However, the creation of environmental safety management system, representing the aggregate of juridical, organizational and economic mechanisms, intended to decrease the environmental risk to the acceptable level, and in case of emergency with an impact on the environment – to provide security to people and to the environment, will help to achieve the maximum reduction of possible damage and compensation of the caused loss.	Insignificant positive impacts

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
	control emergencies. Development of fire prevention activities. Having a plan of work on liquidation emergency spill of fuel, lubricants and mazut. Development of procedures on preventing emergencies (including fire, spills, etc.) Provide the respective training for personnel and give out the necessary equipment.		
Impact on surface-waters	Application of separate system of sewage disposal Application of modern systems of water treatment, grounded on the analysis of sewage quality. Monitoring the condition of water from the surface sources. Quality control of entering and exporting of sewage. Liquidation plan correction of oil product overflows and its approval.	The impact on surface-water is minimised	Insignificant positive impacts
Impact on soils	Mechanical removal, storage into piles and clamps as well as soil	Soil quality improvement at the expense of the replacement of	Insignificant positive impacts

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
	replacement with a qualitative one. Organization of specialized places to exclude the soil contact with the substances of higher danger. Development of the complex of activities which exclude the possibility for oil products to leak on the soil surface.	degraded soil with a qualitatively new one. The possibility of potential soil pollution being a result of oil spill is insignificant due to the application of preventive measures complex.	
Waste generation	Permanent monitoring of the waste disposal places. Approval (renewal) licenses and permissions on waste treatment. Having approved instructions on collecting, storing and transporting the production waste. Making records of all data about the delivered and recycled waste and providing the respective reports. Waste sorting out and storage with account of the direction of its finale usage. Marking of containers, used for waste collection and storage, as	Insignificant change of qualitative and qualitative composition of waste Waste impact on the environment is assessed as insignificant under the condition of realizing the developed projected decisions concerning the rules of temporary storage and established frequency of their removal to recycling and disposal.	Minimum positive impact

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
	well as registration in respective documents of such data as a source of waste products, their quantity, a danger class, a collection date and a date of disposal at the production facility with the purpose of storage. Maximum possible replacement of toxic materials with less dangerous. Sorting out according to the classes of danger with the subsequent waste separation depending on the type. Activities on reducing the amount of generated waste.		
Impact on groundwaters	Development of measures against leakage from reservoirs and from the underground water-bearing communications. Development of the system of hydrogeological monitoring.	The possibility of the impact on the groundwaters is small.	Minimum positive impact
Impact on flora	Accomplishment of the works on landscaping.	Landscaping work will allow to extend the area of greenery.	Minimum positive impact

Impact on the environment	Suggested cushion activities	Residual impacts	Level of residual impacts
Impact on fauna	-	-	No
Impact on the geological environment	Speeding up the construction terms and observing the recommendations of the EIA section, which exclude pollutants entering into the open trenches and pits. Monitoring of the impact on the geological environment.	The subsidence of buildings in the course of use of buildings and constructions is expected to be minimum and short-term. The impact of vibrations and impoundment of areas is extremely insignificant.	Extremely insignificant negative impact
Social impacts	-	Creating additional jobs. Increase of employee incomes and population purchasing activity due to procurement of materials and supply of services for construction necessities.	Positive impact