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## Project

**On Construction of new thermal power station with the capacity of 900 MW consisting of two 450 MW CCGT units in Turakurgan District of Navoi Province**

Draft of the Environmental Impact Statement

(Draft of EIS)

|                               |             |               |
|-------------------------------|-------------|---------------|
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Tashkent 2013

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## **Introduction**

The work purpose consists in an affecting estimation on a circumambient of building of a new thermal power station the general power 900 as a part of two blocks steam gasinstallations by power on 450 in Tourist's Akurgansky region of the Namangan area.

Building new in the Namangan area power 900 with two on 450 has the purpose abbreviation of available deficiency of the electric power in Fergana valley, abbreviation of dependence on import of the electric power from the next republics, optimum use of fuel resources of the country.

Design implementation is provided by the Decision of the President of Republic Uzbekistan №-1943 from March, 28th, 2013 «About measures on the organisation of building of a thermal power station power 900 in the Namangan area» to which the HOOK of "Uzbekenergo" is authorised working out of the predesign documentation in an one-phasic order with working out of the FEASIBILITY REPORT of the design.

The basis for design working out are:

- The task for working out of technical requirements of the competitive documentation by definition the prime contractor;
- The contract on working out of technical requirements of the competitive documentation by definition the prime contractor from 3/25/2013 №83/13 - 038.

Now in Fergana valley deficiency of security of users is felt as the electric power. In summertime the power shortage makes 322 , in winter - to 540 . The formed power shortage becomes covered now at the expense of import of the electric power from Kirgizstana (the Toktogulsky river plant and four river

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plants of average power), with retrace of the gained electric power from the Tashkent power knot in northern part of Kirgizstana by transit through Kazakhstan.

For the purpose of abbreviation of available deficiency of the electric power in Fergana valley, abbreviation of dependence on import of the electric power from the next republics, and also optimum use of fuel resources of the country, the present design provides building of a new thermal power station by the general power 900 as a part of two blocks PGU on 450 with necessary auxiliary buildings and constructions, with creation of a matching infrastructure in Tourist's Akurgansky region of the Namangan area.

The installation of building refers to to I class of affecting on a circumambient (high risk) according to item 37 of the Application №2 to the Decision of Cabinet Ruz №491 from 12/31/2001 and to Cabinet Ruz Decision «About modification and additions, and also a recognition become invalid for some solutions of the government of Republic Uzbekistan» №152 from 6/5/2009

Studying of a current state of all components of a circumambient is switched on in procedure of an estimation of affecting of installation of building around its arrangement, character and installations of affecting is analysed, emergencies are sized up.

The primary goals at work performance were:

- To size up a state of environment around an arrangement of installation of building and extent of negative affecting new on a circumambient;
- To pass the ecological analysis of the design solution, defining thus aspects, installations and character of affecting;
- To carry out the comparative ecological analysis of alternative alternatives.

The affecting estimation on a circumambient of building new in the Namangan area was based on the analysis of a current state of the environment, the acting process equipment, revealing of sources of formation of emissions, dumps and a waste.

Calculation of level of pollution of a free air by emissions new after realisation of the technological solution offered in the design is carried out and its compliance with requirements of Goskomprirody Ruz is defined.

At work performance were guided «by the Rule about the state ecological examination in Republic Uzbekistan», the confirmed Decision of Cabinet Ruz № 491 from 31.12.01., and defining composition and volume of the presented section of an estimation of affecting on a circumambient, and also the Decision of KM №152 from 05.06.2009. «About modification and additions, and also a recognition become invalid for some solutions of the government of Republic Uzbekistan».

## **1. 1. A state of environment around an arrangement**

### **2. Installation of building**

#### **8 1.1. The Characteristic of fiziko-geographical and climatic features**

The section of building new as a part of two on 450 is had in Tourist's Akurgansky region (a file «Shohidon - Nurli Dier») the Namangan area, in 11 km to the West from Namangan and in 4 km to the West from Turakurgan, on right I protect the Big Namangan channel (Item 1 fig.).

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Boundary lines from different directions are lands not used in agriculture, and also:

- From the north on distance of 1 km - highway R-117 «Tashkent - Chust - Chartak»;

- From the south on distance of 500 m - the main gas pipeline Is dry-namangan, -220 and the Big Namangan channel, on distance of 2 km - highway R-112 «Tashkent - Namangan» and on distance of 8 km - a railway station of Aktash «Uzbekiston »;

- From the east - line 220 , behind it, on distance of 500 m - the Big Namangan channel, in 3,0 km - is had substantion "" 110/10 , in 5,0 km sewer treatment facilities are placed,

From the northeast in 24,0 km - potable water intake structures;

- From the West: lands not used in agriculture and on distance 500 - the Big Namangan channel.

From the southwest on the northeast a platform recut - one 220 and two On the right shore pass 110 sq. channels two threads of the main gas pipeline.

The distance to the proximal housing estate which has been had to the south, makes 1 km.

The total area of territory new makes 87,6 hectares, including platforms of the basic buildings and constructions - 28 hectares, section -500 , had to the north of platform - 16 hectares, the hydraulic structures which have been had on left I protect the Big Namangan channel, from the southeast from platform -18 hectare, a fire-engine house (in 2 km jugo-to the east territories ) - 0,6 hectares, the mobilisation zone which have been had to the west of basic territory - 25 hectares.

Platform is stretched from the north on the south, a section landform difficult, a height above sea level of 530-630 m.

All platforms of a section of building intended for a building are free from capital buildings and large constructions, wood vegetation.

The territory of installation of building is had in a northeast part of Fergana valley, at bottom of a southern slope of the Chatkalsky ridge. Fergana valley is surrounded from the north, the east and the south by mountain ridges and has in length 370, width of 200 km.

Thanks to the closed rule of a valley, its climate differs from a climate of surrounding regions. Mountain ridges of Tjan-Shanja and Pamiro-scarlet protect Fergana valley from irruption of the air weights bringing a moisture and a cold snap. Therefore deposits here falls out less, than in piedmonts and mountains of Western Tjan-Shanja. The mountain ridges bordering Fergana valley, affecting aerosphere circulation, lead to development it is mountain-dolinnoj circulation. Its features are manifested in periodic in daily change of bearings of apparent wind.

The main lines of a climate of Fergana valley are dryness and continentality.

The analysis of the climatic characteristic of observed region was spent according to a meteorological station "Namangan" by) (tab. 1.1.1).

Table 1.1.1.

Climatic characteristics of Namangan

| <i>Characteristics</i>  | <i>Measure unit</i> | <i>Size</i> |
|---|---------------------|-------------|
| Factor And, depending on temperature stratification of an aerosphere and defining conditions of horizontal and vertical | -                   | 200         |

| <i>Characteristics</i>  | <i>Measure unit</i> | <i>Size</i> |
|---|---------------------|-------------|
| dispersion of contaminants in a free air                            |                     |             |
| Mid-annual temperature of air                                       | °                   | 15,23       |
| maximum temperature of the hottest month (July)                     | °                   | 28,02       |
| minimum temperature of the coldest month (January)                  | °                   | 0,38        |
| Mid-annual amount of precipitation                                  |                     | 207,32      |
| Mid-annual repeatability of bearings of apparent wind for 16 rhumbs | %                   |             |
|   |                     | 21,83       |
|   |                     | 5,57        |
|   |                     | 3,29        |
|   |                     | 3,45        |
|   |                     | 6,72        |
|   |                     | 4,68        |
|   |                     | 3,80        |
|   |                     | 4,42        |
|   |                     | 6,09        |
|   |                     | 5,31        |
|   |                     | 5,85        |
|   |                     | 5,80        |
|   |                     | 4,67        |
|   |                     | 1,93        |
|   |                     | 5,46        |
|   |                     | 11,15       |
| Calm  |                     | 10,98       |
| Number of cases on graduations                                      |                     |             |
| 0-1   | /                   | 33,55       |
| 2-3   |                     | 59,53       |

| <i>Characteristics</i>                                 | <i>Measure unit</i> | <i>Size</i> |
|--|---------------------|-------------|
| 4-5  |                     | 4,74        |
| 6-7  |                     | 1,67        |
| 8-9  |                     | 0,47        |
| 10-11  |                     | 0,04        |
| 12-15  |                     | 0,00        |
| ≥15  |                     | 0,00        |
| greatest speed of the wind, which excess makes 5 %, U* | m/sec               | 4,31        |

The mid-annual temperature of air makes 15,23 °, absolute minimum-17,5°S, absolute maximum +42,5°. Average minimum temperature for a year-3,56°S, average maximum +35,73°. Average temperature of air for January 0,38 °, average temperature of air for July 28,02°.

Mid-annual humidity of air - 64,2 %.

Deposits in Fergana valley fall out all year long, the mid-annual sum of deposits - 207,32 mm. From October till April deposits character predominate, and from May till September settlements of shower character are observed. In summer months repeatability of showers increases to 63-72 %.

More often (66 %) are noted winters with altitude of a snow overlying strata 1 10 see

Dust storms frequent enough phenomenon, their greatest repeatability is necessary for May, June. Total duration of dust storms for a year makes 41,7 .

Within all year predominates (21,83 %) a wind of northern direction, are frequent enough (11,15 %) are noted the North northwest wind, is most less often observed western (4,67 %) and a southern wind (6,09 %). For observed locality within a year are characteristic northern (21,83 %) and North northwest (11,15 %) winds (fig. 1.1.1).

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## Роза ветров г. Наманган

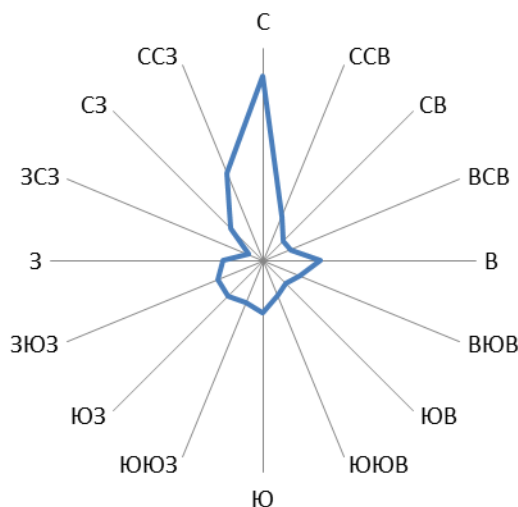


Fig. 1.1.1.

One of the meteorological factors defining conditions of dispersion of polluting winds in an aerosphere, speed of a wind is. In observed region within all year predominate light breezes (average speed of a wind makes 1,95 km/s. In an annual course repeatability of winds with a speed of 2-3 km/s makes 59,53 %, repeatability of winds with a speed of 0-1 km/s - 33,55 % that promotes accumulation of contaminants in a ground upper-air. Strong winds (10 km/s and more) are rare enough (repeatability of 0,04 %).

The closed rule of a valley causes big, than in other areas of Republic, stability of weather and absence of sharp oscillations of temperature in the winter.

From the atmospheric phenomena it is passed most round a smoke (on the average 77 days in a year). Fogs happen less often: 175,4 hours per year (their greatest repeatability is necessary for December), it are considerable above, than in other areas of Uzbekistan.

Ground inversion is observed more often early in the morning and in the evening, their repeatability makes 40 %. The atmospheric pollution index ( ) is equal 1,55.

Thus, both fiziko-geographical, and environmental conditions of observed region promote accumulation of impurity from low unorganized sources of emissions in an active upper-air.

The analysis of fiziko-geographical and climatic features of region of an arrangement of installation of building in the Namangan area shows that high temperatures of air, a paucity of the deposits, raised solar radiation promote environmental contamination, at the same time high repeatability of low speeds of a wind does not favour to dispersion of emissions from high hot wells and to their carrying over on considerable distances.

### 9 1.2. Existing sources of affecting

For region with an agroindustrial direction of managing what the territory of an arrangement of installation of building is, a role of industrial targets as affecting sources, in creation of an ecological condition does not occupy an in the lead rule as, for example, in big cities of Fergana valley - Fergana or Andizhan.

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Here place in the core of land of agricultural purpose and agricultural settlements, only small part of lands is withdrawn under transport highways.

The proximal large factories place in the city of Turakurgan (to 40 factories). Among them there are factories which have sources of emissions, dumps and not the hoz-household flows cleared and crude and almost all factories have sources flows. On types and a relationship of sources of affecting among the city factories it is possible to gate out three groups:

- The factories with sources and economic-household flows without sources of emissions and sources (among them 2 subgroups with and not flows deposit);
- The factories with sources industrial, and hoz-household flows and sources of emissions (two subgroups with the priority sources of the organised and unorganized emissions deposit too);
- The factories with sources and hoz-household flows and with sources of unorganized emissions.

The largest factories of a city are integrated works "" where make dried fruits (productivity 5. . In a year) and Joint-stock company "" (were factory) trust Agrospetsremont where make repair of tractors. Productivity low, only 55 pieces in a year.

Averages, on quantity of the occupied population and output, the factories of easy and food products are: sewing department on underwear exhaustion, a bread-baking complex, macaroni department, confectionery department, food integrated works, printery where products, department on manufacturing and furniture assemblage, weaver's department on manufacturing of carpets and the atlas is made .

Except industrial the factories in a city there is a row of manufactures serving a profile. To them it is necessary to refer to all boiler-houses which act in territory of the large factories, hospitals, schools, motor transportation ( , , motor depots, , the autostation, HUNDRED, the gas station), building ( "Agropromstroja", "Transspetsstroja", , "Namanganvodstroja", "Namanganstroja"), zagotovitelno-supplying, warehouse ( , , Zagotkontora, District silk, , , baseline ) and the other organisations ( , , OPO , Management of pumping plants).

Sources of emissions are available not at all listed factories. The basic stationary sources of emissions are the small heating boiler-houses rigged with pig-iron section coppers of type "Versatile person". Boiler-houses are had in territory of the large factories ("Shirinlik", traktor-repair), , schools, hospitals and one incorporated boiler-house for office buildings. As fuel rock gas serves in boiler-houses. Power of boiler-houses from 0,2 to a 1,5Gkal/hour. All heat abstraction makes 60 Gkal at an o'clock, therefore through pipes is thrown out insignificant quantities nitrogen, carbon.

At the factories of motor transportation service including at traktor-repair factory, there are sources of the organised and unorganized emission of hydrocarbons, welding an aerosol, a metal dust. Quantity of emissions slightly in view of small power of the factories. Besides, these installations are dispersed on the city territory. In boundary lines of the building organisations the organised and unorganized sources of emissions of an anorganic dust are had. Emissions of an anorganic and cotton dust occur from territory of the procuring point which has been had in the western sector of a city between streets Chustsky and Isvahan. Thus, affecting of sources of emissions on a condition of a free air and adjoining medium is restricted to sizes the factories, and, at the same time, is insignificant on force and intensity.

Along transport highways of a city affecting of mobile sources of emissions is observed. On street Namangan-Chustksky volume of traffic makes 3700 buses a day, on street S.Rahimova - 2900 buses in Street days have transit value, therefore in stream structure the considerable part belongs also to cargo large-sized cars. Affecting of emissions of sulphurous anhydride and nitrogen significantly in roadside to



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a strip. The free air mild contamination remains in a housing estate, in territory of hospital, the schools which are fitting to specified streets.

Within industrial, administrative and socially-inhabited territory there are all sources of a water consumption and sources of dumps of hoz-household and faecal flows, and also sources of formation of a household waste. City water supply is based on consumption underground, sweet water from two underground water intakes. The first water intake "" is had in 24 km to the north of Turakurgana. Power of the water intake - 5,5 <sup>3</sup> a day. 7 holes are maintained. Water arrives in a city on to system. The second water intake "ÖÖá-ÖÖú;" is had in 3 km to the east of a city. Power of the water intake<sup>-1,0tys.m<sup>3</sup></sup>. In addition to it arrives 0,2. <sup>3</sup> waters on the water line from Namangan. The rationed water consumption for inhabitants makes 160l/days. Actual consumption makes 282,0 l a day. The quantity of water consumed by the factories on the industrial purposes, is not specified now, but it is necessary to note that on technological features they not , and water consumed on manufactures has a hoz-household purpose.

Sources of dumps of hoz-household flows in a city refer to to the most significant sources of affecting on a circumambient as only the insignificant part of flows is dumped in the sewerage, and goes on treatment facilities of Namangan. The sewage header is laid along the street Namangan and all is administrative-public buildings, schools, a kindergarten, hospital and the multistory building are connected to it. In factory "" territory the station of swapping which is connected by a pressure collecting channel to the central collecting channel on street Namangan is had.

The actual daily average dropping of sewage makes 9503, extent of the central sewage header makes 9. The percent of coverage by the centralised sewerage of inhabited and public fund makes only 11 %. The insignificant part of flows is dumped without clearing in an old quarry on a line the sewerage laid on the right shore of the river of Kasansaj. The basic part of hoz-household and faecal flows is dumped in the rake-outs which bulk is not concreted. In the conditions of development soils, flows are filtrated in ground waters. It conducts to pollution of ground waters by nitrogenous joints. Besides, polluted water migrates on a grade towards Syr-Darya.

Profile of the basic manufactures in a city it is not connected with formation of the low-purity flows needing additional clearing. Flows of the majority of industrial installations are considered is conditional-pure and are dumped in the sewerage, in the incorporated sewerage or in rake-outs. Exclusion make flows of motor transportation points, traktorno-repair factory and the building industry factories, and also flows from a sink of cars. These flows contain oil products, but are not cleared and dumped in an irrigational network and on a landform.

With a housing estate, from all factories and services, and also from streets, occurs a firm household waste. A food waste is used on a forage to cattle. A firm waste, estimates from streets is taken out on an urban dump which is in 10 km to the northwest from a city on the square of 1,2 hectares. The annual quantity of a household waste makes nearby 30.3 the Industrial waste in the core returnable - container, a scrap, oil products.

Within territory of all regions, and also between the socially-social and is administrative-public centre large sections of cemeteries with which retirement of lands from a housing estate is connected in the core are had. In view of an arrangement of cemeteries on raised sections with a deep rule of ground waters affecting on them is absent.

The structure of inhabited quarters is subordinated networks of the existing roads radially converging to a place through the river Kasansaj. Security a total area on 1 person makes 9,4 m<sup>2</sup>/on the people

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Affecting of important natural sources of affecting - and the high-water flows which are passing periodically on a race course of Kasansaja, is considered and artificial are restrained, had above on a river valley.

Outside of urban line from industrial installations in which territory there are significant sources of affecting on a circumambient, it is necessary to note the airport which has been had in 1,5 km to the southeast from a city. Takes off and landing are made from a southeast part of a platform in this connection, aircrafts actually do not fly by over Turakurganom. Thanks to it emergencies with aircrafts in city boundaries are expelled. From the airport on a southeast part of a housing estate there is a noise affecting. In view of low congestion of the airport (on carrying capacity the airport refers to to 5 classroom), noise affecting periodic and it appears only during daylight hours. The zone of significant noise affecting of the airport is restricted to a strip in 750 m into which the housing estate does not enter.

In 2,0 km to the northwest from the city of Turakurgan the warehouse of pesticide of joint-stock company ("Kishlokhuzhalikkime") of Tourist's Akurgansky region is had. Activity of this factory refers to to 111 classes of affecting on a circumambient (the Application of №2 Rules about ecological examination). Its territory is on a safe passing distance from existing housing areas of a city in view of that the sanitary-protective zone of the factories of this class has width of 300 m. Between territory of a warehouse and northwest city lines on distance more than 1,5 km gardens and arable lands are stretched.

### 10 1.3. A structure of a surface, feature of soils and ground waters

In the geomorphological relation the section is dated to to a zone which represents rows of hills with absolute marks from 400 to 520 m.

Kenkusaem and Kasansaem are decomposed. are combined ancient by adjournment the age, presented glomerations, valunno-galechnikom, with sandy-gravijnym a filler. The surface of these adjournment is covered by loams and sandy loams, power of Mezhadyrnye of a hollow of 1,0-1,5 m. are combined modern alljuvialno-proljuvialnymi by the adjournment consisting from by power to 30 metres. The observed territory places on inclined plain of the merged debris cones of Kasansaj, Namangansaj and Chartaksaj. A territory landform slightly with the general grade of a surface from the north on the south and a local grade towards the river Kasansaj. Landform difference between northern raised and southern low regions makes 35-89 m.

The bottom land of the river of the river of Kasansaj has average width of 120 m, it a little rather narrow. The ruslovoj flow is observed only during the wet spring period, at this time depth of the river makes 4-5 m.

The surface is broken by artificial gettings of various depth, an irrigational network which recuts region both in meridional, and in a direction.

The building section places on a river debris cone, therefore proljuvialno-alluvial adjournment are presented by soils power more than 50 m. From a surface valunno-galechnikovye adjournment recoated, the is sandy-loamy layer power from 0,2 to 2,2 m. Along the left shore of Kasansaja notes exits of glomerations. The prized power of glomerations on developments - to 0,5 m, on exposures - 25.

Ground waters within a raised part of a debris cone lie on considerable depth of 10-15 m and only in a bottom land of the river they come nearer to a surface and there are on depth of 0,8-0,5 m.

On engineering-geological conditions in observed territory two engineering-geological regions are revealed:

- Region of a bottom land of the river Kasansaj with the developed thickness alljuvialno-proljuvialnyh adjournment, with a close ground water table.

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- The region embracing other territory where following provisions - are necessary at building on , antiseismic for 8 ball zones.

on depth of 0,5-2,5 m are spread . The region lies in the field of deep ground waters. Only in limits terraces ground waters are prized on depth of 0,3 m. the Regime of ground waters depends on a river regime. In years abounding in water and in passage of high charges on the river ground waters rise on a surface. In other territory ground waters occur at depth 10-15 m.

By results of chemical water analysis of 2580  $\text{mg}/\text{dm}^3$ , a chloride-ions-239,5  $\text{mg} / \text{dm}^3$ , sulphates-ions - 1285,4 $\text{mg}/\text{dm}^3$  are characterised by the maintenance of the dense rest

Underwaters remain the basic source for economic-drinking water supply, and also for technological water supply and an irrigation. Selection of underwaters is carried out by single operational holes and soil water intakes. Depth of holes varies from 10 to 200 m, depending on depths of occurrence of level of underwaters. For water supply, in the core, water-bearing horizons and partially a water-bearing complex are maintained. Underwaters are passed round in water-bearing horizons both in parts and in the flat. In total in Namangan it is maintained fourteen deposits of underwaters. The Kasansajsky deposit of the underwaters which have been had between a southern slope of the Chatkalsky ridge and Kasansajsky borders on to a building platform.

This deposit is characterised by presence pressure ( a complex) and (Tashkent and complexes) underwaters which are dated to and to the glomerations from above recoated . Within a presented deposit the most perspectiv and widely used for water supply and an irrigation are underwaters a complex. They have a wide circulation with the general power mucks of 60-100 m, have a free mirror of ground waters.

In the overhead part of a debris cone of Kasansaja underwaters occur at depth 20-50 m, and in the central part are on depth of 3-10 metres.

The factor of a filtering of mucks fluctuates within 3,4-17,5 m./days of separate holes from 10 to 35 / with a specific discharge from 1 to 2,5 /.

Quality of underwaters, in the core, good, the dense rest  $0,7-1,1/\text{dm}^3$ , their raised mineralization is observed close . The Chemical compound of water the sulphatic. Hardness of water in places exceeds 10  $\text{mg-ekv}/\text{dm}^3$ . Regional operational stocks of a deposit are sized up and confirmed in number of 248,8  $\text{m}^3/\text{sut}$  from which 205,6  $\text{m}^3/\text{sut}$  with a mineralization to 1  $\text{g}/\text{dm}^3$ , and the others to 1,5/ $\text{dm}^3$

In the hole depth of 350 m - waters fresh, pressure, are dated to to the horizons which are lying down between water-resisting clay. The appeared level - 320 m, installed - 20 m. the Specific discharge of the hole - 1,0 /. Water fresh, suitable for drink, is characterised by the maintenance of the dense rest of 840  $\text{mg} / \text{dm}^3$ , a chloride-ions - 38  $\text{mg} / \text{dm}^3$ , sulphates-ions - 32  $\text{mg} / \text{dm}^3$ , carbonates - 231,8  $\text{mg} / \text{dm}^3$ , the general rigidity-10,5  $\text{mg-ekv}/\text{dm}^3$ , removable - 3,8  $\text{mg-ekv}/\text{dm}^3$ .

In other hole drilled in a northwest part of the city territory Turakurgan, water are dated to to glomerations. The installed horizon of ground waters on depth of 40 m, a specific discharge of the hole - 0,8 /. Waters fresh. A water chemical compound: the dry rest - 800  $\text{mg}/\text{dm}^3$ , chloride -  $41,5\text{mg}/\text{dm}^3$ , sulphates - of 264  $\text{mg}/\text{dm}^3$ , the general rigidity - 5,8  $\text{mg-ekv}/\text{dm}^3$ , removable - 3,5  $\text{mg-ekv}/\text{dm}^3$ .

Under institute "" design on a section between a bend of the Big Namangan Channel and the right board of Kasansaja 7 holes of a vertical drain and 3 hard currencies are drilled. On other party Kasansaja. One of them serves for technical water supply. Depth of the drilled holes - 50 m. Diameter of drilling - 1000 mm, diameter - 324 mm. The filter tubular d-324 mm with is installed in the interval 14-23 and 29-45 m in total length of 25 m. Pumps ETSV 12-160-65 of 25 m. are installed in a deaf part of columns on depth

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The charge of one hole - 45 /, makes a specific discharge 5 /.

Statistical water level in hard currency. - 1,0 m, dynamic - 13,0 m.

#### 11 **1.4. A structure of a hydrographic network and a condition of superficial artificial and natural water streams.**

Irrigation of regional centre Turakurgan and adjoining settlements is carried out from the river Kasansaj, the Big Namangan channel and Ahsisaja.

Surface water of natural stream flows is completely knocked down on an irrigation or their water is taken away in irrigations-irrigation networks.

For mattempering of water security of irrigated lands, on a way of a flow of the basic rivers and , dams are built and conservation reservoirs are erected.

Everything, within Namangan 8 conservation reservoirs of the bulk type function, the useful capacity of everyone changes from 5,6 to 155 million <sup>3</sup>.

The river Kasansaj of a ledovo-snow food with the maximum charges to 250 m<sup>3</sup>/with (an earth flow on July, 1st 1965), the minimum charge - 0,54 <sup>3</sup> / with is noted in January 1999.

River flow the Kasansajsky conservation reservoir in capacity <sup>165.3</sup>.

River channel in district territory the width of a race course - 120 m, depth of 4-5 m. has concrete facing,

To the north of Turakurgan from the river Kasansaj take away water channels Kumysharyk, Aksyaryk. According to the inquiry Tourist's Akurgansky charges of channels Kumysh - <sup>2,03</sup> / with, Aksy - 4,0 <sup>3</sup> / with, width of channels from 3 to 5 m, depth Channels pass of 1,5 m. in a getting in an earth race course. They irrigate the territory which has been had to the west of the river Kasansaj. From channel Aksysaj passing on territory of district in an earth race course, water is taken away in additional channels Chumich, with the charge 2,0 m<sup>3</sup>/with, and Hatanok, with the charge 0,3 m<sup>3</sup>/with.

Along the left banking of Kasansaja passes channel Kosh in concrete facing. The water intake in it from Kasansaja (the charge 1 m<sup>3</sup>/c) is in region of fire branch.

During the period when waters in Kasansae do not suffice, channel Kosh from channel Bulak having the water intake on the Big Namangan channel.

The central and east parts of Turakurgan are irrigated from the channel of Namangan - the charge 3,5 m<sup>3</sup>/with. The water intake in it is carried out from the river Kasansaj to the north of district.

On intersection from street Ettikon the channel is divided into Tuzaryk with the charge-1,0 <sup>3</sup> / with, Chulikon - the charge 1,0 <sup>3</sup> / with and Kutikon - the charge 1,5 <sup>3</sup> / with. Around street Navoi from Kutikona the branch of channel Hodzha with the charge 0,5 <sup>3</sup> / is erected with. The territory of the central part of an urban building around street Ettikon is irrigated from channel Shahandaryk, with the charge 0,3 <sup>3</sup> / with.

The big Namangan channel passes in parallel Severo-Ferganskiomu to the channel on distance of 3-5 km to the north from last on southern slopes Namangan and Kasansajsky . The head charge - 61,8 m<sup>3</sup>/with.

The channel chemical compound is formed at the expense of natural composition of the rocks putting a drainage basin of Kasansaj. These waterways are a little subject to anthropogenous affecting, except for agency of agricultural fields and the cattle-breeding factories. The water composition in the Big Namangan channel according to chemical analysis for 2013 is resulted in tab. 1.4.1.

Table 1.4.1

**Quality of initial water of the Big Namangan channel**

| <i>№</i> | <i>Name</i>                   | <i>Measure unit</i>      | <i>Indicator</i> |
|----------|-------------------------------|--------------------------|------------------|
| 1        | Suspended matters             | /dm <sup>3</sup>         | 0,19             |
| 2        | Oil products                  | /dm <sup>3</sup>         | -                |
| 3        | Ammonium                      | /dm <sup>3</sup>         | 1,52             |
| 4        | Nitrites                      | /dm <sup>3</sup>         | 0,05             |
| 5        | Nitrates                      | /dm <sup>3</sup>         | 3,1              |
| 6        | Phosphate (on)                | /dm <sup>3</sup>         | -                |
| 7        | Mineralization                | /dm <sup>3</sup>         | 371,2            |
| 8        | Sulphates                     | /dm <sup>3</sup>         | 144,0            |
| 9        | Chloride                      | /dm <sup>3</sup>         | 40,0             |
| 10       | Iron the general              | /dm <sup>3</sup>         | 0,3              |
| 11       | Rigidity the general          | mg- ekv/ dm <sup>3</sup> | 4,8              |
| 12       | The dissolved oxygen          | Mg / dm <sup>3</sup>     | 13,8             |
| 13       | Permanganatnaja oxidizability | Mg / dm <sup>3</sup>     | 4,5              |
| 14       |                               |                          | 8,0              |
| 15       | Silicon                       | Mg / dm <sup>3</sup>     | -                |
| 16       | Sodium                        | Mg / dm <sup>3</sup>     | 47,3             |
| 17       | Magnesium                     | Mg / dm <sup>3</sup>     | 1,6              |
| 18       | Calcium                       | Mg / dm <sup>3</sup>     | 3,2              |
| 19       | Hydrocarbonates               | Mg / dm <sup>3</sup>     | 2,4              |
| 20       | Transparency (on a cross)     | sm                       | 20               |
| 21       | Copper                        | Mkg/ dm <sup>3</sup>     | 0,017            |

| <i>№</i> | <i>Name</i>            | <i>Measure unit</i>     | <i>Indicator</i> |
|----------|------------------------|-------------------------|------------------|
| 22       | Potassium              | Mg / dm <sup>3</sup>    | 47,3             |
| 23       | Free carbonic acid     | Mg / dm <sup>3</sup>    | -                |
| 24       | Alkalinity the general | mg -ekv/dm <sup>3</sup> | 2,4              |

Thus, the mineralization of water of the channel is low (0,37 maximum concentration limits). An oxygen regime satisfactory, the maintenance of the dissolved oxygen at level 13,8 Mg / dm<sup>3</sup>. Oil products are not detected. On a chemical compound water refers to to the sulphatic class-room, potassium and sodium group. Impurity of water (3,5 maximum concentration limits), (0,3 maximum concentration limits) and (2,5 maximum concentration limits) nitrogen speaks receipt of flows from agricultural fields and from the cattle-breeding factories which have been had above adrift of the channel. On magnitude quality of water in the channel refers to to II class-room of pure waters.

The route of the Big Namangan channel, with a water discharge 34 m<sup>3</sup>/with, passes on to sections of northern boundary line of Turakurgana from the east on the West. On intersection of the channel with the river Kasansaj entrance the sag pipe it is rigged by a board and an aperture in a lateral wall for dump of excesses of water in Kasansaj.

For protection of a city against earth flows a river Kasansaj flow in upper courses the Kasansajsky conservation reservoir. Besides, in the tideway of Kulsaja it is built Kulsajsky by 3,2 million capacity<sup>3</sup> for protection of a northwest part of the city territory.

The region of passage of the Big Namangan channel on northern city line differs the person . Basins of the majority of the stream flows which have been had in a strip , are combined by mucks. Sills have short-term character (in 2-3 hours) and represent a grjaze-stone stream which, getting to the Big Namangan channel, promotes lifting of a water level and overflow of a race course of the channel. Therefore on intersection of the channel with the river Kasansaj in a wall entrance the sag pipe emergency dump of excesses of water in Kasansaj is provided.

The distance to the Big Namangan channel from boundary lines matches to demands of the Decision of KM from 4/7/1992 №174 (the Rule about water security zones of conservation reservoirs and other ponds, the rivers and the main channels and collecting channels, and also sources of drinking and household water supply, medical and cultural-improving appointment in Republic Uzbekistan) about sizes of a water security zone in 200 m taking into account a water discharge in the channel 34 m<sup>3</sup>/with.

## 12 1.5. A condition of a soil-vegetative overlying strata

Formation of a soil overlying strata of observed region was affected largely by environmental conditions for which deserted factors of soil formation are characteristic. So, the type of soils of a platform of building was generated in an environment of old irrigated light grey soils. As in region soils on all to a profile dominate gravijno-galechnikovye adjournment. The pebble and rubble fraction by volume makes more than 80 %, and only the overhead part of a profile is enriched .

Feature of soils - poverty humus. Other feature in adverse vodno-physical properties. A coarse mechanical composition and close friablis gravijno-galechnikovyh mucks cause a small moisture capacity and strong water permeability. At development of such soils it is used and crop rotation

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conducting. On stony soils stone crops of fruit trees well get accustomed and develop. Therefore not without reason the region is famous for rich gardens of a peach, a garnet, an apricot.

The mechanical composition of soils and character of a parent rock do not promote accumulation of the toxic substances arriving with fertilizers and with irrigation waters from . Thanks to it, a geochemical condition of soils by results of the element analysis safe and the maintenance of toxic elements does not exceed a legitimate value.

In view of territory use under building and maintenance of the factories of light industry mechanical infringement of soils, also as well as soils, weak. It is not manifested because of rockiness of soils. In line of housing estates of soil are exposed to moderate agroirrigational affecting.

Within a building section the wood vegetation is absent, the vegetative overlying strata is presented efemeroido-efemerovoj by desert with domination of grassy aspects - , fires, , , annual astragals and with indispensable participation the prickly grasses dominating in an overlying strata in summertime a time - , the camel prickle ( ), , and annual moist .

In view of predominance of territory of observed region of extensive sections with agricultural grounds - gardens, vineyards, sowings, here it is not met typical efemerovo-efemeroidnyh communities with a totality of aspects. Predominating type of vegetation is among which dominate and with and knapweeds. Within housing estates artificial wood landings with a mulberry, poplars, platans and fruit stone aspects participate. Along irrigational round fields and along roads the dense overlying strata from , , sow-thistles, , and also and develops.

The square of green plantings of the general using (parks, parkways and squares) in the city of Turakurgane makes only 17 hectares that matches 2,1 % of urban territory, however the basic greens are concentrated in housing areas in which each manor has the personal plot or from 468,0 hectares of the square of an one-storeyed housing estate about one third or 156 hectares make wood landings. A condition of vegetation the satisfactory.

### **3. 2. Social and economic aspects of building new in the Namangan area**

Now in Fergana valley deficiency of security of users is felt as the electric power. In summertime the power shortage makes 322 , in winter - to 540 . The formed power shortage becomes covered now at the expense of import of the electric power from Kirgizstana (the Toktogulsky river plant and four river plants of average power), with retrace of the gained electric power from the Tashkent power knot in northern part of Kirgizstana by transit through Kazakhstan.

Building of a new thermal power station by the general power 900 as a part of two blocks PGU on 450 with necessary auxiliary buildings and constructions, with creation of a matching infrastructure in Tourist's Akurgansky region of the Namangan area allows to devide out available deficiency of the electric power in Fergana valley, to devide out dependence on import of the electric power from the next republics, and also optimum to use fuel resources of the country.

Inducted allows to provide uninterrupted and reliable supply of users by the electric power.

in comparison with applied now on Uzbekistan steam-turbine plants have such advantages as basic simplicity, practically all-around automation that considerably simplifies maintenance of installations. Besides, they are more compact, than traditional installations, and possess high manoeuvrability (a loading set for 5-20 minutes, in comparison with several hours of steam turbines). Transition on production engineering allows to lift efficiency of use of fuel, and it leads to martempering of ecological circumstances in investigated region as specific emissions of contaminants of per unit made power decrease.

Design implementation on building new in the Namangan area allows to solve partially a problem of busy condition of the population and preparation of highly-skilled personnel.

Quantity of the personnel new in the Namangan area makes 350 persons.

Operating mode - all-the-year-round, round-the-clock with the greatest possible number of hours of use of electric power according to the dispatching schedule of loadings.

Thus, building in the Namangan area has a row of social and economic advantages, will promote raise of efficiency of transformation of energy, fulfils predicted demand for electric energy from developing economy of republic.

#### 4. 3. The ecological analysis of the design solution

In the design the alternative of the complete equipment of the capital equipment of each of two power-generating units in to configuration under the circuit design is observed:

1×+1×+1×+2×.

In the accepted circuit design blocks PGU on the basis of gas turbines of series F are observed.

Power blocks PGU-450 Mvt are intended for electric power manufacture in a base operating mode at the condensing operating mode of steam turbines with a covering of industrial and heating steam demands steam of noncontrollable selections.

Into composition of everyone -450 enter:

- One gas-turbine plant with the oscillator;
- One waste-heat boiler;
- One steam-turbine plant with the oscillator;
- installation;
- Auxiliaries for two : compressor plant with three compressors; feeds of the block and system of turnaround technical water supply, a complex of clearing of industrial flows, an equipment; cooling towers with pumping plant of water supply ; an oil warehouse in container.

Structure of the necessary heat rating new the following:

- For industrial needs steam pressure 8 - 13 <sup>kg/sm<sup>2</sup></sup> in number of 4,5 / is required;
- For needs of heating of industrial and auxiliary premises thermal energy consumption in hot water at a rate of 12-20 Gkal/ch is provided.

Full electric output power in the condensing regime at insignificant use of steam of noncontrollable selection makes 450 . The Gas rate on thus makes 156,85 thousand nm<sup>3</sup>/ch.

The basic technical-and-economic indexes in the condensing regime by manufacture of electric energy are presented in table 3.1 resulted more low.

Table 3.1

#### Main technical economic indicators of CCPP

| <i>N<sup>o</sup></i> | <i>Indicator name</i> | <i>Measure unit</i> | <i>Note</i> |
|----------------------|-----------------------|---------------------|-------------|
|----------------------|-----------------------|---------------------|-------------|



| <i>N<sup>o</sup></i> | <i>Indicator name</i>  | <i>Measure unit</i>        | <i>Note</i> |        |
|----------------------|--|----------------------------|-------------|--------|
| 1                    | Quantity of blocks   | unit                       | 1           | 2      |
| 2                    | Number of business hours in a year   |                            | 8000        | 8000   |
| 3                    | Outdoor air parametres on ISO  | =15°,<br>= 0,1013, φ = 60% |             |        |
| 4                    | Target electric on conditions ISO of<br>T <sub>nv</sub> =15°C, P=0,1013                                    |                            | 464500      |        |
|                      | G  |                            | 307200      |        |
|                      |  |                            | 157300      |        |
| 5                    | Target electric taking into account<br>degradation on conditions ISO of<br>T <sub>nv</sub> =15°C, P=0,1013 |                            | 450000      | 900000 |
|                      |  |                            | 295300      | 590600 |
|                      | S  |                            | 154700      | 309400 |
| 6                    | Heat of combustion of fuel gas   | / <sup>3</sup>             | 8183        | 8183   |
| 7                    | Gas density  | / <sup>3</sup>             | 0,729       | 0,729  |
| 8                    | Heat of combustion of fuel gas under<br>normal conditions  | / <sup>3</sup>             | 8782        | 8782   |
| 9                    | The hour charge of equivalent fuel on  | /                          | 98394       | 196788 |
| 10                   | The hour charge of natural fuel on   |                            |             |        |
|                      |  | <sup>3</sup> /             | 78428       | 156856 |
|                      |  | <sup>3</sup> /             | 84169       | 168338 |
| 11                   | The annual charge of equivalent fuel on  | 10 <sup>3</sup>            | 787,2       | 1574,4 |
| 12                   | The annual charge of natural fuel on   |                            |             |        |
|                      | At =0 wasps and 760 ...  | 10 <sup>6 3</sup>          | 627,4       | 1254,8 |
|                      | At =20 wasps and 760 ...   | 10 <sup>6 3</sup>          | 673,4       | 1346,8 |
| 13                   | Annual power production  | 10 <sup>6</sup>            | 3600        | 7200   |
| 14                   | The specific charge of equivalent fuel on<br>the produced electric power                                   | /                          | 0,2187      | 0,2187 |
| 15                   | EFFICIENCY on power production   | %                          | 56,2        | 56,2   |

| <i>№</i> | <i>Indicator name</i>  | <i>Measure unit</i> | <i>Note</i> |        |
|----------|--|---------------------|-------------|--------|
| 16       | The charge of the electric power on own needs                                | %                   | 3,04        | 3,04   |
|          |  | 10 <sup>6</sup>     | 109,4       | 218,8  |
| 17       |  | 10 <sup>6</sup>     | 3490,6      | 6981,2 |
| 18       | Holiday of the electric power from   | /                   | 0,2255      | 0,2255 |
| 19       | The specific charge of equivalent fuel on holiday of the electric power from | %                   | 54,5        | 54,5   |
| 20       | EFFICIENCY on holiday of electric power                                      | %                   | 0,3         | 0,3    |
|          | Electric power losses in the transformer                                     | 10 <sup>6</sup>     | 10,8        | 21,6   |
| 21       |  | 10 <sup>6</sup>     | 3479,8      | 6959,6 |
| 22       | Annual holiday of the electric power from tyres                              |                     |             |        |
|          | Quantity of the personnel  | person              | 165         |        |
|          | The industrial   | person              | 53          |        |
|          | The repair   | person              | 82          |        |
|          | Administrative and managerial  | person              | 300         |        |
|          | In total   | person              | 50          |        |

The basic and reserve fuel for is rock gas with the characteristics specified more low.

Gas supply is carried out from the main gas pipelines of Suh-Namangan-1 (Ø5308 with pressure: in summertime - 18 <sup>kgs/sm<sup>2</sup></sup>, in a winter time - 6 <sup>kgs/sm<sup>2</sup></sup>) and Suh-Namangan-2 (Ø7208 mm with pressure: in summertime - 23 <sup>kgs/sm<sup>2</sup></sup>, in a winter time - 6 <sup>kgs/sm<sup>2</sup></sup>) with building of point of preparation of gas () and compressor plant (), where gas to pressure 4,85-5,0 .

### **Characteristics of fuel gas**

#### *Components*

#### *Settlement composition of gas in % molar*

Methane CH<sub>4</sub>

93,23

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Ethane  $C_2H_6$

3,25

Propane  $C_3H_8$

0,74

i-  $C_4H_{10}$

0,11

n-  $C_4H_{10}$

0,18

i-  $C_5H_{12}$

0,05

n-  $C_5H_{12}$

0,06

$C_6H_{14}$

0,03

Nitrogen  $N_2$

0,39

Carbonic gas  $CO_2$

1,96

Oxygen

No

Heat of combustion the lowest at 20 ° and 760 mm hg,  $kcal/m^3$

8183

The mass maintenance of hydrogen sulphide,  $g/m^3$

0,003

The mass maintenance sulfurs,  $g/m^3$

0,010

Gas density at 20 ° and 760 mm . ,  $kg/m^3$

0,729

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Smoke gases from two will be taken away through two individual chimneys in altitude on 90 m and in diameter 6,0 m. Chimneys are equipped with necessary connections for system of monitoring of emissions, alarm for the forestalling of airplanes, ladders and service platforms, lightning protection system. Parametres of an air-gas mix make: volume of smoke gases 803,411 m<sup>3</sup>/with, speed of a waste-heat - 28,41 km/s, temperature of a waste-heat - 102° (the Application 3). Polluting the atmosphere substances at maintenance : nitrogen (2 class-room of danger), nitrogen, sulfurs (3 class-room of danger).

The basic advantage of the design solution from an ecology position is issue decrease nitrogen in comparison with traditionally maintained power installations that is attained thanks to at burning of rock gas of combustion chambers with dry torches. The given design allows to lower issue nitrogen from in conversion on NO<sub>2</sub> to 50 mg/nm<sup>3</sup> that match to demands of GOST 29328-92 on gas-turbine plants. Low concentration NO<sub>x</sub> are created not only thanks to constructional features of combustion chamber PGU, and also a created regime of burning at which fuel burns down almost completely.

Management of new installations will be carried out by means of an automatic control system that, along with conducting of operative control, allows to create high operate reliability and to lower the emergency marks in details discussed more low in chapter 8.

Besides steam gasinstallations, a significant source of affecting on a circumambient as a part of the equipment new is . Dump of gas from a pipeline sole timber and equipment , with waste and relief valves is carried out through dispersion candles. Thus in an aerosphere hydrocarbons of 6 names (methane, ethane, propane, butane, pentane,heksane, 4 class-room of danger), hydrogen sulphide (2 class-room of danger) arrive.

Emissions from other stationary sources (the warehouse of chemical reagents, chemical laboratory, ) make quantities.

### **Water consumption and water removal**

For completion of losses in scraper new water-treatment system building is provided.

Source of process water supply new is the Big Namangan channel. A source of the economic-drinking water pipeline the existing intake structure in 24 km from a northeast part is offered.

The water discharge for economic-drinking needs makes 281,29 m<sup>3</sup>/ch (975,26 m<sup>3</sup>/sut).

The water balance circuit design new is resulted in the Application 5.

For two PGU-450 the turnaround system of process water supply by the law Republics Uzbekistan №837-XII from 06.05.1993 is provided. «About water and water use». To installation of 15 m in number of twenty pieces are accepted cooling towers a size of section 15 ×.

The circulating water discharge makes 54600 m<sup>3</sup>/ch. At such circulating charge the water concentration in cooling towers makes

$$q = \frac{54600 \text{ m}^3 / \text{ч}}{20 \cdot 15 \cdot 15 \text{ m}^2} = 12,1 \text{ m}^3 / \text{m}^2 \text{ч}$$

Depth of water in cooling tower basin is provided from a condition of conservation of possibility of work of blocks at a fire water-supply (~ 1500<sup>3</sup>) is a standard three-hour requirement of work of the fire pump.

The circulating water chilled on cooling towers with the help moves to capacitors of the steam turbine and on all auxiliaries of two PGU-450 . On Ø1600 mm after heat exchangers of blocks the completed (warmed-up) water goes on cooling towers for cooling analogous . Further the cycle repeats.

Besides, on a case of a stop of steam turbines and switching-off the reserve circuit design of supply of cooling water on auxiliaries of two gas turbines by means of service water pumps on the separate water line of service water of Ø900 mm with the subsequent direction of the completed water on cooling towers for cooling is provided.

In the circulating pump are installed: four vertical pumps (all workers), on two pumps on block PGU. Pump parameters - the charge ~ 1400 m<sup>3</sup>/ch, a pressure of 22 m, power of electric motor N=1600 of kw, U=6000 century

Three pumps of service water (two workers, one reserve)

Q<sub>1</sub>≅2000 m<sup>3</sup>/ch, =30 m, . Kw propeller N=250, U=6000 century

Two fire pumps (one working and one reserve), Q=630 m<sup>3</sup>/ch, =90 m kw electric motor N=325, U=6000 century

Two drain pumps: Q=40 m, =20 m, N=18 kw, U=380 century

Two pumps grids: Q=120 m<sup>3</sup>/ch, =43 m, N=28 kw, U=380 century

The equipment is served by the travelling crane / 16 .

Completion of losses in (transpiration and water ablation in cooling towers, a purge ) is provided by supply of make-up water from the Big Namangan channel of irrigational appointment. The volume of supply of make-up water considers also the charge on two blocks PGU-450 Mvt and makes ~ 1250 m<sup>3</sup>/ch - for a summer regime, a winter regime ~ 1010 m<sup>3</sup>/ch, in an annual regime ~ 9,9 million <sup>3</sup>, taking into account natural transpiration of water from the settler.

### Substantiation of the charge of make-up water

The make-up water charge develops of losses in and selection on .

Definition of losses of cooling water in :

Losses in the cooling tower.

Losses on transpiration. Settlement losses on transpiration are defined for a summer regime (VII) on the maximum monthly average day temperature of air t=35,7°.

$$q_{\text{transp}} = k_{\text{isp}} \times \Delta t \times q \quad (2.04.02-97, \text{ p. } 79)$$

Where  $k_{\text{isp}}$  - factor on transpiration at temperature of air 35,7 °; =0,00156.

$\Delta t$  - the temperature drop entering and chilled water is preliminary defined  $\Delta t \cong 8^\circ$ .

$q$  - a circulating water discharge,  $q=54600 \text{ m}^3/ч$ .

$$q_{\text{transp}} = 0,00156 \times 8 \times 54600 = 681,4 \text{ M}^3/ч$$

Losses on ablation by a wind from the cooling tower. We accept under the characteristic of modern drip pans - 0,003 % from waters

$Q = 0,003 \%$  from  $q$ .

$$q_{\text{унос}} = \frac{54600 \text{ M}^3/ч \times 0,003\%}{100\%} \cong 1,64 \text{ M}^3/ч$$

Total losses in the cooling tower make:

$$q_{\text{total}} = q_{\text{transp}} + q_{\text{унос}} = 681,4 + 1,6 = 683 \text{ M}^3/ч$$

Losses on a purge.

By result of calculation the purge roughly is accepted 0,83 %

$$Q_{\text{прод}} = \frac{54600 \text{ м}^3/\text{ч} \times 0,83\%}{100\%} \cong 453 \text{ м}^3/\text{ч}$$

Total losses in make:

$$Q_{\text{..}} = 683 + 453 = 1136 \text{ м}^3/.$$

Selection from make-up water system on - 114 м<sup>3</sup>/ (it agree tasks taking into account own needs ).

Total the requirement for make-up water makes:

$$Q_{\text{.}} = Q_{\text{.}} + Q = 683 + 453 + 114 = 1250 \text{ м}^3/.$$

As source of make-up water for two PGU-450 the Big Namangan channel serves. Selection of make-up water for two PGU-450 is provided from an earth race course of the channel, by means of separate pumping plant of make-up water 1 lifting. From -1 water arrives in the open horizontal settler on preliminary clarification.

In pump make-up water 1 lifting three basic horizontal pumps (two workers and one reserve) with the charge of one pump to 650 м<sup>3</sup>/ch and a pressure □ 20 m. Completing electric motor N=160 of kw, V=380 are installed Century

Gabarits pump by overground part L=18,0 m, =6,0 m, =10,0 m. Productivity pump ~ 1250 м<sup>3</sup>/ch.

After clarification in the settler make-up water by means of pumping plant of make-up water of 2nd lifting goes on , on for additional clarification and machining by chemical reagents for the purpose of prevention biological and salt sprinklers of the cooling tower, capacitors and pipelines.

In make-up water pumping plant 2 lifting three basic pumps (two workers and one reserve) are installed. The charge of one pump 650 м<sup>3</sup>/ch, a pressure of 50 m. kw Electric motor N=250, U=6000 century make-up water Pressure pipelines 2Ø426×8 are traced partially in land with antirust isolation of rather reinforced type (L=1600), partially on the trestle with the thermal insulation (L=400). Both pipelines workers.

The big Namangan channel and two threads of a gas pipeline are recut by the trestle. On make-up water pipelines are traced also on the trestle.

Make-up water pumping plants 1 and 2 lifting place on the left I protect the Big Namangan channel with lower marks of a landform.

The make-up water pumping plant 1 lifting has a water intake with lattices and flat grids and a forebay with concrete walls on mating to the Big Namangan channel.

The settler and also are placed in left-bank territory of the channel.

The settler of two section, building depth of 6,0 m, filling of slopes 1:2, a size on a bottom ~ 160×35 m (one section). It is carried out with the shield (++).

two section, building depth of 5,0 m, a contour interval of slopes 1:2. The size on a bottom of one section ~ 120×20 m. Is carried out with the shield. Settler cleaning is provided by the suction-tube dredger, - the excavating machine.

Depth of water in basin of cooling towers is provided from a condition of conservation of possibility of work of the block at on 1,0-1,5 m for fire needs. The fire water-supply (~1500 <sup>3</sup>) is a standard three hour requirement of work of the fire pump. Besides, the volume on 1-1,5 m should ensure functioning of blocks in a current of days at make-up water stopping delivery.

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### Block PGU-450 Mvt chemical water treatment

Machining of crude service water on is provided for block PGU feed. The general total requirement (taking into account own needs ) in water makes ~ 555 m3/ch, including on block feed - 340,6 m3/ch And on heat-supply system feed - 214,2 m3/ch.

#### Sewage PGU-450

Sewage 2 blocks PGU-450 Mvt

Sewage consists of a purge of cooling towers and industrial flows.

Blow of cooling towers is provided in the Big Namangan channel, considering that circulating water passes clarification, and also cooling on cooling towers. The total maintenance of salts in this water does not exceed the maintenance of salts in initial water. It meets the requirements of San Pin №0056-96, Tashkent, 1996 «Sanitary rules and norms of protection of a surface water from pollution».

Under the available data the maximum monthly average water temperature in Big the Namangan channel during the summer period makes 15 °.

As a result of dump of a purge of cooling towers in the channel in the summer water temperature in the channel after full mixture with the minimum water discharge 3,0 m3/with grows no more than on

$$t_{cm} = \frac{3M^3 / c \times 15^\circ + 0,126M^3 / c \times 30^\circ}{3 + 0,126 = 3,126M^3 / c} = 15,6^\circ$$

one grade

Industrial sewage in the beginning goes on complex clearing of industrial flows ().

consists their technological part and sludge fills. Neutralised exhaust waters make 43 m3/ch, and go on sludge fills. After clarification (sediment) by means of pumps water from sludge fills (37 m3/ch) goes on , to turnaround cycle . Reserve dump is provided in the Big Namangan channel.

Flows after conducting of chemical clearing of coppers from salt adjournment - incidental also make ~ 1000 during 3 days, once in three years. Go to a pond-evaporator on natural evaporation.

installations of clearing of greasy waters it is inferred by motor transport on a burial place. In the capacity of time storage it is provided sludge fills for three years of storage. The annual exit makes 1000 .

Limiting values of parametres and the limiting maintenance of components in the cleared flow:

|                   |      |      |
|-------------------|------|------|
| pH                |      | 8,0  |
| Oil               | mg/l | 0,13 |
| Suspended matters | mg/l | 0,19 |

#### Planned sludge fills

##### 1. The Pond-evaporator of chemical washing of coppers.

It is intended for natural evaporation of waste toxic waters. Settlement annual dump taking into account prestarting washings 1000<sup>3</sup>. The settlement layer of annual transpiration h=101-20=81 see

Where: 101 sm - norm of transpiration

20 sm - mid-annual magnitude of deposits

$$S = \frac{1000M^3}{0,81M} = 1235M^2$$

The settlement square of transpiration makes

We accept two sections with a size on a bottom 25×30 m. Depth of section Nstr=2,0 of m. the General demanded square for a pond-evaporator ~ 1,2 hectares (135×90).

### 2. Sludge fills made oily

It is provided for time warehousing of greasy silt, and a coagulant within three years with the subsequent export on salvaging.

Sludge fills the two-section. A size of each section on a bottom 15×15 m building depth of 4,0 m.

Demanded total area for sludge fills greasy waters 100×100=1,0 hectare.

### 3. Sludge fills exhaust waters (and to exhaust).

It is provided for a sediment, arriving from, to exhaust and a suspended matter which are in initial water.

Sludge fills two-section, building altitude of 4,0 m, a contour interval of slopes m=2,0. The square on a bottom of one section () 25×40 m. the Demanded square for sludge fills 200×160 m □ 3,2 hectares. The given gabarits sludge fills are counted for volume ~ 6000 within 10 years, with depth of adjournment ~ 3,0 m.

Clarified in sludge fills water through shaft wells is brought to pumping plant and further goes on, on, for a reuse.

On all sludge fills facing is provided. In all sections of all sludge fills cross-overs are provided for and/transport. On embankment shoulders of all sludge fills the asphalt pavement in width of 6,0 m for motor transport journey is provided.

## Pezometrichesky network

On the device networks for observation over level and quality of underwaters is provided. The total of piezometers - 16 pieces, ~ 27 m. Is supposed average depth the device of four transits.

## Shower (rain) flows

As finishing point of tap of shower (rain) flows the concrete well on platform boundary line in which shower (rain) flows will arrive a gravity flow through underground pipeline system serves.

On new after commissioning of two power on 450 will form a firm waste of 32 names listed more low.

### The list of a waste new PS in Tourist's Akurgan region of the Namangan area

| <i>Nº</i> | <i>Name</i>                                     | <i>Danger class</i> |
|-----------|---|---------------------|
| 1         | from clearing of turbines                       | 2                   |
| 2         | Waste of turbine oil                            | 2                   |
| 3         | The completed electrotechnical oil, transformer | 2                   |



| <i>No</i> | <i>Name</i>  | <i>Danger class</i> |
|-----------|--|---------------------|
| 4         | The completed compressor oil                                     | 2                   |
| 5         | The completed engine oil   | 2                   |
| 6         | The completed industrial oil                                     | 2                   |
| 7         | Solid  | 4                   |
| 8         | Butilen (a waste at hermetic use)                                | 3                   |
| 9         | Waste of refractories  | 4                   |
| 10        | Thermal insulation waste   | 4                   |
| 11        | Waste cationic pitches   | 4                   |
| 12        | Sludge an oil reclaiming   | 3                   |
| 13        | Waste of ferrous metals  | 5                   |
| 14        | Waste of non-ferrous metals                                      | 3                   |
| 15        | Calcines of welding electrodes                                   | 4                   |
| 16        | The completed accumulators                                       | 4                   |
| 17        | The completed automobile tyres                                   | 3                   |
| 18        | Calx   | 3                   |
| 19        | Dust abrasive-metal  | 4                   |
| 20        | Settlements of treatment facilities of a sink of motor transport | 3                   |
| 21        | exhaust  | 4                   |
| 22        | Greasy silt sludge fills   | 3                   |
| 23        | Rubberized asbestos  | 4                   |
| 24        | Rags oiled   | 3                   |
| 25        | The outwared overalls  | 4                   |
| 26        | The completed luminescent lamps                                  | 1                   |
| 27        | Paper for recycling  | 4                   |
| 28        | Completed equipment and the completed office equipment           | 4                   |
| 29        | Household waste  | 4                   |
| 30        | Food waste   | 4                   |

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| <i>Nº</i> | <i>Name</i>              | <i>Danger class</i> |
|-----------|--------------------------|---------------------|
| 31        | First-aid post waste     | 4                   |
| 32        | Estimates from territory | 4                   |

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#### 5. 4. The analysis of aspects the affectings defined in a circumambient of contaminants

Maintenance new as a part of two blocks PGU on 450 in Tourist's Akurgansky region of the Namangan area will be accompanied by power in a circumambient of contaminants.

In an aerosphere harmful substances arrive from 6 sources of emissions: two chimneys in altitude of 90 m, diameter 6,0 m, scavenging candles in altitude of 6,0 m and diameter 0,114 m.

In a free air at rock gas burning will arrive: nitrogen, nitrogen, sulfurs and from equipment : hydrocarbons (methane, ethane, propane, butane, pentane, ), hydrogen sulphide, i.e. contaminants of 10 names. The basic pollutants of a free air are nitrogen (82,3 % from weight of emissions) and nitrogen (13,4 % from weight of emissions). On a share of the others of 8 components of contaminants in total emission 4,3 % drop.

Emissions of contaminants from new in the Namangan area are presented to Item 3.1 tab.

In total from new as a part of two blocks PGU power on 450 Tourist's Akurgansky region of the Namangan area receipt of contaminants in an aerosphere in number of 1671,1788, including nitrogen - 1374,7968, nitrogen - 223,4045 t/year, methane - 59,7911 t/year is expected.

Calculation of concentration of harmful substances is made for a level detection of affecting Tourist's Akurgansky on a free air of an areal of extending of impurity under the program "Ecologist" in territory by the square  $8,05,0^2$  with step of 0,5 km. Results of calculation of dispersion of contaminants in an aerosphere in the graphical form are resulted in the Application 4 on fig. 4.1 4.3.

Meteorological characteristics and the factors defining conditions of dispersion of chemical substances in an aerosphere, are resulted above in section 1.

The maximum concentration nitrogen make 0,13 maximum concentration limits (Item 4.1 fig.), methane - 0,01 maximum concentration limits (Item 4.2 fig.) that does not exceed the quotas allowed by Goskomprirodoj on level of an atmospheric pollution for substances 2 class-rooms of danger ( nitrogen) in 0,2 maximum concentration limits and for substances 4 class-rooms dangers (methane) in 0,25 maximum concentration limits and the factories which have been had in the Namangan area.

Concentration of other contaminants - at level and for boundary lines of territory are not passed round.

chemical substances in the Big Namangan channel does not change a waterway condition as in comparison with an existing rule the water increase of temperature for the account the made winter-proof flows only on 1 wasps is expected, and on a chemical compound dump of a purge of cooling towers is characterised as conditionally pure and San Pin №0056-96 «Sanitary rules and norms of protection of a surface water from pollution» meets the requirements.

chemical substances and heat in the Big Namangan channel will be insignificant thanks to application of turnaround system of technical water supply with cooling on cooling towers.

Building new for needs 450, switching on the water-treatment equipment for a deep demineralization of make-up water for completion of losses of steam and a condensate of a water-flow cycle of the block, installation make-up water for the heat-supply system with the deaerator of the heat-supply system and the process equipment of installation of complex clearing of industrial flows with knot of neutralisation sour and alkaline water after regeneration, a loosening and washing of filters of the circuit design of feed of a water-flow cycle of the block, and also installation of machining of waste greasy waters from oil products, allows to expel contaminants in soils and ground waters (chloride, sulphates, hydrocarbonates of calcium and a magnesium, heavy metals in the mobile form).

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After commissioning Tourist's Akurgansky nitrates and sulphates in soil and vegetation by migration of an aerosphere at the expense of subsidence makes insignificant quantities in view of created low concentration in a free air nitrogen and quantities sulfurs. nitrates does not exceed 0,034 <sup>kg/m<sup>2</sup></sup> a year and does not change their background maintenance in soil.

Change of state of ground waters for the account contaminants from at their filtering it is not expected, since the design provides facing.

The gas turbine exhaust, the gas turbine, the steam turbine, oscillators, transformers, the equipment, an electric equipment, pumps, gas pipelines, compressor, cooling towers, chimneys will be noise sources and vibrations on Tourist's Akurgansky .

The noise level should not exceed 80 in a working zone on distance of 1 m from the equipment on the rigid basis according to SanPiN № 0120-01.

Expected noise levels on distance from make of 1 m:

For the gas turbine and the steam turbine - □80 ;

For all other equipment - □80 .

Emergency valves will be sources of the greatest noise from . Affecting of noise from them will be felt as personnel on work stations, affecting will have periodic and reversible character.

As a whole, acoustical noise from does not render negative affecting on personnel health as created noise will be extinguished by buildings, constructions and green plantings of station. The expected noise level in a housing estate in view of its remoteness does not exceed standard values.

Sources of vibrations on Tourist's Akurgansky is a gas turbine, the steam turbine, the oscillator, the equipment, pumps and turbines indoors , compressors. For decrease in level of vibrations at station ventilating fans, flue-gas pumps and pumps are installed on , pumps and pipelines are divided by flexible inserts, joining of ventilating fans to air ducts also to be made through flexible inserts. Cases of air ducts become covered special vibro - and an acoustical plaster. Expected level of vibrations from sources does not exceed 50 and behind charging floor boundary lines will not be felt.

Thus, expected level of acoustical noise and vibrations from will be much less, the analysis of characteristics analogue shows that agency of noise for boundary lines will not be passed round. It is connected with application of various ways . So, noise from the installation is supposed to be relaxed by means of casing installation. Muffler installation on a steam plant exit warmth Is supposed also. On an exhaust of the gas turbine muffler installation is not provided in view of that the completed gas, arrives in an aerosphere through a high pipe, thus noise is relaxed both on intensity, and in a direction. Besides, though the gas turbine exhaust renders a strong sound pressure in a strip of low frequencies, it is relaxed at passage of exhaust gas through the steam plant warmth. Noise from the gas turbine snifting, putting pressure in a strip of high frequencies, can be also rather easily relaxed sound insulation means. noise from does not exceed standard values under condition of application listed above ways of easing of noise at installation of new installation.

## **6. 5. The analysis of alternative alternatives of the design solution**

"Zero" alternative. At failure from building Tourist's Akurgansky on the former deficiency of the electric power in Fergana valley will be felt, dependence on import of the electric power from the next republics remains, and also there will be no optimum use of fuel resources of the country.

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Alternative of technological solutions. Building new in the Namangan area power 900 with use of traditional power installations for a power production and heat does not lead to raise of efficiency and updating of the oscillating equipment of power sources of the Uzbek power supply system, leads to failure from application of power effective production engineering with the most economic modern installations () from EFFICIENCY of a power production over 55 %.

Thus, the design solution of building new in the Namangan area power 900 as a part of two blocks PGU power on 450 is optimum.

## **7. 6. An estimation of aspects of the affecting defined by retirement from a circumambient of natural resources**

Industrial activity Tourist's Akurgansky will be accompanied by retirement of minerals (gas) and water.

Ground tap under territory new in Tourist's Akurgansky region of the Namangan area is supposed at level of 87,6 hectares, including platforms of the basic buildings and constructions - 28 hectares.

The annual water discharge for industrial needs Tourist's Akurgansky makes 10000 thousand of the Big Namangan channel <sup>3</sup>. The annual water discharge of drinking quality for needs makes 355,97 thousand of the underground water intake <sup>3</sup>.

At work of two it will be consumed in a year of 1346,8 million 3 gas.

## **8. 7. Emergencies**

Aprioristic frequencies of crashes on according to [3] can be sized up as <sup>10-5</sup>.

Emergency marks on Tourist's Akurgansky after design implementation are minimised thanks to application of the modern (microprocessor) automated control system and control. The automated control system is intended for performance of function of logic management, regulating in automatic and manual regimes, emergency and restrictive protection, precautionary and the fault signalling, control, representation and archiving of technological parametres, high-speed registration of the basic events and parametres in emergencies.

Listed below system and power station sections represent certain risk from the point of view of a fire hazard with the subsequent explosion:

- station;
- The block of fuel gas ( on a gas line and the filter);
- System of pipelines for gas supply;
- The block valves (in a separate compartment of the block of auxiliaries );
- System on combustion chamber torches;
- Systems of lubricant and power oils of the turbine / of the oscillator;
- Electric systems.

The largest dangerous crashes are connected with maintenance of the gas equipment consisting from:

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- Knot of the mercantile account of gas;

- Knot of separation of gas where mechanical cleaning and branch from a rock gas moisture is carried out;

- compressor plant () in which composition is available 2 the compressor (1 worker, 1 reserve);

The gazodozhimnaja station serves for supply of fuel gas to gas-turbine plant combustion chambers ().

The gazodozhimnaja station is intended for compression of a mix of hydrocarbonic gases (which can serve some fuel for the gas turbine) at constant maintenance (7 000 hours/years) with necessary breaks for preventive works (oil addition, clearing of filters). includes 2 (two) the compressor one of which working, and one reserve and it is counted for work of the gas turbine with the maximum gas rate.

Carried out calculation of radiuses of zones of defeat for two alternatives of scenarios of crashes - at a fire on and explosion mixes in a gas turbine building. The analysis of the gained results shows that at a fire on , a zone of defeat with radius 25,5 m (irrevocable losses) and with radius 76,5 m (sanitary losses) do not overstep the bounds of territory of platform .

In case of explosion in a building of the gas turbine the defeat zone is restricted by platform .

In the capacity of antifire measures the design provides following provisions.

The principle of fire protection for the gas turbine () is based on use of system of jet water spraying on sections with high risk of origination of a fire.

The given system of water fire-fighting is the new working out presented in the market of the fire-fighting equipment. For fire extinguishing the system allows to use the minimum volume of water. New system of water spraying of type «small drops of a fog», matching to the standard NFPA (National association on hydraulic actuators) 750 has been chosen alternatively to system of fire extinguishing with carbonic acid application.

Advantages of new system the following:

- The system remains in working readiness during conducting of planned preventive maintenance .
- On system reduction in act leaves 5-10 while the system of fire extinguishing with carbonic acid application becomes more active during 30 seconds
- Control over repeated ignition during the period of cooling .
- Safety evacuation in case of emission (the best visibility unlike 2).
- It is not toxic and does not call an asthma at the personnel.
- Working out of difficult procedures on and to the personnel warning is not required.
- Case GT should not be leakproof.
- Absence of harmful affecting on a circumambient.

Antifire measures are developed for the purpose of performance of following demands:

- Prevention of origination of a source of a fire and its extending.
- Protection of those. The personnel.
- Early detection of a fire, the warning of the personnel and fire extinguishing.
- Decrease of the damage caused by a fire.

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Performance of the given demands is attained at the expense of optimum disposing of the equipment (passive measures) and by adoption of matching measures under the forestalling of a fire and its suppression (active measures).

If for any technical reasons, passive measures do not match to the shown demands, matching active measures are applied in the capacity of compensations.

For the purpose of prevention of extending of fire and coproducts of burning the station is divided into fire-dangerous zones. Protection of these zones against a fire is carried out by means of application or passive (structural, complex and operative measures), or active measures (portable fire extinguishers, systems of fire protection) or combinations of these measures there where the risk of origination of a fire is high.

Sections with the raised risk of origination of a fire separate from each other by means of the cases made of fire-resistant materials. Similar cases are applied on following sections:

- The gas turbine thermoblock.
- Auxiliaries .

On these sections of the case are rigged with an automatic fire-extinguishing system.

Fire-dangerous zones, are protected by fire-fighting walls. Fire-fighting walls are installed for the purpose of protection of the gas turbine against fires or explosions.

Also by means of these walls the main control panel, a relay premise and a cable floor separate from contiguous sections.

With a view of a non-admission of extending of fire apertures in fire-fighting walls and fire-resistant cases (a door, apertures for a lining of pipes or cables, ventilating ducts etc.) are condensed.

Ways of evacuation from all fire-dangerous sections and approaches for fire control are carefully volplaned outside, not encumbered and properly marked. The length does not exceed them installed by matching rules and conduct in a safe range or to an exit. Are provided, at least 2 itineraries of evacuation outside from fire-dangerous sections of 1 and 2 classes.

The emergency lighting (with reserve accumulators on a minimum of 60 mines of work) is installed along evacuation ways as follows:

- Specify a direction to an emergency exit.
- Over emergency exit doors the sign which is marking out an exit outside burns.

The design and emergency lighting system installation are according to applied standards.

## **9. 8. Character of affecting on a circumambient**

Maintenance Tourist's Akurgansky will be accompanied by affecting on a circumambient in the form of receipt of emissions, dumps and a firm waste.

With emissions in a free air receipt of contaminants 10 names is expected.

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The maximum concentration of all contaminants do not exceed the quotas allowed by Goskomprirodoj (0,2 maximum concentration limits for substances 2 class-rooms of danger, 0,25 maximum concentration limits - for substances 3 class-rooms of danger and 0,33 maximum concentration limits - for substances 4 class-rooms of danger).

Affecting will be insignificant on magnitude, but constants at maintenance .

The free air will become soiled, in the core, emissions of products of combustion of rock gas: nitrogen.

At conducting of civil work short-term concentration of a dust of an anorganic, wood dust, welding the aerosol, not exceeding standard values behind boundary lines will be created.

Thus, affecting on a free air from sources of emissions Tourist's Akurgansky after building end will be constant, but insignificant on magnitude of loading on a free air thanks to application advanced steam gasproduction engineering of combustion of fuel.

Considerably agency of a prototype system on a circumambient for the account nitrogen and black increases at the emergencies discussed above.

Affecting on a circumambient at emergencies will be strong, but not enduring and to have periodic character.

Affectings on superficial ponds and ground waters it is not expected at observance of the nature protection provisions accepted by the design.

Dump of thermal waters thanks to application of turnaround system of technical water supply with use cooling towers does not call raise of negative affecting on water biothat the Big Namangan channel. It is known that at a sharp increase of temperature of water on 10° there is a destruction of fish, the ecological regime changes. According to the design, dump of thermal flows in the channel leads to a water increase of temperature on 1 ° and does not change a water chemical compound since dumped scavenging waters of cooling towers on composition refer to to conditionally pure.

Maintenance is connected with formation of a firm waste of 32 names. For time storage of an industrial waste separate capacities and specially rigged platforms are provided. For gathering a firm household waste are provided . Negative affecting on a circumambient from places of warehousing and storage of a firm waste it is not expected.

At maintenance the probability of origination of emergencies is practically expelled at the expense of the superiority of thermodynamic data , its constructional solutions and to maintenance of the automatic control system creating high operate reliability.

The personnel will be affected by noise and vibrations from sources of two 450 which level does not exceed standard values. However, after commissioning Tourist's Akurgansky , it will be necessary to make actual indications of level of noise affecting.

Thus, building Tourist's Akurgansky in the Namangan area does not call a negative change of state of a circumambient and population health.

#### **10. 9. Provisions on decrease in adverse effects on a circumambient**

The design provides system of continuous monitoring behind atmospheric emissions ( ) for control over the products of combustion made new . The Tracking system behind emissions should control volume of products of combustion and concentration  $NO_x$ ,  $SO_2$ ,  $CO_2$ ,  $CO$ , and  $O_2$ .

Installation of two systems MVA is provided. One of systems MVA should be installed on boundary line of territory , and second should be installed in nearby inhabited territory. Systems MVA



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will be used for definition of firm corpuscles less than 10 micrometre, NO, SO<sub>2</sub>, temperatures and moistures of atmospheric emissions, directions and speeds of a wind.

Bases of monitoring of atmospheric emissions by means of systems MVA are supposed to be prepared not later than for two months prior to the beginning of building.

Besides, installation of system of continuous supervision of the maintenance of impurity in sewage, level pH and the maintenance of oils is supposed. It is necessary to control also level pH and the maintenance of oils in rain drains. Monitoring should be spent in drain pits of system of purification of sewage and in control wells of rain water drains.

The organisation of system of continuous monitoring behind formation, time warehousing and traffic a waste new is provided also.

### **9.1. The plan of measures on preservation of the environment**

The contractor should prepare the Plan of measures on preservation of the environment for decrease of harmful affecting of building by a circumambient. The given plot should include the organizational circuit design, the monitoring plot, the paperwork, the gathering and waste disposal organisation, the plan of action in emergency situations. The contractor should confirm the given plot at the Customer not later than for two months prior to the beginning of building.

### **9.2. Management and circumambient monitoring**

#### **Monitoring and management of air emissions**

following gas analysers at a gas turbine exhaust duct:

- Analyser NO<sub>x</sub>.
- Analyser SO<sub>2</sub>.
- Analyser O<sub>2</sub>.
- Analyser CO.
- Analyser CO<sub>2</sub>.

All these signals should arrive in .

transfers reports on continuous monitoring of emissions under the forms confirmed by the Customer.

#### **Analyser NO<sub>x</sub>**

a) Installation of analyser NO<sub>x</sub> and O<sub>2</sub> for the analysis nitrogen and oxygen is made in a tailrace canal of leaving gas of the gas turbine, and analyser O<sub>2</sub>, for measurement of base concentration.

b) the Quantity of sondes for a fence of tests depends on a tailrace canal size. Besides, it is necessary to measure speed of a gas stream in the channel, and to define a sonde diving depth, to gain average concentration.

c) the List of technical requirements to the gas analyser nitrogens NO<sub>x</sub>:

Type: it is desirable not dispersing sorbtion in a spectrum infra-red (or with a chemiluminescence method);

Analysis cycle: the continuous;

---

Automatic changes of a range: is available (three divisions);

Measuring range: under the recommendation of the Participant

For outdoor installation, therefore should be in the case

Function of compensation of an interference of gases (such, as  $O_2$ )

d) This gas analyser should be in the case.

f) Values of concentration  $NO_x$  and  $O_2$  should be transferred in .

g) system failure Signals (self-diagnostics function) should be transferred in .

#### Analyser $SO_2$

Installation of gas analysers  $SO_2$  and  $O_2$  for measurements of concentration sulphur and oxygen in a tailrace canal of leaving gas of the gas turbine, and gas analyser  $O_2$  for measurement of base concentration.

The quantity of sondes for a fence of tests depends on a tailrace canal size. Besides, it is necessary to measure speed of a gas stream in the channel, and to define a sonde diving depth, to gain average concentration.

Analyser  $SO_2$  specification should be following:

Type: it is desirable not dispersing sorbtion in a spectrum infra-red.

Analysis cycle: the continuous

Automatic changes of a range: is available (three divisions)

Measuring range: under the recommendation of the Participant

For outdoor installation, therefore should be in the case.

If it is required, function of compensation of an interference of gases should be provided.

This analyser should be installed in the separate case.

System failure signals (self-diagnostics function) should be transferred in .

#### Analyser $O_2$

a) gas analyser  $O_2$  Specification should be following:

Type: continuous, paramagnetic.

Analysis cycle: the continuous.

Measuring range: under the recommendation of the Supplier.

Automatic graduation: should be for outdoor installation, therefore should be in the case.

b) system failure Signals (self-diagnostics function) should be transferred in .

The gas analyser WITH

Technical requirements to the given analyser should be the following:

Type: it is desirable not dispersing sorbtion in the infra-red

Spectrum areas

Analysis cycle: the continuous:

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Measuring range: under the recommendation of the Supplier.

For outdoor installation, therefore should be in the case.

b) the Alarm (self-diagnostics Function) should be transferred in .

#### Analyser CO2

Technical requirements to the given analyser should be the following:

Type: it is desirable not dispersing sorbtion in the infra-red  
Spectrum areas.

Analysis cycle: the continuous:

Measuring range: under the recommendation of the Supplier.

For outdoor installation, therefore should be in the case.

b) the Alarm (self-diagnostics Function) should be transferred in .

### 9.3. Ambient air monitoring in frontier zones

following devices for performance of indications in a frontier zone where it is necessary to carry out circumambient monitoring.

- Analyser NOx·

- Analyser SO2·

The counter for indication of the weighed corpuscles.

Devices for temperature measurement

Moisture testers (relative).

Devices for measurement of a bearing of apparent wind/speed.

Indications NOx/SO2, should register the registrar who is available in the case of analyser NOx/SO2 and to be transferred in .

Signals of indications of temperature of ambient air, direction and speed of a wind too should be transferred in .

#### Analyser NOx

The list of technical requirements to the gas analyser nitrogen.

Type: it is desirable with a method of a chemiluminescence or sorbtion in a spectrum infra-red;

Analysis cycle: the continuous;

Measuring range: under the recommendation of the Participant;

For outdoor installation, therefore should be in the case;

Function of compensation of an interference of gases, such, as 2.

#### Analyser SO2

Gas analyser SO2 specification should be following:

Type: , or ultra-violet ;

Analysis cycle: less than in 1 hour;

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Measuring range: under the recommendation of the Supplier;

For outdoor installation, therefore should be in the case.

#### **The counter for indication of the weighed corpuscles**

The counter specification should be following:

Type: under the recommendation of the Supplier;

Analysis cycle: less than in 1 hour;

Measuring range: under the recommendation of the Supplier.

### **9.4. Ambient air monitoring in a residential zone**

Following devices for performance of indications in a residential zone where it is necessary to carry out circumambient monitoring are provided:

- Analyser NOx

- Analyser SO2

- The counter for indication of the weighed corpuscles.

These devices should be stored indoors with air central air.

Signals of indications should register the digital display in diskettes or compact discs.

#### **Analyser NOx**

The list of technical requirements to the gas analyser nitrogen:

Type: it is desirable with a chemiluminescence method) or sorbtions in a spectrum infra-red

Analysis cycle: the continuous

Measuring range: under the recommendation of the Participant

#### **Analyser SO2**

Gas analyser SO2 specification should be following:

Type: , or an ultra-violet luminescence;

Analysis cycle: less, than in 1 hour;

Measuring range: under the recommendation of the Supplier.

#### **The counter for indication of the weighed corpuscles**

The counter specification should be following:

Type: under the recommendation of the Participant.

Analysis cycle: less than in 1 hour.

Measuring range: under the recommendation of the Supplier.

#### **Premise for analysers and monitoring devices**

For maintenance of working capacity of all devices the suitable premise is provided.

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## 9.5. A data transfer

The data transmission system between new and which HOOK of "Uzbekenergo" and a data transmission system from two on , had in an office building new is in a building is provided.

The charge and other parametres of fuel gas should be transferred in according to the specified demands:

- The charge at o'clock, pressure and temperature of fuel gas;
- The formula of calculation of the charge.

Calculations are spent on the basis of state standards .

### The list of offered controllable parametres

GT/GENERATOR Instrumentaion:

- Humidity of a circumambient;
- Ambient air temperature;
- Pressure of a circumambient;
- Composition of fuel gas (the gas chromatograph);
- Magnitude of controllable gas;
- Maintenance  $NO_x$  in leaving smoke gases of the gas turbine;
- Maintenance  $SO_2$  in leaving smoke gases of the gas turbine;
- Maintenance  $O_2$  in leaving smoke gases of the gas turbine;
- Maintenance  $CO_2$  in leaving smoke gases of the gas turbine;
- Maintenance CO in leaving smoke gases of the gas turbine.

b) the Instrumentaion of other equipment:

- pH cooling water;
- The analyser of maintenance  $NO_x$  in ambient air;
- The analyser of maintenance  $SO_2$  in ambient air;
- The counter of the maintenance of the weighed corpuscles;
- The metre of temperature of ambient air;
- A determinant of a bearing of apparent wind;
- The metre of speed of a wind.

Implementation of offered monitoring provisions around an arrangement Tourist's Akurgansky allows not to admit an environment change of state.

### 11.10. The forecast of changes of a circumambient

The estimation of changes of a circumambient as a result of building Tourist's Akurgansky showed following results.

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The free air condition does not change and will be admissible.

harmful substances in a free air does not change a condition of soil and vegetation at the expense of fall to them of nitrates.

Building of two power on 450 as a part of new in the Namangan area does not change a condition of superficial stream flows in view of dump of thermal waters in the Big Namangan channel and chemical substances thanks to application of turnaround system of technical water supply with cooling towers.

The condition of soils and ground waters does not change thanks to application to facing sludge fills and the organisations of specially rigged platforms of time storage of a firm waste.

## 12. The conclusion

The first stage of procedure of an estimation of affecting on a circumambient of building of a new thermal power station the general power 900 as a part of two blocks steam gasinstallations by power on 450 in Tourist's Akurgansky region of the Namangan area revealed following results.

Building new is planned in Tourist's Akurgansky region of the Namangan area, in 11 km to the West from Namangan and in 4 km to the West from Turakurgan, on right I protect the Big Namangan channel.

The distance to the Big Namangan channel from boundary lines matches to demands of the Decision of KM from 4/7/1992 №174 (the Rule about water security zones of conservation reservoirs and other ponds, the rivers and the main channels and collecting channels, and also sources of drinking and household water supply, medical and cultural-improving appointment in Republic Uzbekistan) about sizes of a water security zone in 200 m taking into account a water discharge in the channel 34 m<sup>3</sup>/with.

Boundary lines from different directions are lands not used in agriculture and highways.

The distance to the proximal housing estate which has been had to the south, makes more than 1 km.

The total area of territory new makes 62 hectares, including:

1. Promplohchadka in composition with -220- 28 hectares;
2. Territory under building -500- 16 hectares;
3. Territory for hydraulic structures- 18 hectares;

The territory of installation of building is had in a northeast part of Fergana valley, at bottom of a southern slope of the Chatkalsky ridge.

The analysis of a state of environment around an arrangement of installation of building in the Namangan area shows that high temperatures of air, a paucity of the deposits, raised solar radiation promote environmental contamination, at the same time high repeatability of low speeds of a wind interferes with dispersion of emissions from high hot wells and to their carrying over on considerable distances. The region of an arrangement of installation of building is characterised by an agroindustrial direction of managing, a role of industrial targets as affecting sources, in creation of an ecological condition does not occupy an in the lead rule as, for example, in big cities of Fergana valley - Fergana or Andizhan.

The building section places on a river Kasansaj debris cone. Ground waters within a raised part of a debris cone lie on considerable depth of 10-15 m and only in a bottom land of the river they come

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nearer to a surface and there are on depth of 0,8-0,5 m. Underwaters are the basic source for economic-drinking water supply, and also for technological water supply and an irrigation.

The chemical compound of the Big Namangan channel is formed at the expense of natural composition of the rocks putting a drainage basin of Kasansaj. These waterways are a little subject to anthropogenous affecting, except for agency of agricultural fields and the cattle-breeding factories.

Feature of stony soils of a platform of building - a coarse mechanical composition and close friabilis gravijno-galechnikovyh mucks cause a small moisture capacity and strong water permeability that does not promote accumulation of the toxic substances arriving with fertilizers and with irrigation waters from . Besides, at conducting of civil work mechanical infringement of soils, also as well as soils, weak.

Within a building section the wood vegetation is absent, the vegetative overlying strata is presented efemeroido-efemerovymi by grassy aspects.

Maintenance Tourist's Akurgansky will be accompanied by affecting on a circumambient in the form of receipt of emissions, dumps and a firm waste.

Valovj emission of contaminants at maintenance new makes 1671,1788. With emissions in a free air receipt of contaminants 10 names is expected. Prevailing among pollutants are nitrogen - 1374,7968 (82,3 %) and nitrogen - 223,40448 t/year (13,4 %). On a share of the others of 8 components 4,3 % drop.

The maximum concentration of all contaminants do not exceed the quotas allowed by Goskomprirodoj (0,2 maximum concentration limits for substances 2 class-rooms of danger, 0,25 maximum concentration limits - for substances 3 class-rooms of danger and 0,33 maximum concentration limits - for substances 4 class-rooms of danger).

Thus, affecting on a free air from sources of emissions Tourist's Akurgansky after building end will be constant, but insignificant on magnitude of loading on a free air thanks to application advanced steam gasproduction engineering of combustion of fuel.

Considerably agency of a prototype system on a circumambient for the account nitrogen and black increases at emergencies. By the spent calculations it is shown that the defeat zone at the most probable crashes (ignition of rock gas with its subsequent explosion in a gas turbine building) does not attain a housing estate. At maintenance the probability of origination of emergencies is practically expelled at the expense of the superiority of thermodynamic data , its constructional solutions and to maintenance of the automatic control system creating high operate reliability.

Affectings on superficial ponds and ground waters it is not expected at observance of the nature protection provisions accepted by the design.

Dump of thermal waters thanks to application of turnaround system of technical water supply with use cooling towers does not call negative affecting on quality of water of the Big Namangan channel. According to the design, dump of thermal flows in the channel leads to a water increase of temperature on 1° and does not change a water chemical compound since dumped scavenging waters of cooling towers on composition refer to to conditionally pure.

Maintenance is connected with formation of a firm waste of 32 names. For time storage of an industrial waste separate capacities and specially rigged platforms are provided. For gathering a firm household waste are provided . Negative affecting on a circumambient from places of warehousing and storage of a firm waste it is not expected.

Thus, building in the Namangan area new with two power on 450 with application of high technologies of burning of fuel allows to lower deficiency of security of users of Fergana valley the

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electric power, to increase reliability of their electrical supply without a change of state of a circumambient around disposing of installation of building.

Building of a new thermal power station by the general power 900 as a part of two blocks steam gasinstallations by power on 450 in Tourist's Akurgansky region of the Namangan area does not lead to aggravation of negative aftereffects for a circumambient and health of the population under condition of observance of the nature protection provisions provided by design .

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## 14. The application

### **The list of the accepted reductions**

ISO – International Organization for Standardization;

KKS – uniform system of coding «Kraftwerk Kennzeichen System»;

LAN – Local Area Network;

CPSU – continuous power supply units;

ASS – Auto start standby;

ECP– Emergency control panel;

AVMDS – Automated vibration monitoring and diagnostics system;

CPCS- Computerized process control system ;

CPCSCCPU- Computerized process control system of combined cycle power unit

AMEE - Automated monitoring of electrical equipment;

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SD – Stand-alone demineralizer;

AWS – AWS Automated workstation

UMS- Utility metering system;

ATSE – Automatic telephone system, exchange;

AFFE– [Automatic Fire Fighting Equipment](#) AFFE ;

DB – Database;

FS– foul condensate

ST (grosman) storage tank;

FCST– foul condensate (grosman) tank

SCSE – system of continuous supervision of emissions;

BNC– the Big Namangan channel;

UPS– Unit Pump Station

MCR– Main control room;

SD– condensate demineralizer; condensate purification plant ( , );

WWHE – Water-water heat exchanger;

HP– High-pressure;

HVL– HV line;

IGV – inlet guide vanes ( . );

WTP - water treatment plant;

UL – upper-level;

WCC- water-chemistry conditions;

GBC- gas booster compressor ;

GOST – National, State standards;

CGH– Condensate gas heater;

HRSG – Heat recovery steam generator (boiler) condensate gas heater;

GDP – Gas-distributing plant;

GT– Gas turbine

GTU– Gas turbine Unit;

DBP– [differential bus protection](#);

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BCS – booster compressor station ( );

DC – Distiller cleaning

DDS – Distillatory desalting station;

DOW – Distillatory desalting unit;

A– Actuators

SCV– shutoff and control valves;

SC– short-circuit;

CI– control instrumentation;

CP– condensate pump;

EC– efficiency rating, ration, coefficient

HR – Heat recovery boiler (steam generator);

LAN – Local area network;

AEC -Air emissions control;

MD– Methodical documentations;

IEC – IEC (International Electrotechnical Commission);

LP– Low pressure

SECR - State electric control room of State Joint Stock Company “Uzbekenergo” ;

MWPS– aqueous makeup; make-up water pumping station;

STD– scientific and technical documentation;

OJSC – Open Joint Stock Company;

ODE – [Interregional Dispatching Office](#) Distribution office;

HVACS - heating, ventilation and air conditioning system;

SCR– short-circuit ratio

OSG-220 – open-type-bus-and-switch arrangement; outdoor switchgear 220 kW;

OSG-500 – open-type-bus-and-switch arrangement; outdoor switchgear 500 W;

CA– Common [auxiliaries](#) ( , ) ;

BP– balance of plant;

OOIT– outdoor, exposed open-air installation of transformers;

ICP– interconnected control panel;

EMRC– emergency management remote control;

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CCPP – [combined cycle gas turbine unit](#) CCGT;  
CCPU – combined cycle power unit;  
MPC– maximum permissible concentration  
PC -personal computer;  
FSR– Fire safety regulations;  
GTS- Gas treatment station;  
HSU— Hardware-software suit;  
STP- Steam turbine plant;  
RTE – rules of technics of exploitation;  
RDE– rules of devices of electroinstallations;  
RHCM - reserve hardware of control and management;  
R– regenerative ;  
SD– supervising documents;  
RPA- relay protection and automatics;  
PRL– pressure regulations under loading;  
DCS– the Distributed Control system;  
SC– the switching centre;  
SWC– service switching centre;  
SRT- service reserve transformer;  
RUz-the- Republic of Uzbekistan;  
ACS – automatic control system;  
AMS – automated management system;  
CA – computer aids;  
AP– average pressure;  
MDT– means of dispatching telecontrol;  
MSM – the monitoring system and managements;  
CCN – a computer communication net;  
S– service;  
BNR– building norms and rules;  
SDCU– system of display of collective using;  
CS– cooling system ).  
SCR – system of cooling of a rotor;  
ARDB – the arches of rules on designing and building;

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CADEPSS– the collection of administrative documents on exploitation of power supply systems;

F – filters;

SCTMPI– system of chemical-technological monitoring of power installations;

SES– the stabilizer of electric system;

TEI – technical and economic indicators;

TPS – thermal power plant;

ICPW– installation of correctional processing of water;

PI– the position index;

ICGR– installation of clearing of greasy runoffs;

DRRS – the device of reservation of refusal of the switch;

DRPS – devices of reception and processing of signals;

FMA – filters of the mixed action;

CWP– chemical water purification;

DATE – digital automatic telephone exchange;

CCP–central control panel;

CCP–central control panel;

HMI–human-machine interface;

DCB – direct current board;

CP– control panel;

EP – electrotechnical part;

ESRP –electric part of system of regulation and protection;