AMMONIA MARINE TERMINAL

TAMAN

KRASNODAR REGION, RUSSIA

Executive Summary EIA Report

Prepared for TOGLIATTIAZOT

by

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1.0. OPERATIONAL CONTEXT

1.1. Purpose and Need

This Project's objective is to construct a range of facilities for receiving, storage and shipping of ammonia produced by OAO "TogliattiAzot" for export by seagoing vessels via a new port at the Tamansky peninsula (Krasnodar Province, Russia). The ammonia terminal will be located in the Temryuk District at the Black Sea coast in the vicinity of the Zhelezny Rog (*Iron Horn*) Cape.

The new ammonia transportation route will be an alternative to the currently existing route, i.e. the ammonia pipeline Togliatti – Odessa – Yuzhny Port.

The need for a new route for transportation of 2 million tonnes of ammonia per year is attributed to the fact that after the break-up of the USSR the existing sea terminals for shipment of liquid ammonia for export are located in the territory of adjacent countries (Ukraine: Yuzhny Port for 2.5 million tpy and Latvia: Ventspils Port for 1 million tpy).

The final section of the ammonia pipeline Togliatti – Odessa (800km) is also located in Ukraine's territory. Transit of ammonia by pipelines and railroad via Ukraine has a number of limitations; it is not regular and not smooth enough. This prevents the operation of the manufacturing facilities of OAO "TogliattiAzot" at full design capacity and results in additional expenses relating to unscheduled shutdown of the operation; in addition, customers raise financial claims due to uneven supplies.

Furthermore, due to high tariffs for ammonia transportation via Ukraine, the TogliattiAzot Company pays annually to the Ukrainian party approximately US $ 40 million for ammonia transit.

In general, the direct and indirect losses of TogliattiAzot relating to ammonia transit and shipment are estimated by experts at approximately US $ 50 million annually.

Under such conditions, it has become essential to ensure within a reasonably short period of time a way for transportation and shipment of liquid ammonia for export via the Russian territory, permitting Russia thereby to keep its positions in the world market of mineral fertilizers which ranks the third after natural gas and oil. The TogliattiAzot Company accounts for 15% of the world production of liquid ammonia.

The construction of a new sea terminal will ensure uninterrupted operation of the TogliattiAzot ammonia plant, eliminate dependence of exporters on third parties, stabilize the sales and increase the revenues to the federal and local state budgets.

Furthermore, the implementation of the project will create additional jobs in the Temryuk District associated with the ammonia terminal operation, contribute to the transport development, and as a consequence, to the overall development of the region.

The planned liquid ammonia storage facilities will be located at the north-eastern slope of the Zelenskogo Mount about 2.6km to the north of the town of Volna, on the lee of the prevailing winds in relation to the residential areas, with due consideration of the layout of the area and natural conditions of the territory.

The site selection for the ammonia terminal was based on the following factors:

- Natural depths of the sea sufficient for construction of jetties for mooring of tankers with deadweight of up to 30,000 tonnes;
- A sufficient distance from residential areas and social and cultural facilities ensuring the required width of the sanitary protection zone;
- Maximum possible closeness to the sea shoreline.

Figure 1 shows the location of the area for the project implementation.

1.2. Legal and Institutional Framework

Preparation of the feasibility study for construction and the materials required for the environmental impact assessment has been based on the requirements of the applicable legal and regulatory acts both at the federal level and at the level of the given member-territory of the Russian Federation, i.e. Krasnodar Krai (Province)

The Institutional framework for the scrutiny of the project includes three levels: federal (Russian Federation), regional (Krasnodar Province) and local (Temryuk District).

At each of these levels it is necessary to take into account opinions of non-governmental organizations and representatives of the public.

OAO "TogliattiAzot" Corporation is currently carrying out all procedures required for submission of the TEO-C materials for approval by the relevant agencies at all above institutional levels within the framework of their competence and authorities specified by the applicable legal and regulatory acts.

2.0. DESCRIPTION OF THE OPERATION

The planned transfer terminal is a complex engineering facility with ramified main and auxiliary process streams. All integral parts of the liquid ammonia terminal project and their basic elements, which are potential sources of environmental impacts, are listed in Table 2-1.

Table 2-1: Integral Parts of the Liquid Ammonia Transfer Terminal Projects

Ser. Nos.	Description of main project parts	Objective	Basic elements
Transportation Facilities			
1	Railroad line between Vyshestebliyevskaya Station and TogliattyAzot Station	Liquid ammonia transportation in railroad tank cars from the main railroad line to the ammonia storage facilities. Length: approximately 40km	Railroad sidetracks Bridges and embankments with culverts Railroad crossings TogliattiAzot railroad station
2	Ammonia pipeline	Liquid ammonia transportation from the storage facilities to the tanker loading system. Length: approximately 4 km	System of Insulated Steel Pipelines of the Onshore and Tanker Loading Facilities equipped with devices capable to control ammonia leakage and to block automatically faulty sections
Onshore Terminal			
3	Onshore ammonia storage facilities of the terminal	Transfer and storage of liquid ammonia	1. Unloading facility (two double-sided unloading racks for 14 unloading points at each side, i.e. the total of 56 points; one additional unloading rack for 14 unloading points. Thus, the total number of unloading points is 70) 2. Isothermal storage facilities for liquid ammonia (two vertical double-wall steel cylinders each with a capacity of 30,000 tonnes of ammonia) 3. Support system for the ammonia storage (including compressor and condensate station, gas-piston electric power plant, flare facility, etc.)

Ser. Nos.	Description of main project parts	Objective	Basic elements
4	Technological facilities within the coastal zone	Provision of support services for the onshore terminal	Support facilities, including ammonia circulation pump, drainage tank, seawater pump station
Sea Terminal			
5	Hydroengineering and onshore facilities of the sea terminal	Engineering support for vessel handling, safe mooring at the berth and integrated services of vessels	1. Shore protection structures (total length of approximately 3 km) 2. Approach pier (total length of over 2 km) 3. Loading jetties 4. Protection against waves (total length of over 1 km) 5. Fairway and operational sea area 6. Gas tankers and support vessels
Auxiliary and Office Facilities			
6	Auxiliary facilities for support to the terminal operations	Wastewater treatment facilities, fire safety systems, storage of materials and supplies, equipment maintenance facilities	1. Biological wastewater treatment plant 2. Accumulating and evaporation pond 3. Fire department
7	Office building and general auxiliary services of the terminal	Day-to-day management of the operations	Office and general facilities buildings, entrance building, boiler house, pump station, TogliattiAzot industrial site, etc.

Figure 2 shows the layout of main facilities of the liquid ammonia terminal.

3.0. DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1. Climatic Conditions

The climate of the area is moderately warm, with mild humid winters and hot summers, and with a rather low precipitation rate. The basic weather and climatic characteristics are determined by the latitudinal and geographic position of the area (the southernmost zone of the temperate climatic belt), by the impact of circulation and orographic factors, as well as the effect of the water masses of the Black and Azov seas.

With the average winter temperatures varying from –1.3°C to +2.4°C it is typical of the given area that the ambient air temperature might sharply drop with intrusion of cold air masses. In summer, the average ambient air temperature varies from +22.9°C to +24.3°C.

Precipitation distribution is extremely non-uniform throughout a year and across the region. The average annual precipitation rates vary from 374mm to 510mm. In winter, humid and warm air masses and low precipitation intensity are prevailing, while in summer torrential rains are common (up to 1.42 mm/hour).

The average relative air humidity for many years of observations is 76% to 79%.

The average annual evaporation rate (548 mm) exceeds the precipitation rate.

The directions of prevailing winds are north-easterly and easterly. The occurrence rate of calms is low. In general, the air pollution potential is moderate with favorable conditions for impurities dispersion.

3.2. Geomorphology and Geology

Geomorphological Structure. The subject area constitutes a lowland plain with individual elevations varying from a few tens of meters up to one hundred meters or more. It belongs to the Kerch-Taman ridgy-hilly region.

The relatively flat surface of the area is complicated by hills (Mount of Zelenskogo) and gullies of Matrosskaya and Kutsaya cutting the coastal high-land from south-west to north-east.

Within the areas adjacent to the planned construction site, volcanic mud relief originating in Upper Pliocene and Lower Quaternary mud volcanism is rather common.

Intensive gully formation and mudslide processes occur within the coastal zone.

Geological Setting. The oldest formations are primarily sandy-clayey deposits attributed to the molassa maritime rock associations of Miocene-Pliocene age. Limestones occur sporadically.

A thick Quaternary crust of weathering of eluvial, eluvial-deluvial and eolian-deluvial types is well developed over the neogenic rock formations and is represented by primarily sandy silts and clays.

Tectonics. Modern seismicity and mud volcanism of rather high levels, complex contrasts of the gravity field and some other factors confirm the potentially high level of seismic hazard of the region. The magnitude of most earthquakes ever recorded is 3 to 4 Richter scale, but there are areas with an earthquake magnitude of 5 or 6.

In general, according to the macro- and micro-seismicity zoning the subject area is rated as a zone with potential seismicity of 9 of Richter scale.

3.3. Surface and Ground Waters Quality

The hydrographic network is represented by dried-up gullies and creeks with intermittent flow. There are no rivers in this area. The area is rated as a drainless zone of the Russian Federation.

The very low average annual precipitation rate recorded over many years of observations and the non-uniform distribution of atmospheric precipitation throughout a year in combination with primarily clayey structure of the surface ground and pre-Quaternary sediments create unfavorable conditions for underground water accumulation. The degree of protection of groundwater due to their shallow location in the given area is rated as low and medium (except for the upper and lower parts of the Zelenskogo Mount slopes).

Feeding of underground waters is ensured due to atmospheric precipitation, which occurs to a significant extent during the autumn and winter period. The permeability of the water-bearing rocks is everywhere rather low.

Pressure-less groundwater in Quaternary sediments is common, with discharge through seepage at the Zelenskogo Mount slope, as well as into the pre-Quaternary rocks, into the Kutsaya gully and to the Black Sea.

Water in the Miocene-Pliocene deposits occurs only sporadically and locally.

The salt content of water in aquifers varies primarily from 11.1 to 28.3 g/l.

An assessment of the degree of underground water protection has been made only for the upper aquifer because of the following factors:

- The engineering geological surveys have not revealed the character of the interrelation between the groundwater horizon and the lower aquifers;

- A significant depth of the groundwater levels suggests a definite conclusion about the absence of any impacts of the railroad construction on the lower aquifers.

The results of this assessment have revealed areas with poor, medium and high degree of groundwater protection, which has been taken into consideration in the design solutions adopted for hard paving and a system of rainwater runoff from the industrial sites and engineering structures of the ammonia terminal.

3.4. Ecology and Biotic Resources

Vegetation. The original natural vegetation of the Tamansky peninsula has virtually not been conserved. At present, most of the peninsula territory has been used for farming and constitutes a combination of different agrocenoses, primarily vineyards.

The areas of natural vegetation communities (less than 20% of the total area) are used as pastures and have been significantly destructed. Fragments of typical steppes with various herbs, fescue and feather-grass vegetation can be observed occasionally.

The vegetation occurring on taluses, cliffs and exposed rocks is typical of the given area and most original, because it includes many endemic species specific for the floristic area of the Black Sea steppe province, including the following: *Adonis flammeus* Jacq. v. *caudata* (Stev.) Boiss., *Allyssum obtusifolium* Stev., *Hesperis Steveniana* DC., *Matthiola odofatissima* R. Br. v. *taurica* Conti, *Thlaspi macranthum* Busch., *Crambe koktebelica* Busch., *Medicago cretacea* MB., *Medicago rupeslris* MB., *Hedysarum tauricum* Pall., *Hedysarum candidum* MB., *Hypericum hyssopifolium* Vill. ssp., *chrysothyrsum* Woron.

Wildlife. The modern fauna, the species composition and the structure of the wildlife are the result of many years of anthropogenic impacts.

Currently, most of the wildlife is concentrated in areas with the least anthropogenic pressure, i.e. lagoons, coastal sea area, gullies and forest areas in the form of narrow protection strips along the roads and farming fields.

The population of the agrolandscapes is represented only by species adapted to the continuous anthropogenic pressure and having feeding resources here. The bulk of wildlife is constituted by rodents and small passerine birds.

In general, there are 37 species of mammals, 13 species of amphibians and reptiles and 170 species of birds.

The Tamansky peninsula is crossed by migration flyways of migratory birds.

3.5. Soil Conditions

The structure of the soil cover is composed predominantly of “chernozem” soil of southern types (black earth soils). Meadow and steppe soils have formed in surface depressions. There is a tendency to formation of “solonchak” soil (saline soil) due to the prevailing evaporation conditions. “Solonetz” soils occur on the tops of hills and on the slopes of hill ridges composed of Tertiary marine clays.

The prevailing part of land resources is used primarily for growing crops. Most of the land is used for vineyards and as arable land. Natural soil and vegetation conditions have been conserved only in parts of pastures.

Throughout the area degradation of soil (loss of humus, excessive compaction, excessive moisture content and salinization) is observed due to the intensive anthropogenic pressure.

3.6. Marine Environment, Ecology and Sensitivity

Hydrologic Conditions. The average seawater surface temperature is 17.75°C; the temperature varies from 6.57°C to 25.90°C with a maximum in July-August and a minimum in February. The temperature distribution throughout the sea depth is rather uniform: down to a depth of 20-30m in summer and 50m in winter. The salt content within the water layer of 0 to 30m is on average 17.95 pro mille varying from 15.70 to 18.71 pro mille. The average annual sea level in the subject area is –24 cm below the standard sea level of the Baltic system and it is typical of the Black Sea. The maximum height of significant waves is 6.45m. The most dangerous waves are of south-easterly, southerly, south-westerly and westerly directions. The occurrence rate of calms of less than 5m/s is about 60%.

The most probable currents are those in the western and eastern sectors. The value of the average current velocity vector is 0.4 to 3.4 cm/s and the maximum value is from 36 to 50 cm/s.

Hydrochemical characteristics of waters. The average content of dissolved oxygen in surface seawater layers is 6.13 ml/l (varying from 5.34 to 7.70 ml/l). At a depth of 30m to 50m it reaches its maximum. It decreases down to 5 to 6 ml/l within the 50m to 70m layer and down to 0.4 to 1.0 ml/l at the bottom, or even down to zero in case of water upwelling caused by winds. The saturation of surface seawater with oxygen is 103% on average per year, but it reduces to 50% to 80% at the bottom.

The value of positive reaction of water (pH) averages 8.3 of NBS units, which is in compliance with the maximum permissible level according to water requirements relating to water bodies used for fishery purposes (from 6.5 to 8.5).

The water contains on average 0.012 mg P/l of dissolved inorganic phosphorus, 0.005 mg N/l of nitrite nitrogen, 0.0207 mg N/l of nitrate nitrogen, 0.125 mg N/l of ammonium nitrogen, and 0.081 mg Si/l of silicon, which is below the respective regulatory limits for water bodies having fishery significance.

Seawater pollution. The main sources of seawater pollution are onshore facilities (AO “Yuzhny” state farm, cattle farms, vineyards and fields), as well as authorized waste dump sites in the vicinity of the Zhelezny Rog cape, military facilities, shipping traffic, etc. Pollutants may reach the sea as a result of aerosol transfer by air masses during dust storms occurring annually in the subject area.

The concentration of *petroleum hydrocarbons* in seawater was on average 0.025 mg/l (twice below the permissible level for fishery water bodies). *Synthetic surfactants* are not a decisive pollutant in this sea area (their concentration varied from 0.025 to 0.04 mg/l). The *phenol* content was 0.0001-0.0035 mg/l averaging 0.0006 mg/l. Only its maximum value exceeded the MPC level (by 3.5 times).

Chlororganic pesticides (DDE, DDT) were not detected in the area of the planned construction. The γ-hexachorocyclohexane content was close to the detection limit.

Status of Marine Biota (organisms). 93 species of microalgae were detected in the seawater at different depths, which exceeds 50% of the total number of species identified in the Black Sea. The species composition of zooplankton (food supply for roe, larvae and fry) consists of 16 species, i.e. 15% of the species occurring in the Black Sea. Prevailing are forms of the genus *Acarcia* occurring throughout a year, which are typical for the Black Sea. The algae flora consists of 104 species or 35.6% of the entire Black Sea flora. Their main part occurs in the areas with solid ground, i.e. at the Zhelezny Rog and Panagiya capes.

The number of burrowing animal species is rather low (it did not exceed 9). In the eastern part of the Black Sea there are 111 fish species, of which the following species have commercial values: anchovy, sprat, whiting, Black Sea mullet, etc.

3.7. Socioeconomic Conditions and Cultural Characteristics

3.7.1. General

The Temryuk District is located on the Tamansky peninsula in the north-western part of the Krasnodar Krai (Province) and adjoins the Black and Azov Seas, as well as the Kerch Strait. It has onshore borders to the Slavyansky, Krymsky and Anapa Districts.

In the administrative respect the district (rayon) is divided into 11 village okrugs with 8 stanitsas (Kossacks' villages), 28 towns and 2 farmsteads. All residential areas of the district, except for the city of Temryuk are of village type, i.e. most of the population (68.8%) lives in rural areas, the rest (31.2%) lives in Temryuk, the administrative center of the District.

According to the main socioeconomic characteristics, the Temryuk District belongs to underdeveloped agricultural areas of the Krasnodar Province and is substantially inferior in economic respect to the neighboring territories located along the Black Sea coast to the east of the Temryuk District.

As of 01.01.2002, the population of the Temryuk District was 119,400 or about 2% of the population of the Krasnodar Province. The density of population is 60.8 persons per 1 sq.km (somewhat lower than the total figure for the Krasnodar Province, i.e. 66 persons per 1 sq.km).

The area to be potentially affected by the project construction is located in the south-western part of the Temryuk District at the Black Sea coast in the direct vicinity of the Kerch Strait, near the town of Volna (which is at a distance of 600m east of the construction site) and approximately coincides with the territory of the Tamansky and Novotamansky village okrugs. As of the early 2002, the population of these okrugs was: 9,800 and 4,900, respectively (or 8% and 4% of the total population of the Temryuk District. The population of Volna settlement is about 740 persons.

3.7.2. Social Situation

The average number of employed population in the Temryuk District is 31,000, i.e. about 26% of the total population or about a half of the population capable to work. Despite the fact that the total number of officially recorded unemployed persons is 10,600 (8% of the population) the actual number of unemployed or part-time employed is much higher. According to the local administration, it is very difficult for young people to find a job after graduation. A big problem is also the low wages and delays in paying wages.

The average monthly wage in the Temryuk District is lower by about a quarter than the average wage for the Krasnodar Province. In 2002, the average monthly wage in the Temryuk District was RUR 1,308 as compared with RUR 1,698 for the Krasnodar Province; in 2001 these figures were RUR 1,889 and 2,495, respectively (1 USD is approximately RUR 30).

The highest average wages in 2001 were paid in the transport and communications sector and in the construction sector (RUR 3,170 and 2,336, respectively), while the lowest wages were paid in the industry (RUR 1,703) and in agriculture (RUR 1,992), where the majority of the population is employed. On the other hand, the wastes in the agriculture in the Temryuk District are higher by about 20% than in other parts of the Krasnodar Province. This is attributed to the fact that the agriculture in the Temryuk District specializes in wine growing, i.e., the most profitable sector of agriculture.

Social problems, typical of the entire district, are especially acute in the area selected for the implementation of the ammonia terminal project, where prior to the beginning of the construction it was extremely difficult to find a job. Even according to very conservative official estimates, the level of unemployment in the Novotamansky village okrug exceeded 10% (compared with 8% for the Temryuk District as a whole).

3.7.3. Economic Status

There are 1,700 enterprises operating in the Temryuk District with different forms of ownership and turnover and over 3,000 self-employed persons.

The main sectors are agriculture and industry; the proportion of employed in trade and general services is much lower. The latter fact is most likely attributable to the fact that the official statistics does not cover all persons involved in sales in local markets, renting their apartments or houses and selling their own produce to tourists spending their vacations in this region in summer.

Agriculture. In 2001 about 15,600 persons were employed in the agroindustrial sector of the Temryuk District. This sector provides 40% of taxes to the district's budget or about 170 million rubles (about 5 million US dollars) in year 2001. The leading subsectors are viticulture and winemaking, rice growing, fishing and fish processing. The agroindustrial sector is represented by 27 agricultural enterprises, including 21 viticulture enterprises, 3 rice-growing enterprises and 3 vegetable and grain growing enterprises. Stockbreeding is of secondary importance. Over the recent years there is a trend toward an increase in the production of agricultural produce in terms of value and in real terms.

The main sector in the Taman and Temryuk areas is wine-growing – the major enterprises are OOO "Yuzhnoye" with 1,111 hectares of vineyards (average yield is 6,000 to 6,500 kg per 1 hectare), OOO "Tamanskoye" with 591 hectares of vineyards, OAO "Progress" with 569 hectares, ZAO "Chernomorskoye" with 803 hectares and OAO "Yantar" with 554 hectares of vineyards. These enterprises also grow grain and vegetables. For example, in 2001, OOO "Yuzhnoye" produced 5,060 tonnes of grain and 115 tonnes of vegetables. Stockbreeding is of lower importance and it is declining with the growth of areas used for vineyards.

The Khvalayun enterprise is involved in fishing in the coastal area. The length of the fishery area in the vicinity of the planned ammonia terminal is 9.5km. Fishing is carried out with the aid of fixed nets. The average annual catch in this area is 213 tonnes of fish.

Industry. The industry in the Temryuk District is represented by 17 medium-size enterprises with 1,260 employees, which is by an order of magnitude less than in the agriculture. In 2001, the volume of industrial products was RUR 1,515 million in terms of value. The industry produces construction materials, consumer goods, confectionary, etc.

In 2001, the rates of the industrial growth slowed down. Output of some categories of products decreased: a decline in production of bakery products by 1.1 times, slight decline in flour and wine manufacture, a sharp fall in the production of vegetable oil (by 2.2 times).

In the Tamansky and Novotamansky okrugs, the industrial sector is represented primarily by wine processing; a molding materials factory in Taman manufactures a rather small amount of products. There are also some small repair workshops in Taman, Tamansky and Progress.

Transport. Various types of transportation services are provided in the district, except for air services and pipeline transportation. The district is crossed from east to west by a railroad line, there is a well-developed network of motor roads, there are two international ports: Temryuk and Kavkaz.

In the vicinity of the ammonia terminal there is a road network of local significance connecting the town of Volna, the wastewater treatment facilities and the recreational zone with different villages and towns located in the inland part of the Tamansky peninsula.

Tourism and Recreation. The Temryuk resort zone located on the Azov Sea coast includes the following resort areas with mud baths: Golubitskaya, Zaporozhskaya, Kuchugury and Taman. There are over 20 mud volcanoes in the district having balneological properties. There are 72

resort and recreational facilities located at the sea coast within the Temryuk District, as well as 3 children's summer camps. However, the overall level of the tourism infrastructure in the district is rather low; most of the recreational facilities provide only a minimum of services; the general utilities services in the district are inadequate and affect the tourism; the water supply and sanitation systems are inadequate and frequently fail; there are difficulties with disposal of municipal wastes, etc. As a result, the district is attractive only for tourists with a low income level.

The shores are composed of clayey steep slopes up to 30m high, hindering the access to the beach and are prone to landslides and rock falls, making it dangerous to stay at the beach in most areas. The beach itself is 5m to 25m wide composed of various materials: fine gravel, sandy silt and only to a minor extent of sand.

There is a recreational facility (Fakel) in the direct vicinity of the construction site; this facility provides a comparatively high level of services. There are also a number of seasonal recreational facilities in the towns of Volna and Veselovka consisting of summerhouses with a minimum set of conveniences, as well as some camping sites. The overall capacity of those recreational facilities is 1,040 persons. During a summer season they provide services to approximately 10,000 persons. In addition, up to 300 to 350 persons spent their vacations in summer in private homes in the town of Volna. Thus, the total number of tourists spending their vacations during the summer period in the zone of the project is up to 12,000 persons. According to ToAz estimates, income from tourism in the AMT vicinity reaches 12 million rubles per year.

Utilities Infrastructure of the Temryuk District and especially the Tamansky and Novotamansky areas is in an unsatisfactory condition. Until now, many residential areas do not have any natural gas supply. Water services are also inadequate. Water supply is irregular, especially in summer, when large quantities of water are taken for watering gardens. The quality of tap water is poor. In the largest residential area – the city of Temryuk – water for the public water supply system is taken from the Kuban River, where water does not comply with the relevant hygienic requirements. Furthermore, the water from the Kuban River does not contain enough fluorine, while water from artesian wells is high in iron and needs additional purification.

In many rural areas there are no wastewater treatment facilities and sanitation systems. The existing sanitation systems are in a run-down condition and require modernization and repairs.

A separate problem is disposal of domestic waste. The system for removal of waste to disposal sites is inadequate; the services provided by dump sites are expensive and unaffordable for majority of the residents, and this results in an increase in the number of unauthorized dump sites, including those within the coastal zone.

Social Infrastructure. In 2001, there were 48 facilities for pre-school children in the Temryuk District. Starting from 1998 the number of children attending these facilities had been increasing. The trend with respect to general schools is opposite: the number of school children has been declining since 1999. The number of schools remains constant. Another trend typical of the entire province is the decreasing number of school teachers, which is due to the inadequate financing of the education system.

The healthcare system of the district consists of 16 outpatient polyclinics with 235 medical doctors and 679 nurses. There is an ambulance station in Temryuk; six new ambulance vehicles were purchased in 2001.

In the area adjacent to the planned ammonia terminal location, medical assistance can be provided in the Taman district hospital with 70 beds. It provides medical services to 25% of the population of the Temryuk District. In more complicated cases, residents of the district have to go to Temryuk or Anapa, where there are more advanced clinics.

There has been a tendency over the recent years toward a declining number of medical doctors and the extent of medical services provided to the residents (19.7 doctors per 100,000 persons), as well as a slight decrease in the number of nurses. The continuing lack of funding results in

inadequate supplies of medical equipment and medicines and inability to provide free medicines to the socially unprotected groups of the population.

3.8. Land Use and Settlement Patterns

3.8.1. Population Distribution

The structure of the population distribution in the vicinity of the planned ammonia terminal has been formed over an extended period of time in history. In ancient times, a significant settlement of Greek colonists existed in the area where now the Taman village is located. In the late Middle Ages until the early 18th century the Turks made a substantial contribution to the development of the population in this area. Starting from the late 18th century migrants from other parts of the Russian Empire settled on the Tamansky peninsula, and especially Cossacks from today's Ukraine. The final structure of the settlement in the area of the planned ammonia terminal was formed in the 1960s, when the town of Volna was built at the Black Sea coast.

The network of settlement in the area adjacent to the ammonia terminal is rather dense: in the western part of the Tamansky peninsula there are 6 residential areas within an area of 240 km^2 (i.e. on average one settlement per 40 km^2), most of them at the sea coast or at the lagoon.

Most of these settlements consist predominantly of single- or two-story houses, primarily with an adjacent lot of land. Urban type of buildings is typical mainly for the central part of the Taman stanitsa (Cossacks village), which has a status of a village, but has all well-defined urban functions (administrative, trading, cultural, etc.).

Concise characteristics of the settlements located within a relative vicinity of the project site are given in Table 3.8-1 (as of the beginning of 2002).

Table 3.8-1. Concise Characteristics of Settlement

Name	Distance to project site, km	Population	Including those in the working age	Pensioners	Unemployed	Students
Volna	0.6	740	396	156	-	76
Tamansky	7.5	1921	716	412	214	290
Taman	8.2	9069	4700	2652	2	1546
Andryushchenko	9.1	97	27	32	10	14
Progress	12.4	1283	585	233	128	123
Veselovka	16.5	1675	641	335	199	217

Furthermore, specialists from more remote settlements of the Temryuk District (Vyshestebliyevskaya, Zaporozhskaya, etc.) have employed at the construction site, including people from areas located at a distance of 20km to 30km and the Company organized commuting transport for its employees. Thus, the areas involved in the implementation of the project extend beyond a range of 10-15km in the direct vicinity of the ammonia terminal.

3.8-2. Land Use

The facilities to be constructed for the ammonia terminal project, including a railroad access line, are located within agricultural areas and are surrounded by farming land. According to natural agricultural zoning of the land fund of the RF, the construction area belongs to the steppe and forest-steppe zone, Ciscaucasian forest-steppe province. Only steppe vegetation grows in its natural condition within the zone affected by the construction. According to the vegetation composition this area can be rated as herbs/fescue/feather-grass steppe, but natural vegetation

occurs only on pastures, the total area of which does not exceed 20% of the total area. Farming land is located on the plain and gentle slopes of hill ridges cut with deep gullies with both flat and steep slopes.

Areas under crops in the Temryuk District are 57,500 hectares; in addition, 19,300 hectares are occupied with vineyards, orchards and berry plantations owned by major agricultural enterprises. Private farmers' land is used mainly for production of vegetables, potato and melons. In the west of the Tamansky peninsula, within a zone adjacent to the ammonia terminal, virtually all farming land is used for vineyards – the area used for other crops is very small. The overall trend over the recent years is to increase the output of the agriculture and enhance the significance of viticulture as the basis of commercial operations of the major agricultural enterprises in the Tamansky and Novotamansky areas. The Administration of the Krasnodar Province gives high priority to viticulture as a unique and promising sector of national economy for this region.

The overwhelming majority of farming land in the area of the project is owned by a small number of agroindustrial enterprises – companies with limited liability such as "Yuzhnoye", "Progress", "Chernomorskoye", "Yantar" (more detailed information is provided in the section on agriculture). Part of the land is owned by the Krasnodar Province as reserve land and land re-distribution fund. The proportion of land owned by small private farms is insignificant and it has not increased during the past years. In general, it is typical of the Temryuk District that the number of farms decreases along with an increase in the average size of a farm. Starting from the mid-1990s and until the early 2002 the number of private farms had dropped from 1350 to 968 and the average size of a farm increased twofold – from 3 ha to 6 ha, although the leading farmers own as much as 150 hectares or more.

The construction project approval procedure was accompanied by the procedure for allocation of land for its implementation, and the TogliattiAzot Corporation held consultations and negotiations with local authorities, companies and individuals owning the land, which is needed for the project implementation, i.e. with agroindustrial enterprises and private farmers, who had obtained their land in the process of dissolution of the former collective farms. As a result, the land required for TogliattiAzot was provided on the basis of long-term lease agreements (for a period of 49 years) with due consideration of the interests of their former owners: first of all land was provided, which has low agricultural value (salinized or unfertile land, areas located at the coast, in depressions, etc.). All land owners interested in compensation in terms of land have received other land plots similar to those withdrawn, from the land re-distribution fund and reserve land; other land owners received compensations in terms of money, chemical fertilizers, fuel, etc. on the bases of the market value of their land (the overall compensation for the land withdrawn for railroad line construction amounted to approximately RUR 35 million or over US $1 million). In a number of cases, when it was impossible to reach an agreement with landowners, the TogliattiAzot Corporation made appropriate modifications in the engineering design, resulting in certain changes in the configuration of the main onshore site, because it had failed to reach an agreement with local farmers.

A decision relating to allocation of land and conversion of the purpose-oriented category of the land was taken by the Head of the Temryuk District Administration, Krasnodar Province (Resolution No.2492 of 28.09.2001 "On land allocation on the basis long-term lease agreements to OAO "TogliattiAzot" in the Temryuk District") and by the Head of the Krasnodar Province Administration (Resolution No. 1013 of 24.10.2001 "On land allocation to OAO "TogliattiAzot" in the Temryuk District").

In conformity with these documents, the following land areas were allotted for construction and operation of the project facilities:

Description of facilities to be constructed	Allotted area, hectares
Railroad access line	153.05
Onshore storage and cooling terminal to the north of the town of Volna	14.0

Ammonia pipeline trestle from the onshore storage and cooling terminal up to the head of the trestle to the north-west of the town of Volna	15.0
Office building with general facilities in the town of Volna	3.3
Auxiliary facilities in the vicinity of the town of Volna	31.45
Total:	**216.8**

The allocated land has the following categories:

- agricultural land 91.72 ha
- land for residential areas 3.42 ha
- reserve land 121.66 ha

A list of land plots provided for the project construction with a breakdown by land owners and land categories is given below in Table 3.8-2.

Table 3.8-2. List of allotted land areas

Description of land owners	Area of land, hectares	Legal status of allotted land
AF "Yuzhnaya"	63.8	For use
AF "Chernomorets"	4.0	For use
Tamansky village okrug	3.4	For use
Small private farms	18.5	Ownership of the Company
Land re-distribution fund	5.4	Ownership of Krasnodar Province
Reserve land	121.7	Ownership of Krasnodar Province
Total:	**216.8**	

3.9. Demography and Population

The social and demographic situation of the Temryuk District is critical with respect to the fact that the mortality rate exceeds the birth rate, the public health is deteriorating and the life expectancy decreases. In 2002, as a result of natural migration of residents, the total population of the district had decreased by 658 persons (including a decrease by 55 persons in the Tamansky area and by 26 persons in the Novotamansky area).

At the same time, the migration has a positive balance (although insignificant in absolute terms): during the same period the permanent population of the Temryuk District had increased by 862 persons (including 28 persons in the Tamansky area and 16 persons in the Novotamansky area). The emigration from Taman is caused primarily by the unfavorable social situation and the lack of jobs with reasonable remuneration in this mainly rural area. On the other hand, immigrants from even less socially favorable areas of the Russian Federation had moved to Taman, including people who come prior to their retirement to the Kuban region from other parts of the country with harsh climatic conditions, e.g. Arctic regions, Russian Far East, etc.

The local agricultural companies recruit people from other regions for temporary jobs during periods of active work in vineyards, mainly from Dagestan (up to 100 persons). After the beginning of the ammonia terminal project implementation, including the railroad line construction, a much more significant number of people have immigrated to take temporary jobs, including soldiers from military construction units. This can result in increasing social tensions in areas where the number of immigrated workers is significant.

The structure of the population of the Tamansky village okrug with respect to the age categories is in general similar to that of the entire Temryuk District: slightly more than a half of the population is in a productive age; pensioners account for about one quarter of the population. As of the beginning of 2003 the proportion of pensioners was 29% in Taman and 21% in Volna. Students made up 17% and 10%, respectively. The situation in the Novotamansky area is similar.

The nationality composition of the Temryuk District population is typical of the Krasnodar Province: the overwhelming majority are ethnic Russians (93% in 2002). The main ethnic minorities include Ukrainians (5.6%), Tartars (2.3%) and Armenians (1.5%). Because of the fact that the population is virtually monoethnic, the relations between people of different nationalities are not a source of any significant social tensions, although at the local level there are some signs of inimical attitude toward immigrants from the southern republics of the former Soviet Union (mainly North Caucasus and Transcaucasia).

Local Cossacks constitute a separate socio-cultural group (they are mainly ethnic Russians and Ukrainians), who try to restore the old traditions, life style and self-governance modes typical of the Kuban Cossacks during the pre-Soviet time. The exact number of the Cossacks associations is unknown (there is a contradiction between the data from different sources), but it is probable that there are a few hundreds of Cossacks (from 200 to 400). The Taman Cossacks are well organized, they are conservative and very cautious with respect to any innovations, new people and immigrants. The Cossacks organization – the Cossacks stanitsa community is based in Taman and one of its leaders, V. Drozdov, the Ataman's deputy in charge of ecology, takes active part in discussions relating to the ammonia terminal project and maintains that the proposed project alternative does not provide sufficient safety for the local community and the environment.

The literacy level of the population is similar to the average level for the entire Province and the country as a whole, and actually exceeds 95%.

3.10. Public Health Status

The public healthcare system is, according to the local residents and the Administration, the most critical social issue, although the Sanitary and Epidemiological Inspection Agency of the Krasnodar Province has rated the Temryuk District as a zone of well-being. It does not differ from the other parts of the province with respect to the statistics of respiratory diseases (including bronchial asthma), cancer, urogenital, digestive and skin diseases, as well as children's congenital anomalies. During the recent years, there has been an increase reported in the incidence rate of diseases of the nervous system, which might be attributed to unfavorable social factors.

3.11. Historical and Archeological Sites

3.11.1. Brief History of the Area

The location of the Tamansky peninsula at the border of the Antique World and the zone of Eurasian steppes determined the character of its historic development in the ancient times. One of the unique archeological monuments is the ancient Taman settlement. Archeological investigations and ancient documents, including those written by Herodotus, Strabo and Plinius the Elder made it possible for modern scientists to restore the history of Taman and identify the settlement as the Greek polis of Hermonassa (4th century B.C. to 4th century A.D.) in its lower layers, and successively in the middle and upper layers as the Khazar town of Matluka-Tamatarkha (8th century – first half of 10th century), the capital city of the ancient Russian princedom of Tmutarakan (second half of 10th century – 11th century), Polovtsy settlement of Matarkha (12th century – first half of the 13th century) and Genoese colony of Martega (14-15th century). From the 15th century until the 18th century the Tamansky peninsula was part of the Osman Empire and a Turkish castle was built at the place of the modern Taman Stanitsa. In the late 18th century the territory was taken under control by the Russian Empire as the outcome of the Russian-Turkish war, and in 1792 Zaporozhye Cossacks were resettled to Taman to protect

this territory. The subsequent history of the region is closely related to the history of the Russian state, and in particular its conquest and development of the Northern Caucasus.

3.11.2. Archeological Significance

At present, there are over 700 archeological monuments and 155 historic and cultural sites in the Temryuk District protected by the state. Ten most unique monuments have been registered as monuments of federal significance. They include the Taman settlement having a status of a reserve pursuant to a Resolution taken by the Council of Ministers of the RSFSR on 24.01.1980. There are numerous archeological sites in the vicinity of Taman constituting farming facilities of the ancient Greek settlement of Hermonassa and independent antique settlements – Suvorovskoye-1, Suvorovskoye-2, a settlement at the 7km mark, a soil necropolis and a mound necropolis, the town of Karokondama flooded by the sea, as well as a settlement on the Zelenskogo Mount and other settlements, necropolises and mounds.

Monuments of federal significance originating in other periods of the history of Taman include the first Russian orthodox church built in 1793 by the Zaporozhye Cossacks; a hydroengineering facility of the 15th century – the Turkish water wells; the museum of the famous Russian poet M. Lermontov and some other monuments (RSFSR Government Resolutions No. 624 of 04.04.1974 and No.1327 of 30.08.1960; RF President's Decree No.176 of 20.02.1995).

The monuments having federal significance are located also outside of the Temryuk District, e.g. an ancient settlement and the historic museum in Anapa at a distance of 40km to the east of the construction site.

3.11.3. Types of Settlements

The following archeological sites are located within the ammonia terminal area and in its immediate vicinity:

A settlement at the Lisovitskogo gully is a single-layer archeological site dated back to the 8-10th centuries. Over 12,000 artifacts found at this site are of archeological interest.

Vinogradny-7 Settlement (located at a distance of approximately 50m from the ammonia terminal facilities) is a two-layer archeological monument (the first layer is a medieval settlement dated back to the 10-11th centuries and the second layer is an ancient site dated back to the 3rd to 1st century B.C.).

Balka Khreyeva Settlement (cultural layers of the Roman and medieval times, burial grounds of the time before the 1st century A.D., 1st century A.D. and 9th century).

Vinogradny-12 Settlement (located at a distance of approximately 100m from the ammonia terminal facilities). A layer of this settlement has been preserved to the north of the railroad line within the farming land.

Volna-1 Settlement with an area of 32 hectares is located at a distance of approximately 500m from the ammonia terminal facilities, at the northern foot of the Zelinskogo Mount in an area owned earlier by the state farm "Yuzhnyi" (the settlement had existed with some interruptions during the ancient and medieval times). Detailed archeological surveys have confirmed the assumption that the cultural layer of this settlement extends south-eastward and south-westward and it appears to be possible to discover some associated facilities outside of the boundaries of the settlement, such as agricultural and household facilities.

Volna-2 Settlement is located at an elevation of 22m to 37m above the sea level, on a cliffy coast at the Panagiya cape, in the Kholodnaya Dolina valley at a distance of approximately 2,500m from the ammonia terminal facilities. Fragments of amphoras and late Hellenistic black-varnish dishes found at this site have permitted the archeologists to date this settlement back to the period from the 4th to the 1st century B.C.

Tamansky-4 Settlement is located at a distance of approximately 2,500m from the ammonia terminal facilities. Archeological finds indicate that this settlement can be dated back to the periods from the 4th century B.C. to 2-3rd centuries B.C. and from 8-9th centuries to 12-13th centuries A.D.

Mound Group 257 (Zelenskaya Mount-1) has been partially investigated during the 20th century.

In the process of archeological surveys of the construction site carried out in 2002 by the Committee for Protection, Restoration and Operation of Historic and Cultural Sites (Heritage) of the Krasnodar Province, most of archeological finds (5th to 2nd century B.C.) were discovered at the following locations:

- at both slopes and at the head of the Kutsaya gully at the temporary production site (area of 4 hectares) used for manufacture of pile tubes
- at the head of the pipeline trestle (area of 5 hectares); and
- along the access road running on the bottom of the Kutsaya gully.

In order to determine the boundaries of an assumed settlement and the thickness of its cultural layer, the Committee has recommended continuing the investigations by excavating test pits at the head of the pipeline trestle and within the adjacent area.

The significance of the above archeological monuments should be specified more accurately in the process of further investigations. The volume of required archeological excavations at the construction site has been set in Statement No.3784 of 21.12.2001 by the Committee for Protection, Restoration and Operation of Historic and Cultural Sites (Heritage) of the Krasnodar Province.

4.0. ENVIRONMENTAL IMPACTS SUBJECT TO REGULATION

4.1. Air Emissions. Impacts on Ambient Air Quality

4.1.1. Impacts Associated with Construction

Adverse impacts on the ambient air have been considered caused by construction machinery and equipment used at several construction sites of the ammonia terminal project:

- railroad access line 35km long;
- ammonia storage site;
- biological wastewater treatment facilities and fire department site;
- buildings and facilities within the coastal zone;
- hydroengineering facilities of the sea terminal.

Emissions of 18 harmful substances have been assessed. The expected concentrations of virtually all substances at a distance of several hundreds meters from the construction sites are negligible (<0.02 of MPCs).

An exception is NO_2, the concentration of which at the recreational facilities “Fakel” and “Volna” might reach (including the background concentration) a value of 0.39 of MPC, which is in any case significantly below the regulatory hygienic limit. The main source of NO_2 (up to 53%) are diesel generators.

The total amount of harmful substances released during the entire period of construction of all facilities of the ammonia terminal has been estimated at 842 tonnes.

4.1.2. Impacts Associated with Operation

The main source of pollutants emissions to the atmosphere are:

- In the ammonia storage area – the facilities for ammonia unloading from railroad tank cars; locomotives, compressors, power plant and flare facility;
- At the TogliattiAzot railroad station – sand storage area and the locomotive;
- At the coastal site and the piers – the facility for ammonia loading into gas tankers, vessel engines and compressors.

The expected impact of the technological equipment of the ammonia terminal on the atmosphere will be insignificant. The concentrations of such substances as carbon black, vapors of gasoline and kerosene, nitrogen oxide, sulfur dioxide, dust, carbon monoxide, ammonia and methane will not exceed 0.1 of the respective MPCs outside of the boundaries of respective sites.

Within the recreational facilities "Fakel" and "Volna" only concentrations of the sum of NO_2 and SO_2 might reach 0.7 and 0.76 of the respective MPC levels. The main sources of these pollutants are vessel engines and the locomotive.

The gross emissions of pollutants during the ammonia terminal operation phase will be 342.8 t/year.

The level of air pollution within the nearest residential areas (recreational facilities of "Fakel" and "Volna) will not exceed the regulatory limits.

The recommended dimensions of the sanitary protection zones are as follows: 1,000m for the ammonia storage site and 500m for the onshore facilities; they are determined, similarly to the right-of-way zone along the ammonia pipeline, by the safety requirements in case of potential accidents.

Air pollution abatement measures incorporated in the design ensure minimization of the impact of the ammonia transfer terminal on the atmosphere.

The detailed calculations of the risk of potential impact on the personnel or local residents in the vicinity of the terminal in case of potential accidental release of ammonia to the atmosphere have indicated that the expected potential risk is quite acceptable taking into consideration the planned technological measures, as well as civil defense and emergency prevention measures.

4.1.3. Impact on the Quality of Ambient Air

The calculations of pollutants emissions to the atmosphere and resulting ground-level concentrations of different pollutants have indicated that their impact on the quality of ambient air during the construction and operations phases of the liquid ammonia terminal project will be minimal and environmentally acceptable.

In the future an official design of maximum permissible emissions of pollutants to the atmosphere will be prepared, which will be an integral part of the package of permitting documents to be provided prior to the commissioning of the ammonia terminal.

4.2. Water Supply and Wastewater Removal. Impacts on the Surface Waters Quality

4.2.1. Water Supply

The source of water supply will be seawater from the Black Sea.

The computed seawater requirement will be 405 m^3/hour, including 100 m^3/hour for engine cooling, 305 m^3/hour of drinking water obtained at the seawater desalination plant of MSF-500-8 type manufactured by TESSAG. Freshwater (its requirement is 499 m^3/day) will be upgraded to comply with the potable water quality norms at a plant for production of potable water. The brine obtained

(284.2 m^3/hour) will be discharged to sea. Seawater will be abstracted at the Nos.1 and 2 loading jetty site by means of submersible pumps. The water intake station will be connected to the chlorination station. Mechanical purification of seawater will be ensured by filters located at the first-lift pump station. Seawater will be pumped to the desalination plant from the coastal site by the second-lift pump station. Potable water will be stored in two tanks of 400 m^3 capacity each.

The off-site water distribution system (46.26 m^3/hour) of the ammonia terminal will provide water to the onshore facilities and buildings, biological wastewater treatment plant, liquid ammonia storage facilities, the TogliattiAzot railroad station, fire department, office and hotel complex.

The on-site water distribution system (10.63 m^3/hour) will provide water to the warehouses, wastewater pump station and the office and general facilities building.

The design provides for separate systems for general and drinking water supply and fire water supply.

The fire water requirement is 302.2 l/s for the off-site buildings and facilities and 193.5 l/s for the liquid ammonia storage facilities.

The main source of fire water supply is the fire water tanks with a total capacity of 10,000 m^3.

Water re-use and water recycling operations are to be introduced for both gas generators cooling systems and lubricating oil cooling systems in ammonia compressors.

4.2.2. Wastewater Removal

The wastewater removal networks will remove wastewater from the ammonia storage facilities (59.84 m^3/day), the TogliattiAzot railroad station, buildings and facilities in the coastal zone, fire department, office and hotel compound, as well as sanitary and bilge water from waste-recovery vessels (328.2 m^3/day).

Sanitation network will be used for removal of sanitary wastewater via a pressure sewer system the to the biological wastewater plant having a design capacity of 400 m^3/day. The treatment facilities comprise a receiving chamber, a horizontal sand trap, two compact KU-200 plants, sludge sites, and a conditioning tank for disinfection with chlorinated lime. The qualitative parameters of treated wastewater will comply with the requirements set for discharge to water bodies of fishery significance (BOD_{total} = 3 mg/l, suspended matter 3 mg/l and ammonium nitrogen 0.39 mg/l). Decontaminated wastewater will be removed to a double-section accumulating and evaporation pond with a useful capacity of 416,388 m^3, (5.0m deep, dimensions in plan 260m $\times$ 350m). The design life of the pond is 3 years.

Stormwater drainage system provides for removal of rainwater runoff:

- from the TogliattiAzot railroad station site to a 100m^3 regulating tank and then via an oil trap to the accumulating pond;
- from the ammonia storage site to a 700m^3 accumulating tank and then via an oil trap to further use (washing of sites, watering of vineyards, feeding of fire water tanks); in case of unsatisfactory treatment and potential pollution with ammonia the water will be sent to the biological treatment plant;
- from the No.2 site (biological treatment plant, evaporation pond, fire department) to a 75m^3 accumulating tank and then via an oil trap to the accumulating pond;
- from the coastal zone to the local treatment facilities (settling, thorough purification in ion-exchange filters) with subsequent discharge to the Black Sea via two outlets;
- from the fire department to a local treatment facility (oil trap) and then to the biological treatment plant;
- from launders of the onshore technological unloading facility to a regulating tank and then to the biological treatment plant.

4.2.3. Dispersion outlet of waste seawater

The waste seawater from the desalination plant will be discharged back to sea via a dispersion outlet device installed above the water level at a distance of 960m from the coast. The overall amount of seawater discharge will be 384.2 m^3/hour.

4.2.4. Impact on the Quality of Surface Waters

The adopted systems for wastewater collection and treatment are sufficient for preventing any adverse impacts on the quality of surface waters. However, taking into consideration the environmental significance of efficient wastewater treatment it is planned, prior to the completion of the ammonia terminal construction, to:

- clarify the process diagram and capacity of the biological wastewater treatment facilities to take into account all possible pollutants (including a theoretical possibility of presence of insignificant concentrations of ammonia in rainwater runoff from the industrial sites);
- specify the water balance of the accumulating and evaporation pond in order to determine its most effective configuration and capacity.

All clarified data will be used for preparation of an official design of the maximum permissible discharge of pollutants with wastewater, which will be an integral part of the package of permitting documents to be provided prior to the commissioning of the ammonia terminal.

4.3. Solid Waste Management and Disposal

4.3.1. Wastes Classification

An inventory has taken into account the major (large-tonnage) types of wastes. During the construction phase the following types of wastes and waste generation sources will be:

- waste from vessels, vehicles, machinery and equipment used for construction (spent batteries, spent oils, oily rags, tires, etc.);
- construction debris (concrete and asphalt debris, metal scrap) and soil;
- domestic waste (solid domestic waste, kitchen waste, sewage from septic tanks, etc.).

During the operation phase the following waste will be generated:

- industrial wastes (spent oils, silica gel, nut coke, etc.);
- wastes from vessels and vehicles (bilge water, spent batteries, spent oil and oily rags, tires, etc.);
- wastes from auxiliary processes (metal scrap, residue from rainwater runoff treatment, sweepings from the sites, etc.);
- domestic waste (solid domestic waste, kitchen waste, sewage from septic tanks, etc.).

The composition and nomenclature of wastes will be specified in more detail in the process of preparation of an official design of the norms for waste generation and waste disposal limits, which will be an integral part of the package of permitting documents to be provided prior to the commissioning of the ammonia terminal.

No specific hazardous wastes will be generated in the process of ammonia handling.

4.3.2. Volumes of Waste Generation

Predicted volumes of waste generation have been determined for each type of waste. As can be seen from the Table below, the total amount of wastes that will be generated during the entire construction phase will be approximately 1,763,683 tonnes. About 97% of this amount will be virtually non-hazardous soil (Hazard Class 5).

Most hazardous wastes (Hazard Classes 1 and 2) are spent batteries, electrolyte and spent oil.

During the operation phase approximately 22,490 tonnes of waste will be generated. Bilge water (Hazard Class 3) and sanitary wastewater (Hazard Class 4) from vessels will account for 57% and 40% of the total amount, respectively.

Especially hazardous wastes (Hazard Classes 1 and 2) are mercury-containing lamps, spent oils and batteries.

Hazard Class	Construction phase (total period), tonnes			Operation phase (annually), tpy		
	Railroad access line	Onshore terminal	Sea terminal	Railroad access line	Onshore terminal	Sea terminal
Class 1	**1.1**	**0.6**	**0.3**	**0.02**	**0.1**	**0.3**
Class 2	**14.6**	**7.7**	**14.0**	**0.01**	**22.0**	**6.8**
Class 3,	**2.3**	**5.4**	**223.6**	**11.0**	**35.8**	**12871.7**
Including bilge water (the density is assumed to be 1 t/m^3)	-	-	*216*	-	-	*12870*
Class 4,	**56,970.7**	**1,943.2**	**76.3**	**121.0**	**226.0**	**9129.7**
Including sanitary wastewater (the density is assumed to be 1 t/m^3)	*55,113*	*1,820*	-	-	-	*9034*
Class 5,	**496,835.1**	**1,207,435.8**	**152.7**	**26.1**	**31.9**	**6.8**
Including soil (the density is assumed to be 1.5 t/m^3)	*496,557*	*1,206,770*	-	-	-	-
Sub-total	**553,823.8**	**1,209,392.7**	**466.9**	**158.13**	**315.8**	**22,015.3**
TOTAL:	**1,763,683.4**			**22,489.2**		

4.3.3. On-site Waste Management during Construction and Operation Phases

Different types of wastes generated at the ammonia terminal site will be collected separately.

During the construction / operation phase appropriate areas will be designated for temporary waste storage in conformity with the relevant environmental and sanitary requirements and the time intervals determined for periodic waste removal.

During the construction phase any wastes generated by vehicles will not be accumulated and stored on-site, but removed to the waste disposal facilities of the respective contractor.

It is planned for the construction phase that up to 70% of inert wastes (concrete and reinforced concrete debris) and soil will be used for grading of the sites.

Prior to the completion of the ammonia terminal construction, the design solutions relating to primary accumulation of liquid and solid wastes from transport vessels will be clarified and specified in more detail (volumes of waste and areas designated for its accumulation, terms for temporary storage). Decisions will be taken in conformity with the relevant provisions of the Water Transport Code of the RF and the international IMO/MARPOL agreement.

Introduction of special technological measures for waste decontamination / processing does not appear to be economically viable because of small amounts of waste generation.

4.3.4. Disposal / Recycling of Wastes

Mercury-containing lamps, oily rags, bitumen waste and waste paints, as well as wastes having commercial value as secondary resource will be supplied for decontamination / recycling to external specialist organizations. At present, there are required documents which confirm the ability of respective organizations to receive the respective wastes in declared amounts.

Bilge water and sewage from vessels will be collected by a waste recovery vessel and delivered to the treatment facilities of the neighboring seaports (Novorossiysk or Kavkaz).

Before the completion of the ammonia terminal construction, it is planned to make a comparative assessment of different alternatives for handling liquid and solid wastes from transport vessels for subsequent treatment or disposal. All alternatives will be considered in conformity with the provisions of the Water Transport Code of the RF and the international IMO/MARPOL agreement. The assessment of the alternatives will be based on their environmental acceptability and economic viability.

It is planned to dispose of significant amounts of solid wastes in existing landfills upon . Selection of landfills, and if necessary, the measures required for their upgrading to ensure compliance with the applicable environmental and sanitary requirements, will be made before the completion of the terminal construction.

5.0. ASSESSMENT OF SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROPOSED OPERATION

5.1. Impacts during the Construction Phase

5.1.1. Geomorphology and Geology

Railroad Access Line

The main consequence of the railroad line construction having an impact on the geological environment will be modification of the terrain as a result of construction of embankments and cutting of slopes. Changes in the topography will result, in turn, in modification of the runoff drainage, which might cause intensification of erosion processes and formation of waterlogged areas, heaving of clayey ground and subsidence processes in loess sediments.

Furthermore, it is possible that the railroad embankment will be subjected to washing-out.

Areas unfavorable for construction and operation of the terminal facilities, as well as measures aimed at minimizing the negative impacts of the construction are presented in Section 6 of this Concise Explanatory Note.

Onshore Terminal

The main impacts on the geological environment at this stage will be associated with implementation of the engineering preparation of the sites, and namely:

- grading of the sites for foundations of buildings and installations;
- removal of topsoil and vegetation along the pipeline routes in areas where it will be laid underground;
- excavation of pits for foundations in the liquid ammonia storage area, office and hotel complex and other facilities;
- construction of temporary roads and infrastructure for the construction period at the liquid ammonia storage site;

- regulation of runoff drainage over the entire construction site.

Impacts imposed on soil mass during the construction phase might intensify erosion processes, initiate failures of pit walls and bottom, enhance formation of waterlogged areas and cause heaving and subsidence of the ground. Areas where such unfavorable processes might evolve, as well as measures for their minimization are discussed in Section 6 of this Concise Explanatory Note.

Offshore Terminal

During the construction phase, impacts on the geological environment will be caused by construction of the pipeline trestle, mooring facilities for ammonia loading, protective structures and shore reinforcement operations.

The main types of impacts on the geological environment in the process of the offshore terminal construction are as follows:

- mechanical changes in the shore and beach conditions at the land-sea junction and in the areas of shore protection operations;
- occasional and unintended leaks of technical, washing and sanitary water from vessels and machinery used during the construction phase;
- stormwater runoff from the construction site of the land-sea junction facilities and adjacent land areas, as well as form areas where shore protection operations will be carried out.

The main sources of impacts on seawater during the construction of the offshore facilities will be:

- vessels and machinery used for construction of offshore facilities;
- auxiliary vessels;
- machinery and equipment used for construction of trestles, piers and protection structures (machinery for driving-in of piles, vehicles, cranes, welding equipment, etc.);
- construction machinery used for improvement of the site at the land-sea junction and adjacent shore areas;
- construction machinery used for shore protection operations.

Impacts on the geological environment during the construction phase will be manifested in the following modifications as compared with the baseline conditions:

1. Pollution of bottom sediments and beach sediments due to potential leaks of oil products (fuel oil, diesel fuel, lubricating oils, etc.) used for operation of vessels and onshore vehicles and hoisting equipment within the offshore terminal construction zone.

   It is necessary to monitor on a periodic basis the contents of petroleum hydrocarbons in seawater during the entire construction phase within the overall program of environmental monitoring.

   Provided that there will be no hydrocarbon leaks and the applicable regulatory requirements relating to collection and recycling of wastes will be complied with in the process of the construction of offshore and onshore terminal facilities, pollution of bottom and beach sediments will be insignificant.

2. Local changes in the shoreline and beach condition in the land-sea junction area and at the shore protection facilities.

   It is planned to carry out shore protection operations along a 2km long shoreline section from the Kutsaya gully to the town of Volna and at a 950m long shoreline section from the Fakel recreational camp and westwards. The embankment slopes will be 1:2 and 1:1.5. Currently, the total shore front length where shore reinforcement will be required is being substantiated in detail within the framework of a separate design to take into account the existing lithodynamic processes and other environmental conditions of the shore zone.

5.1.2. Quality of Surface and Ground Water

Railroad access line

In the process of the line construction, according to the previous experience, the most common impact on the geological environment is pollution of groundwater by the earthmoving and road construction machinery and equipment, imported ground used for track bed construction and ballast, as well as potential formation of waterlogged areas caused by construction of benches at the slopes and other excavations, and the barrage effect of the track bed itself.

The planned railroad line has been for the purpose of convenience divided into separate sections with specific landscape and hydrogeological conditions and indicated with the respective kilometer marks:

Section 1 (from Vyshesteblievskaya to 3km mark +500m). The railroad track and associated facilities will not cause any substantial changes in the chemical composition of the groundwater stream and will not affect the baseline processes relevant for formation of underground water composition.

Section 2 (from 3km mark +500m to 5km mark). The degree of protection of groundwater here is low. The groundwater level is at a depth of 10m to 12m. No problems relating to potential pollution have been predicted for this area, because it is a steppe pasture land. No significant railroad facilities will be constructed here. The only factor that will have an effect on underground water is the runoff drainage from west to east across the railroad line via culverts. Stagnation of water in ditches along the track line should be avoided, because it might affect the bearing ability of Pontian clays prone to heaving under the track bed and other facilities.

Section 3 (from 5km mark to 21km mark+300m). This section runs primarily over an arable land and partially through a vineyard. No significant changes in the hydrogeological conditions have been predicted during the construction phase.

Section 4 (from 21km mark+300m to 25km mark +350m). Groundwater occurs here at a considerable depth and no water had been detected here in the process of the survey excavations. Irrigation water ducts run to the west and north of the railroad line toward the lowland maritime farming land areas. During the construction phase specific measures are needed to protect those areas and water ducts against pollution.

Section 5 (from 25km mark +350m to 30km mark +500m). The degree of protection of groundwater here is satisfactory; the groundwater occurs at a depth of over 6m to 8m. During the construction phase, measures will be taken to prevent salinization, silting, contamination and pollution of water in numerous gullies crossed by the railroad track. No substantial changes in the hydrogeological conditions have been predicted during the construction phase, provided that appropriate protective measures are taken.

Section 6 (from 30km mark +500m to 33km mark +700m). Groundwater occurs in sands at a depth of over 10m, except for the flat gully bottom in the vicinity of the 31km mark +400m, where the groundwater level is probably shallow. Provided that the planned underground water protection measures are taken (See Section 6 of this Concise Explanatory Note), no substantial changes in the hydrogeological conditions have been predicted.

Section 7 (from 33km mark +700m to the TogliattiAzot station). The main processes that might negatively affect the mentioned facilities during the construction phase are:

- Possible barrage effect of the foundations of buildings and facilities;
- Saturation of the soil with water resulting from potential transformation of construction pits to sources for feeding groundwater;
- Pollution of groundwater with leaks from foundation pits and ditches in the process of fueling vehicles;
- Formation of linear shallow groundwater streams along the pipelines;
- Lower degree of protection of groundwater as a result of site grading;

- Lower bearing capacity of clays prone to heaving in case of excessive moisture content at pit and ditch bottoms.

The groundwater level within the site varies from 4m in the south-east to 10m in the rest of the area. The degree of groundwater protection is satisfactory.

Barrage effect might occur only in the south-eastern part of the railroad station, where the groundwater level is higher than the foundation bottom elevation.

In the process of pit and ditch excavation and in case when they are left open for a longer period of time, they might be filled with rainwater or snow-melt water; its seepage to the free groundwater surface or formation of shallow groundwater under those man-made excavations is also possible. At the same time, pollutants from the construction and road construction machinery and equipment might potentially reach groundwater during fueling or refilling of fluids directly at the construction site.

Provided that the environmental protection measures incorporated in the engineering design will be implemented in proper manner, the negative impact of underground waters will be minimized and may be rated as acceptable.

Onshore Terminal

During the construction phase the main negative impacts on groundwater can manifest themselves in the form of changes in the hydrodynamic and balance structure of groundwater streams (disturbance of the hydrological regime, feeding conditions, flow and discharge of stream), as well as in the form of groundwater pollution.

In connection with certain differences in the hydrogeological conditions it appears to be reasonable to consider two situations:

- for the northern part of the site, where the groundwater horizon is well developed in eluvial deposits of Neogenic age and where the liquid ammonia storage facilities at the TogliattiAzot station will be located; and
- for the southern part of the site, where the groundwater horizon is well developed in deluvial deposits of Lower and Middle Quaternary age and where the planned onshore terminal facilities will be located.

Northern part of the site. The low permeability of the sandy silt and clay cover prevents fast penetration of pollutants from the surface. An exception is the pits to be excavated for engineering facilities (tanks, pipelines, etc.). In order to protect the underground water during the construction phase the engineering design provides for a range of environmental protection measures (See Section 6 of this Concise Explanatory Note).

Taking into consideration the short period required for construction, as well as appropriate measures foreseen in the design for diversion of rainwater and washing water runoff from the site, it may be assumed that the probability of saturation of the ground during the construction phase is insignificant.

In general, it has been predicted that no significant impacts on the levels and hydrochemical regimes of underground waters would take place in the process of construction within the northern part of the site.

Southern part of the site. Excavation of pits, construction of foundations and backfilling operations might cause pollution of groundwater. It should be taken into account that the initial quantity of groundwater is rather limited and its salt content is 10 g/l or more with an average nitrate content exceeding the regulatory MPC level by two or three times. Due to the fact that the groundwater stream is able to carry pollutants to the sea during a long period of time after the completion of the construction, calculations have been made to estimate the rate of transfer of an inert pollutant by a groundwater stream in the southern part of the site. The estimated actual seepage rate is in the order of 0.001 m/day, i.e. the area to be affected by local pollution is extremely small.

5.1.3. Ecology and Biological Resources

Vegetation

Most significant impacts on the vegetation cover may be imposed during the construction of the liquid ammonia terminal.

The main types of impacts on the vegetation cover of the site during the construction phase are as follows:

- complete destruction of vegetation communities within the allotted land area;
- loss of part of pasture resources and temporary decrease in their productivity;
- damage to vegetation at the boundary of the constructions sites and at access roads;
- stunting of vegetation with construction dust and deleterious pollutants released to the atmosphere;
- elevated fire hazard within the site.

In the process of construction the vegetation cover within the allotted land will be removed virtually completely; the vegetation in the adjacent areas is normally disturbed.

After the completion of construction, the process of successive recovery commences and the vegetation cover seeks to restore its original form.

Minor leaks of oil, fuel and lubricants, spills of chemicals and various types of solid waste might affect the diversity of vegetation or even form spots barren of any vegetation, but such impacts will be only of limited and insignificant character.

As a result of construction work (excavation of trenches and foundation pits) and traffic of vehicles and machinery, the erosion processes in adjacent areas will be enhanced, and especially so at crossings of gullies. The vegetation in erosion prone areas (slopes of gullies) is highly vulnerable with respect to construction work, which implies that immediate land reclamation measures should be taken.

Wildlife

In the process of construction of the railroad access line the existing habitats within the right-of-way zone will be completely destroyed over a relatively small area: steppe habitats used as pasture, as well as field and forest habitats (forest strips).

The following insignificant areas of wildlife habitats will be withdrawn:

- steppe habitats at the following railroad line sections: 9km to 10km (ind.3); 10km-18.9km; 20.5km to 21.5km; 23.7km to 27.2km (ind.2); 27.2km to 28.0km (ind.1);
- field habitats at the following railroad line sections: 8.0km to 9.0km; 11.5km to 12.9km; 21.5km to 23.7km; 32.5km to 35.0km (ind.8); 18.0km to 20.5km; 29.0km to 32.5km (ind.7);
- trees and brush habitats: 10km to 14.9km (ind.5).

Within the onshore terminal site the primarily anthropogenic habitats will be completely destroyed, and namely: farming land (32.6 hectares) and vineyards (4.2 hectares).

Within the zone to be potentially affected, anthropogenic habitats and residential areas prevail accounting for 80.4% of the sanitary protection zone area.

Due to the disturbance factor caused by accumulation of people and noise level generated by operating vehicles and construction machinery, and due to partial destruction of habitats, animals might be forced out of the zone affected by construction.

Clearing of the construction site might result in the death of individual small mammals, amphibians and reptiles. However, the overall impact on the wildlife communities will be negligible, because the wildlife species in the given types of habitats are mainly very common and environmentally flexible species which readily adapt to anthropogenic impacts.

5.1.4. Soil Conditions

Removal of the fertile topsoil layer during construction of the ammonia terminal facilities, including pipelines, will be accomplished by bulldozers; it will be loaded by excavators and transported by dump trucks. The amount of fertile topsoil with a humus content of over 2% will be 36,000 m^3. The amount of conditionally fertile topsoil with a humus content of less than 2% will be 162,800 m^3. Both the fertile and conditionally fertile topsoil will be temporary stored along the railroad line. Then the topsoil will be transported by trucks for an average distance of up to 30km for stockpiling in areas designated on the basis of a separate design and then the fertile topsoil will be utilized.

The impact on land resources and topsoil condition in the process of earthmoving operations and construction work might result in the following (only within the areas where earthmoving operations are carried out):

- modification of mesorelief caused by grading of sites;
- formation of man-made microrelief caused by the traffic of heavy construction machinery (holes, ruts, tracks, etc.);
- deterioration of physical and mechanical properties of soils, impeded biological activity of the humus layer;
- impact of air emissions from the machinery and equipment on land resources both within the projects sites and within the sanitary protection zone of the facilities;
- impact of machinery, vehicles, structural elements and waste generated in the process of removal of temporary facilities (roads, storage areas, parking lots for vehicles and machinery);
- movement of low-productivity underlying rocks to the surface;
- intensification of erosion processes caused by destruction of natural vegetation;
- contamination of soils with waste of construction materials, garbage, etc.;
- pollution of soil with solid and liquid wastes generated in the process of construction.

Provided that the planned pollution abatement measures will be properly implemented (See Section 6 of this Concise Explanatory Note) it is expected that there will be no significant consequences for the soil cover.

5.1.5. Marine Environment, Ecology and Sensitivity

The potential impacts may be divided into the following groups:

Mechanical impacts. Destruction of the benthos in seabed areas used for piles of the pipeline trestle and mooring facilities for gas tankers and other vessels, as well as protective facilities at the jetties.

Physical impacts. Lower illumination of seawater due to higher water turbidity in the process of driving-in of piles, filling of protective structures, construction of jetties and the harbor for auxiliary vessels, penetration of clayey particles from the construction zone at the land-sea juncture of the pipeline trestle and from shore protection operations; an increase in the noise and vibration levels due to operation of the construction machinery and equipment, as well as support vessels; vibration-type equipment for driving-in of piles; local thermal impacts on plankton from cooling systems of the power plants of vessels.

Chemical impacts. Occasional and unintended leaks of technical, washing and sanitary water from vessels and machinery used for construction of hydroengineering facilities; stormwater runoff from the shore at the construction site at the land-sea junction and adjacent land area, as well as from the zone of shore protection operations.

Pollution of the marine environment during the construction phase might be due to the following deleterious substances:

- petroleum hydrocarbons used for operation of marine and land-based transportation means within the terminal zone: fuel oil, diesel fuel, lubricating oils, etc.;
- oil-containing bilge water and waste fuel generated as a result of leaks of oil products through valves, flange connections and pump gaskets in fuel and lubricating systems, etc.;
- spent oils generated in the process of filtration, separation, spillage, lubricants replacement, etc.
- synthetic surfactants, surface-active hydrocarbons, phenols and heavy metals transported by stormwater runoff;
- suspended matter generated in the process of filling protective piers, driving-in of piles, construction of mooring facilities, etc.

The assumed consequences of the impacts on the marine biota (covering insignificant areas):

- mechanical destruction of benthos forms over seabed areas under the pile supports and protective structures;
- lower intensity of photosynthesis of macrophytes and stunting of filtering benthos within areas of precipitation of suspended matter generated by earthmoving operations at the land-sea junction area and by shore protective operations;
- stunting and death of plankton in areas of high seawater turbidity during construction of the facilities at the land-sea junction and shore protection structures;
- destruction of larvae of hydrobionts due to noise and vibration impacts;
- forcing-out of fish, invertebrates, marine mammals and birds out of their habitats due to noise and vibration impacts and loss of food supply;
- stunting of hydrobionts as a result of potential pollution of seawater and bottom sediments.

In general, in case of compliance with the planned environmental protection measures (See Section 6 of this Concise Explanatory Note) no substantial environmental consequences have been predicted for the marine environment, including the marine biota.

5.1.6. Demography and Population

The impact of the project on the demographic processes during the construction phase will be associated mainly with the immigration stream of people to the construction area. The number of employees recruited for this stage of the project implementation will exceed 1,000 persons. During the operation phase the number of employees will be approximately 250 persons and it may be predicted that the total population of the town of Volna and the Temryuk District will increase by up to 600 to 650 persons. Due to immigration of people, primarily of young and middle age, as well as due to a certain increase in the birth rate (including extramarital births), the average age of the local population will become younger and the demographic tensions will be alleviated.

5.1.7. Socioeconomic Conditions and Cultural Characteristics

Social Situation. The impact of the project construction on the social situations will manifest itself primarily on a local level and will be restricted to the Temryuk District. No social impacts have been predicted for other areas.

During the construction phase, the main effect will be creation of new jobs in construction industry and additional jobs in the field of general services. It is planned to recruit 264 employees for construction of the onshore terminal and from 161 to 734 persons depending on the season for construction of hydroengineering facilities. With the total number of employees of up to 1,000 persons during the construction phase, the number of additional jobs in associated sectors (auxiliary industrial and general services) might reach 1,900 to 2,000. These jobs will be created

not only directly at the project site, but also in neighboring administrative areas of the Temryuk District. However, after the completion of construction, it might be expected that the total number of these jobs will decrease.

Creation of new jobs will have a direct effect on the quality of life for people involved in the project implementation and their families. The improved well-being of this group of population will result in more spending, and as a consequence, in an increase in the overall turnover of goods.

A negative impact on the social situation in the town of Volna and in the entire district might be caused by recruiting of approximately 1,000 military construction workers. This fact might result in social tensions and protests of the local residents. Appropriate measures have been planned in order to mitigate the potential negative impacts (See Section 6 of this Concise Explanatory Note).

Along with an increase in the employment in the district, the social effects of the project will include participation of the corporation in the development of the social infrastructure and implementation of social programs at the local level.

In order to improve the transportation services in the district, the TogliattiAzot Company provided eight Ikarus buses and several Volga cars to the local administration. It has also constructed a TV retransmission antenna to ensure more stable transmission of TV programs for the local residents, which permits them to receive additional federal TV programs. The Company has also financed renovation of the hospital in Taman, renovation and equipment of a school, a kindergarten and a club in the town of Volna. It has provided funds for some of its local employees for construction of individual housing, etc. The TogliattiAzot Company had also rendered support to the local administration and residents in emergency situations, such as the flood in 2002 when the Company's workers were assigned to take part in emergency response actions; the Company provided vehicles, construction materials, electric equipment, clothing and footwear for the people affected by the flood. In general, the Company invested about RUR 30 million only during the period until April 2001 for the socioeconomic development of the Temryuk District.

Agriculture. The impact on the agricultural sector will have only limited local character within the Temryuk District both during the construction and operation phases, and will affect only the farms directly adjoining the project site.

The land allotted for the project construction was provided mainly from the reserve land of the Krasnodar Province. Potential impact of the construction and operation of the project might be imposed only on the agroindustrial firms "Yuzhnaya" and "Chernomorets", whose land has been rented for the construction of the project facilities and access roads. To prevent/mitigate the potential negative impacts on these farms, wasteland and low-productive land was primarily selected for the construction. If fertile land was taken, then land of similar quality was provided to the affected farms from the Province's land reserve. Compensations paid for the land withdrawn for railroad line construction amounted to about RUR 35 million (part of this compensation was provided in terms of supply of fertilizers, pesticides and fuel). On the basis of the above facts it may be stated that the impacts on the agricultural sector will be of limited local and insignificant scale.

To prevent negative impacts on the fisheries, the TogliattiAzot Corporation selected an engineering solution, which will minimize the impact on fish migration along the Taman coast, i.e. construction of a pile trestle with large spans between piles (24m). From the fishery viewpoint, the construction of a breakwater, according to experts, will be similar to construction of an artificial reef creating appropriate conditions for spawning of certain fish species and providing an additional food supply. Nevertheless, an impact on fisheries will be imposed in the form of withdrawal of a part of the sea currently used by the local fishing cooperative (Khvalayun) and might result in lower catches due to an increased noise level and seawater turbidity. The withdrawal of a part of the sea area used currently for commercial fishing should be compensated for in accordance with the estimates made by a specialist research institute and approved by the KubanRybvod supervisory agency.

Industry. Construction of the ammonia terminal will intensify the activities of the local construction organizations and increase the scope of their operations. Local organizations of the Temryuk District will be involved in minor and simple construction and installation work, but the construction of complex facilities will require construction resources on a larger scale.

The terminal operation will result in an increase in taxes paid to the municipal, regional and federal budgets both associated with the operation of the terminal itself and additional, associated and service sectors.

Transport. The main change relating to the transport sector will be higher intensity of the traffic and larger volumes of cargoes to be transported during this period, resulting in higher revenues for transportation organizations during the construction phase.

The ammonia terminal belongs to the transportation sector of the national economy, and as a consequence, its operation will have an effect on the overall performance of this sector at the district and province level. The proportion of cargoes transported by sea will increase both with respect to the structure of transported cargoes and in the structure of the turnover of goods.

A positive impact will be improvement of the access to the town of Volna. Potential negative impacts might be associated with the operation of the railroad access line due to an elevated risk of accidents in connection with higher traffic intensity. To prevent accidents, the Company has planned a number of additional measures (including installation of signal-controlled railroad crossings).

Tourism and Recreation. Impact on the tourism and recreation sector will be of limited local character (town of Volna and the adjacent coastal area of the Temryuk District). During the construction phase the recreational potential and attractiveness of the area for tourists will be affected due to elevated noise levels, more intensive transportation, disturbance of landscapes, presence of a large number of construction workers, additional loads on the utilities sector, etc.).

The impact of the project during the operation phase will be of diverse character. On the one hand, the ammonia terminal is rated as a potentially hazardous operation from the environmental viewpoint, which might have a negative impact on the recreational attractiveness of the area. But on the other hand, in order to mitigate the potential negative impacts, the Company plans to make contributions to the development of the municipal, social and cultural infrastructure, shoreline protection and establishment of civilized beaches, which would improve the recreational attractiveness of the coastal area.

Municipal Utilities Infrastructure. The impact will be of limited local character; other areas might be potentially affected only in case of solid waste disposal. During the construction phase an additional pressure will by imposed on the existing municipal infrastructure.

During the operation phase significant impacts on the local municipal infrastructure are not expected; at the same time it is presumed to use part of the capacity of ToAz biological treatment facility for Volna settlement needs.

Social Infrastructure. No direct impact on the local education system has been predicted both during the construction and operation phase. An indirect positive effect will be implementation of a number of social development programs by the Company within the district, in particular, renovation of the school in the town of Volna and provision of adequate equipment for the school.

The effect on the healthcare system will be most significant during the construction phase, because a maximum number of employees will be involved during this period. It will impose an additional pressure on the existing healthcare system, but at the same time this pressure will be relieved due to the expansion of the existing medical facilities and participation of the Company in the development and equipment of the medical facilities of the Temryuk District.

5.1.8. Public Health

Immigration of workers during the construction phase might result in increasing frequency of occurrence of injuries and sexually transmitted illnesses, as well as alcohol abuse by immigrants. Higher employment of mothers without an adequate expansion of the pre-school children facilities might result in an increase in the frequency of infant illnesses. If the wastewater treatment facilities would be put into operation with a delay, it might potentially result in a higher frequency of acute diarrheal diseases.

5.1.9. Historic and Archaeological Sites

During the construction and operation phase, consequences of the project implementation for the cultural and historic heritage might take place at the local level: direct consequences within the areas directly affected by the construction and indirect consequence for the adjacent areas.

During the construction phase the main source of impact on historic and cultural sites will be during implementation of construction work, and especially earthmoving operations (impact imposed by construction and transportation machinery and equipment). The following consequences are possible: destruction of some objects of cultural heritage in the process of construction work; physical disturbance of the areas of historic monuments and their protection zones as a result of earthmoving operations (trench and pit excavation, cutting of hill slopes, filling of embankments, etc.); disturbance of natural terrain and microrelief within the area of monuments and their protection zones due to the traffic of heavy construction machinery (formation of holes, ruts, tracks, etc.); destruction of natural vegetation in the monument areas within the land allotted to the Company on a permanent or temporary basis.

5.2. Impacts during the Operation Phase

5.2.1. Geomorphology and Geology

Railroad Access Line

Due to the fact that during the operation phase there will be culverts, anti-erosion coating in watercourses and at the embankment slopes, as well as other protective measures provided at the railroad facilities, any intensification of exogenous geological processes or any substantial changes in ground properties are not expected.

Onshore Terminal

Since by the time of commissioning of the terminal facilities there will be anti-erosion coating in watercourses and at the embankment slopes, culverts and other protective means provided, it is not expected that there will be any intensification of exogenous geological processes or any substantial changes in ground properties. The main processes will be associated with ground deformation at the base of facilities.

The presence of deluvial loess-type sandy silts of Lower, Middle and Upper Pleistocene age in the area of operations indicates that there is a potential possibility for ground subsidence. In the process of the geological surveys no subsidence or loess pseudokarst phenomena have been revealed. At the same time, based on laboratory testing the ground conditions have been rated as Category I with respect to subsidence probability, which requires that the monitoring program should incorporate observation of rock stresses and changes in the ground stability

In general, there is all ground to believe that the operation of the onshore terminal facilities will not have any substantial impact on the geodynamic situation in the given area.

Offshore terminal

The main negative impact on the geological environment during the operation phase of the offshore terminal will be modifications in the shoreline and the width of beaches due to changes in the coastal longshore drift patterns during storms as a result of the effect of wave and shore protective structures.

The impact on the geological environment will be manifested in the form of local seabed wash-outs at the pile supports of the pipeline trestles and jetties.

The main factor of impact on the drift stream and shoreline is the continuous protective structure designed to protect the mooring facilities against waves and located at a distance of approximately 2 km from the coast. It is not an obstacle for drift transfer, because it is located beyond the sand field of surface precipitation confined within the isobath of 12m. However, this structure acts like a

breakwater pier with a wave shadow behind it. This will result in less intensive longshore drift pattern causing accumulation and building-up of material at the shore. Downstream, on the contrary, the resulting conditions will cause washing-out of the shore.

In order to make a quantitative assessment of expected changes, calculation of drift rates have been made for a number of successive profiles along the shore both for the baseline natural conditions and for the presence of the planned facilities. The effect of the latter was assessed by comparing the obtained results with the baseline conditions.

Changes in the contour have a character of a sinusoid with a pitch of approximately 1km. At a section of about 1km long, in the direct vicinity of the terminal, the shoreline will advance seawards for a distance of up to 10m per year. At both sides of the accumulation area there will be washout zones where the shoreline will retreat for a distance of up to 5m. The results obtained can be explained by formation of a tombolo behind an obstacle at the shore slope.

It may be assumed that the shoreline advance will proceed in the future at a slowing down rate due to gradual adaptation of the seabed topography to the changed conditions.

To avoid the negative consequences appropriate measures will be provided to protect the shore within the section prone to the beach washout. It would probably suffice to provide annually a certain amount of sand to fill washed out areas (in the order of several thousands of cubic meters).

Shore protection measures within the terminal zone will probably substantially improve the condition of the shoreline and beaches. At this section of the shoreline, quartz sand outcrops are concentrated at a shore terrace and are the main source for feeding the beaches with sand. At an average annual rate of the shoreline retreat of 0.7m, the total amount of beach-forming material to the coastal zone at the terminal's shore section is estimated at 22,200 m^3/year. As a result of the shore protection measures, the main beach feeding source will be partially blocked, resulting in washing-out and decrease in the beach width. This, in turn, will negatively affect the shoreline sections beyond the shore protection structures, because a decrease in the beach width will cause stronger impact of waves on the shore terrace and enhance the shore terrace abrasion rate.

To minimize these negative consequences, it is necessary to plan annual filling of sand at the washed out sections of beaches. Currently, detailed justification of the total shoreline length requiring shore protection measures is being prepared within the framework of a separate design to take into account the existing lithodynamic processes and other environmental conditions of the shoreline.

Penetration of pollutants to the marine environment is possible in case of discharge of stormwater runoff from the industrial sites of the jetties and onshore facilities, discharge of stormwater from the onshore treatment plant to sea.

During the operation phase it is potentially possible that seawater will be polluted with aerosols containing adsorbed pollutants from the power plants of gas tankers, auxiliary vessels and vehicles operated on land.

Pollution of suspended matter and bottom sediments. Pollutants might be adsorbed on suspended matter, transferred by the existing sea currents over an extended sea area and precipitate to the seabed, causing pollution of the upper layer of bottom sediments. As a result, a certain increase in the level of bottom sediments pollution is possible during the terminal operation phase as compared with their baseline condition. It is necessary to monitor on a regular basis the content of petroleum hydrocarbons in suspended matter and bottom sediments within the sea area adjacent to the terminal during the entire period of the terminal operation within the framework of the environmental monitoring program.

In general, the predicted level of bottom sediments pollution during the operation of the onshore and offshore terminal facilities will be extremely insignificant provided that the design solutions relating to collection and disposal of waste, as well as wastewater treatment would be strictly complied with.

During the operation of the terminal facilities it is possible that *local washing out of the sand seabed surface* at the support base will occur as a result of impact of currents and wave streams during strong storms, when the water flow rate at the seabed might exceed the critical value for the

beginning of the seabed erosion. The maximum depth of washout at the pile supports might be equal to 2 diameters of a pile. Since the sand layer depth does not exceed here 0.5m, it is possible that the sand will be washed out down to the bedrock during strong storms. The width of the washout zone will not exceed 3 diameters of the supports.

In general, the impact on the seabed relief near the supports will be of local character and will not have a substantial effect on the functions of the marine environment within the subject sea area.

5.2.2. Quality of Surface and Ground Water

Railroad Access Line

During the operation of the TogliattiAzot railroad station the following negative processes might take place:

- potential barrage effect of the foundations of buildings and structures in the south-eastern part of the station, where the groundwater level is higher than the foundation depth;
- saturation of the ground with water due to potential transformation of reservoirs and settling ponds into local sources for feeding groundwater;
- groundwater pollution due to leaks from settling ponds and reservoirs;
- an increase in the vulnerability of groundwater due to the site grading.

A favorable environmental assessment of the development of the above processes has been made with due consideration of the following natural factors and conditions:

- a high degree of protection of groundwater due to significant depth of the groundwater level and clayey composition of ground within the aeration zone;
- good drainage of surface water from the site due to the overall slope of the site surface towards the sea and high absolute elevations of the site;
- lack of any “especially dirty” or technically inferior installations or devices.

Since there are no pollution sources the impact of the railroad line operation on groundwater has been predicted to be insignificant. No substantial changes in the hydrogeological conditions are expected.

Onshore Terminal

Because of certain differences in the hydrogeological conditions it appears to be reasonable to consider two situations, similarly as it has been done for the construction phase:

- for the northern part of the site, where the groundwater horizon is well developed in eluvial deposits of Neogenic age and where the liquid ammonia storage facilities at the TogliattiAzot station will be located; and
- for the southern part of the site, where the groundwater horizon is well developed in deluvial deposits of Lower and Middle Quaternary age and where the planned onshore terminal facilities will be located.

Northern part of the site. Under the heavy tanks there will be no considerable ground compaction; the groundwater level, according to the survey data, is somewhat lower than the zone affected by the compressing loads.

The compressor station might impose vibration impact on the ground and measures have been provided in the engineering design with respect to foundation preparation, because the clays at the base are prone to heaving, and as a consequence, might lose their initial stability (strength) when exposed to moisture and loads.

Any other facilities might have an insignificant effect on the groundwater level due to potential leaks of freshwater, seawater and mother solution from the desalination plant, drinking water

reservoirs and from the office building. Wastewater leakage is possible from the office building and sewerage main lines.

Southern part of the site. Within the coastal part of the site, the operation of the following facilities might have negative impact on the groundwater condition:

- accumulating pond;
- settling pond;
- industrial site of TogliattiAzot;
- houses near the town of Volna;
- office and hotel complex;
- cargo jetty with a boiler house and pump stations;
- pipelines, including the two water pipelines, one sewer line and two ammonia pipelines.

Potential leaks from reservoirs and underground water-bearing lines might cause pollution of groundwater.

Provided that the planned environmental protection measures are ensured (See Section 6 of this Concise Explanatory Note), no substantial environmental consequences with respect to groundwater quality have been predicted.

5.2.3. Ecology and Biological Resources

Vegetation

The main type of impact during the operation phase is air pollution. The vegetation cover has a function of a biogeochemical barrier in ecosystems by absorbing pollutants from atmospheric precipitations. Under normal terminal operation conditions, the effect of air pollution on the vegetation cover will be of local and insignificant character.

Wildlife

The planned ammonia terminal will be located in substantially disturbed wildlife habitats modified by anthropogenic impacts. Animal communities in such habitats have a limited species composition and low population numbers; flexible species capable to readily adapt to anthropogenic impacts prevail in such animal communities. In this connection, under the normal operating conditions the impact of the terminal on the wildlife will be insignificant.

Monodominant groups of animals have been preserved, including synanthropic species with high adaptation ability and species (mainly birds) using this area only for a short period of time.

5.2.4. Soil Conditions

Impacts on land resources during the railroad line operation will be due to dust emission from open railroad cars in the process of transportation of bulk cargoes, leaks of lubricants from wheel pairs, exhaust emissions from locomotives, as well as loss of ammonia. The effect of these factors will not reach beyond the railroad line right-of-way zone.

Impacts on land resources during the operation of the ammonia terminal will be associated with air emissions from the terminal facilities. Under the conditions of arid climate, ammonia cation will precipitate in the soil absorbing structure resulting in loss of strength of structural elements of soil and dusting of its structural aggregates. All these processes should be carefully observed within a soil cover and land resources monitoring system.

5.2.5. Marine Environment, Ecology and Sensitivity

The potential impacts may be divided into the following groups:

Physical impacts. Noise and vibration generated by operation of technical devices at the jetties and on vessels; local thermal impacts on plankton from cooling systems of the power plants of vessels.

Chemical impacts:

- Potential leaks of liquid ammonia in the process of loading operations (untight seals of pipelines, hose connections of gas tankers);
- Potential fuel leakage during bunkering of vessels;
- Runoff of industrial effluents and rainwater form platforms of pipeline trestles and jetties;
- Stormwater runoff from hard pavement of the hydroengineering facilities site;
- Discharge of wastewater to sea from the wastewater treatment plant;
- Emissions from power-generating plants of tankers and auxiliary vessels.

Monitoring of pollutants content in seawater during the terminal construction and operation phases has been planned within the framework of the environmental monitoring program.

Protective structures have been designed to protect the terminal facilities against waves by ensuring better suppression of wave energy and more efficient wave reflection. At the same time, they do not prevent or impede water exchange due to the open nature of the support structures (pile structure with rock riprap and concrete blocks). In addition, being a solid substrate, these structures might serve as:

- a ground for settlement and development of marine biota providing food supply for fish;
- habitat for colonies of mussels filtrating and purifying seawater;
- an additional spawning and feeding ground for fish.

In general, in case of compliance with the planned environmental protection measures (See Section 6 of this Concise Explanatory Note) no substantial environmental consequences have been predicted for the marine environment, including the marine biota.

5.2.6. Demography and Population

An indirect effect will be a significant increase in the undesired immigration: excessive immigration of potential workforce exceeding the actual requirements and trying to find jobs in a hope for better wages, as well as an attractive place for homeless people and criminal groups. This might cause additional social tensions in the region.

5.2.7. Socioeconomic and Cultural Conditions

Social Situation. During the operation phase the main type of effect on the social situation will be creation of permanent jobs: it is planned to employ 183 persons at the onshore terminal and 75 persons at the hydroengineering facilities. In addition, the number of additional jobs in associated industrial and general services sectors might reach 700 to 750 jobs.

The new jobs will result in higher level of well-being of the population involved in the project implementation.

The terminal operation will also increase revenues of the public budgets of different levels and extra-budgetary funds, facilitating realization of various socially oriented programs.

5.2.8. Public Health

As a result of creation of additional capacities in the local medical facilities in the vicinity of the project and contribution of the Company to the development and equipment of the medical facilities in the Temryuk District it is predicted that the overall public health indicators will improve.

5.2.9. Historical and Archaeological Sites

During the operation phase the *main source of impacts* on the objects of cultural heritage will be operations relating to the technical maintenance of the facilities and various emergency situations.

Provided that the planned environmental protection measures are ensured (See Section 6 of this Concise Explanatory Note), no substantial environmental consequences with respect to archaeological sites have been predicted.

5.3. Key Uncertainties and Data Gaps

At present, some of the work relating to the ammonia terminal design development and to be incorporated in the Environmental Action Plan has not been completed (See Section 6.2 of this Concise Explanatory Note). The main types of such work include the following:

- substantiation of the total front length of shore protection structures (taking into account the existing lithodynamic processes and other environmental conditions of the coastal zone);
- clarification of the composition and capacity of the biological wastewater treatment facilities to ensure maximum coverage of all possible pollutants (including the theoretical possibility of the presence of minor ammonia concentrations in rainwater collected from the industrial sites);
- clarification of the water balance of the accumulating and evaporation pond with the purpose to determine its most efficient configuration and capacity;
- a comparative assessment of different alternatives for recovery of liquid and solid wastes from vessels for their subsequent treatment and disposal;
- preparation and implementation of an Action Plan relating to disclosure of project information in connection with the public concerns and the need for preparation of adequate answers to the defined environmental problems, which might arise during the construction of the ammonia terminal.

The environmental action plan (See Section 6.2 of this Concise Explanatory Note) sets a concrete timeframe for completion of this work.

5.4. Comparison of Impacts Associated with Alternatives

A comparative analysis had been made in 1998 with the purpose to assess three alternatives for the terminal located in the vicinity of the town of Volna with appropriate cost estimates. The following alternatives have been assessed:

1. Location of the ammonia terminal to the east of the town of Volna with delivery of ammonia in railroad tank cars to the port site;
2. Location of the ammonia terminal in the vicinity of the Kutsaya gully to the west of the town of Volna with delivery of ammonia in railroad tank cars to the port site;
3. Location of the ammonia terminal at two sites: (1) in the vicinity of the Vyshestebliyevskaya Stanitsa – facilities for unloading ammonia from railroad tank cars; (2) in the vicinity of the Kutsaya gully to the west of the town of Volna

Based on a comparison of the computation results and taking into consideration the relevant requirements relating to the safety of the town of Volna, as well as the specific features of the given territory, the second alternative has been selected as a basis.

6.0. MITIGATION MEASURES AND/OR MEASURES TO ENHANCE ENVIRONMENTAL AND SOCIAL BENEFITS OF THE PROJECT

6.1. Environmental Protection Measures

6.1.1. Measures for Protection of Geological Environment

The main measures aimed at preventing unfavorable consequences of the project construction have been designed to ensure seismic stability of the buildings and facilities and their protection against subsidence and soil erosion.

The design development for all facilities, selection of structural elements and materials, justification of the foundation type and design have been carried out taking into account the rated seismicity of the region equal to 9 Richter scale.

In order to avoid any non-uniform deformations of the ground under the ammonia storage facilities, the following foundation design has been selected. Its base is composed of reinforced concrete piles with a depth of 20.0m with the following elements installed on them in the following sequence: a monolithic reinforced concrete grillage slab, a sand pad, the lower monolithic reinforced concrete slab, monolithic reinforced framework and the upper monolithic reinforced concrete slab. Such a complex structure has been designed with the purpose not only to ensure uniform settlement, but also attenuate quasistatic impacts onto the ground mass imposed in the process of loading and unloading of the tanks.

To prevent negative impacts of ground heaving and shrinkage, it is planned to create maximum loads onto the foundations close to the heaving pressure.

To avoid development of heaving and shrinkage processes the following measures have been designed:

- Taking into consideration a possibility of formation of a water-bearing horizon of temporary shallow groundwater (*verkhovodka*), it is planned to excavate foundation pits during the dry season of the year or prevent the pits against surface water inflow. When loosening the eluvial cover in the zone of variable moisture content and in areas where the underground water is shallow, it is necessary to provide water removal from pits. The permeability of clays in all engineering geological elements has been assumed to be 0.15 m/day.
- To protect the ground prone to heaving against moistening and to avoid formation of man-made soil layers in trenches and pockets of pits the soil will be compacted to a maximum density without using draining materials; asphalt pavement will be provided to cover pit pockets by a factor of 1.5.
- Any excavations in loess-type rocks will be made with their replacement and covering of slopes with a layer of draining ground 0.5m thick.

To reduce the damage caused by erosion it is advisable to either decrease the flow rates and energy of surface water streams or enhance the erosion resistance of the rock. In this connection the following measures will be taken:

- In all areas where linear facilities cross gullies and ravines it is planned to construct culverts to prevent any disturbance of the natural hydrological regime;
- The walls and bottom of water-diversion trenches and ditches should be reinforced with crushed stone to prevent their washing-out;
- Slopes of embankments and excavations should be reinforced by coarse material and by seeding grass over a prepared fertile soil layer.

To ensure conservation of the natural ground structure at the base of foundation pits and to minimize any alterations of their properties it is necessary to comply with the following general rules of construction work:

- Drainage of atmospheric precipitation runoff by appropriate grading of sites, construction of water-diversion trenches and prevention of water accumulation in foundation pits;
- During pit excavation it is not permitted to destroy the ground at the design elevation; in clayey ground, irrespective of the work procedures used, it is necessary to leave a protective layer 0.2m to 0.4m thick, which should be removed only prior to the foundation construction.

To minimize the damage caused by processes occurring at the sea coastline, detailed investigations are being currently carried out with the purpose to substantiate the total length of the shoreline front requiring reinforcement taking into account the existing lithodynamic processes and other environmental conditions within the coastal strip.

6.1.2. Ground Water Protection Measures

The main potential impact on the underground water will be imposed during the construction phase, but the protection measures planned will be applied also during the operation period. The following basic underground water protection measures have been designed:

- Regular inspection and maintenance of culverts under the road bed;
- Protection of foundation pits against penetration of surface runoff by constructing water-diversion trenches and by water removal;
- Collection of polluted liquids, including oil products into impermeable reservoirs to prevent their seepage (infiltration) to groundwater;
- Use of effective hydraulic insulation (liners) at the bottom of reservoirs for ammonia storage and in the evaporation pond, as well as other systems in stormwater drainage and sanitation networks for prevention of leakage;
- Fueling of construction machinery outside of foundation pits and trenches;
- Temporary storage of industrial and domestic solid waste in specially designated areas with asphalt paving.

6.1.3. Measures for Protection of Biological Resources

Vegetation

To minimize the negative impacts on the vegetation cover of the territory is is planned for the construction phase to:

- implement measures for protection of vegetation within the area affected by construction (maximum use of the existing access roads, storage areas, etc.);
- construct roads with hard paving to reduce dust formation;
- carry out in due time required drainage measures (to avoid changes in the hydrological regime of the neighboring biogeocenoses);
- carry out biological reclamation of disturbed land to restore soil and vegetation conditions typical of the given area; and
- observe the relevant fire safety rules.

The main environmental protection measures to be taken during the operation phase are:

- compliance with the fire safety rules and regulations within the ammonia terminal sites;
- environmental monitoring of the status of rare and endangered species in the sanitary protection zone of the terminal, in case mass occurrence of rare species is identified.

Wildlife

The range of the planned environmental protection measures includes:

- performance of construction and installation work within strictly limited areas designated for the respective facilities;
- clearing of the construction sites either prior or after the period of nesting of birds;
- prohibition of leaving open the excavated pits for poles or foundation pits for longer periods of time to prevent falling of amphibians, reptiles and small mammals into the pits;
- limitation of the vehicle and machinery traffic to the existing access roads;
- supervision over collection, removal and storage of industrial wastes;
- prevention of formation of unauthorized dump sites for food leftovers and domestic waste as places for concentration of synanthropic species of birds and other animals;
- in the process of construction and installation work, strict supervision is required over the observance of fire safety rules during the fire hazardous season;
- compliance with the rules for keeping dogs at construction sites;
- regular preventive vaccination of dogs kept at construction sites against rabies;
- prevention of any possibility for pollution of sites with fuel and lubricants;
- prohibition of any unauthorized hunting for animals (briefing of the personnel or relevant covenants in the employment contracts).

During the operation phase the necessary environmental protection measures should be aimed at restoring and stabilizing the conditions of habitats disturbed during the construction. These measures include environmental monitoring with the main purpose to assess the efficiency of the environmental protection measures taken and minimize the impacts on rare animal species.

6.1.4. Soil Protection Measures

The technology for selective removal of fertile topsoil layer at the construction sites and its stockpiling for future use is determined on the basis of the following parameters:

- significant thickness of humus horizons of soils;
- mechanical composition of soils (sandy silt and clayey contents);
- neutral or slightly alkaline reaction of the media is characteristic of all soils.

The thickness of the humus soil horizons subject to removal is 20cm to 50cm. The thickness of potentially fertile topsoil layer is 20cm to 70cm.

The technology for implementation of this work, areas designated for topsoil stockpiling and characteristics of the stockpiles are specified in a separate Design for topsoil layer removal.

The fertile topsoil layer can be used for adding it to low-productive soils.

The design provides for the following technical conditions for land reclamation:

- within the zone of mineral soils the most fertile humus layer from 0.4m to 0.5m thick should be removed;
- areas for stockpiling the fertile humus layer have been designated and conditions for its storage specified;
- technological schemes for utilization of the fertile humus layer have been developed.

To ensure conservation of the fertile topsoil layer and land resources along the linear facilities the following technical conditions for the land reclamation have been specified:

- on mineral soils, the most fertile humus horizon A with an average thickness of 0.3m to 0.5m should be removed from the entire width of the trench, the width of the operating machinery and mechanisms and the zone for stockpiling of soil horizons A, B and C;
- Stockpiling of excavated mineral ground (horizons B, C, D) over horizon A at a distance of 1m from a trench;
- Backfilling of trenches starts with mineral ground;
- Return of the soil horizon A to the land reclamation zone (width of the trench, machinery and mechanisms, as well as zone for stockpiling soil horizons A, B, C).

To prevent planar and gully erosion, as well as other processes of topsoil degradation, the following range of measures have been designed:

- Maximum conservation of the natural runoff conditions (provision of culverts);
- For stabilization of the slopes it is planned to use straw mats with a wire mesh above them. The wire mesh is fixed with pegs at several points in a manner to protect the straw against strong winds;
- Regulation of the surface runoff drainage considering restoration of the natural runoff drainage pattern;
- Measures aimed at distribution of the runoff from catchment areas and removal of rainwater to trenches and ditches along service roads;
- Grading of the catchment area and reinforcement with vegetation, enhancement of the roughness of thalwegs in the existing depressions with the aid of shrubs and small earth banks. It is possible to use concrete launders with roughness ribs for water removal;
- Enhancement of the surface roughness by provision of small earth banks;
- Technical and biological land reclamation;
- At the stage of biological reclamation it is necessary to follow the prescribed farming techniques including plowing across slopes to prevent linear erosion (burrows, ruts, ditches along the slope.

The quality of the performed work should be inspected by an environmentalist of the contractor organization for construction and a state inspector in charge of land protection and management.

6.1.5. Measures for Protection of Marine Environment and Biota

To protect the marine environment and biota the following main measures have been designed:

- Compliance with all requirements of the regulatory documents relating to shipping safety for all vessels during the sea terminal construction and operation phases (regulatory dimensions of sea areas and jetties for mooring of auxiliary vessels, safety zones of mooring facilities, etc.);
- Compliance with the International Convention for the Prevention of Pollution from Ships – MARPOL 73/78
- Approval in due manner of shipping courses, routes, shipping areas and anchorage areas for all types of vessels entering the sea terminal;
- During the construction of the pipeline trestle, jetties for loading ammonia and for auxiliary vessels, as well as protection structures, it will be prohibited to handle vessels without facilities for collection of bilge water and waste generated on such vessel and facilities;
- Use of vessels with insulated ballast tanks, replacement of ballast on deep water after having passed the Bosporus;
- Reclamation of land adjacent to the sea coastline in the vicinity of the sea terminal;

- Monitoring of pollutants concentrations in seawater and in suspended matter within the framework of the environmental monitoring of the marine environment with the purpose to identify any unintended leaks of pollutants from vessels and technical means during the sea terminal construction and operation;
- prevention of leakage of petroleum hydrocarbons from technical and transportation means involved in construction of the land-sea junction and in the adjacent land areas;
- collection and recycling of spent lubricants and other wastes from technical means employed for construction of the onshore facilities;
- reclamation of land in the areas adjacent to the sea terminal;
- minimization of penetration of pollutants to seawater with aerosols adsorbing pollutants released to the atmosphere from engines of vessels, construction machinery and welding equipment by complying with the relevant regulatory documents relating to maximum permissible emissions of pollutants to the atmosphere from sea vessels and technical means;
- selection of the time schedule for the work at the land-sea junction area and the shoreline protection operations with due consideration of the spawning periods of commercial fish species.

6.1.6. Demography and Population

No special measures are required.

6.1.7. Socioeconomic and Cultural Conditions

To mitigate impacts on the social situation in the given area it is essential to recruit a maximum number of employees from the local communities, develop training and re-training programs for local specialists needed for the project. To resolve this issue the Company has taken a decision to employ preferably local residents from the Temryuk District – currently, members of 12 local communities have been employed at the Company's operations; the Company has paid the expenses for study of a number of its employees at higher educational institutions; some employees received occupational training at the Company's facilities located outside of the Krasnodar Province.

At the operation stage, yearly payments of ToAz for social-economic development of Temtuk district could reach 2 million US dollars.

Due to the fact that negative impacts can be imposed primarily during the construction phase, appropriate measures will be taken mainly during this period, although some measures (e.g. implementation of training programs) will be carried out during the operation phase. The list of planned measures includes the following:

- Consistent efforts with respect to the public relations and relations with other interested parties;
- Involvement of the public in monitoring of the environmental and social situation;
- Preferable recruiting of employees from local communities on the basis of relevant professional and qualification requirements;
- Implementation of training programs for employees recruited from local communities;
- Compensations to be paid for withdrawn farming land and damage to fisheries, etc.;
- Purchase of goods and services from local producers during the construction period, conclusion of agreements with local contractors for rendering different services;
- Strict compliance with the boundaries set for the temporarily and permanently allotted land;

- Compliance with the environmental measures aimed at conservation of the topsoil layer, vegetation cover and wildlife;
- Development and implementation of a land reclamation program;
- Implementation of social programs, efforts for development of the municipal utilities and social sectors.

Additional measures will be taken by ToAz to further disclosure the information about the efficiency of the suggested engineering solutions. From June 10 till June 13, 2003, a comprehensive assessment of safety of both facilities and delivered equipment was completed in compliance with the international standard HAZOP requirements. The GIAP Expert Commission (the Central Institute of Nitrogen Production Industry) as well as PROCO Company (France) and EIG Company (Germany) were among the participants of this assessment.

Withdrawal of a part of water areas from the use for fishing (in the port protection zone) should be compensated to the Khvalyun cooperative, which fishes in this area, in accordance with calculations made by experts from the authorized institute and approved by the supervision authority (Kuban'rybvod). In addition, ToAz is currently negotiating with local fishery cooperative a supply of modern fishery boats.

As a result of implementation of all planned measures and prevention of potential accidents, no negative impacts on the socioeconomic aspects have been predicted for the operation phase.

6.1.8. Public Health

In order to ensure epidemiological, sanitary and hygienic safety in connection with its operations, the Company has developed a set of measures presented below.

The first set of measures is related to epidemiological safety:

- It is planned to provide appropriate facilities for accommodation of construction workers, renovate and develop the local municipal infrastructure and provide required medical personnel and equipment for the construction phase.
- A waste management plan is being developed for the construction phase.
- It is planned to carry out extensive rodent extermination procedures and ensure that the accommodation facilities for the construction workers will be inaccessible for rodents; appropriate conditions will be provided for storage of drinking water and foodstuff.
- It is planned to clarify more specifically the boundaries of natural infection sources. Based on the results obtained and other available data, differentiated methods and techniques will be developed for prevention of each specific infection depending on the activity of natural sources and the degree of risk of infection for people in each particular area.

The second set of measures aimed at establishing sanitary protection zones:

- Appropriate design documentation will be prepared for all facilities to substantiate the dimensions of the respective sanitary protection zones (SPZ) subject to approval by the relevant supervisory agencies of the Krasnodar Province in conformity with the procedure prescribed by law.
- The sufficiency of the SPZ width will be substantiated on the basis of appropriate calculations and an inventory of emission sources.
- At the stage of preparation of the working documentation, a Design for organization, development and revegetation of the sanitary protection zone will be developed and have approved by the relevant supervisory agencies in due manner.

The third set of measures provides for organization and implementation of epidemiological,

sanitary and hygienic monitoring, including the following:

- Monitoring of the quality of drinking water. Sanitary Norm SanPiN 2.1.4 1074-01 and Sanitary Rules (SP) for routine sanitary monitoring.
- Monitoring of the quality of underground water to identify any pollution according to SP 2.1.5.1059-01 and Sanitary Rules (SP) for routine sanitary monitoring.
- Monitoring of the quality of surface water bodies in conformity with SanPiN 2.1.5.980-00, SanPiN 4631-88 and Sanitary Rules (SP) for routine sanitary monitoring.
- Monitoring of air pollution.
- Supervision over implementation of the waste management plan.

6.1.9. Historical and Archaeological Sites

The project management has established working relations with the Committee for Protection, Restoration and Operation of Historic and Cultural Sites (Heritage) of the Krasnodar Province. Required archeological surveys have been carried out at the expense of the Company within the area planned for the project. Pursuant to the recommendations given by the Committee, the Company has defined the procedure for carrying out surveys required for construction planning. Approval of land allocation for the project takes into consideration compliance with the requirements of the Committee relating to preliminary archeological surveys. Pursuant to the Committee's recommendations and in order to ensure conservation of the cultural and historic heritage of the Russian Federation, the TogliattiAzot Company has planned the following measures for the construction phase of the project:

- Completion of archeological excavations within the construction site to preserve any objects of archeological value;
- Organization and implementation of monitoring of archeological sites within the zone potentially affected by the project.
- Compulsory participation of an archeologist (provided with an open list entitling him to carry out archeological surveys) as an observer (authorized representative of the agency for protection of cultural heritage) during any earthmoving operations.
- Prompt organization of archeological excavations aimed at protection (preservation) of identified archeological sites;
- Reclamation of the ground surface disturbed in the process of construction work within the area of any historic monuments to prevent development of exogenous processes.

During the operation phase the Company plans:

- Organization and implementation of monitoring of archeological sites within the zone potentially affected by the project;
- Provision of conditions for organization and implementation of systematic archeological excavations within the zone potentially affected by the project;
- Prompt organization of archeological excavations to protect (save) identified archeological sites or other work in case of emergencies at the project facilities posing threat to objects of cultural heritage;
- Promotion of studies of cultural heritage within the zone potentially affected by the project and facilitating measures aimed at its preservation, including support to museums.

6.2. Draft Environmental Action Plan (EAP)

Ser. Nos.	Brief description	Status, Timeframe
1.	Carry out detailed substantiation of the total shoreline length requiring shore protection (reinforcement) taking into account the existing lithodynamic processes and other environmental conditions of the coastal zone (within the framework of the Shore Reinforcement Design).	Under development. Prior to the beginning of full-scale construction of the ammonia terminal
2.	Clarify the composition and capacity of the biological wastewater treatment facilities in order to take into account to a maximum extent all potential pollutants (including the theoretical possibility of the presence of insignificant ammonia concentrations in rainwater runoff from industrial sites).	Under development. Before the completion of the ammonia terminal construction
3.	Clarify the water balance of the evaporation pond in order to determine its most effective configuration and capacity.	Under development. Before the completion of the ammonia terminal construction
4.	Carry out a comparative assessment of different alternatives for removal of liquid and solid waste from transportation vessels for subsequent treatment or disposal. All alternatives should be considered in conformity with the provisions of the RF Water Transport Code and the international IMO/MARPOL agreement. The main criteria for the assessment of alternatives are environmental acceptability and economic viability.	Under development. Before the completion of the ammonia terminal construction
5.	Prepare a Plan for monitoring environmental impacts (including monitoring of impacts on socioeconomic conditions and public health) during the terminal construction and operation phases.	Under development. Prior to the beginning of full-scale construction of the ammonia terminal
6.	Prepare a Plan for public consultations and disclosure of project information (PCDP) and begin its implementation. Incorporate measures aimed at adequate disclosure of project information to provide a response to the concerned public relating to environmental problems discussed in connection with the project (summarized and defined in the PCDP).	At the finalization stage. Prior to the beginning of full-scale construction of the ammonia terminal
7.	Prepare a Chance Find Protocol (CFP) describing procedures for protection of archeological monuments in case of their discovery in the process of the terminal construction (including a brief summary of agreements reached with the Committee for Protection, Restoration and Operation of Historic and Cultural Sites of the Krasnodar Province).	At the finalization stage. Prior to the beginning of full-scale construction of the ammonia terminal

7.0. OUTLINE OF ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The objectives of the environmental and social monitoring include:

- Assessment of the efficiency of the environmental, sanitary-hygienic and socioeconomic measures during all phases of the project implementation (planning and design development, construction, operation and closure);
- Timely identification of sources of potential negative impacts on the quality of the natural environment and habitats;
- Supervision over compliance with the approved terms and conditions for the use of natural resources (i.e. levels of air emissions, wastewater discharge, limits for solid waste generation);
- Verification of the data obtained by computational and modeling techniques;
- Regular collection of reliable data referring to the current status of the geological environment, soils, atmospheric air, water bodies on land, vegetation, land animals within the zones potentially affected by the project construction and operation.
- Supervision over the trends in changes of the socioeconomic conditions in the given area;
- Information support for governmental environmental supervisory agencies.

The main principles applied for the development and implementation of the monitoring program are as follows:

- Establishment of a permanent system for controlling the quality of procedures, techniques and results of monitoring;
- Use of certification methods and cooperation with duly accredited organizations implementing the work;
- Continuous recording of the monitoring results and preparation of regular reports on the monitoring results for the environmental supervisory agencies.

Organization of routine environmental and sanitary-hygienic monitoring should be ensured at each stage of investment activities both offshore and onshore:

- Construction phase (prior to the commencement of construction, during construction and commissioning);
- Operation phase.

The objects of the environmental and social monitoring are:

- Sources of anthropogenic environmental impacts;
- Nature complexes and their components, as well as natural processes occurring within the zone potentially affected by the ammonia terminal construction and operation;
- A set of indicators referring to the socioeconomic conditions.

The environmental monitoring includes:

- Monitoring of hazardous geological processes;
- Monitoring of underground waters;
- Monitoring of soil and land pollution and degradation;
- Monitoring of vegetation;
- Monitoring of the marine environment;
- Monitoring of air pollution.

The social monitoring includes:

- Number of employees (by categories: engineers and supervisors / workers), including local residents;
- Average wages and salaries (by categories);
- Number of employees from local communities who had occupational training or re-training;
- Deductions to local budgets and extra-budgetary funds;
- Compensations paid to the local enterprises;
- Number of local contractors / subcontractors;
- Volume of work performed by local contractors;
- The Company's expenditures for implementation of social programs;
- Sickness rates of the personnel involved in the project and inhabitants of the town of Volna.

The routine monitoring program for supervision over compliance with the sanitary rules and implementation of anti-epidemic preventive measures during the construction phase will be developed to the full extent by the beginning of the full-scale construction and is subject to approval by the Sanitary and Epidemiological Inspection Agency.

7.1. Monitoring during the Construction Phase

7.1.1. Hazardous Geological Processes

The need for monitoring is dictated by the threat of negative impacts of hazardous natural processes on the project facilities and the importance of recording the environmental impacts.

The monitoring procedures will comprise:

- Observation of hazardous processes;
- Analysis of the observation results and preparation of recommendations for improving the engineering protection;
- Designing of additional measures to ensure reliability of the facilities and efficiency of the engineering protection of the sites.

During the construction it is planned to organize monitoring of the actual effects of the construction work on the changes in the geological environment and intensification of the existing or emerging new engineering geological processes. Furthermore, it is planned to establish stationary observation grounds in areas most prone to active modern geological processes to continue observations of their development and assess the efficiency of the protection measures during the operation phase.

7.1.2. Ground Waters

The scope of work for assessment of the level and hydrochemical regime of groundwater includes a range of field, laboratory and room studies aimed at solving the following problems:

- Collection of data referring to a cycle of observations of the baseline (i.e. prior to the construction) groundwater regime parameters;
- Comparison of the baseline data with the observation results obtained during the construction phase;
- Identification of areas where changes in the groundwater level can be caused by construction work.

Two processes relating to groundwater will be monitored: changes in the level of groundwater streams within the ammonia terminal boundaries and changes in the quality (chemical composition and physical properties) of groundwater. Observation grounds will be established with a set of monitoring wells to obtain the required data.

7.1.3. Soils

The main objective of monitoring during the construction phase is to monitor any non-compliance incidents, soil degradation and pollution in the process of construction and earthmoving operations.

Monitoring will refer to the topsoil layer at construction sites, as well as any areas disturbed as a result of construction and earthmoving work.

The following goals should be attained:

- Collection of baseline data during the period preceding the construction phase referring to the quality of soils, as well as topsoil degradation and pollution;
- Supervision during the construction phase over removal of the topsoil layer, its stockpiling, preservation and utilization; organization of monitoring of top soil layer pollution and degradation within the zone affected by construction work, as well as the reclamation of disturbed land.

The monitoring program includes large-scale environmental and soil investigation, which would permit in the course of construction work monitoring of:

- the thickness of removed topsoil layer in the process of earthmoving operations;
- topsoil stockpiling and storage conditions for subsequent use of topsoil for land reclamation;
- topsoil degradation and pollution within the zone affected by construction;
- the quality of land reclamation.

To obtain the required data, a stationary network of observation grounds will be established.

7.1.4. Vegetation

Monitoring of vegetation will be carried out at stationary observation grounds established for soil pollution and degradation monitoring.

7.1.5. Marine Environment

The main objectives of the marine environment monitoring during the construction phase are:

- collection of reliable data referring to the content of suspended matter and pollutants in seawater within the affected sea area during the construction of the hydroengineering facilities and earthmoving operations relating to shoreline protection/reinforcement and construction of the land-sea junction area;
- assessment of the chemical composition of bottom sediments;
- assessment of the beach condition during the construction phase;
- assessment of the condition of the marine biota within the affected area during the construction phase;
- assessment of the anthropogenic impacts on individual components of the marine environment during the construction phase.

The observation network within the subject sea area will consist of stationary and temporary observation points. The stationary observation points will be used for identifying any changes in

the marine environment parameters during the entire construction period. When monitoring the content of suspended matter in the turbid water plume during the construction operations at the sea-land junction area and shoreline reinforcement work, observations will be carried out at temporary monitoring points, the position of which should be determined depending on the direction of the turbidity plume movement.

The spatial position of the observation points of the monitoring network has been selected with due consideration of the following factors:

- assessment of the baseline situation and predicted impacts of construction work on the marine environment;
- location of the hydroengineering facilities of the ammonia terminal and the shore areas to be reinforced;
- parameters of the sea currents within the areas where construction operations will be carried out;
- regulatory requirements relating to water bodies having fishery significance.

Prior to the commencement of the construction work, baseline surveys have been carried out to study the condition of the marine environment and biota concentrated within the selected observation points to permit a comparison of the marine environment status at different stages of the life cycle of the ammonia terminal with the initial baseline conditions.

7.1.6. Air

In conformity with the Methodological Guidelines for computation, regulation and monitoring of pollutants emissions to the atmosphere (NII Atmosphera, St. Petersburg, 2002) the category of “source-pollutant” has been assumed for all substances and sources.

It is planned to make appropriate measurements at all emission sources once per year.

Two stationary monitoring stations will be established for air sampling in the vicinity of the recreational facilities “Volna” and “Fakel”.

7.2. Monitoring during the Operation Phase

7.2.1. Hazardous Geological Processes

In the course of the ammonia terminal operation observations will be carried out at special observation grounds to monitor:

- exogenous geological processes;
- engineering geological processes initiated by the project construction;
- efficiency of technical measures designed to protect engineering structures against adverse consequences of geological and engineering-geological processes;
- seismic events.

7.2.2. Ground Waters

During the operation phase the prognosticated data relating to changes in the level and hydrochemical groundwater regimes will be verified. The regime observations will be carried out at the monitoring grounds with a network of observation wells equipped during the construction period.

7.2.3. Soils

During the operation phase, topsoil pollution and degradation monitoring will be carried out at observation grounds equipped at the earlier stage.

7.2.4. Vegetation

Monitoring of vegetation will be carried out at stationary observation grounds established for collection of data referring to soil pollution and degradation.

7.2.5. Marine Environment

During the operation phase the condition of the marine environment and biota will be monitored at the observation points established at the earlier stage to ensure comparability of all results obtained.

7.2.6. Air

Taking into account the high degree of potential hazard of the ammonia terminal it is planned to carry out routine monitoring of ammonia concentrations in working zones of the terminal, including the ammonia storage area, unloading facilities, jetties, electric power plant and compressor stations.

To monitor the gas concentrations in the ambient air along the ammonia pipeline and around the tanker loading facilities, as well as in adjacent areas, it is planned to use a mobile laboratory installed on the UAZ-452A vehicle.

For measurements at emission sources, the routine environmental monitoring will be carried out in conformity with the Methodological Guidelines for computation, regulation and monitoring of pollutants emissions to the atmosphere (NII Atmosphera, St. Petersburg, 2002) for the category of “source-pollutant” for all substances and sources.

Fugitive and mobile emission sources have been excluded from the list of emission sources to be monitored.

Two stationary air monitoring stations installed at the recreational facilities “Volna” and “Fakel” will be used for air sampling.

It is necessary to finalize the air sampling methodology for measurements at the flare facility depending on the particular design of the flare. The scheduled monitoring includes also monitoring of ammonia emissions from loading hoses.