

energy increased during the last three years in the United States thanks to the implementation of an intensive domestic policy to promote the extraction of this fuel from non-conventional sources. This action was reflected in the international markets as a reduction in the price of the fuel, which permits Puerto Rico to buy this product at low and favorable prices.

In addition, when analyzing Puerto Rico's economic situation, and its relation with the sudden changes in the cost of liquid fossil fuels, it was concluded that Puerto Rico's economy is not viable, unless its vulnerability to the shocks of crude oil markets is reduced dramatically.¹ This reduction is achieved by diversifying the sources for generating electricity through the use of natural gas, as a transition to the effective use of renewable sources of energy in the future. The direct result will be the strengthening of our economy and, at the same time, the improvement of the environment, as demonstrated by the interpretation made by economists of the Environmental Kuznet's Curve.

Most of the electricity is produced in the south of Puerto Rico, but it is consumed in greater quantities in the north. Hence, the need for a geographical diversification with respect to the generation of electricity. With the construction of the Via Verde project, the AEE will be able to increase generation in the north and to improve the electrical system reliability. This will give the AEE greater flexibility to choose the parameters to work on the point and with the fuel that will permit the most efficient and economical generation of electricity and with a lesser generation costs and impact on the environment.

On the face of the economic crisis confronting Puerto Rico, the AEE amended its Fuel Diversification Plan to accelerate the transition, through the use of natural gas, to the effective use of renewable energy sources. In the measure in which the use of natural gas cheapens the cost of electric energy and drives the country's economic recovery we will be in position to promote the development and establishment of generation from renewable energy sources. With this in sight the AEE signed several contracts to receive and acquire from private cogenerators a total of 295 MW in renewable energy projects and it is considering proposals to receive and acquire an additional 207 MW. In addition, internally the AEE is studying the viability of renewable solar thermal energy which would generate 50 MW.

B. Description of the Environment

A description of the environment in the zones through which the project will pass is

1

Comments in reaction to the conference titled "Transition to an Energy Use and Production Structure that will Permit Efficiency and Growth at a Sustainable Rate" by Gerrit Jan Schaeffer, drafted by Dr. Elías R. Gutierrez, February 19, 2010.

discussed in Chapter 3. The project consists of the construction and installation of a natural gas transportation system through the municipalities of Peñuelas, Adjuntas, Utuado, Arecibo, Barceloneta, Manatí, Vega Baja, Vega Alta, Dorado, Toa Baja, Cataño, Bayamón and Guaynabo. The same will have a longitude of 92 miles approximately and will require a maintenance right of way of 150' on each side of the pipeline. The construction will impact, within the right of way and throughout its length, a width of 100' (30.48 m) for the construction within which will be created a 50' (15.24 m) operational right of way and the remaining 50' in width will be restored to its original state once construction activities are completed. The total area impacted by the project will be 1,113.8 acres approximately. An additional area of 32 acres will be required for special and particular situations necessary in this type of construction.

The 48 wards (barrios) through which the pipeline will cross are: in Peñuelas, the wards of Tallaboa Poniente, Encarnación, Tallaboa Saliente, Tallaboa Alta and Rucio; in Adjuntas the wards of Saltillo, Portugués, Vegas Arriba, Vegas Abajo and Pellejas; in Utuado, the wards of Arenas, Salto Arriba, Pueblo, Salto Abajo, Río Abajo, Caguana and Caniaco; in Arecibo, the wards of Río Arriba, Hato Viejo, Carreras, Tanamá, Cambalache, Santana, Factor and Garrochales; in Barceloneta, the wards of Garrochales and Palmas Altas, in Manatí, the wards of Tierras Nuevas Poniente, Bajura Afuera, Río Arriba Poniente, Río Arriba Saliente and Coto Sur; in Vega Baja, the wards of Pugnado Afuera, Río Abajo and Almirante Norte; in Vega Alta, the wards of Bajura, Sabana and Espinosa; in Dorado, the wards of Higuillar, Maguayo and Mameyal; in Toa Baja, the wards of Media Luna, Candelaria, Sabana Seca and Palo Seco; in Cataño, the Palmas ward; in Bayamón the Juan Sánchez ward and in Guaynabo the Juan Sánchez ward.

The environmental document presents a general description of the different environmental aspects characteristic of each one of the municipalities through which the Via Verde pipeline will cross. In addition, the AEE has contracted Asesores Ambientales y Educativos (AAE) to conduct the project's environmental studies. They, in turn, contracted diverse firms to realize the same. The firms contracted were the following: for the flora and fauna study the firm of Coll, Rivera Environmental; for the geology study, the firm of Geo Cim, Inc; for the Jurisdictional Determination, Coll Rivera Environmental; for the archeological study Phase 1A, archeologists Marisol Rodríguez Miranda and Carlos Ayes Suárez. These studies are part of the appendixes that are presented together with the environmental document.

The most relevant aspects regarding the environment are summarized as follows:

- Flora and fauna

For purposes of the flora and fauna, the study area was divided into five sub-areas: subtropical dry forest, subtropical wet forest plains, mogotes of the subtropical wet forest, subtropical wet forest, and lower-montano subtropical wet forest.

For the subtropical dry forest, the total plant species found was 164, divided into 57 families, and the total animal species found was 65 divided into 33 families. Of these, the critical species of flora, regulated and in danger of extinction, according to the Department of Natural and Environmental Resources (DNER) were: palo de vaca (pigeon-berry), jayajabico (soldierwood), guayacán blanco (Hollywood lignumvitae), *Passiflora bilobata* Jussieu, palo de violeta (violet tree) and jusillo (*Henriettea squamulosum*). The species of fauna were: pato quijada colorada (White-cheeked Pintail or Bahama Duck), guabairo (Puerto Rican Whip-Poor-Will, *Caprimulgus vociferous noctitherus*), paloma perdiz áurea (Key West Quail Dove), calandria (Puerto Rican Black-Cowled Oriole) and bien-te-veo (Puerto Rican Vireo).

For the subtropical wet forest plains the plant species was 353, divided into 86 families, and the total animal species was 90, divided into 47 families. Of these, the critical flora species, regulated and in danger of extinction, according to the DNER were: higüerillo (white fiddlewood), cedro hembra (Spanish cedar), ceiba (Silk-cotton tree) and avispillo (Jamaica ocotea). The species of fauna were: culebra corredora (Puerto Rican Racer Snake), paloma cabeciblanca (White-crowned Pigeon), boa de Puerto Rico (Puerto Rican Boa), buruquena (Freshwater Crab), calandria (Puerto Rican Black-Cowled Oriole) and the bien-te-veo (Puerto Rican Vireo).

For the area of subtropical wet forest mogotes the total species of plants was 424, divided into 91 families and the total species of animals was 86, divided into 41 families. Of these, the critical species of flora, regulated and in danger of extinction, according to the DNER were: palo de vaca (pigeon-berry), doncella (*Brysonima coriacea*), ceiba (Silk-cotton tree), almez (*Celtis australis*), ortegón (*Coccoloba swartzii*), palma plateada (Tyre palm), jayajabico (soldierwood), palma de lluvia (Llume palm), corcho blanco (Water Mampoo), *Hyperbaena domingensis*, lebisa (*Licaria triandra*), *Maytenus ponceana*, *Passiflora Murucuja* L., palo de violeta (Violet Tree), *Pristimera caribaea*, almendrón (Florida poisontree), palma de sombrero (Puerto Rico Palmetto), ortiga (*Urera baccifera*), *Zamia amblyphyllidia*. The species of fauna were: culebra corredora (Puerto Rican Racer snake), boa de Puerto Rico (Puerto Rican Boa), calandria (Puerto Rican Black-Cowled Oriole) and the bien-te-veo (Puerto Rican Vireo).

For the area of the subtropical wet forest the total species of plants was 363, divided into 94 families, and the total species of fauna was 64, divided into 28 families. Of these, the critical species of flora, regulated and in danger of extinction, according to the DNER were: culantrillo, higüerillo (white fiddlewood), doncella (*Brysonima coriacea*), cedro hembra (Spanish-cedar), ceiba (Silk-cotton tree), plateado (*Exostema ellipticum*), *Hibiscus trilobus*, palo de peo (*Lasianthus lanceolatus*), laurel (Jamaica ocotea), almendrón (Florida poisontree), yagrumillo (*Schefflera gleasonii*) and ortiga (*Urera baccifera*). The species of fauna were: culebra corredora (Puerto Rican Racer Snake), calandria (Puerto Rican Black-Cowled Oriole) and bien-te-veo (Puerto Rican Vireo).

For the area of lower-montano subtropical wet forest the total of plant species was 86, divided into 41 families and the total animal species was 20, divided into 12 families. Of

these, the critical flora species, regulated and in danger of extinction, according to the DRNA was cedro macho (*Hyeronima clusioides*). The fauna species was the bien-te-veo (Puerto Rican Vireo).

Although according to the consultation made with the United States Fish and Wildlife Service (F&WS), the project could affect habitat adequate to several species, none of these species was detected during the field work, with the exception of the guabairo (Puerto Rican Nightjar).

- Geology

According to the study of the geology, the area through which the project will cross is very diverse and it encompasses close to 90 million years of Puerto Rico's geological history. The geological report indicates that the alignment crosses two geological faults that cross in the general direction of east to west in the Juana Diaz outcropping, both of the normal type. These, like the other geological faults that cross the alignment, are considered inactive. The alignment enters the layer of rocks from the Eocene (40 to 55 million years ago) which is comprised in the Great Southern Puerto Rico Fault Zone. The layer, some 4.5 km wide, extends until the margin of the Utuado Pluton, an extensive mass of intrusive rock that is also within the alignment. Also, along a 14 km stretch, the alignment crosses two of the types of topographical zones that characterize the Karst Zone; which are not necessarily part of the protected Karst Zone, according to the DNER.

The report concludes with a discussion of the limitations that the alignment's geology can present to the Via Verde project. It indicates that none of them present a major impact to the project, since all of them are addressed with the geologic and geotechnical study that is the basis for the design and construction which minimizes or eliminates their possible impacts.

- Natural systems

The project will cross through a great variety of natural and artificial systems characteristic to the island. The most significant natural and artificial systems within a distance of 400 mt or less of the proposed project alignments were considered in the document.

Next to the project are five bays (the Tallaboa Bay in the Municipality of Peñuelas, the Guayanilla Bay in the Municipality of Guayanilla, the Toa Bay in the Municipality of Toa Baja, the San Juan Bay and the Puerto Nuevo Bay); one cove (Boca Vieja in the Sabana Seca ward of the Municipality of Toa Baja); three estuaries (the estuary of the Tallaboa Bay, the Cocal River estuary, and the San Juan Bay estuary); one beach (Punta Salinas Beach); three forests (Bosque del Pueblo, Rio Abajo Forest and Vega Forest); two quarries (in the municipalities of Peñuelas and Utuado); two salt mines (in the Tallaboa Poniente ward of the Municipality of Peñuelas); four marsh areas

(freshwater marsh in the Santana ward and the Caño Tiburones marsh, both in the Municipality of Arecibo; San Pedro marsh in the Sabana Seca ward of the Municipality of Toa Baja, and Las Cucharillas marsh between the municipalities of Guaynabo, Toa Baja and, for the most part, Cataño); 31 aquifer areas (two each in the municipalities of Peñuelas, Barceloneta, Manatí, Vega Baja, Vega Alta, Dorado, Toa Baja and Cataño; three in the Municipality of Adjuntas; five in each of the municipalities of Utuado and Arecibo; and one each in the municipalities of Bayamón and Guaynabo); three springs in the Municipality of Arecibo; 18 canals (three in the Municipality of Peñuelas, seven in the Municipality of Arecibo, three in the Municipality of Manatí, one in the Municipality of Vega Baja, one in the Municipality of Dorado, two in the Municipality of Cataño, and one in the Municipality of Guaynabo); six lakes and lagoons (one artificial body of water in the Tallaboa Alta ward of the Municipality of Peñuelas; the Adjuntas lake, in the Juan Gonzalez ward; the Pellejas lake in the Pellejas ward, and the Garzas lake between the Garzas and Saltillo wards; the Matrullas lagoon in the Palo Seco ward of the Municipality of Toa Baja; and Secreta lagoon in the Palmas ward of the Municipality of Cataño); six cave systems (five in the Municipality of Arecibo and one in the Municipality of Vega Baja); a 3.91 lineal-mile crossing in the Carst Belt Region in the Municipality of Manatí; 156 drinking water wells and sampling stations; 117 creeks; 13 rivers (the Tallaboa river in the Municipality of Peñuelas; the Corcho river in the Portugués ward of the Municipality of Adjuntas; the Pellejas river in the Vegas Abajo ward of the Municipality of Adjuntas; the Rio Grande de Arecibo in the Pellejas ward of the Municipality of Adjuntas, and in the Carreras, Hato Viejo and Tanamá wards of the Municipality of Arecibo; the Caguanita river in the Caguana ward of the Municipality of Utuado; the Caguanas river in the Caguanas ward of the Municipality of Utuado; the Tanamá river in the Tanamá ward of the Municipality of Arecibo; the Rio Grande de Manatí in the Palmas Altas, Bajura Afuera and Rio Arriba Poniente wards of the Municipality of Manatí; the Cibuco river in the Municipality of Vega Baja; the La Plata river in the Municipality of Dorado; the Cocal river in the Sabana Seca ward of the Municipality of Toa Baja; the Hondo river in the Palmas ward of the Municipality of Cataño; the Bayamón river in the Palmas ward of the Municipality of Cataño); four natural reserves (Tiburones Canal Natural Reserve, Hacienda La Esperanza Nature Reserve, El Indio Natural Reserve and the Las Cucharillas Marsh Nature Reserve); 128 sinkholes (3 in the Municipality of Utuado, 64 in the Municipality of Arecibo, 47 in the Municipality of Manatí, 9 in the Municipality of Vega Baja, 2 in the Municipality of Guaynabo and one each in the municipalities of Dorado, Toa Baja and Cataño - the alignment will cross over 21 of which 14 had already been impacted by PR-10).

It is stressed that the project will not impact or affect coral reefs, cays, dunes, cisterns, dams, reservoirs, drinking water intakes or irrigation systems because none are in areas near the project.

- Determination of Jurisdiction

The determination of jurisdiction study concluded that of the 2,988,833.3 m² (738.6

acres) of wetlands under the jurisdiction of the United States Corps of Engineers delimited for this project, the project's construction right of way will cover some 369.3 acres.

The delimited wetlands are classified in the following categories: palustrine forested, palustrine herbaceous, palustrine herbaceous in agricultural use in the past or in the present, estuarine forested, estuarine forested canals and estuarine salt marshes. Approximately 2.0 acres of palustrine forested wetlands were delimited; 310.1 acres of palustrine herbaceous wetlands; 397.8 acres of palustrine herbaceous wetlands in agricultural use in the past or in the present; 23.6 acres of estuarine forested wetlands; 1.2 acres of estuarine forested canals; and 3.9 acres of estuarine salt marsh wetlands.

- Soils and land uses

The project is distributed in 419 plots of which 84.8% belong to the private sector and 15.2% to the public sector. The different types of use of the soils through which the alignment will cross are distributed approximately in the following manner: industrial area, 3.1%; recreational area, 2.8%; transportation area, 0.3%; commercial area, 0.1%; residential area, 1.0%; agricultural area, 56.2%; forest area, 35.3%; and hydrographic-hydrological area, 1.3%.

Of the 92 miles the project encompasses, 4.3% will be in a zone classified as having a 0.2% annual probability of risk of flooding, 0.43% will be in a zone classified as A (areas with a 1% annual probability of flooding and a 26% probability of flooding within 30 years), 38.9% will be in a zone classified as AE (areas with a 1% annual probability of flooding and a 26% probability of flooding within the next 30 years), 3.8% will be in a zone classified as VE (area with an annual probability of flooding equal to, or greater than 1% and a 26% probability of flooding within 30 years) and 54.5% will be in a zone classified as X (area with an annual probability of flooding of less than 1%).

- Highway crossings

Sixty three (63) state highway crossings are identified as intercepted by the project's alignment. These are indicated in Addendum 1, Highway Crossings.

- Proximity to the communities and quiet zones

The sectors or communities close to the project's alignment, approximately 400 meters or less from them, and each municipality's quiet zones closest to the project were determined. The findings are gathered in Addendum 2, Distance to the Communities and Quiet Zones.

- Archaeological and architectural findings and cultural and historic sites

The Phase 1A study identified the already known archaeological resources and

established the basis for discovering additional resources in the project's area. The following findings are worth highlighting:

In the Municipality of Peñuelas - vestiges of the railroad line and the Loyola Hacienda in the Tallaboa Poniente ward; a small shell heap with pottery and conch shell fragments from the chicoid taino period in the Encarnación ward; the Dolores and Coto Haciendas in the Rucio ward.

In the Municipality of Utuado: an archeological find near the cemetery and the river crossing.

In the Municipality of Arecibo: archaeological residues inside a cave with habitation remains and several in the Rio Arriba ward; archaeological finds in Refugio Salmón and in the Ventana cave, in the Hato Viejo ward; residues, a cave or rockshelter, petroglyphs and pictographs and historical material were found in Matos Cave in the Carreras ward.

In the Municipality of Barceloneta, in the Palmas Altas ward there are vestiges of the railroad line that intercept the alignment at mile 53.25. The Phase 1A Archaeological Study recommends a 1B Phase, with the exclusion of the mountainous areas and the Tiburones Marsh zone, for the whole area the project will traverse in this municipality.

In the Municipality of Manatí: two architectural structures, the Truss Bridge and Central Monserrate sugarcane mill.

In the Municipality of Vega Baja: an architectural structure, Hacienda Monserrate; the study recommends going ahead with Phase 1B in the Paso del Indio area.

In the Municipality of Vega Alta: architectural structure, a bridge; the Abra de los Perros Cave is considered an area of archaeological findings.

In the Municipality of Dorado: Casa Hernandez or the residence of Mrs. Antonia Ramirez; abundant dispersed materials were found of the Taíno/Colonial period of the late 19th Century; material on the surface of the Taíno, subtaíno, late saladoid and colonial period in Punta Corozo; a multi-component site with Taíno and late 19th century colonial period in the Mameyal ward.

In the Municipality of Toa Baja: Santa Elena dairy farm; fragments of 19th century historical ceramic dispersed on the surface; ruins of the Our Lady of Candelaria shrine in the ancient Hacienda El Plantaje, in the Sabana Seca ward of Toa Baja; an archaeological site under the gravel topping in the posterior part of land belonging to the Electric Power Authority, in the Palo Seco ward.

In the Municipality of Cataño: Hacienda Palmas in the Palmas ward.

C. Study of Alternatives and selection of the alignment

Chapter 4 analyzes in detail the alternatives considered for the execution of this project. The following were considered among such alternatives: land alignments for a natural gas pipeline; the use of a system of barges and buoys to receive, re-gasify, store and provide natural gas; the construction of a liquified natural gas receiving and re-gasification terminal. In addition the utilization of renewable energie options technically and commercially proven and the No Action alternative were also considered.

- No Action

The No Action alternative was found to be not feasible given the transcendence, importance and public well-being sought by the project. It was considered that, although this alternative would avoid the impact related to the construction, installation and operation of a pipeline to transport natural gas, such impact can be minimized and mitigated. This alternative is not indicative of no impact, since it forces the continued burning of petroleum derived products which generate a greater amount of pollutinon and emissions into the air and at higher costs than the burning of natural gas, which would make the service of electric power more expensive and it would negatively impact Puerto Rico's economy.

The No Action option would not permit maintaining a structure of fixed costs that would avoid the abrupt peak changes in the cost of the fuel acquired. This can only be avoided by reducing the dependence on the use of petroleum and expensive fossil fuels. In addition, the limitations of the federal and state permits on the type of fuel that can be burned would lead us to one of two options: to cease generating electricity, which is not viable, or burn a cheaper fuel with higher sulfur content than that contained in said permits, which would expose us to fines and sanctions.

- Liquified natural gas receiving terminal in the San Juan Power Plant

Even though Puerto Rico has an Liquefied Natural Gas (LNG) Terminal with the capacity to supply our needs, at the EcoElectrica Cogenerator facility, the alternative of constructing a new LNG terminal near the San Juan Thermoelectric Plant was considered because it would be near an existing dock for the receipt of fossil fuel. Three criteria were used determine whether this was a viable alternative: specific site factors, maritime operations, and environmental issues.

The analysis of these criteria leads us to the conclusion that this was not a viable alternative for the following reasons: we would need to dredge the navigational canal and the turning basin; the dredged material would present the problem of securing an adequate disposal location; the dredging and disposal operations would produce a high concentration of sediments, which would impact the benthic area and the water quality even more; maritime traffic would be adversely affected and as a consequence our economy and tourism because the San Juan Bay is the backbone of our tourist

economy; the increase in maritime traffic would affect marine life in the area; there would be an increase in the temperature of the Puerto Nuevo Bay waters, which would have a cumulative effect on the benthic community of the bay, water quality would be affected and, in consequence, the water quality parameters required in the environmental permits which govern the power plant; due to space limitations in the power plant and in areas near it, we would be unable to comply with the regulations that determine the space that must exist between the different elements within the terminal and the establishment of an exclusion zone or distance from populated areas; the costs associated with the construction of the pipelines to transport natural gas from the coast of the island would not be eliminated; the process of studies and permits together with the construction and commencement of the operation could take from 7 to 10 years, it would not satisfy our need for an immediate project to propitiate the transition from petroleum to renewable sources of energy; the project would be too expensive because it would surpass \$1,000 million.

2.3.2. Barges and buoys

The installation of a system of barges and monobuoy for the receipt, storage, re-gasification and transport of the natural gas was considered as one of the alternatives. The AEE evaluated the viability of the construction of these systems in three areas: San Juan, Toa Baja and Arecibo. The criteria considered in such evaluation were: costs, space, time to have it operational, permits, safety, environmental justice, past experiences in Puerto Rico and the United States.

The process for the design, construction and operation of the barges and buoy system would have an approximate cost for each power plant of between 70 and 80 million dollars yearly, subject to the signing of a contract with the company in charge of the process for a term of not less than 20 years. At the end of the 20 years the cost would be some 1.6 billion dollars for each power plant. The time period required to start the operation of the system would be between 5 and 8 years. In addition, an analysis for each power plant demonstrated that it is not a viable alternative in the short term.

The San Juan Power Plant does not have space available to locate the receiving terminal; the pipeline to the power plant would run through an area of intense maritime traffic; there are low-income communities near the project that would be affected; the proximity of CAPECO would influence the community's perception of the project.

The Palo Seco Power Plant does not have space to locate the receiving terminal; the permits process is complicated and costly; there are low-income communities near the project that would be affected, the proximity to CAPECO would influence the community's perception of the project.

The Cambalache Power Plant does not have space available to locate the receiving terminal; the permits process is complicated and costly; there are low-income communities near the project that would be affected.

The foregoing ruled out the construction of a system of barges and monobuoy for the receipt, storage, re-gasification and transport of natural gas within the time frame required for the action under consideration. Consequently, the supply of natural gas to this power plant will have to be through a gas transport pipeline, inevitably.

- Natural gas pipeline

In this analysis, some components of the study owned by the AEE and conducted under contract by *Power Technologies Corporation* (PTC) in 2006, titled: *Corridor and Alternative Routes Selection Study*. The two alignments suggested in the PTC study to carry natural gas from EcoEléctrica to Cambalache Power Plant were analyzed, together with a third alignment not considered in the study. The same was done with the alignments suggested in the study for the transport of natural gas from Cambalache Power Plant to the metropolitan area power plants, Palo Seco and San Juan.

For the selection of the alignment with the greater potential for development, the three alignments for each stretch were compared and the alignment that obtained the greater number of positive criteria in its favor was selected. Eight criteria were used to compare each stretch: land use; bodies of water impacted; miles of forest or natural reserves impacted; endangered species; archaeological findings; highway crossings; zoning or soil calification and nearby residences. For each criterion, a positive (+) value was assigned to the most favored stretch, except for the criterion of nearby residences, which was assigned a value of two (++) positives since one of the primary goals of the project is to be as far away as possible from communities or inhabited areas.

The matrix created would indicate which alignment would have the greater potential for development for each stretch. The alignment selected for the project would be the union of the two favored segments. Necessary variances were incorporated into this selected alignment due to different reasons: minimal impact to the communities, avoiding or minimizing the environmental impacts, economic factors and factors associated to the construction. The total number of variances incorporated were 18, broken as follows: 12 variances to keep far away from communities; three variances to avoid or minimize environmental impacts; one variance for economic factors; and two variances for construction reasons. The incorporation of these variances resulted in the alignment presented in this environmental document.

D. Project Description

Via Verde will provide a natural gas transport system from EcoEléctrica in Peñuelas to the AEE's Cambalache, Palo Seco and San Juan power plants through some 92 miles of 24" diameter, underground steel pipeline.

The pipeline and the other construction materials will be ordered from companies outside of Puerto Rico and will be received by the Port of the Américas and the San

Juan Port Zone. Six operation centers will be established located adjacent to each port, plus in the areas of Utuado, Arecibo, Vega Alta and Toa Baja. Their locations are already impacted by industrial activity and their use will be temporary in nature while the project is under construction. They will serve as bases for the receipt, storage, inventory and dispatch of materials and equipment for the project.

The project will have a cost of \$447,000,000 dollars. This sum includes the items of design, purchase, hauling and delivery of materials, construction, payment of licenses and taxes, land acquisitions, studies and permits. The cost of the conversion to natural gas of the units is estimated at between 50 and 70 million dollars.

Before the excavation begins there will be coordination with the Public Service Commission or with the Permit Office (Oficina de Gerencia de Permisos), as applicable, so that the agencies or companies with underground infrastructure mark the location of said infrastructure. Whenever possible, a minimum distance of 24" from other underground infrastructure will be maintained.

Four gas flow meters with their respective equipment, one bidirectional PIG launcher/receiver and one PIG receiver will be installed, and connections will be provided for a portable PIG launcher/receiver unit. The latter are to carry out inspections, measurements and cleaning inside the pipeline. In addition, isolation or security block valves will be installed to isolate segments in case of inspections, repairs or emergencies, the number and location of which will be determined by the class and location.

The equipment will have the capacity to operate at maximum pressure and temperature of 1,450 psi and 120°F, but the entry pressure will be 650 psi and it will be reduced to 400 psi before it enters the combustion turbines.

- Natural Gas

Natural gas is a fossil fuel formed by organic matter underground at high pressure for geological-scale times. It is a mixture of hydrocarbons whose principal component is methane (CH₄). It is colorless and odorless and it is lighter than air; its specific gravity fluctuates between 0.55 and 0.64; its explosive limit is 3-17%, outside of these limits there is no combustion. Natural gas is non-toxic, but it is a simple asphyxiant if it displaces oxygen, which could produce dizziness, deep breathing or, due to the need for air, nausea and unconsciousness in case of overexposure, which would require immediate medical attention. It is not classified as carcinogen or potentially carcinogen.

To address leakages the emergency response and rescue personnel must use a self-contained respirator (SCBA) and fire-resistant clothing, and they must have the training required by Law (29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*). All personnel must be evacuated from the affected area and if it is in a confined space, the area ventilation is to be increased.

One cubic foot of natural gas produces an average of 1,000 BTU. It represents one fifth of the world's energy consumption. It is one of the cleanest fossil fuels and better for the environment because the sulfur dioxide emissions are minimal and those of nitrous oxide and carbon dioxide are less than those of other fossil fuels. The natural gas industry is comprised of three segments: production, transmission and distribution. In Puerto Rico it is used in its entirety for the generation of electricity although natural gas has other domestic, commercial, industrial and transportation uses.

- Personal safety

The construction project will be contracted out. The contractor will be responsible for submitting a work plan which includes the health and safety aspects established in the Code of Federal Regulations, Title 29, *Labor*, Part 1910, *Occupational Safety and Health Standards* and Part 1926, *Safety and Health Regulations for Construction*.

- Construction stages

The construction will be done by segments and it will follow a specific sequence (production line style). Each construction stage will be described below.

- Identification of owners, Surveying I and Environmental Studies

The *New Star Acquisitions* company was hired for this stage. They identified the land owners; they were asked for an access permit to carry out the land surveying and the pertinent environmental studies and one was signed. In the first stage of the surveying the LIDAR aerial technology was used; with the alignment's coordinates the environmental studies were started.

- Clearance of the right of way

Once the land comprising the right of way has been acquired, heavy machinery will be used to clear and level. Although the construction right of way will be 100' in flat areas, on mountainous areas and in places where the horizontal directional drilling is made, it may range from 100 to 300 feet. It is estimated that 1,113.8 acres will be impacted and 687,760 cubic meters of soil will be removed. The soil removed will be stored to be used later in the restoration stage. The necessary measures will be taken to minimize sedimentation of the water bodies.

- Land surveying

The center points of the line will be checked and marked. Then the pipeline (in 40-foot long spreads) is laid throughout the alignment.

- o Trench Construction

Specialized machinery will be used for the construction of the trenches (*wheel ditcher*) or machinery with a mechanical arm, depending on the conditions of the area. The trenches will be 5 to 6 feet deep and 4 to 5 feet wide, so as to allow a 3-foot cap over the pipeline. The removed soil will be sifted and stored alongside the trench to cover the same later. The remainder will be disposed of in an authorized landfill. It is estimated that 494,206 cubic meters of soil will be removed.

The highway crossings will be made by boring and the pipeline will be at a minimum of 4 feet under the same highway. (See addendum 1, Highway Crossings). These segments will be designed to tolerate the weights associated to the highway and the vehicles that pass through it. The crossings of bodies of water and of some highways will be made by horizontal directional drilling (HDD). This is a "dry" crossing method because it does not interfere with the flow of the body of water, and it is made underneath the bed of the body of water. A dye will be added to detect small bentonite leaks. Ten bodies of water were identified that will be crossed by HDD. In addition, 66 crossings of bodies of water were identified to be crossed by open trench. Addendum 3, Crossings of Bodies of Water, contains the bodies of water and the coordinates where the project will cross.

- o Welding and bending

Once the pipeline is positioned, the necessary bending is made to couple it to the ground with machinery that exerts hydraulic pressure. Then it is laid on supports, the ends are cleaned, lined up and welded using the manual submerged arc welding method. The welded seams will be checked with non-destructive methods; if any flaw is detected, the weld is repaired or it is cut off and a new weld is made. Lastly, the ends are covered with a protective coating. Next a second inspection of the pipeline protective coating is made.

- o Lowering and backfill of the trench

The pipeline is lifted using specialized machinery (sidebooms) and it is lowered into the trench. Fine-particle sifted soil is used first to back-fill the trench to prevent damage to the protective coating. Then the remainder of the soil and small stones are deposited on the excavated trench and finally the top soil is placed within the construction area. In total the minimum cover will be 36 inches and 48 inches in agricultural areas. The recommendations of the Highways Authority with respect to the backfill material to be used will be followed in crossings of highways, roadways and roads where the open trench method was used.

- Hydrostatic testing

In compliance with 49 CFR 192.505, *Strength test requirements for steel pipeline*, hydrostatic testing will be conducted on the totality of the pipeline. The pressure will be higher than the operating pressure for at least eight hours.

- Pipeline right of way restoration

After passing the hydrostatic test, the right of way will be restored. Of the 100 feet width of the construction right of way, 50 will be restored to their original state; the remaining 50 feet will be a permanent or operations right of way, which will be restored only with wild vegetation or lawn without deep roots. In agricultural lands it may be used to plant crops that don't have deep roots. On wetlands, mitigation will be carried out "on site".

- Construction in special areas

- Wetlands and mangrove areas

In non-saturated areas the same equipment and procedure of open trench will be used. In saturated areas, the pipeline is welded outside the wetland area; the excavation and backfill of the trench is made with backhoes; the pipeline is installed by the push and pull method through flotation buoys; the buoys are removed and the pipeline is sunk by its cement coating or using weights.

To prevent the equipment from sinking or to avoid disturbing the soil or excessive turbidity of the water, timber mats or timber rip-raps will be placed. The organic cover extracted will be stored and used as backfill.

- Earthquake prone areas

Via Verde will be designed and constructed with similar specifications to those used in places with a higher incidence of intense earthquakes, like California and Alaska. The following measures will be incorporated to the design to guarantee the integrity and continuous operation of Via Verde: the relative alignment of the pipeline relative to the faults to diminish the impact of a slip in such fault; burying the pipeline in a wide trench, with long lateral slopes filled with compacted sand to allow for the deformation of the pipeline during a seismic event; including enough bends in the design of the pipeline to guarantee its flexibility; the results of the geotechnical studies that will be conducted to evaluate the properties of the soil.

- Karst zone areas

During the construction there will be a resident biologist at all times to evaluate the area carefully. Only light equipment will enter to minimize the possibility of harm. Adequate

erosion and sedimentation controls will be established. There will not be any operation centers or auxiliary spaces of the construction in this zone. The pipeline will be installed through the pulling method to minimize the heavy equipment. The backfill will be adequate to permit the hydraulic capacity of the soil. Once the trench is covered, vegetation will be immediately planted in the area surrounding the permanent right of way. The pipeline patrolling program during the operation will give special attention to the soil to detect any erosion.

- Use of explosives

The use of explosives will not be necessary. Nevertheless, if any area were identified in which the use of explosives is indispensable, it will be made only by specialized personnel and in compliance with the applicable laws and regulations.

- Conversion of Units to natural gas

The units that will use natural gas for the production of energy will be: Units 1, 2 and 3 of the Cambalache Power Station; Units 3 and 4 of the Palo Seco Power Station; Units 7, 8, 9, 10 and Combined Cycle Units 5 and 6 of the San Juan Power Station. The units will be modified so they can burn natural gas, Bunker C or a combination of both. The minimum and maximum flow of natural gas each power station will need, respectively, will be: 5.5 and 61, 1.1 and 84, 1.1 and 180 MMSCFD. The systems that will require modifications, among others, will be: modifications to boilers and their gas supply system and modifications to turbines.

- Risk analysis and safety measures

The safety aspects of the gas pipelines are addressed by the Office of Pipeline Safety (OPS). It is in charge of carrying out inspections, establish regulations, promote research, issue compliance orders, apply civil and criminal penalties and educate the public, among other functions. The Pipeline Safety Improvement Act established an alliance between the Federal Department of Transportation, the Energy Department and the National Institute of Standards and Technology, to conduct research, make demonstrations and standardize procedures that guarantee the integrity of pipelines. Via Verde of Puerto Rico will be governed by the codes of the Federal Department of Transportation.

According to the OPS, the causes of incidents and accidents in the natural gas pipelines are, in order of probability of occurrence: corrosion, excavations, failure of the construction materials, action of the forces of nature, human error and unknown or miscellaneous causes. The OPS established preventive measures to minimize each one of these risks.

- Information program

One of the most important factors of Via Verde is safety, for which reason keeping the public informed is vital to the success of the project. The AEE established a public information plan in two phases.

The first one already commenced and it covers the periods of time before and during the construction. We continue to present the project to the mayors and their legislative assemblies, to agencies with inherence in the project, professional forums and to the general communities. The presentations have the purpose of: conveying clear, concise and correct information; know and respond to the communities' concerns; and establish a point of contact between the community and the AEE. In addition, the different means of communication are used to convey the information.

The second phase will be during the operation of the project. A written Public Information Plan will be developed in accordance with 49 CFR 192.616, Public Awareness, and the American Petroleum Institute, Public Awareness, Recommended Practice 1162.

- o Class location

The different specifications for the manufacture of the pipeline are established in 49 CFR 192.5, Class Location, in accordance with its location or the population density. The regulated specifications that will depend on the classification are, among others: thickness of the pipeline, distance between valves, operating pressure, frequency of inspections and tests. The class unit by location extends to 220 yards (200 meters) on both sides of the line center of any continuous mile of pipeline. There are four classes defined in the following way: Class 1- area near the coast or which contains 10 or less buildings designated for human occupation; Class 2 - area which contains more than 10 but less than 46 buildings; Class 3 - area that contains more than 46 buildings or where the pipeline is within 100 yards of a well defined place (building, children's play area, recreational area, open air theater, or where the public congregates) and is occupied by 20 or more persons, at least 5 days in the week for 10 weeks in any 12 month period (the days and weeks don't need to be consecutive); Class 4 - area where there are four storey buildings or taller.

The classification of the class unit by location may vary by the increase in the population density after the pipeline is installed and in use. The federal regulation establishes that a study must be made to determine, among other things, the hoop stress and the yield strength. This study will determine whether there will be a need to vary the operational pressure so as to adapt to the new class by location. The applicable regulation is 49 CFR 192, sections 609, Change in Class Location: Required Study, 611, 553, General Requirements, and 555, Up rating to Pressures that Will Produce a Hoop Stress of 30% or more of SMYS (Specified Maximum Yield Strength) in Steel Pipelines.

- o Pipeline specifications

The life span of the Via Verde pipeline is fifty years. The same will be designed in accordance with federal regulation 49 CFR 192, sections 105, Design Formula for Steel Pipe and 111, 107, 113 and 115, Design Factor for Steel Pipe, Yield Strength for Steel Pipe, Longitudinal Joint Factor for Steel Pipe and Temperature De-rating Factor for Steel Pipe, and standard 5L of the American Petroleum Institute (API 5L). Among the tests to be conducted on the pipeline are: chemical analysis, impact, hardness, hydrostatic and weld tests.

- o Corrosion control

A Fusion Bonded Epoxy (FBE) external coating will be applied to the pipeline. A second coating, Tough Coat, will be applied over the FBE to the part of the pipeline that passes through bodies of water and under highways for protection when the pipeline is pulled from one side to the other. In addition, the pipeline will have cathodic protection to prevent corrosion. The pipeline will be evaluated annually to insure the functioning of the cathodic protection and the voltage will be monitored by monitoring stations that will check the functioning of the rectifiers. All the parameters of the federal regulations will be followed: 49 CFR 192, sections 463, External Corrosion Control: Cathodic Protection, 469, External Corrosion Control, Test Stations. During the operation, a PIG (pipeline inspection gauge) will also be used, a tool that runs the length of the pipeline and uses non-destructive methods to identify and document defects and anomalies in the same.

- o Welding

Welders will be qualified before the project starts; and all of them must pass the tests required for this type of welds. The destructive method will be used for the qualification of the pipeline welds. It consists in evaluating the weld measuring the force needed to break it. Approved welders will be assigned an identification number that must be placed on every welding job s/he performs. If any irregularities are detected in the weld during the X-ray test or the hydrostatic test, the welder will be removed from the job immediately and the weld will either be repaired, or it will be cut off and a new weld will be made. The weld inspections will be visual, by an inspector with specific expertise in the type of weld, and through X-rays. The welds will be covered with a protective coating. The applicable regulation is 49 CFR 192, section 243, Non-destructive Testing.

- o Hydrostatic test

Once the pipeline has been lowered into the trench and covered, it is filled with water and a test pressure greater than the maximum allowable operating pressure (MAOP) is applied. The test pressure is 1.1 times the MAOP in open spaces, 1.25 times in Class 2 locations and 1.5 times in Class 3 locations. The pressure applied is stabilized for 8 hours. The test helps locate areas in the pipeline (including the welds) that cannot

tolerate elevated pressures and which therefore fail.

- o Pressure control equipment, isolation valves

To prevent accidents caused by excessive pressure, monitoring and protection equipment to guard from harm caused by elevated pressures will be installed. In addition, valves will be installed that will isolate sections of the pipeline in case of emergency or to perform inspections and repairs. These will be placed by intervals as required by regulation, as a function of the Class by Location.

- o Precautions for excavations

The greatest risks to the integrity of the pipeline are excavation activities whereby any contact with the pipeline must be informed to the operator for the corresponding actions. Before excavating, every person must communicate with the Public Service Commission, or the Permits Office (OGP), as applicable. They will communicate with the operator who will mark the pipeline's alignment. Work will be done in conjunction with the municipalities to establish an excavation control mechanism. An inspector will be assigned to be present during the excavation.

- o Operator qualification

The OPS requires that the operator and personnel hired by him takes part in a formal personnel qualification program (Operator Qualification Rule, August 27, 1999), which must be in writing. This plan must start before the pipeline begins to operate. The personnel qualification program is governed by 49 CFR 192.805, Qualification Program, and it must be documented in accordance with 49 CFR 192.807, Recordkeeping, to demonstrate compliance with the written plan. The OPS established an inspection protocol for use by federal and state inspectors. In addition, the operation personnel must comply with the Regulations of the Testing Program to Detect Controlled Substances in Officers and Employees of the AEE.

- o Clearance distance from the pipeline

The regulation, for the purpose of protecting the underground pipeline, requires that it keep a distance of 12 inches from other underground equipment and infrastructure (49 CFR 192.325). Nevertheless, whenever possible a distance of 24 inches will be kept. The regulation does not provide distance requirements between the pipeline and buildings or dwellings.

- o Inspection and maintenance

A Pipeline Integrity Management Program will be developed and established pursuant to 49 CFR 192.911, which will discuss the specific risks for each high consequence area (HCA, or AAC for *Area de Alta Consecuencia* in Spanish) identified in accordance with 49 CFR 192.905. In addition, an Inspection and Maintenance Program will be prepared that will cover the pipeline, flow meters, valves and other equipment. Copies

of these will be kept in our Power Plants and in EcoEléctrica. In addition, pursuant to 49 CFR 192.709, Recordkeeping, a file will be kept for everything related to the repairs, patrolling, inspections and tests.

- Patrolling

The AEE will establish a patrolling program to observe evidences of leakage and conditions in the right of way that may affect the integrity of the pipeline. The patrolling methods will be: walk through, drive through or helicopter flights. The frequency of patrolling is established in 49 CFR 192.705, Transmission Lines: Patrolling, and it depends on the class by location.

- Markers

Once the line is constructed, markers will be placed throughout its length. The places, reasons and information the markers must have are regulated in 49 CFR 192.707, Line Markers for Mains and Transmission Lines.

E. Impacts

Every possible effort was made to avoid areas or habitats of ecological value and to avoid significant impacts. In places where it is unavoidable, measures will be taken to minimize the negative effects and mitigate the impact caused.

- Deforestation and soil movement

It is estimated that 1,113.8 acres of land will be impacted. All the trees and vegetation will be removed from that area. The movement of soil for the project's construction is 1,181,966 cubic meters, approximately. The impact caused by these activities will be soil erosion, sedimentation of bodies of water, emission of fugitive dust, possible reduction in the soil's absorption capacity due to compaction, increase in the potential for the introduction of invasive species and reduction of available habitat for fauna.

- Emissions of fugitive dust

The following measures will be taken to minimize these impacts: a construction permit will be requested for fugitive dust emission sources; a Notice of Intent will be filed and a Storm Water Pollution Prevention Plan will be prepared; sprinkler trucks will be used to sprinkle the areas; dump trucks will use tarps.

- Erosion and sedimentation

To minimize the impact the following measures will be taken: the work area will be demarcated to avoid removal from outside the area; an Erosion and Sedimentation Control Plan will be prepared; a Notice of Intent will be filed and a Storm Water

Pollution Prevention Plan will be prepared; the soil will be stored adjacent to the trenches or be reused as backfill (the remainder will be disposed of in an authorized landfill); the soil will be compacted; and the removed vegetable cover and trees will be mechanically shredded and reused as wood chips; in areas of marked slopes, terraces will be built and covered with wood chips.

- o Karst Zone

The protected karst zone in Puerto Rico covers some 151 square miles. Via Verde will cross over some 3.91 linear miles, or 0.08 square miles of these, which is equivalent to 0.05% of the protected karst zone. During the construction there will be a resident biologist available at all times to evaluate the area carefully. Only light equipment will enter the zone to minimize the probability of damage, for that reason the installation of the pipeline within said area will be using the push and pull method. Adequate erosion and sedimentation controls will be established. There will be no operation centers or auxiliary spaces to the construction in this zone. The backfill will be adequate to allow the soil's hydraulic capacity. Once the trench is covered, vegetation will be planted immediately in the area surrounding the permanent right of way. The pipeline patrolling program during the operation will pay special attention to the soil to detect any erosion.

- Agriculture

The potential impacts on agricultural land will include: crop losses, interference with agricultural drainage, loss of top soil, soil compacting and impact to irrigation systems. Once the construction is finished, the use of the soil will continue as before, including planting as long as it doesn't include trees whose roots may interfere with the pipeline.

The following measures were evaluated to minimize or mitigate the impacts and the viable ones will be implemented: the time of less impact to agriculture will be established; when the soils are used continually for cultivation damages will be indemnified; topsoil will be separated and stored for reuse; erosion control measures will be implemented; the surface soil will be de-compacted to facilitate planting and water absorption; the construction works will be coordinated with landowners and lessees to avoid as much as possible damages to irrigation systems and cattle movement; there will be indemnification for crop losses.

- Deforestation

Loss of vegetation will be inevitable. Therefore the following measures will be taken: the right of way will be delimited to avoid damage in other areas; the soil will be restored to its original state and only the permanent right of way will be kept free of deep-rooted vegetation; a mitigation plan will be devised for cases in which the loss of species with ecological value cannot be avoided; reforestation will be in a 3:1 ratio.

- o Forests

The original alignment crossed through three forests: Bosque del Pueblo, Rio Abajo Forest and De La Vega Forest, which together comprise 10,515.85 square miles of forest. To prevent impacting those, the alignment was varied so as to avoid Bosque del Pueblo totally, the Rio Abajo Forest will not be impacted because the existing, already impacted RoW of PR-10 will be used. The only forest to be impacted will be De La Vega Forest. Its total area is 1.85 square miles and only 0.0086 square miles of it will be impacted temporarily, that is 0.47%. Once the construction is finished, 0.0043 square miles will be restored, whereby the permanent impact will be 0.235%. The impact to the total area of the three forests will be 0.0086 square miles or 0.000082%.

- Wetlands

Thirty-three percent (33%) of the alignment will cross through wetlands. The impact will be reflected on soil disturbances, which will increase the turbidity of the water, there will be temporal and permanent loss of vegetation and impact to resident and migratory species. To minimize the impact on wetlands the following measures will be taken: to avoid the accumulation and putrefaction of the removed vegetable cover, it will be removed outside of the area and disposed of as non-hazardous solid waste; the right of way will be delimited to avoid impact outside of this area; erosion and sedimentation control measures will be established; vehicles with leaks will not be allowed; special wetland construction techniques will be used; loss of vegetation will be mitigated on site; a Mitigation Plan will be prepared in coordination with the concerned agencies.

- Mangroves

This resource will not be impacted since measures have already been taken to avoid the same: the alignment was varied in the four mangrove areas so as to avoid crossing over the same or construction techniques will be used that will not impact them (HDD).

- Surface water bodies

Seventy-eight (78) bodies of water through which the project will cross were identified. The small ones will be crossed by open trench. The impacts include turbidity, sedimentation, diminution of dissolved oxygen, mortality of aquatic fauna and flora. The impact will be mitigated by reducing the construction time: bodies of water fewer than 10 feet wide will be crossed in 24 hours or less; from 10 to 100 feet wide, in 48 hours.

The more voluminous bodies of water will be crossed with HDD. Geotechnical studies will be made and construction plans specific for the site will be developed. The release of bentonite may affect the turbidity, diminish dissolved oxygen and affect the respiration of aquatic organisms. To avoid it a dye will be added to detect leaks and, should one occur, the flow of bentonite will be immediately stopped and the pertinent

Agencies will be notified. Another impact is the size of the construction right of way which will be 150 to 300 feet on both sides of the body of water. Erosion and sedimentation control measures will be established.

- Groundwater and aquifers

Thirty-one (31) aquifers were identified; the possibility of polluting groundwater is remote. To avoid oil and fuel spills a Spill Control Plan will be established.

- Water consumption

The hydrostatic test entails the greater water consumption (7 million gallons) whereby, to eliminate the impact on the public distribution system and the bodies of water, the water will be obtained from the wells for which the AEE has a water franchise. Bottled water from local suppliers will be used for consumption by employees. A local supplier will be hired to sprinkle the ground. He will be responsible for supplying the truck and the water.

- Water wells

Of 156 wells within a radius of 460 meters from the alignment, only five are inside the project's operation right of way. These will be identified in the project's drawings, their location will be marked on the ground to avoid impacting them and any breaks that may occur due to the construction will be repaired.

- Transportation and traffic

Barges will be used for the maritime transport of materials and machinery to the Port of the Americas and the San Juan port zone. To minimize the impact to maritime transport the following measures will be taken: all the requirements established by the receiving ports, the Ports Authority and Federal Customs will be complied with; a logistics plan will be submitted for endorsement by the pertinent authorities.

The roadways will be used as access to transport personnel, equipment, vehicles (light and heavy) and materials to the different project areas. Roads will be crossed using the open trench method or drilling. These roads are indicated in Addendum 1, Highway crossings. To minimize the impact to the integrity of the roadways and the interruption of, or increase in traffic the following measures will be taken: car pooling by employees will be encouraged; a Traffic Management Plan will be submitted to the Transportation and Highways Authority (in Spanish Autoridad de Carreteras y Transportación or ACT); if necessary and in coordination with the ACT and the local Police, detours will be established; the trenches will not be left uncovered.

- Archaeological finds and cultural and historic places

Three rock shelters with the presence of petroglyphs, possible farming terraces, remainders of two railroad bridges and the remainders of two haciendas were located. An archaeological study was conducted, Phase 1A which indicated the most important findings: Tallaboa Site, Salto Arriba Site, Bridges, Hacienda La Teresa, Hacienda Las Lisas, rock shelters, farming terraces, Paso del Indio, Punta Corozo, Dorado 15, Toa Baja 18, Hacienda La Candelaria, Warehouse 5. The recommendations the Institute of Puerto Rican Culture and other concerned agencies see fit to provide will be followed.

- Noise

Via Verde is a lineal project and the construction will move along day by day, therefore the noise will not be concentrated in any specific area. The noise levels of the machinery and the vehicles to be used are comparable to those established by the Environmental Quality Board's (in Spanish Junta de Calidad Ambiental or JCA) Noise Pollution Control Regulation. The following measures will be taken to minimize the effects of noise in populated areas: the work will be circumscribed to the time schedule established by the Regulation; the vehicles and machinery will have noise control equipment; inasmuch as possible, the newest equipment found will be used; the machinery will be turned off when not in use.

- Spills

In general, spills occur by human error: poor handling of the products, lack of maintenance of the equipment, and lack of adequate knowledge of the functioning and operation of the machinery. If spill occur, they will not be of a significant magnitude, because small quantities of the products will be used. The most significative event would be the total spill of a fuel truck, 2,500 gallons of diesel fuel.

The following measures will be established to avoid spills or minimize the impact of the same: a Spill Control Plan and a Spill Prevention, Control and Mitigation Plan for the use of bentonite will be prepared; Personnel will be trained (in: handling of chemicals; situations that might cause spills; how to avoid or minimize the impact; how to respond to a spill and who to inform; the correct functioning and operation of machinery); vehicles will have a Spill Kit; spills in water will be cleaned using absorbent pads and in case of spills on the ground, the contaminated soil will be removed; the collected material will be deposited in containers, identified, full RCRA tests will be conducted and it will be disposed of in an authorized place; vehicles with leaks will not be allowed in the work area; no chemicals will be stored outside the operation centers.

- Wastes

It is estimated that non-toxic solid wastes will be generated in amounts greater than 100 cubic yards weekly, approximately. This could increase the amount of waste received at the landfills because this waste will be collected and transported to the nearby landfills approved by the JCA. The impact will be minimized by reusing part of the soil

to backfill the trenches and restore the right of way, only the surplus soil will be disposed of in an authorized landfill. The vegetable cover and trees removed will be mechanically shredded and used as wood chips for erosion control in slopes. Measures will be established for the control of erosion and sedimentation. Handling of chemical products will be delegated on experienced personnel and it will be separated from the other waste to be disposed of in accordance with the pertinent regulations after being characterized with a Full RCRA analysis.

The following measures will be implemented to minimize the impact caused by used water: the water used in the hydrostatic test will be discharged in our power plants with a permit from NPDES and in coordination with the EPA; the contractor who provides the portable toilets will be in charge of providing maintenance and for disposing of the waste and for handling any spills, all in accordance with the regulations of the Department of labor and Human Resources.

- Socioeconomic impact

The project represents a temporary benefit for the local economy. Among the benefits are: the taxes paid to the municipalities if applicable; employment opportunities (between 1,000 and 1,200 temporary direct jobs and some 4,000 to 4,500 indirect jobs); and an increase in sales and the use of services (hotels, motels, restaurants, gas stations, fast food and articles of prime necessity businesses, hauling trucks, sprinkler trucks, heavy equipment, rental of cars, trailers, portable toilets, purchase of lumber, gravel and bottled water, among others).

The project's construction will not have a disproportionate environmental impact on any socioeconomic group and whatever impact there is will be of short duration because the construction is not stationary. Free access to communities and residences will be ensured; the work area will be delimited; special work areas will be located outside the quiet zone; the necessary measures to control fugitive dust, noise and increased traffic will be complied with. A public information program to educate the community prior to the construction will be established and will continue during the same.

One of the most important impacts will be the establishment of the maintenance right of way which encompasses 150 feet of the pipeline. Within this were located approximately 102 structures or residences. The properties will be appraised and the owners will be compensated (fair market value) for the appraised value. The general use of the soil will not be altered, however, the construction of buildings or structures or the planting of trees or vegetation with deep roots will not be permitted in the operation right of way (a width of 50 feet throughout the length of the pipeline).

- Protected, threatened or endangered species

The presence of the listed species was not detected during the field work, with the exception of the guabairo (Puerto Rican Nightjar, *Caprimulgus vociferus noctitherus*).

This species will be protected by the implementation of a protocol for its protection and conservation and by constructing the project outside of its nesting season. All permanent loss of habitat for the guabairo will be mitigated in accordance with a plan approved by the DNER and the United States Fish and Wildlife Service.

Regarding the species of fauna designated as vulnerable, the Puerto Rican boa and the white-cheeked pintail or Bahama duck were sighted. The Puerto Rican boa will be protected by the implementation of a protocol for its protection and conservation during the construction phase. The white-cheeked pintail prefers lagoons or ponds, which are not under the project's impact footprint. Other species such as the falcón de sierra (Puerto Rican Sharp-Shinned Hawk, *Accipiter striatus venator*), the guaraguaito (Puerto Rican Broad-Winged Hawk, *Buteo platypterus brunnescens*) and the Puerto Rican Parrot (Puerto Rican Amazon, *Amazona vittata vittata*), should not be impacted as long as areas with characteristics similar to their habitat are not disturbed, especially during their mating and nesting seasons.

The species of flora designated as critical can be identified with some conspicuous method (printed marking ribbon, or "DO NOT CUT flagging tape") and thus avoid impacting them. If there is the possibility of impacting them, they will be transplanted to an adequate place, by personnel qualified for this practice.

- Air quality impact

The change to natural gas represents a substantial reduction in criteria pollutants air emissions. The percentage of reduction of criteria pollutants in pounds per year for each power plant, calculated according to the formulas of the Air Pollutants Emission Factors (AP 42), will be the following: 75.79% for the Palo Seco Power Plant, 69.30% for the San Juan Power Plant, and 66.75% for the Cambalache Power Plant. The only individual criteria pollutant that would see a slight increase in the percentage of emissions (6.04%) would be the Volatile Organic Compounds (VOC) in the Palo Seco Power Plant. In compliance with federal regulations, a Prevention of Significant Deterioration (PSD) permit will be obtained for this power plant.

The change to natural gas will also result in a significant reduction (between 25% and 30%) in carbon dioxide emissions. An increase in the concentration of carbon dioxide in the atmosphere results in an increase in global temperatures or global warming.

- Environmental monitoring program

As part of the efforts to avoid or minimize the impacts of the construction, the project will have an Environmental Coordinator who will be in charge of the project's environmental impact issues.

- Cumulative impact

The cumulative impact is the total effect on the environment resulting from a series of past, present or future actions of independent or common origin. No cumulative impact on mangroves and wetlands is expected.

There may be constructions going on in certain project areas which coincide with Vía Verde and contribute to increase the fugitive dust in the air. The cumulative effects on the air quality due to the operation of the units are contemplated in the current permits and those that will be obtained for the changes due to the use of natural gas. The cumulative impact of pollutant emissions will be a positive one, since there will be a reduction in the emissions of criteria pollutants and carbon dioxide.

The project's impact on traffic will be added to the impact due to private and public vehicles from other projects developed in the area. The cumulative impact will be temporary in each municipality.

During the project's construction there will be an increase in the demand for bottled water and water used for sprinkling which will be added to the demand from other construction projects and the demand from the general population. This will be temporary for the duration of the construction.

The impact to agricultural areas in certain areas is unavoidable and in those the project's impact will be added to the impact of past and future agricultural activities.

There will be a temporary noise increase during the construction that will be added to the noise impact of public and private vehicles and other construction equipment located in the area. Although the noise generated by the project will not be concentrated in one specific zone because the construction area will change daily, it will be temporary.

F. Socioeconomic study

Chapter 7 includes a socioeconomic study to determine whether the impact the proposed action will have is one of fair treatment for all groups of persons. To prepare this analysis data from the 2000 Census were used, which were obtained from the information supplied by the Puerto Rico Planning Board, Census Office.

The policy for the implementation of Environmental Justice in Region 2 of the Federal Environmental Protection Agency (EPA), established that a homogeneous population such as Puerto Rico's is identified in its totality as a minority, wherefore an analysis by ethnic groups is not applicable and must be substituted by an analysis of socioeconomic groups and other factors (United States EPA Region 2 Draft Interim Policy on Identifying EJ Areas, June, 1999).

As the population of Puerto Rico is homogeneous, identified in its totality as a minority, we proceeded to measure the impact the project would have on other factors beyond

ethnicity. Among the factors considered were: geographical distribution, racial groups and socioeconomic groups. The socioeconomic factors considered were: gender, age, income, education, employment and housing. The condition for Puerto Rico was established for each one of the factors and it was compared with that of the 13 Municipalities where the construction will be made. From there, it was compared with the 48 specific wards through which it will cross, for the purpose of detecting if any of these areas would be disproportionately affected in any of the factors under consideration.

The following findings were made:

- Geographic distribution - The construction will be made in wards of diverse population density; fluctuating between 5.1 and 2,334.9 inhabitants per square kilometer. Even so, it does not represent a disproportionate burden because it will not require complete sectors or areas of a community to be moved or evicted. The mobilization or eviction of tenants or property owners of existing properties will be isolated. Ninety-one (91) structures or residences were observed within the maintenance right of way, which could be the equivalent of the relocation or compensation of some 263 persons. Addendum 5, Persons within the Maintenance Right of Way, gives an idea of the quantity of persons, by ward and municipality, which could be affected.
- Race - Homogeneity in the distribution of races was observed throughout the project's alignment, and a proportional relation is kept when the wards, the municipality and the island are compared. Only the Palo Seco community in the Palo Seco Ward of the Municipality of Toa Baja represents the black race, in percentage, in a greater proportion than that found in the other wards and municipalities. For this community, the analysis revealed that it is at a considerable distance from the project's area whereby it will not be adversely impacted. There will not be any expropriation of residences or land belonging to this group.
- Gender - The general pattern for Puerto Rico was maintained. The difference in the population by gender in the wards directly associated to the project, compared to that of the municipalities or with the totality of the island of Puerto Rico, is not significant wherefore the project will not have a disproportionate impact on any group in terms of gender.
- Age - The project will not have a disproportionate environmental impact on any group on account of age, or on the services or housing they require. The 18-65 years group will benefit temporarily, because close to 1,200 direct jobs will be created during the construction of the project and services will be used which will benefit these groups and create hundreds of indirect jobs.

- **Income** - Neither the median and per capita and family income, nor the poverty index will vary as a consequence of the project's construction and operation. The only impact will be on the working class, because close to 1,200 direct jobs will be created in the region, in addition to the indirect jobs, which will represent an increase in income. This increase, although positive, will be temporary, because the construction works will last approximately eleven months.
- **Education** - The population in areas where the project will be developed is in an average level similar to the rest of Puerto Rico. The schooling or education level attained by the population through which the pipeline will cross will not vary as a consequence of the project's construction and operation and there will not be any disproportionate impact on any group based on the classification of education.
- **Employment** - The project will not affect the employment and unemployment rates in Puerto Rico directly or indirectly. Nor will it affect the distribution of occupations of employed persons or of the classes of workers. The project's impact on the area will be a temporary increase in the labor force due to the direct and indirect jobs contemplated during the construction.
- **Housing** - The project will not affect the present housing availability in these municipalities during its construction or operation, because the majority of the land through which the pipeline will cross will not be residential but mostly in agricultural and industrial use, and part of the alignment will pass through government-owned land. In addition, there are housing developments in progress in the thirteen municipalities, which will increase the quantity of housing units in these areas, wherefore the project will not compromise the need for expansion in the housing area. As previously indicated, only 91 structures or residences were found within the maintenance right of way, which represented 0.08, 0.03 and 0.01% of the residences when compared with the total number of residences in the 48 wards through which the construction will be made, the 13 municipalities and the totality of the island, respectively.

We note that no group, based on the different classifications, will receive a disproportionate negative environmental impact on account of the project. Even so, the AEE will take the necessary measures to maintain the communities adjacent to the project and the population of the municipalities, informed of the project's scope, its impacts and benefits. This will be through a public education program developed by the AEE, which will comply with all the applicable state and federal regulations.

As part of this education program, the AEE will be in charge of preparing and

distributing all the necessary informative materials and will schedule meetings with the communities and other interested groups. In addition, the AEE is in communication with, and has presented the project to the mayors of the municipalities where the construction will be made and to the agencies called upon to ensure that projects of this magnitude do not create disproportionate burdens on particular groups.

G. Agencies consulted

Chapter 8 lists the municipalities and agencies consulted, state and federal, and to whom the Preliminary Environmental Impact Statement (in Spanish, Declaración de Impacto Ambiental Preliminar, or DIA-P) will be circulated. Addendum 4, Meetings with Agencies, summarizes the meetings held with them. The agencies to whom the document will be circulated are the following: Puerto Rico Aqueducts and Sewers Authority, Department of Transportation and Highways Authority, Public Lands Authority, Land Management Administration, Public Service Commission, Department of Natural and Environmental Resources, Institute of Puerto Rican Culture, Environmental Quality Board, Planning Board, Fire Department, Ports Authority, State's Historical Preservation Office, United States Corps of Engineers, US Fish and Wildlife Service, Environmental Protection Agency, National Marine Fisheries Service, Federal Highway Authority, and the Municipalities of Peñuelas, Adjuntas, Utuado, Arecibo, Barceloneta, Manatí, Vega Baja, Vega Alta, Dorado, Toa Baja, Cataño, Bayamón and Guaynabo.

