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Sent: Monday, August 15, 2011 4:33 PM
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FRANCISCO E. LOPEZ GARCIA; 'Larry Evans'; larry.evans@bcpeabody.com; YousevGarcia
Subject: Answers to USACE's Questions submitted by email on 8/8/2011
Attachments: Text.htm; ATT2391362.bmp; final draft of answers to_bob.doc

Greetings: Attached please find the referenced answers regarding the alternative analysis.
Thank you,

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Regarding Question 1.a through e. of your email:

Analysis of impacts caused to **bodies of water, endangered species, jurisdictional areas, corals, water quality, aquatic resources and Essential Fish Habitat**, cannot be based only on the distance of the pipeline. Even though the terrestrial pipeline is much longer than the marine pipeline associated with the buoys system, the impact analysis evaluation must consider:

- a. **Effects during construction and operation** – Effects to the environment during the construction and operation of this system are independent from how long the project will be, instead they are directly dependent on the activities to be performed during the construction of the system and its operation. In the case of the terrestrial pipeline the impacts will occur to some of the bodies of water during the construction phase (since major rivers and forested wetlands will be crossed with HDD, which has virtually no effect) will only be temporary in nature, and no impact is expected during the operational phase. In contrast, the buoys systems will have impacts both, during the construction and operational phases. The loading from the LNG barge and the regasification will affect the water quality since it will cause increases in water temperature and turbidity. The space affected by the operation of the FSRU or buoys system is large due to the **maneuvering** that must be done by the ships in order to berth and unload the LNG. As a result, the constant decrease in water quality will endanger any benthic system that exists in the area, including zooplankton. The National Oceanic and Atmospheric Administration (NOAA) estimated that the vaporization systems would be drawing between 100 – 176 million gallons of seawater every day¹ and that billions of fish eggs, larvae and other zooplanktons will be destroyed each year through impingement and entrainment². Together with the above, it must be pointed out that the location of the FRSU and buoys system in the north part of the Island may have an impact in the San Juan Bay Estuary and the ecosystem being protected by the US Environmental Protection Agency as well as, the state Environmental Quality Board. Each buoy will have a single 5-8 km crossing where trenching will be done for pipeline installation. In total we'll have between 15-24 km (6-10 miles) of water crossing. This is assuming the trench can be dug in a straight line, as shown in the illustrations. (See Figure # 1) Consideration must be given to the impact on the entire marine area to be impacted by the installation of each buoy. Each installation will affect a minimum 33 acres (99 acres total) of marine area. This includes installation of the flow line, suction anchors, PLEM anchor chains and cables and the hydrostatic testing of the flow lines. At least 16 anchors would have to be placed to secure each buoy (based on Northeast Gateway Deepwater Port construction in Massachusetts). Also see, item d. below.

¹ National Oceanic and Atmospheric Administration (NOAA): www.noaa.gov

² Davy, Kay: NOAA Fisheries. Habitat Conservation Division, *Proposed LNG Facilities in the Gulf of Mexico*, Workshop on Liquefied Natural Gas (LNG) Facilities. April 28, 2004

- b. **The possibility and the time lapse needed for the area to recover to its original condition (including physical and benthic conditions)** - Regarding the effect on the wetlands of the terrestrial route, which will be impacted by direct excavation, with the exclusion of areas to be crossed using HDD; which will have no impact to the bodies of water, the impacts to the bodies of water and the jurisdictional lands will be petty small and mostly temporary in nature, allowing for the area to repopulate and reaching restoration to its original condition. The effects of the buoys system or FSRU's are not a onetime impact nor in some cases temporally in nature, like the one for the terrestrial pipeline, since the berthing and unloading of LNG will be a constant activity which will affect on a permanent basis the benthic community constituted at some levels of the ocean.
- c. **Difference in construction techniques** – As required by the Mineral Management Service, through 30 CFR 250, "Pipelines greater than 8-5/8 inches in diameter and installed in water depths of less than 200 feet shall be buried to a depth of at least 3 feet unless they are located in pipeline congested areas or seismically active areas as determined by the Regional Supervisor. Nevertheless, the Regional Supervisor may require burial of any pipeline if the Regional Supervisor determines that such burial will reduce the likelihood of environmental degradation or that the pipeline may constitute a hazard to trawling operations or other uses. A trawl test or diver survey may be required to determine whether or not pipeline burial is necessary or to determine whether a pipeline has been properly buried." Construction of buried pipelines in the coastal marine waters would require the use of different excavating equipment that would cause irreparable damage to the coastal zone (Coral Reefs) and the designated critical habitats therein. Despite not having to dredge to permit accommodating the great draft of the tankers, a submarine pipeline would have to be built from the buoy to the shore and that would have an impact on an ecologically sensitive area such as the San Juan Bay and its estuary, or in the north coast areas which are considered as critical habitat for five species of coral reefs in danger of extinction, such as the Acropora.
- d. **Possibility and conditions needed for the endangered species to repopulate the area** – On the wetland areas associated with the terrestrial route, as stated in the Joint Permit Application (JPA), there are no Essential Fish Habitat (EFH), nor any endangered species to be impacted. In the case of the marine line and FSRU or buoy system (regardless of the kind) there will inevitably be an impact to the critical habitat for the species of Acropora, which is a genus of scleractinian coral in the Phylum Cnidaria. Some of its species are

known as table coral, **Elkhorn coral and Staghorn coral**. There are currently 149 described species. Acropora are one the major reef building corals, responsible for building the immense calcium carbonate substructure supporting the thin living skin of a reef. This habitat is very susceptible to subtle changes, and any damage might be considered permanent, with all of the geological and ecological consequences related, such as the loss of physical barriers for high tides and the lost of vast areas of the coral. For Via Verde, five species of endangered animals were identified in a portion of the route. All buoys required to service PREPA northern power generating plants (3) are in the path of the humpback and pilot whales, and other marine mammals, such as the manatee. Some studies have indicated that whales, when exposed to the hydrodynamic forces or large ships, may be drawn into the path, thus colliding with the ship. Most ship strikes are fatal to marine mammals. Vessels strikes, especially with threatened and endangered marine species, represent a direct, major, adverse impact resulting in Level A Harassment (based on information gathered from the Environmental Impact Statement for the construction of the Northeast Gateway Deepwater Port (NGDWP)(FEIS, October 2006, page 4-56). The NGDW integrated state-of-the-art marine mammal detection technology with its LNG Fleet operations. There are also, at least three species of endangered sea turtles: hawksbill, leatherback and green sea turtle which have been documented in at least two of the FSRU potential locations: San Juan and Palo Seco. These and other species, like dolphins, could get entangled in the cables from construction equipment. The Pipeline construction activities mimic bottom trawl fishery activities, since the plow would be dragged across the sea floor by a towing cable and control umbilical that travel from the plow to the towing vessel. Also, during operation, the anchor chains would pose a threat to mammals that stray into the area. Spills of fuel and other contaminants from the vessels during construction and operation is a constant threat to marine species which is not present in the Via Verde project.

- e. **Essential Fish Habitat considerations** - A number of construction and operation activities would impact benthic communities by disturbance or alteration of the substrate and by entrainment of benthic larvae in process sea water. Also, there could be displacement of fishing efforts from the Port area and the safety zones. This would create an increase in fishing efforts in other areas and cause saturation unless temporal closures are imposed. According to information secured from Environmental Impact Statement for the construction of the Northeast Gateway Deepwater Port (NGDWP)(FEIS, October 2006, page 4-14) these particular types of impacts would persist for the duration of the project (25 years or more) and would occur over approximately 43 acres of substrate.

Since PREPA evaluated the construction of three buoys, the impact would persist in approximately 129 acres of substrate. Sea water used for ship operations will be withdrawn from a depth of 20-30 ft. Because this depth is in the upper third of the photic zone, this portion of the water column supports and active phytoplankton community. Future production of phytoplankton entrained in the ships water systems would be lost from the area ecosystem. As a reference, compensatory mitigations were developed to offset life cycle impacts resulting from the NGDWP. Also a mitigation plan was put in place to counter the base-case impacts associated with the operation of the project (FEIS, October 2006, page 4-44). Also, an NPDES permit would be required to monitor the potential impact of the thermal discharge and ongoing water withdrawal. A monitoring program would have to be prepared to comply with this requirement. If, during thermal monitoring, measured temperatures at the 500 meters sampling location exceed ambient temperatures, temperature plume must be followed until ambient temperature is achieved. These deviations must be reported to the EPA and the NMFS within 30 days (example of this situation is the NGDWP)

- f. **Adjustments made to Via Verde in order to considerably decrease its environmental impact** - Via Verde incorporated over 40 adjustments to its originally proposed alignment, all aimed to reduce its environmental impact at the request, and as part of the permit evaluation process and requirements, of other federal environmental agencies. In contrast, the installation of all related equipments associated with the operation of the three (3) FRSU needed does not allow us to reduce the impacts of said infrastructure as being done in the terrestrial option selected. As a result of these changes Via Verde is a more environmentally sound project.
- g. **Environmental impact of the Three (3) FSRU's would have to be added and then the result compared to Vía Verde's impact** – To operate our generating units on a reliable fashion, as proposed with Vía Verde all 3 FSRU's or buoy systems would have to be constructed. For this reason the total impact for the construction and operation of all three FSRU's systems would have to be considered when compared to Vía Verde's impacts. This would definitely render the FSRU alternative not only environmentally more damaging, but also completely unreasonable in light of the costs associated to the three projects as compared to Vía Verde. Also see our answer to your comment number 4.

Regarding comment number 2:

- a. **Zoning and Land Use** - Although there are no zoning regulations on the open seas under the jurisdiction of Puerto Rico, due to the regulations of marine traffic

and the existence of migrating paths for marine mammals along the north coast, we concluded that the “zoning” was incompatible with the development of the FSRU’s or buoy systems. Regarding the space available within the power plants:

- i. San Juan Plant – the industrial area where this plant is located contains a number harbor operations where all imported goods (food and all kind of materials) are received in the Island. Since more than 80% of the goods used in Puerto Rico are imported, this harbor area and its operations are vital to the economy of the Island. Therefore, none of these operations can be affected by expropriation of needed real state in order to construct a receiving terminal.
 - ii. Palo Seco Plant - this plant is completely surrounded by residential areas, such as Cataño, Marina Bahia, & the Levittown communities. The Municipality of Catano is mainly populated by low income families, which would render the project incompatible when environmental justice conditions and requirements are considered. Also, most of the open spaces seen on the south of the Palo Seco Plant are part of the Cucharillas Nature Reserve.
 - iii. Cambalache – this plant is located within the Arecibo costal wetland area. Please notice the plant’s limited footprint, which is related to this fact. PREPA had to design a small plant in order to comply with regulatory agencies requirements aimed at minimizing impact to wetlands. Also, to the east of this plant there is a Nature Reserve known as Cano Tiburones.
- b. **Impact to transportation and traffic** – Notwithstanding the 500 meters zone required by Coast Guard and MARAD, and as stated above, more than 80% of the goods used in Puerto Rico are imported. In light of this fact, the San Juan harbor area is a highly busy one, and any interference with the marine traffic, no matter how small would have the potential to affect on a big scale the economy of the Island. Also, any emergency related to the operation of the FSRU’s or buoy systems could render the harbor useless for hours or days at a time, situation that is unbearable for this area and non consistent with the effective utilization of the San Juan Port. It is important to remember that, as stated above, the impact of the 3 FSRU’s must be totally considered when comparing it to Via Verde’s impact.

- c. **Ease of Access** - This parameter has two approaches: (1) one during construction and a second one (2) during operation of the projects. During construction of Via Verde, it is important to notice that Puerto Rico has a very large and branched road infrastructure (including paved and unpaved roads), which allows direct access to any point of the project. On the other hand, the construction of the FSRU's or buoys system would require the use of limited and highly congested waterways available for the transportation of materials and equipment needed. During the operational stages, especially on case of emergency (including operational and natural emergencies), access to an FSRU, where high seas prevail, would be extremely difficult if not impossible, due to the persistence of high waves and energy of the ocean as discussed in Item 4 below. In the case of Via Verde, due to the large and branched road infrastructure and the possibility of reaching every point of the project by foot, the ease of access will be better.
- d. **Noise Impact** – NMFS has established guidelines for what constitutes harassment and acoustic takes on marine mammals under the MMPA and the ESA. Two levels of acoustic harassment have been defined in the MMPA: The current thresholds are 180 dB for Level A harassment, and 160 dB (impulse) and 120 dB (continuous) for Level B harassment. Whenever noise exceeds these thresholds, the potential for significant adverse impacts to marine mammals exists. Changes in marine mammal behavior can be attributed to a variety of factors, many of which are largely unknown. There is a potential for marine mammal behavior modification during operation, primarily from acoustic harassment caused by the operation of LNG vessels. To demonstrate and document that whales are not exposed to sound levels that exceed permitting thresholds, MARAD required the NGDWP to install and operate an array of near-real-time acoustic detection buoys to detect and localize vocally active marine mammals relative to construction-related sound sources
- e. **Costs** – Yes, there was a scribal error. Also, remember that in order to operate our generating units as proposed with Vía Verde **all 3** FSRU's or buoy systems would have to be constructed. For this reason the total impact for the construction and operation of all three FSRU's systems would have to be considered when comparing to Vía Verde's impacts. As a result the cost of the 3 FSRU's would be close to 5,000 million (5 billion) dollars during the 20 year contract without the cost of natural gas, while Via Verde will be close to \$1,000 million (1 billion) for the construction and operation during a 20 year period, without the cost of natural gas.

Regarding comment number 3:

What we meant was that, given the relative "newness" of LNG offshore delivery systems, we could not find any particular information that focused on the Caribbean area, i.e. Puerto Rico, which clearly laid out the physical parameters one would want to see as ideal for an offshore operation. For example, would deep water be preferable over shallow water; with the high incident rate of hurricanes would particular substrate conditions be required (the Excelerate Energy facility cited in the e mail was closed recently due to damage suffered from hurricanes), etc. There is a study (Study on Ship Motion Analysis of Turret-Moored LNG FSRU Compared with Experiment)³ which states that FSRU's are a response to the NIMBY (*Not In My Back Yard*) problem regarding the construction of **new terminals**, not a response to the construction of transmission or distribution pipelines.

Regarding comment 4:

We meant to demonstrate that there is not a lot of information out there that would support the use of an FSRU over a land based pipeline to deliver NG. Yes, as mentioned, there are two operations in the U.S. (Gateway in the Gulf of Mexico and Northeast Gateway in Massachusetts, both run by Excelerate, and Neptune also in Massachusetts run by Suez, but one has been closed due to hurricane damage in the Gulf of Mexico). Our principal point is that Puerto Rico has an open, exposed shoreline that suffers hurricanes on an annual basis. In addition to the periodic hurricanes that affect our area from June to November each year, the wave height or ocean energy is very high throughout the year on our Atlantic north coast. The same study mentioned above (Study on Ship Motion Analysis of Turret-Moored LNG FSRU Compared with Experiment), states that an important consideration during operation is safety in loading and offloading condition and that LNG carriers should be operated in the proximity of the LNG FSRU, where the effects of hydrodynamic interactions have to be carefully taken into consideration for safe operation. Although this study did not consider, the hydrodynamic interactions between FSRU and LNG carrier, these interactions are very susceptible to be highly disturbed by the ocean energy and wave height, thus making its operation highly risky and prone to constant interruptions all throughout the year. This situation would render PREPA's inversion to be futile since it would make our electric system a non reliable one. This affects the concept of reasonability that the analyzed alternative must have. Again, we emphasize that NEPA requirements in particular Section 1502.14 requires the EIS to examine **all reasonable** alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. **Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and**

³ Study on Ship Motion Analysis of Turret-Moored LNG FSRU Compared with Experiment, *Kyoung-Wan Lee, Yu-Rim Cho, Jae-Ouk Sun, Seung-Gyu Jeong, Young-Dal Choi, Hong-Gun Sung, Seok-Won Hong, Proceedings of the Ninth (2010) ISOPE Pacific/Asia Offshore Mechanics Symposium, Busan, Korea, November 14-17, 2010, Copyright © 2010 by The International Society of Offshore and Polar Engineers, ISBN 978-1-880653-79-1: ISSN 1946-004X. www.isopec.org*

using common sense, rather than simply desirable from the standpoint of the applicant.⁴ Also, the "range of alternatives", as referred to in Sec. 1505.1(e) of the NEPA, refers to the alternatives discussed in environmental documents. It includes all reasonable alternatives, which must be rigorously explored and objectively evaluated, as well as those other alternatives, which are eliminated from detailed study with a brief discussion of the reasons for eliminating them. According to Section 1502.14, a decisionmaker **must not consider alternatives beyond the range of alternatives discussed in the relevant environmental documents.** Moreover, a decisionmaker must, in fact, consider all the alternatives discussed in an EIS as established in NEPA Section 1505.1(e).⁵ Therefore, because the FSRU's were neither reasonable nor feasible for PREPA to construct, they were not chosen as the preferred alternative.

Regarding comment 5:

That is correct. There are a lot of acronyms out there as well, e.g. FSO and FSPO, that all generally refer to an offshore buoy/floating facility delivery system of some sort, with small operational differences among them, but with common problems for their construction and operation, as discussed above.

⁴ <http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM#6>

⁵ <http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM#6>