***Revised** 25* September 2003
File No. 27701-402

The Bahamas Environment, Science, and Technology Commission
Ministry of Health & Environment
P.O. Box CB 10980
Nassau, Bahamas

Attention: Dr. Donald Cooper

Subject: Response to BEST Comment Letters of
13 and 27 May, 16 June, 9 and 22 July, and 20 August 2003
Environmental Impact Assessment, Volume I

Ladies and Gentlemen:

Haley & Aldrich, Inc., on behalf of AES Corporation has prepared the attached *final* set of responses to the comments received in your 13 May and 27 May 2003, 16 June, 9 July, 22 July, and 20 August 2003 letters. The letters contained comments on the Environmental Impact Assessment (EIA), Volume I, specifically, the Executive Summary and Sections 1, 2, 3, 4, 5, 6, and Sections 7 through 10. These written responses are provided as follow-up to our 10 September 2003 meeting between AES and BEST to review the last set of responses submitted. The *final* set of responses attached incorporates comment closure dates and edits discussed at that meeting to provide record of acceptance of all comments and closure of the EIA review process.

For clarity, and as with past submittals, we have repeated your comments below and provided our response following each comment. Comments where responses have been reviewed by BEST and deemed complete show the date of BEST having informed us of completion. Initial comment responses that have been further revised based on BEST input are shown in blue.

We appreciate the thoughtful and professional EIA review provided by BEST and its staff, and BEST's assistance in coordination with other Bahamian agencies throughout the EIA process. In particular, the thorough, thoughtful, and constructive work of Ms. Nakira Gaskin-Wilchcombe, Ms. Rochelle Newbold, and Mr. Paul Schutt has significantly benefited the environmental approach to this project – their contribution to the project and on going teamwork are very much appreciated. We look forward to our continued involvement with BEST for Environmental Management Plan refinement and implementation to initiate construction of this important project.

Sincerely yours,
HALEY & ALDRICH, INC

Derek G. Amidon, P.E.
Vice President

CC: Mr. Paul Schutt
Ms. Nakira Gaskin-Wilchcombe
Ms. Rochelle Newbold

BEST
25 September 2003

Date Completed

Response Status Key

[4 June 2003] Date of BEST informing AES that comment response is complete.

[_ _ _ _ _ _ _ _ _] Dashed underline indicates initial response has been revised based on BEST input at a project review meeting (6/4/03, 7/9/03, etc. - revisions shown in ***bold italics***)

[_____] Double underline indicates comment treated as "Open & Active" after initial BEST review. Text has been added to these responses, as well as new attachment references, relative to the initial comment response. Text added since the last meeting with BEST is shown in blue.

[ ] Open bar indicates comment response is pending review by BEST

Table Attachments:

*****Table 3-9 "Revised Estimated Quantities of Waste Generation – Construction and Operations"
Table 3-10 "Ocean Cay Product and Waste Tracking Table" – *Updated 9/3/03*
*****Table 3-11 "Revised Ocean Cay Annual Waste Stream Totals by Category"

Appendix A (Attachements):
[Note that each Attachments numbered according its related Comment]

Attachment #13 – Grain Size Analyses
Attachment #16 – Day Tank Product Sheets
Attachment #32 – MSDS for Heat Transfer
Attachment #34 - *Figure EMP-2, "Overall Effluent Flow for Ocean LNG, Ocean Cay, the Bahamas"*
Attachment #49 – MSDS for Drilling Fluids
Attachment #64 – Hydrotest Procedure
Attachment #85 – Ocean Cay Sanitary System Plan
Attachment #88 – Sodium Hypochlorite Generator Spec Sheet
Attachment #128 – MSDS for Rheobuild (concrete additive)
Attachment #131 – Conditions for Marine Blasting
Attachment #142 – Airstrip Package
Attachment #143 - *"Offshore Special Installation Requirements" 11142903-413-TRP-001*
Attachment #145 – Deep Water Report
Attachment #148 – Typical Trenching Machines
Attachment #149 – Typical Pipeline Anchors
Attachment #159 – Figures 3-5 and 3-6, All Hazards Training (*9/03/03 Updates*)
Attachment #181 – Summary Checksheet for EMP Revisions

*Note that Tables 3-9 and 3-11 were revised and attached to the 30 June Response to BEST Comments. In subsequent review sessions, the content of these two tables was eventually folded into Table 3-10 in order to be more comprehensive and concise. Tables 3-9 and 3-11 are included here simply to reflect the basis for comment response in which they were identified in the 30 June Response, and to provide a complete record herein of the overall review process.

BEST
25 September 2003

Date Completed

EXECUTIVE SUMMARY:

[04 June 03] **Comment – 1**

S.5 Potential Environmental Impact of the Proposed Project

Page S-5 paragraph 3: Include a reference to the target chlorine concentration of the seawater discharge. Include a more specific reference to the applicable seawater discharge standards to be attained (e.g., Bahamian, EPA, State of Florida, and/or World Bank) that "will satisfy widely recognized national and international environmental standards."

Response

The target chlorine residual concentration referenced in Section 3.4.1.4 is 0.2 parts per million (ppm). This level is consistent with the residual chlorine levels routinely assigned to discharge permits issued within the United States. It is also consistent with the World Bank guidelines for these discharges.

The discharge criteria in the State of Florida is defined as 0.01 ppm at the perimeter of the mixing zone which may be up to 125,600 square meters in Class III marine coastal waters or 502,655 square meters in open waters. The 0.2 ppm discharge proposed will meet the State of Florida requirements through dilution within the mixing zone. The discharge will be monitored for compliance with the 0.2 ppm concentration in the waste stream prior to mixing.

[04 June 03] **Comment – 2**

Page S-5 paragraph 4: Include a more specific reference to the "applicable significant impact level" to be attained for air emissions (e.g., Bahamian, EPA, State of Florida, and/or World Bank).

Response

The applicable air standards used for evaluation of the project air emissions are referenced in Section 3 and 5 of the Environmental Impact Assessment (EIA). The results of the comparison between the project air emissions and the more stringent of the Florida Department of Environmental Protection (DEP) and the US EPA ambient air quality standards are shown in Appendix G. The evaluation has also used the US EPA New Source Performance Standards (40 CFR 60, subpart GG) for comparison with the modeled project air emissions. The modeling completed and described in Section 3 and 5 of the EIA is in accordance with the recommended methodology of the US EPA.

[04 June 03] **Comment – 3**

Page S-5 paragraph 5: Define more specifically (preferably utilizing decibels or a range of decibels) the "negligible" noise impacts on the nearest neighboring inhabited islands. Noise impact levels should be defined for base load operating conditions. The noise impact levels

and the frequency of peak noise events during operations and maintenance should also be defined. Indicate generally under what conditions the residents of Cat Cay will hear the operations at Ocean Cay.

Response
The potential impacts from noise to the island of South Cat Cay are discussed in Section 5.6. Sound modeling was undertaken to estimate noise impacts at South Cat Cay during baseline, construction and operational phases of the project and the report is included as Appendix P. The sound impacts are estimated in decibels. The determinations of the model indicate that noise impacts at South Cat Cay do not exceed 55 dB(A) during the day, or 45 dB(A) during the night. The noise levels expected at Cat Cay were determined by modeling to be indistinguishable from normal background sound from waves, wind and insects. The referenced standards are the accepted noise levels required by the State of Florida. The World Bank guidelines prescribe a daytime noise level only.

SECTION 1.0 INTRODUCTION AND OBJECTIVES:

[04 June 03] **Comment – 4**

Page 1-1 paragraph 1: Line 14 should read, "Pending necessary approvals from the Government of The Bahamas, the construction of the LNG Terminal is expected to begin in early 2003 and is scheduled to be completed within 36 months of the start date."

Response
The text referenced in this comment should be modified as stated, with a further modification to the construction start date, which is currently planned for mid 2003.

SECTION 2.0 PROJECT DESCRIPTION:

[04 June 03] **Comment – 5**

2.1 Project Location Description

Page 2-1, paragraph 1: Include appropriate references to permanent housing to be located on South Bimini (per subsection 2.2 Site Description page. 2-2)

Response
The reference to the permanent housing planned on South Bimini appears in the third paragraph of this section. The last sentence of the first paragraph should be changed to read, "For the purpose of this EIA, the term "project boundary" refers to all temporary construction and permanent work spaces, including the rights-of-way, permanent housing locations,

Date Completed

storage yards, staging areas, vessel anchor areas, and any additional work spaces required to construct or operate the project, as described further in Section 3."

[04 June 03] **Comment– 6**

2.2.4 Bimini

Page 2-3, paragraph 1: Include appropriate references to the design, construction and impact mitigation of the proposed pipeline landfall on the western coast of North Bimini.

Response

The appropriate references to text later in the document for discussion of design, construction, and potential impacts are Section 2.3.1.4 B Pipelines and Section 5.2.4.2 A Construction Impacts at Bimini.

[09 July 03] **Comment– 7**

2.3.1.1 Island Expansion

Page 2-4, paragraph 1: If select fill or shore protection materials need to be imported to meet design specifications, include appropriate references to the types, volumes, and sources of the fill as well as the quality control measures that will be utilized to insure that the fill materials meet specification and are not contaminated with other materials. If no select fill or shore protection materials need to be imported, include that fact in this section.

Response

The imported fill material includes core stone, filter stone, and armor stone. This material will be natural rock and will not include any construction debris, organic material, or other deleterious or substandard materials.

All rock will be highly resistant to weathering and disintegration under wetting/drying conditions. The stone will be durable, free from detrimental cracks, seams and other defects.

The core material will consist of material with a bulk specific gravity of no less than 2.55 and a minimum uniaxial strength of 40 MPa. The armor stone and filter rock can be broken down into two classes. The first class will have a minimum bulk specific gravity of 2.65, water absorption of no greater than 2%, and a minimum uniaxial strength of 70 MPa. The second class of armor and filter rock will have a minimum bulk specific gravity of 2.65, maximum water absorption of 6% and a uniaxial strength of no less 40 MPa. The grading of this material will be identical to that of the first armor class rock.

BEST
25 September 2003

Date Completed

The estimated quantities are as follows: 98,000 m. tones of filter stone, 80,000 m. tones of armor stone, and 385,000 m. tones of core stone. Several potential quarry sources for this stone have been investigated in the Bahamas, United States, Canada, Guyana and the Dominican Republic.

No stone will be imported from any contaminated source. Quarries identified as potential sources will be requested to provide certification that no contamination is present in the purchased material. ***These certifications will be maintained within the EMP and will be submitted to the Government of the Bahamas on a quarterly basis.***

[04 June 03] **Comment– 8**

A. Site Preparation (page 2-5 thru 2-6)

Page 2-5, paragraph 2; bullet 3: Include appropriate references to the waste management plan to be utilized by all construction service vessels. The waste management plan must provide details about the origin, volume, and physical and chemical characteristics of wastes to be produced, as well as the storage, handling and final disposition of all wastes produced by the construction service vessels.

Response
Construction service vessels will include dredge vessels, service barges, delivery barges, the vessels supporting the pipeline construction, and fueling barges. The management of wastes generated during the construction phase of the project is discussed at Section 3.7.1 Construction Related Wastes. Typical shipboard wastes are described as paint, thinners, oils, rags, debris, cardboard, batteries, and aerosol cans. Blackwater and greywater will be periodically pumped as necessary to a barge for disposal outside the 3 mile limit in accordance with MARPOL 73/78.

The construction contractor, under the oversight of AES, will be responsible for the proper characterization, collection, storage, and ultimate disposal of all construction related wastes materials, in compliance with the Bahamas Department of Environmental Health Services (DEHS) Solid Waste Regulations and the requirements of the DEHS Director. As the design of the project progresses, further details regarding the volume, physical and chemical characteristics of the waste will be determined and included in the Waste Management Plan in the EMP.

The Environmental Management Plan (EMP) provided as Appendix U in the EIA, includes requirements for Construction Spill Prevention, Control and Countermeasures Plans and a Waste Minimization Plan.

BEST
25 September 2003

Date Completed

[04 June 03] **Comment– 9**

Page 2-5, paragraph 4: Provide details about how the incinerating toilets will be powered.

Response

The incinerating toilets will be powered either by propane or diesel generator power as determined by the units specified by the Contractor during the construction phase of the project.

[04 June 03] **Comment– 10**

Page 2-6, paragraph 2: Provide details about the type of waste oil storage tanks and secondary containment systems to be utilized (e.g., number, volume, location, type of secondary containment, applicable construction standard to be utilized, etc.). Indicate how waste oil is to be managed during the site preparation phase of the project.

Response

AES anticipates there will be one waste oil tank (500 to 1000 gallon capacity) used to collect waste oil during the construction phase of the project. This tank may be portable and relocated on the island during the course of the construction. The tank will be placed no closer than 50 meters from the coast line. The tank will be moved onto a barge when it is full for shipment to a disposal site. The tank would be replaced onsite with an empty tank. A second smaller volume portable oil tank may be used to collect waste oil from various work locations around the island. The portable tank would be emptied into the main tank on a daily basis. All oil stored on the island during construction will be contained in appropriate containers or tanks. Tanks will be placed within secondary containment tubs, unless they are equipped with integral secondary containment (double walls). The containment will extend to also include the connection ports leading to the tanks. Waste oil will be disposed offsite at a location approved by the DEHS Director. The construction contractor will be responsible, with oversight from AES, for the proper management of used oil generated during the construction phase of the project. Oil will be managed in accordance with a Construction Spill Prevention, Control and Countermeasures Plan that has been approved by AES. The Spill Prevention, Control and Countermeasures Plan will cover the requirements included in Attachment 1 of Appendix U, EMP.

[04 June 03] **Comment– 11**

Page 2-6, paragraph 3: Provide details about how the RO desalination unit and concrete batch plant will be powered.

BEST
25 September 2003

Date Completed

Response

The barge mounted RO desalination unit and the concrete batch plant to be utilized during the construction phase of the project will both be self powered by diesel generators.

[09 July 03] **Comment– 12**

Page 2-6, Paragraph 4: Provide details about the plan for exporting and recycling or otherwise disposing of scrap metal and machinery currently on site. If the material is to be buried on site, provide details regarding how potential contaminants will be removed from the scrap metal and machinery and properly disposed of and, specifically, where AES proposes to bury scrap materials on the island.

Response

AES has prepared a scrap metal management plan for the scrap metal and obsolete machinery currently placed on the site. The plan was provided to BEST in June 2003. The plan will be used to determine potentially contaminated scrap from non-contaminated scrap and the appropriate disposal options that may be utilized. ***The scrap metal management plan is an integrated plan that distinguishes between land-based and marine-based scrap metal and provides for recovery of both as required for island modifications.***

[09 July 03] **Comment– 13**

B. Dredging

Page 2-6, paragraph 5: Readdress the need for, and utility of, the construction and operation of a broad variety of turbidity control devices including, but not limited to, settling basins, dikes, control weirs, etc. Engineering, constructing and operating turbidity control devices in an attempt to control temporary increases in suspended silt concentrations and silt deposition rates in nearby marine waters is of questionable utility for several reasons:

1. Based on geotechnical data gathered to date AES asserts that, "Dredged materials will be mainly rock and settlement is likely to occur significantly faster than if it were sand." (reference: page 2-55, paragraphs 2 thru 4).

2. Marine scientists retained by AES characterize the benthic habitats near Ocean Cay as "primarily soft bottom / sand habitats with low diversity of benthic macrofauna. In a few places there are some small isolated patches of sea grasses and a few isolated patches of soft corals". Sediment dispersion modeling predicts that the area of environmental impacts due to trench jetting operations (required for laying 24 inch pipeline to the west of Ocean Cay in waters between 7 and 30 meters deep) will result in sedimentation occurring no further than 400 feet from the trench. The marine

scientists predict that areas impacted by sedimentation will reclaim themselves within "a few years".

3. Island expansion is currently scheduled to be a temporary activity lasting 22.4 months.

If any turbidity control measures such as dikes, settling ponds and weirs are to be constructed and operated at Ocean Cay, AES must identify or make reference to an applicable standard for turbidity levels in discharge waters. AES must also indicate that the same turbidity standard to be used for the design engineering and construction of turbidity control devices and for the turbidity levels in discharge waters.

AES must also identify or make reference to a monitoring program that indicates how turbidity levels in discharge waters are to be tested and how the applicable standard will be met during the dredging and island expansion phases of the project.

Response

The turbidity levels shall be monitored at a distance of 150 m downcurrent (as prescribed in State of Florida regulations) from ongoing dredging activities and from the outfall location(s) where excess water from reclamation and/or stockpiling activities is released. At this distance, turbidity levels must not exceed 29 NTU over background measurements, as prescribed by the State of Florida regulations. If at any time 29 NTU above background turbidity is reached the operation upstream of the exceeding reading will be halted immediately.

Background turbidity measurements shall be monitored once daily for each day that dredging, reclamation or stockpiling is ongoing. Background monitoring stations must be located no less than 1000 meters from site of dredging or land outfall. Turbidity measurements shall be taken 1.0 meters off the bottom, at mid-depth and 1.0 meters below the surface. Individual measurements shall be taken for a minimum of 60 seconds such that the required standard deviation and accuracy is achieved. The turbidity monitoring measurements must be taken no later than 1 hour following the background measurement to account for tidal fluctuations in turbidity.

Turbidity control is primarily the responsibility of the constructors, with oversight by AES. The frequency of turbidity measurements will be determined in the field the by environmental inspectors (EI) from both AES and BEST. Either EI will have the authority to shut down the activity causing the turbidity if measurements exceed the threshold below and until the activity causing the turbidity issue is sufficiently addressed. A maximum of 29 NTU has been established. Either a filtration system or settling pools must be constructed to maintain this turbidity standard. Turbidity measurements will be documented on field monitoring forms as part of the EMP. Completed forms will be provided to the EI representing the Government of

Date Completed

the Bahamas, and a summary of measurements (and turbidity events and resolution, if they occur) will be submitted to the Government of the Bahamas quarterly.

The majority of the dredge material will be gravel and cobble size rock. Overall, it is expected that about 35% of the dredge material will be sand. Based on available borings, the sand is typically fine grained with a mean grain diameter of approximately 0.25 mm, and approximately 8 percent fines content, although the fine content at some locations is higher. Settling ponds and control devices such as dikes and weirs as shown on Figure 2.26 of the EIA will be designed to settle out this material and maintain turbidity releases within the allowable limits.

Grain size analysis and the associated location drawings for offshore investigations performed in the vicinity of the planned dredge activities are included as Attachment #13 to this response letter.

[04 June 03] **Comment– 14**

Page 2-6, paragraph 6: Readdress the need for, and utility of, constructing the proposed excess material shoal containment structure. Engineering, constructing and operating the proposed perimeter constructed of geotubes on a shoal in the open ocean in an attempt to contain dredge materials is of questionable utility for several reasons:

1. To date, AES has presented no evidence that the proposed geotube design engineering solution has been successfully utilized for constructing and containing dredge spoils in open ocean conditions anywhere in the world. Information has been reviewed by the US Army Corp of Engineers on the subject of typical applications for geotextile materials as well as similar information provided by a leading manufacturer of geotextile materials. There is no identification or knowledge of where geotubes or other geotextile materials applications have been utilized in the manner proposed by AES.

2. The proposed geotube containment dike is not designed to contain silt. AES proposes to utilize geotubes "made of woven geotextile sheets of widths of 4 to 6 meters and sewn along the edges with inlets and outlets sewn at regular intervals." AES also indicates that the geotextile materials to be used are permeable fabrics designed to allow water to flow through.

3. Geotextile materials are designed to resist physical and biological degradation. If individual geotubes and/or the geotube perimeter dyke were to fail, excess dredge spoil materials would not be contained and extremely durable synthetic materials could become fugitive water born wastes in the marine environment.

4. Decommisioning the excess material shoal and disassembling of the geotube perimeter

Date Completed

dike (during a yet to be defined time period in the future) poses a number of significant logistical challenges with respect to emptying the geotubes, collecting geotextile materials and preventing pieces of geotextile materials from becoming fugitive water born wastes in the marine environment. Decommissioning aspects of the proposed excess material shoal are not referenced in the EIA.

5. Additional options should be presented in addressing excess dredge spoils.

6. Based on geotechnical data gathered to date, AES asserts that, "Dredged materials will be mainly rock and settlement is likely to occur significantly faster than if it were sand." (reference: page 2-55, paragraph #2-4).

7. Marine scientists retained by AES characterize the benthic habitats near Ocean Cay as "primarily soft bottom / sand habitats with low diversity of benthic macrofauna. In a few places there are some small isolated patches of sea grasses and a few isolated patches of soft corals". Sediment dispersion modeling predicts that the area of environmental impacts due to trench jetting operations (required for laying 24 inch pipeline to the west of Ocean Cay in waters between 7 and 30 meters deep) will result in sedimentation occurring no further than 400 feet from the trench. The marine scientists predict that areas impacted by sedimentation will reclaim themselves within "a few years".

8. Island expansion is currently scheduled to be a temporary activity lasting 22.4 months.

The proposed excess dredge spoil plan may or may not successfully contain dredge spoils and will do little to control silt suspension or deposition in dredging and excess dredge spoil operations. All of the issues described above require further investigation, evaluation and reporting on the part of AES.

Response

AES has investigated and evaluated the use of geotubes to contain excess dredge materials at the shoal location referred to in the EIA. Due to a recalculation of cut and fill dredge estimates, AES has determined that the volume of excess material expected during the dredge operation can be either stockpiled on the island or sold. Therefore, no offshore shoal of excess dredge material will be constructed as originally referenced in the EIA.

[04 June 03] **Comment– 15**

C. Site Fill and Soils Improvement

Page 2-10: See review comments provided above for subsection B. Dredging, page 2-6,

BEST
25 September 2003

Date Completed

paragraph 5.

Response

Please reference our response to your comment on Section 2.3.1.1 B (Comment # 13) .

[04 June 03] **Comment– 16**

E.5. Diesel Fueling System

Page 2-15: Provide references to the applicable standard(s) to be utilized for the construction and operation of all diesel fuel storage, containment, and, transfer systems. All diesel storage tanks must be located within impermeable containment dykes or structures and protected with bollards and/or curbing designed to protect the fuel tanks, containment, and transfer systems from accidental collisions with fueling and operating equipment. All fuel tank pressure relief systems must be equipped with automatic shut off valves designed to prohibit fuel spills in the event of overfill during tank filling operations. All fuel transfer areas must be located on impermeable surfaces. All fuel transfer equipment must utilize automatic shut off valves and/or nozzles designed to prohibit fuel spills in the event of overfill during fuel transfer operations. Fueling stations must be equipped with fire extinguishers and sorbent materials of adequate capacity to provide for immediate primary response to spills and/or fires. Fueling system management must be a part of the Environmental Management Plan (EMP). Consider drafting this subsection in a manner that clearly distinguishes between system design engineering objectives and system operating parameters and conditions.

Response

The two 20,000 gallon capacity day tanks proposed to be located near the Small Vessel Harbor will be provided with integral secondary containment systems. The tanks will be built to NFPA 30 and UL 142 Label of Approval standards. The day tanks will be equivalent to the tanks shown on the product cut sheets included as Attachment #16.

The fueling management systems from the shore manifold to the storage tank and the storage tank to the users will be will be designed in accordance with NFPA 30. The 300,000-gallon diesel storage tank will be designed in accordance with API 650 and 33 CFR §154.

Each of the fueling stations will be designed in accordance with the above standards as described below:

- *systems will include fuel tank pressure relief systems equipped with automatic shut off valves designed to prohibit fuel spills in the event of overfill during tank filling operations;*
- *fuel transfer areas will be located on impermeable surfaces; and*
- *all fuel transfer equipment will include automatic shut off valves and/or nozzles*

BEST
25 September 2003

Date Completed

designed to prohibit fuel spills in the event of overfill during fuel transfer operations.

- *Bollards or curbing will be placed around tanks and piping systems to avoid potential equipment damage.*

During operations the fueling systems will be equipped with fire extinguishers and sorbent materials of adequate capacity to provide for immediate primary response to spills and/or fires in accordance with the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan as outlined in Attachment 2 of the EMP (Appendix U of EIA).

[04 June 03] **Comment– 17**

2.3.1.2 LNG Terminal

A. Berthing

Page 2-17, paragraph 2: Provide references to the applicable standard(s) for the management of ballast water. Indicate that all marine vessels berthing at the terminal will manage ballast and bilge waters in strict accordance with the "Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens" as specified by the International Marine Organization (IMO). The Bahamas is an active member of the IMO and requires that all marine vessels operating in Bahamian waters adopt the above referenced guidelines and adhere to the prescribed standard operating and reporting procedures. Ballast water management must become a part of the EMP.

If AES Ocean Ltd. intends to enable marine vessels to off load any solid or liquid wastes while at berth, provide appropriate references to a waste management plan for those wastes in this section. If marine vessels will not be permitted to off load any solid or liquid wastes while at berth, include that fact in this section.

Response

The text included at 5.2.2.1 B states that " In order to minimize and avoid impacts related to introduction of pollutants and invasive species all bilge discharge procedures will follow standard MARPOL regulations. Ballasting procedures will follow standard practices consistent with other Bahamian ports and in accordance with all applicable regulations." The IMO guidelines referenced in the above comment will be adopted and integrated into the EMP for the project.

AES will not permit or enable marine vessels to offload any solid or liquid wastes while at the berthing locations. The terminals and berths are designed for the transfer of LNG and LPG only.

BEST
25 September 2003

Date Completed

[04 June 03] **Comment– 18**

B. LNG/LPG Receiving

B.5 Electrical, Control and Hazard Protection Systems

Page 2-22, paragraph 3: Provide references to the applicable standard(s) for construction and operation of all electrical, control and hazard protection systems referenced in section B.5. Indicate which applicable standard(s) are to be utilized for LNG related systems and which are to be utilized for LPG systems. Provide references to detailed diagrams for the electrical, control, and hazard protection systems necessary for the emergency response plan contained within the EMP.

Response

Applicable codes for electrical, control and hazard protection system are as follows:

- *NFPA 59A - Standard for the Production, Storage and Handling of Liquefied Natural Gas*
- *NFPA 59 - Utility LP-Gas Plant Code*
- *NFPA 70 - National Electric Code*
- *SIGTTO - Society of International Gas Tanker and Terminal Operators - Recommendations and Guidelines for Linked Ship/Shore Emergency Shutdown of Liquefied Gas Cargo Transfer*
- *ISA – Standards and Practices for Instrumentation*
- *ISA S84.01 – Application of Safety Instrumented Systems for the Process Industries*

Detailed diagrams are not available at the current stage of engineering and design development. They will be provided to BEST when they are available and will be referenced in the EMP.

[09 July 03] **Comment– 19**

Page 2-22, paragraph 5: Specify each type of liquid material that could drain into the spill sumps to be located at the ends of the platform. Provide details, in narrative format and in the form of figures and design engineering drawings, that provide further information about the location, design and operation of those spill sumps. Explain how the spill sumps are to be kept free of fugitive oils, lubricants and debris draining off the berthing area during storm events and how oil water separation will be accomplished when storm water drains into the sumps during storm events. In the event of a system failure(s) during a storm event while the loading or unloading of product(s) is in progress, explain how the sumps will function in the

Date Completed

event that a mixture of fugitive liquids, fire fighting water, and/or, storm water is diverted simultaneously into the spill sumps located at the ends of the platform.

Response

The area around the loading arms will be sloped to drain any LNG spills to the spill sump located at the end of each platform. Each sump will be sized for the contents of one loading arm plus piping up to the platform isolation valve. The loading arm hydraulic system, which would contain oils and lubricating materials, will be curbed to collect any spills from those systems. Therefore the spill sumps on the platform designed to collect spilled product will not be contaminated with fugitive oils during storm events. No other sources of oils, lubricants, etc. will be located in the platform area. Operational procedures including daily checks of the sumps and emptying of the sumps after each LNG unloading sequence will be implemented during operations. Design engineering drawings showing these systems will be provided once they are complete.

Rain water and firefighting water falling on the platform area would accumulate in the spill sumps. This water would routinely be automatically drained into the stormwater discharge systems, unless the thermal detectors installed in the spill sumps detected a temperature change indicating a potential release of product (LNG/LPG). If such a release were detected, the automatic draining feature would be halted and the operators would receive an alarm notification. If a condition existed where firewater and/or stormwater were collecting in the spill sump at the same time spilled product was accumulating, the temperature of the water would quickly vaporize the LNG/LPG it contacted. Firewater will not be used on an un-ignited LNG spill since the water application will greatly increase the rate of vaporization thus expanding the area exposed to flammable vapor. ***The Spill Prevention, Control, and Countermeasures Plan (SPCC) and Facility Fire Response plans will be included within the EMP.***

[04 June 03] **Comment– 20**

Page 2-23, paragraph 2: Clarify what is meant by "Leaks that occur in the shore area will drain away from piping via natural drainage grades to spill sumps". Specify each type of material that could "leak" "in the shore area". Define the boundaries of "the shore area". Define what is meant by "natural drainage grades". According to section 1.1 Project Background (page 1-3 paragraph #2) there will be no natural grades on Ocean Cay. Moreover, according to section 2.3.1.1 Island Expansion (pages 2-4 thru 2-5), all but the southeastern portion of the island will be raised significantly above current grade. Define if leaks in the shore area will drain across mineral soils or impermeable surfaces. Provide details, in narrative format and in the form of figures and design engineering drawings that provide further information about the location, design and operation of the spill sumps to be located in the shore area. Explain how these sumps are to be kept free of fugitive oils, lubricants and debris draining off the shore area during storm events and how oil water

separation will be accomplished when storm water drains into the sumps during storm events. In the event of a system failure(s) during a storm event while the loading or unloading of product(s) is in progress, explain how the sumps will function in the event that a mixture of fugitive liquids, fire fighting water, and/or, storm water is diverted simultaneously into the spill sumps located in the shore area.

In general, consider drafting this subsection in a manner that clearly distinguishes between system design engineering objectives and system operating parameters and conditions.

Response

The shore area previously referenced in the EIA refers to the structures at the berthing and LNG/LPG transfer areas. These areas do not have a natural grade, but rather a designed grade that will drain potential spills back to the provided spill sumps as described in our response to your Comment # 19. Equipment containing LNG or LPG will be mounted on curbed concrete pads so that any spills will drain across impermeable surfaces. As described in our response to Comment #19, fugitive oils and lubricants are not anticipated to enter the spill sumps because curbing separates the area of hydraulic piping systems from the area that drains to the spill sumps. This design is used for other process equipment that contains oil and lubricants. The stormwater from these locations will be directed to an oil/water separator prior to discharge. The issue of stormwater and/or firewater in the spill sumps is addressed in our response to Comment #19.

[09 July 03] **Comment– 21**

C.1. LNG Tanks

Page 2-25, paragraph 4: Indicate that during the transportation, staging, handling, and installation of perlite insulation, proactive preventive containment measures will be prescribed and implemented in order to prohibit perlite from becoming a wind blown or water born waste fugitive waste.

Response

Perlite will be shipped in 1 ton bags, in the non-expanded state (i.e. looks like a fine sand), that will be transported in 20 foot shipping containers for weather protection and ease of handling during loading and storage.

The bags will only be removed from the shipping containers when installation into the tanks is ready to begin. Bags will be taken straight from the containers to the expansion furnace located at ground level adjacent to the tank being filled.

BEST
25 September 2003

Date Completed

Perlite expansion will be performed using an on site horizontal portable field perlite expansion furnace. A draft fan through a closed conduit draws expanded perlite and furnace exhaust to the cyclone skid where the perlite settles from the exhaust stream. The perlite is conveyed into the tank via a "Roots" blower system that draws ambient air to blow the perlite through a second closed conduit system used to transfer perlite into the annular space.

The hot gas and perlite fines that are exhausted from the cyclone skid are drawn into the baghouse filtration system by a second draft fan. In the baghouse the fines are removed from the exhaust stream and only the hot exhaust gas from the furnace is released as a dust suppression measure. The fines are collected inside the baghouse and are transported into the tank annular space.

Therefore, the expanded perlite insulation will be contained within a closed conduit system and placed directly into the LNG or LPG tanks to keep exposure or potential atmospheric release to a minimum. ***Additionally, the roof of the tank will be installed and it will cover the annular space into which the perlite will be placed thereby eliminating exposure to the environment. The contractor will make a thorough inspection of the tank prior to installing the perlite insulation and if any openings are evident which have a potential to allow perlite insulation to escape, a filter fabric, such as burlap or other permeable cloth, will be placed over those openings until the operation has been completed.***

[09 July 03] **Comment – 22**

C.2. LPG Tank

Page 2-26, paragraph 2: Indicate that during the transportation, staging, handling, and installation of perlite insulation, proactive preventive containment measures will be prescribed and implemented in order to prohibit perlite from becoming a fugitive and/or wind blown or water born waste.

Response

Please refer to the response to Comment #21. ***The roof of the LPG tank will be installed and it will cover the annular space into which the perlite insulation will be placed thereby eliminating exposure to the environment. The contractor will make a thorough inspection of the tank prior to installing the perlite insulation and if any openings are evident which have a potential to allow perlite insulation to escape, a filter fabric, such as burlap or other permeable cloth, will be placed over those openings until the operation has been completed***

[04 June 03] **Comment – 23**

C.3. Secondary Containment Structures

Page 2-26, paragraph 4: Provide references to the applicable standard(s) for construction and

BEST
25 September 2003

Date Completed

operation of LPG and LNG containment structures.

Response

The LNG tank will be designed, fabricated, and constructed in accordance with API 620 Appendix Q. The LPG tank will be designed, fabricated, and constructed in accordance with API 620 Appendix R. The tank containment design will be in accordance with the requirements of 49 CFR 193/NFPA 59A for LNG and NFPA 59 for LPG.

[04 June 03] **Comment – 24**

Page 2-26, paragraph 5: Provide details, in narrative format and in the form of figures and design engineering drawings that provide further information about the location, design and operation of all tank dike spill sumps. Explain how the sumps will function in the event that a mixture of spilled liquids, fire fighting water and/or storm water is diverted simultaneously into the tank dike spill sumps. Rewrite the last sentence of this paragraph. It is not clear how fire protection "facilities" can be based on "credible leaks" nor what this very important sentence otherwise intends to communicate. Fire protection facilities are designed and constructed based on operational hazard assessments and emergency response is based on monitoring and detecting credible leaks. Also consider drafting this subsection in a manner that clearly distinguishes between system design objectives and system operating parameters and/or conditions.

Response

The LNG dike is designed in accordance with NFPA 59A. The volumetric capacity of the LNG dike is sized in accordance with 49 CFR Part 193. The LPG dike is designed in accordance with NFPA 59.

A tank dike spill sump will be provided within each tank secondary containment structure described in C.3. Each sump will be sized for a one-hour spill based on the tank outlet nozzle size. The potential spill volume will be calculated per NFPA 59A. The one-hour spill scenario will be used for spill sump sizing purposes only. Stormwater that would regularly accumulate in the tank containment spill sumps will be automatically transferred to the stormwater discharge system, unless the thermal sensors installed in the sumps detected a temperature change indicative of a release of product. If a release were detected the pump transfer would cease and the operators would receive an alarm notification. If a spill collected in the spill sump at the same time it was collecting stormwater and/or firewater, the temperature of the water would quickly vaporize the collected product.

Appendix C of the EIA, LNG Terminal Hazards and Safety Considerations contains further information regarding the facility siting and leak potential analysis conducted for the facility. In accordance with NFPA 59A, the design and construction of LNG facilities requires

Date Completed

modeling of the hazard zones that could result from the code-specified release of LNG. The results of these calculations is used to determine if an LNG facility of a specific design and layout can be located at a specific site without causing an unacceptable impact on the safety of the public who live or work near the site. The hazard zone modeling does not form the basis for sizing the plant fire protection system. The sizing of these systems is based on "credible" leaks, spills, and fires of manageable proportions for plant siting evaluation.

[04 June 03] **Comment – 25**

C.4. Containment Sump Systems

Page 2-27, paragraph 1**:** This section should be referenced in sub sections B.5. and C.3. and expanded to address the requests included in those sections above. Alternatively, consider eliminating this section and including it in sections B.5. and C.3. Also consider drafting this subsection in a manner that clearly distinguishes between system design engineering objectives and system operating parameters and conditions.

Response

Upon review of the subject text, AES agrees that the information conveyed within this section is appropriate for inclusion in sections B.5 and C.3.

Rainwater and firewater collecting in the jetty, tanks and process area spill sumps discussed in B.5 and in the tank dike spill sumps discussed in C.3 will be removed by automatically activated sump pumps. Each sump pump~~s~~ will be equipped with an automatic shutoff to prevent pump operation if low temperature is detected in the sump (i.e., a product release is detected). If product release is detected the operators will receive an alarm notification and will take appropriate corrective action.

[09 July 03] **Comment – 26**

C.5. Electrical, Control, Fire Protection and Gas Detecting Systems

Page 2-27 paragraph 2: Reconsider and rewrite this paragraph. It is simplistic if not erroneous to indicate that, "The electrical, control, fire protection and gas detecting systems for the LPG system will be similar to those for the LNG systems…" Highlight and explain the important differences between LPG and LNG systems in the EIA. Expand upon those differences in a detailed manner in the EMP. Worker health and safety is contingent on all operating personnel understanding the fundamental physical differences between LPG and LNG as well understanding the differences in the systems designed to safely operate adjacent LPG and LNG facilities. Indicate which applicable standard(s) are to be utilized for LNG related systems and which are to be utilized for LPG systems. When corrected, this section should be referenced in section B.5. and expanded to address the requests included in that

BEST
25 September 2003

Date Completed

section above. Alternatively, consider eliminating this section and including it in section B.5. Consider drafting this subsection in a manner that clearly distinguishes between system design engineering objectives and system operating parameters and conditions. Provide references to detailed diagrams for the electrical, control, fire protection, gas detecting and all other hazard protection systems necessary for the emergency response plan contained within the EMP.

Response

LNG and LPG have different physical properties including differences in molecular weight, explosive ranges and the blend of hydrocarbons. MSDS sheets for these materials, indicating their physical property differences are provided in Appendix F of the EIA. Principal hazards associated with both LNG and LPG as well as some of the differences between the two are described in the Terminal Safety and Hazard Considerations document (Appendix C of the EIA). Although they are different materials, in the majority of the facility they will be handled in a combined stream. The combined stream is the as-received product from ship transfer to the LNG storage tanks. The materials are separated when they pass through the LPG removal system. At that point the LNG proceeds to regasification and enters the natural gas pipeline to the U.S. The LPG is directed to the LPG storage tank where it is stored until it is loaded onto ships for transport to the customer.

The main difference between the storage of LNG and LPG is in the materials of construction. Due to its storage temperature of -260F, materials for LNG service are typically stainless steel, 9% Nickel steel or aluminum. LPG has a storage temperature of -44F and can therefore use components constructed from impact tested carbon steel.

The facility will be provided with an integrated DCS (Distributed Control System) that will provide automated controls and detection systems for both the combined stream as well as the natural gas and LPG streams.

Since the LNG code (NFPA 59A) is more stringent than the LPG code (NFPA 59) with regard to spill control, fire protection and hazard detection, these systems will meet the requirements of NFPA 59A (which meets or exceeds the requirements for LPG per NFPA 59). Gas detectors and flame detectors are designed for hydrocarbon service covering LNG as well as LPG. The same detectors will be used throughout the facility to detect leaks of any forms of the hydrocarbon. The LFL (lower flammability limit) detectors will be mechanically equivalent for all installations, however the alarm points within the particular control loops will be set according to the explosive limits of the materials stored nearest the detectors.

Although detailed diagrams for the electrical, control, fire protection and gas detecting systems have not been prepared at this time, they will be prepared and referenced as appropriate in the EMP. We anticipate that these diagrams and functional descriptions of how these systems are integrated and operate will be an important component of the operator training program.

BEST
25 September 2003

Date Completed

The Emergency Response Plan outlined in the EMP will be expanded to include the details of these systems. ***In addition, the personnel training described within the EMP will emphasize the differences between LNG and LPG, and the required responses needed for potential emergencies associated with each product.***

[04 June 03] **Comment– 27**

D. LNG Regasification and Send Out

Page 2-27, paragraph 3: The conceptual design diagram entitled "LNG Regasification Process Flow Diagram" (Figure 2.10) referenced in this subsection is adequate for the purposes of the EIA, however, detailed process flow diagrams must be included in the EMP.

Response

The detailed process flow diagrams developed prior to start-up of operations will be incorporated as appropriate into the EMP. We envision the detailed PFD will be an important component of the operator training program.

[04 June 03] **Comment – 28**
D.1. Vapor Handling System

Page 2-27, paragraph 4: Sentence 2… "During ship unloading, heat input into the system will be from pumping and leakage from the ambient surroundings."… is confusing and misleading. Vapor handling systems for flammable materials are designed to reduce the potential for "leakage" of any sort. Reflect more realistic operating conditions in this sentence. Consider rewriting sentence #4 (the sentence is not clear). Also, consider drafting this subsection in a manner that clearly distinguishes between system design engineering objectives and system operating parameters and/or conditions.

Response

The second sentence of this paragraph should read "During ship unloading, heat input into the system will be from mechanical pumping systems and transfer from the warmer ambient air surrounding the piping and transfer systems." The fourth sentence of the paragraph should read "This allows part of the heat input of the system to manifest itself as a sensible heat increase in the stored LNG, reducing the amount of vapor generated in the storage tanks.

[04 June 03] **Comment – 29**

D.4. LNG Booster Pumps

BEST
25 September 2003

Date Completed

Page 2-28, paragraph 6: Sentence #1 is unnecessarily confusing and needs to be clarified.

Response

The information conveyed in the first sentence of the subject paragraph should read "Effluent liquid from the LPG removal system will pass through one of six LNG boost pumps to increase the pressure to 15,207 kPa (2200 psig) before flowing through the high pressure LNG vaporizers, where it is transformed from it's liquid state to a gaseous state, and into the natural gas pipeline."

[04 June 03] **Comment – 30**

D.7 Air Compressors

Page 2-29, paragraphs 3 & 4: Identify or reference the types of filters and lubricants to be utilized by the air compressors and the corresponding sections of the waste management plan included in the EMP. If the compressor motors are not electric motors, identify or reference the filters and lubricants to be used by those compressor motors. Identify or reference the desiccant medium to be utilized by the compressed air dryers. Identify how these materials will be handled, recycled and/or disposed of during operations and scheduled maintenance and include that information in the EMP.

Response

Two (2) 100 % oil free rotary screw type compressors will be installed, therefore there will not be lubricant discharge. There are only two disposable items (inlet air filter and the drier) both of which will be discarded as non-hazardous solid waste as allowed by the Bahamas DHES.

The inlet air filter will be a cartridge type and will need to be replaced after approximately 4000 hours of operation. If the compressor is only in use 50 % of the time, then the inlet air filters will need to be replaced annually.

There are two types of driers that may be utilized depending upon the final vendor selected. If a drum type drier is selected, then servicing will be needed approximately once every seven years. If a desiccant type drier is selected then the desiccant will need to be replaced biennially. Both the spent drum driers and the desiccants will be managed as non-hazardous solid waste in accordance with the Waste Management Plan in the EMP.

[09 July 03] **Comment – 31**

D.8. Instrumentation and Control

BEST
25 September 2003

Date Completed

Page 2-29 paragraph 5 thru page 2-30 paragraph 1: Indicate the applicable standard(s) that will be utilized for the construction of the Distributed Control System (DCS). Indicate if the LPG system, the emergency monitoring and response systems, and/or any other systems will also be included into the DCS. If instrumentation and control systems are not to be included in the DCS or are to be stand alone systems please explain. Indicate what measures will be taken to shield the low voltage lines that connect remote sensors and monitors to the central microprocessor of the DCS from electromagnetic interferences generated during normal operating conditions, equipment failures and emergency events. Provide details and references to the operation and maintenance of the DCS in the EMP. Worker health and safety relies on protecting the integrity and reliability of all instrumentation and control components and the entire DCS system.

Response

Applicable codes for the DCS:

- *NFPA 59A - Standard for the Production, Storage and Handling of Liquefied Natural Gas*
- *NFPA 59 - Utility LP-Gas Plant Code*
- *NFPA 70 - National Electric Code*
- *SIGTTO - Society of International Gas Tanker and Terminal Operators - Recommendations and Guidelines for Linked Ship/Shore Emergency Shutdown of Liquefied Gas Cargo Transfer*
- *ISA – Standards and Practices for Instrumentation*
- *ISA S84.01 – Application of Safety Instrumented Systems for the Process Industries*

The basic control functions (temperature control loops, flow control loops, etc.) for LPG systems and LNG systems will be handled identically within the DCS. A vaporization system will not be required for the LPG product and therefore a control system for that process will not be provided for LPG.

The DCS will display the status of all hazard detection instrumentation (LNG and LPG) and will provide for manual operator initiation of the Emergency Shutdown systems and firewater spray deluge systems.

Instrument lines will be protected from interferences by segregation of the instrument cable. In addition, the instrument cable will be covered with a shield that is grounded at one end.

Details and references to the operation and maintenance of the DCS will be included in the EMP following the final design phase of the Project.

BEST
25 September 2003

Date Completed

Ocean LNG recognizes that the Government of the Bahamas (GOB) will require access to some data streams directly from the plant instrumentation systems that are directly related to safety monitors and environmental compliance. These data streams will most likely fall within one of the following groups:

- ***Air emissions monitoring***
- ***Effluent monitoring***
- ***Emergency response alarms***
- ***Information regarding facility throughput***

These data streams will be identified within the EMP after Ocean LNG and the GOB conduct a workshop to determine the specific formats and content of the data streams needed as well as discuss any software/hardware requirements and compatibility issues that may exist.

[04 June 03] **Comment – 32**

E. LPG Removal System

Page 2-30, paragraphs 2-4: Identify or reference the types of wastes that could be generated by the LPG removal system and include that information in the EMP. These wastes may include filters, lubricants, heating oils and other heat exchanging mediums, spent catalysts, etc. to be utilized by the LPG removal system as well as all solid, liquid and gaseous waste streams generated by the LPG removal system (e.g., paraffin and/or other heavier molecular compounds and exhaust gases that may be generated by the LPG removal system).

Response

There will not be solid/liquid or gaseous waste streams generated by the LPG removal system. In addition, the LPG removal system will not use a catalyst or have a lubrication system. There will be a hot oil heating medium system (XCELTHERM 500 heat transfer fluid, MSDS provided as Attachment#32 or equivalent). This will be a closed loop system containing filter elements that will need to be replaced on an annual basis. The used filter units will be disposed of in accordance with appropriate solid waste handling procedures as described in the EMP.

[04 June 03] **Comment – 33**

Page 2-30, paragraphs 2-3: Explain why ethane will be included in the pipeline gas rather than separated and sold as an added value product. If ethane is to be utilized to maintain the heating value of pipeline gas, please explain why AES intends to use ethane rather than LPG to accomplish that task.

BEST
25 September 2003

Date Completed

Response

AES has examined the possibility of stripping the ethane product from the process stream for use as an added value product. Based on our review, the limited production of the ethane and somewhat limited market added to the constraints of shipping the product on specially designed ethane carriers in the Atlantic basin do not warrant the additional capital investment required. Therefore it has been decided to provide as much ethane in the end product stream as allowed by the specifications at the delivery point and the balance of the ethane will remain in the LPG stream for shipment to the US market as feed stock for additional processing.

[27 August 03] **Comment – 34**

2.3.1.3 LNG Ancillaries

A. Water Intake and Discharge System

Page 2-33, paragraph 2: Provide details or references to the following:

1. The mass flows and physical and chemical characteristics of all liquid waste streams entering the seawater discharge system.
2. The operating procedures required to monitor, test, treat, and control all liquid wastes entering the seawater discharge system.
3. The waste management plan for the collection, handling treatment and disposal of sediments and other solids separated from the water intake and discharge system.

Include all of the above information in the EMP.

Response

Since the last comment response and as a result of discussions with BEST, AES has determined to change the proposed LNG re-gasification to an air-warmed rather than water-warmed process. A general description of the air system appears in the response to Comment #138. This revision allows significant reduction of seawater usage and chemical additives for treatment and discharge. As a result, AES has revised its estimation of the mass flows and physical and chemical characteristics of all liquid waste streams entering the resulting seawater discharge. Values associated with these streams are shown on the attached tables (Revised 3-9, 3-10 and 3-11) and discussed below. Table 3-10 will be incorporated into the EMP and will allow for tracking of the reduced quantities of materials discharged.

A general description of the expected liquid waste streams is included in Section 3.4.3 of the EIA. Revision of the waste stream appears in Figure EMP-2, "Overall Effluent Flow for

BEST
25 September 2003

Date Completed

Ocean LNG, Ocean Cay, the Bahamas" (Attachment #34), and Table 3-10. The proposed plan for monitoring and control of the discharge is included in Attachment 13 to Appendix U, the EMP.

Section 3.7.2 of the EIA includes a description of the procedures for disposal of solid wastes and sediments that may be separated from the liquid streams. In general organic materials screened from incoming seawater will be returned to the ocean. Inorganic materials will be separated and managed with other solid waste streams. The source, character, and management of these wastes will be defined in the Waste Management Plan in the EMP and consistent with other similar wastes listed in Revised Table 3-9 and Table 3-10, as further described below.

With respect to these and other wastes generated by this process, Table 3-10 entitled "Ocean LNG Product and Waste Tracking" has been developed and a revised version is attached showing the modified, reduced waste streams associated with different island operations, and anticipated categories and types of waste that will be generated. This table is provided to BEST to demonstrate how AES will manage and track island material usage, and resulting waste generation and management. Specifically the liquid waste streams that will be discharged to the sea through Outfall 001 are listed as items 41, 42, 43, , 44, 46, 47, 48, 50, 51, 52, 54, 88, and 90 on Table 3-10. The product information for each discharge constituent is located in the Columns under the header "Discharge." Approximate annual usage of each of these products is listed under the header "Usage," while the wastes generated are listed under the "Waste Streams" header. Included in the waste stream information is the waste description, annual generation rate, waste characterization, disposition, storage location, and disposal location. This table and related tables (Revised Table 3-9, Table 3-11) will be continue to be refined and updated through facility design, construction and operation. This method provides a "cradle to grave" mechanism to track materials purchased, their use, and wastes generated from these materials and island operations. The information presented above will be included within the EMP.

[27 August 03] **Comment – 35**

B. Desalination Plant

B.1. Pretreatment

Page 2-35, paragraphs 2&3: Provide details or references to the following:

1. The mass flows and physical and chemical characteristics of the "disinfectant" (sic. biocide?), acid, and coagulant to be added to the incoming feed water (seawater) in the pretreatment process.
2. The mass flow and physical and chemical characteristics of the backwash waters

BEST
25 September 2003

Date Completed

resulting from the maintenance of multi-media sand filters before the backwash water is discharged to Outfall 001 as described in Section 2.3.1.3 of the EIA.

3. The operating and maintenance procedures to be utilized for the pretreatment process.

Include all of the above information in the EMP.

Response

Since the last comment response and as a result of discussions with BEST, AES has determined to change the proposed LNG re-gasification to an air-warmed rather than water-warmed process. A general description of the air system appears in the response to Comment #138. In general, the air-warmed system will produce water through condensation from air and, on average, the amount of water produced will be adequate for site service water demands. For the limited number of days a year that this is not possible, backup RO units will use seawater to produce service water. This revision allows significant reduction of seawater usage and chemical additives for treatment and discharge. As a result, AES has revised its estimation of the mass flows and physical and chemical characteristics of all liquid waste streams entering the resulting seawater discharge. Section 3.4.1.1 includes a description of the RO desalination process. Information on product usage and waste management associated with this system is summarized in the attached updated Table 3-10 "Ocean LNG Product and Waste Tracking." The products and wastes associated with the desalination plant are listed in Table 3-10 in line items 41 through 53. Specifically the sand filter backwash and brine reject stream are combined in item 50 – the amount shown in the attached revised Table 3-10 reflects a reduction of over 99% in the combined discharge from that expected with the previous water-warmed LNG re-gasification system (reduction from 521.5 million gallons per year to 2.5 million gallons per year). Table 3-10 will be incorporated into the EMP and will allow for tracking of the reduced quantities of materials discharged.

An electrochlorination system will be utilized to disinfect the seawater coming into the RO system as described below.

Electrochlorination Unit

The electrochlorination unit produces sodium hypochlorite solution by electrolysis of seawater. The chlorine will control bacterial slime and algae. The seawater will be obtained from an onsite well drilled specifically for the chlorination system and the 10,000 gpd back up potable water RO unit. The Electro-chlorination system will utilize a packaged seawater electrolytic chlorine generation system, a hypochlorite storage tank, chlorine injectors, and chlorine solution diffusers at the seawater intake. Hydrogen generated during electrolysis is vented to the atmosphere.

BEST
25 September 2003

Date Completed

The 1500 ppm sodium hypochlorite solution will be supplied to the water from the Condensed Water Pump, the water from the on-site well and the seawater intake system that supplies the 250,000 gpd back-up RO unit. Hypochlorite solution may also be needed intermittently for fouling control of the freshwater collection and treatment systems.

Hypochlorite Injection

Hypochlorite injection points are piped to the intake pipe, the intake screens and to the seawater pump discharge. The preferred primary injection point is at the seawater pump discharge. The injection point may be altered from time to time to treat the intake pipe and screens based on operational experience. The water flow at the injection point is measured and the hypochlorite injection rate is automatically regulated based on the water flow.

The seawater flow to the reverse osmosis desalination units is dechlorinated. Fresh water to the service water and potable water is measured and the streams are automatically rechlorinated to the desired dosing level.

The hypochlorite production is based on a continuous base dosing of 2 ppm with 10 ppm shock dosing. As recommended by some experts, an intermittent low dose injection may be effective in some applications. Typically, this involves a low dose of 1 to 2 ppm injection 5 minutes on, 25 minutes off. The exact dosing will be adjusted based on operational experience and the biofouling load. To minimize the use of hypochlorite, the intermittent dosing will be investigated during early plant operation and implemented if found to be successful.

Residual Chlorine

The residual chlorine at the outfall will be less than 0.2 ppm on a 24 hour average basis. Continuous measurement and a totalizer will verify that this requirement is met. If the average value is approached, the chlorine injection rate will automatically be reduced. A single measurement point in the combined flow outfall (point #26 on figure 2.15) is used for measuring residual chlorine.

Approximately once per month, the electrolytic cells are cleaned of carbonates and hydroxides by circulating a dilute (5%) HCl solution in a closed loop through the cells and back to an HCl storage tank. The process takes approximately one hour after which the HCl solution is drained back to the HCl tank. The dilute HCl solution is brought back to approximately 5% molar solution after numerous cleaning cycles by refreshing the solution with commercial grade concentrated HCl. The solution can reach 2.5% molar solution before refreshing is required. Exhausted solution is neutralized before discharge to the seawater outfall. It is estimated that 1 m^3 per year of spent HCl solution will be discharged.

BEST
25 September 2003

Date Completed

As shown on the revised Table 3-10 attached, the overall reduction in discharge volume, represented by the modification to air-warmed LNG re-gasification is over 99% in terms of water volume, contained hypochlorite discharge, and residual chlorine discharge from the desalination system.

[27 August 03] **Comment – 36**

B.2. Service Water

Page 2-36, paragraphs 1& 2: Provide details or references to the following:

1. The mass flow and physical and chemical characteristics of the concentrated brine reject stream.
2. The treatment (if any) and destination of the concentrated brine reject stream.
3. The waste management plan for spent RO modules or membranes.
4. The operating procedures required to monitor, test and record information related to the quality control of potable water.
5. The operating and maintenance procedures to be utilized in the service water process.

Include all of the above information in the EMP.

Response

With the revised system, water from the atmosphere condenses on the outside surface of the Air Heater tubes. Flows described herein are shown of Figure EMP-2, "Overall Effluent Flow for Ocean LNG, Ocean Cay, The Bahamas", and are summarized on the attached updated Table 3-10. The amount condensed depends on the ambient temperature and the dewpoint of the air, but will range between zero and 900,000 gpd with a yearly average of 655,000 gpd. The water is collected in the bunded area below the Air Heaters and runs to a sump containing the Condensed Water Pump. The Condensed Water Pump maintains the level in the Service Water Tank. Any excess condensed water flows over a weir in the sump to the discharge system by natural flow.

Service Water

A service water system will receive, store and distribute water from the Condensed Water Pump to service water users. A 1,000,000 gal service water tank will be provided so that there is enough water stored so that the fire water pumps can run for a minimum of 2 hours at peak rate and the potable water supply to Bimini can be maintained at 100,000 gpd for a period of 4 days when no condensed water is available from the air heater due to unfavorable ambient conditions or plant shutdown. Service water pumps will supply a distribution piping system consisting of utility stations throughout the plant and in areas where wash down is required.

Service water will also supply the Potable Water Production Units.

Potable Water

The potable water system is fed by two 250,000 gpd Potable Water Production Units. The potable water system provides an average of 100,000 gpd of potable water to Bimini (maximum rate is 250,000 gpd) and a maximum of 50 gpm to the hostel and 60 gpm to the demineralised water system. A 300,000 gallon potable water storage tank is provided. Any filter backwash or wastewater from the Potable Water Production Units is sent to the wastewater discharge system.

RO systems have also been revised over the original design and will consist of backup units only. A back-up 10,000 gpd RO unit will treat seawater taken from the on-site well to provide potable water to the plant incase of a loss of the normal potable water system.

A second back-up consisting of 2 x 250,000 gpd RO units will treat seawater from the seawater intake system to provide potable water to Bimini and the plant incase of a loss of the normal potable water system.

The feed to the RO units must be dechlorinated by injecting 6ppm Sodium Bisulfite upstream of the RO unit (this concentration assumes 2ppm chlorine in the seawater). The sulfite is changed to sulfate, which is already present in seawater.

The filters within the RO units will be backwashed using reject brine. No chemicals or additives will be used, and no treatment will be required. The RO membranes will be cleaned every 6 months by circulating a 2% by weight citric acid solution and a 0.1% by weight sodium hydroxide solution. The chemicals used will be food grade or better. After cleaning, the solutions are neutralized to pH of between 6 and 8 and are disposed of in the seawater outfall stream.

The modified design utilizes the same maintenance as that described for the original desalination unit, described below, however the volumes of discharge required for resulting process waste are reduced as shown on the attached updated Table 3-10.

Lastly, note that this system is for backup purposes only on days when insufficient moisture is available from the ambient air to supply needs of the overall system, and days when the plant if shut down for extended periods of time and water supply is needed to support Bimini water demand.

Multimedia filter backwash:
Multimedia filters will be backwashed using reject brine from the first stage RO units. No chemicals or additives are used and no treatment is required.

BEST
25 September 2003

Date Completed

RO element cleaning:
The RO membranes are cleaned every 6 months by circulating a citric acid solution (2% by weight) and a solution (0.1% by weight) of sodium hydroxide (caustic). The chemicals used are food grade or better. After cleaning, the solutions are neutralized to a pH of between 6 and 8 and disposed of by discharging slowly into the seawater outfall stream. The estimated volume of neutralized citric acid solution discharged per year: 4000 gallons. The estimated volume of neutralized caustic solution discharged per year: 4000 gallons.

Dechlorination
The feed to the RO units must be dechlorinated by injecting 6ppm (based on 2ppm chlorine in seawater) Sodium Bisulfite upstream RO unit. Sodium Bisulfite injection will be adjusted automatically to match chlorination dose and frequency. This method is widely used to remove chlorine residuals from discharge waters and there are no harmful effects. The sulfite is changed to sulfate which is already present in natural seawater.

The anticipated overall reduction in spent RO membrane elements (Line 49 of updated Table 3-10) under the modified design is from 60 to 5 elements per year, and reduction of brine reject water discharged is over 91% (Line 52 - reduction from 657 mgpy to 55 mgpy).

[27 August 03] **Comment – 37**

B.3. Demineralized Water

Page 2-36, paragraphs 3 thru 5: Provide details or references to the following:

1. The mass flow and physical and chemical characteristics of the waste stream resulting from the electrodeionization (EDI) system.
2. The treatment (if any) and destination of the waste stream identified in #1 (above).
3. The waste management plan for spent RO modules or membranes and ion exchange resins.
4. The operating and maintenance procedures to be utilized in the demineralized water process.

Include all of the above information in the EMP.

Response

Electrodeionization (EDI) process is used to produce deionized water. Potable water is routed to the EDI system for deionization. Voltage across the cells forces dissolved solids through the membranes into the concentrate / reject stream. The current splits the water molecules into hydrogen and hydroxyl ions, continuously regenerating the resins in the process, hence no cleaning chemicals are required. Under the modified design, the wastewater from the EDI

BEST
25 September 2003

Date Completed

system is recycled to the service water system. The product water from the EDI plant is used as make-up water for the closed cooling water system, for injection in gas turbines (GT's) to control NOx emissions during infrequent operations on diesel fuel, and turbine blade washing during periodic maintenance. The deionized water is stored in an 80,000 gal storage tank. As shown on the attached updated Table 3-10, no discharges result from this process (as opposed to discharge of approximately 20 gpm containing untreated TDS under the previous design). Please also see our response to Comments #34 and #35 above.

Again as the design, construction and operation progress, additional revision will be to the table, as part of the EMP. Operating and maintenance procedures to be utilized in the modified desalination facility are also being included in the EMP. Operating procedures to monitor the quality of potable water are being included in the EMP.

[27 August 03] **Comment – 38**

B.4. Water Discharge

Page 2-37, paragraph 2: Provide details or references to the following:

1. The mass flow; physical and chemical characteristics of the mixed liquid waste stream to be discharged at Outfall 001.
2. The treatment (if any) of the waste stream identified in #1 (above).
3. The operating procedures required to monitor, test and record information related to the quality of the combined liquid wastes to be discharged at Outfall 001.

Include all of the above information in the EMP.

Response

Under the modified LNG warming system design, modifications showing the reduced waste streams generated and discharged to Outfall 001 have been characterized, and included in the attached Revised Table 3-10 and updated Table 3-11, as described in the response to Comment #34.

Operating and monitoring procedures to be utilized in Outfall 001 operation are described in 3.4.3 of the EIA, and Attachment 13 of the EMP (Appendix U to the EIA); these methods will be refined as design progresses, and the final procedures and tracking table (Table 3-10) will be updated and included in the final EMP.

[04 June 03] **Comment – 39**

C.3. Fuel Storage

BEST
25 September 2003

Date Completed

Page 2-40, paragraph 2. Indicate the applicable standards that will be utilized for the construction of the two 20,000gallon day tanks located near the support vessel harbor.

Response

*Please reference our response **to Comment #16 regarding applicable standards** for diesel fueling systems which are inclusive of the tank storage.*

[04 June 03] **Comment – 40**

C.4. Fuel Systems

Page 2-40, paragraphs 3 thru 5: Indicate the applicable standards that will be utilized for the construction and the operation of the systems referenced in this subsection.

Response

The GTG's will be designed in accordance with API 616, which makes a reference to applicable codes (ASME B31.3) for the fuel system.

[04 June 03] **Comment – 41**

C.5. Fire Protection Systems

Page 2-40, paragraph 6: This subsection indicates in general terms "The GTG fire protection system will be designed to meet the requirements of the NFPA". Please indicate specifically which sections of the NFPA will be utilized as applicable standards to be met. Correlate those NFPA sections with the system components of the fire protection system. Include that information in the EMP. Evaluate the utility and cost/benefit of installing methane sensors on the ceilings of enclosures housing gas pressure regulators, gas heat exchangers and/or GTGs and integrating those sensors with the gas monitoring and fire protection elements of the DCS.

Response

The fire extinguishing components of the fire protection system will be designed in accordance with NFPA 12 while the gas detection components will be designed in accordance with IEC/EN 50018, NFPA 85.

Gas Detectors (including methane sensors) located within the housing of the GTG will be

BEST
25 September 2003

Date Completed

wired into the GTG control system for safety interlocking of GTG equipment. Since this measure is incorporated into the design standards a cost/benefit analysis will not be required.

[04 June 03] **Comment – 42**

C.6. 4160 Volt AC Power System
C.7. 480 Volt AC Power System
C.8. 120/230 Volt Power System
C.9. DC Power Supply System
C.10. Uninterruptible Power Supply (UPS)
C.11. Grounding and Lighting Protection

Pages 2-41 thru 2-42: Indicate which applicable standard(s) will be utilized for the construction of each of the systems listed above (C.6. thru C.11.).

Response

*NFPA 70 *(NEC) governs for installation methods for all electrical equipment, in conjunction with the following codes.*

C.6. 4160 Volt AC Power System
Switchgear and MCC Equipment will be constructed to applicable sections of ANSI/IEEE C37, ANSI C19.3, ANSI/NEMA ICS 6, NEMA ICS 1,2, UL347

C.7. 480 Volt AC Power System
Switchgear and MCC Equipment will be constructed to applicable sections of NEMA ICS 2-322, UL-845, UL-1558, ANSI C3

C.8. 120/230 Volt Power System
NFPA 70

C.9. DC Power Supply System
Applicable UL standards for batteries and charger

C.10. Uninterruptible Power Supply (UPS)

1. *UL 1778 - UPS Standard.*
2. *NFPA 70 - National Electrical Code.*
3. *IEEE 446 - Recommended Practice for Standby Power Systems.*
4. *IEEE C62.41 - Recommended Practice for Surge Withstandability.*
5. *NEMA PE 1 - Uninterruptible Power Systems.*
6. *OSHA - Occupational Safety and Health Association.*

BEST
25 September 2003

Date Completed

C.11. Grounding and Lighting Protection
IEEE Std 142, NFPA 780, NFPA 70

[04 June 03] **Comment – 43**

D. Storm Water Management System

Pages 2-43 thru 2-46: Sumps previously referenced on page 2-22, paragraph 5; page 2-23, paragraph 2; page 2-26, paragraph 5; and page 2-27,paragraph 1 are not referenced in this sub section. Indicate how storm water and mixed wastes collected in each of the above referenced sumps will be collected; controlled, transferred; treated and discharged through Outfall 001; Outfall 002 and/or Outfall 003 respectively.

Response

The sumps referenced in previous sections include the spill collection sumps located at the loading platforms and the spill sumps located within the tank dike area for the LNG and LPG tanks. The management of stormwater collected within these sumps should have been included in Section 2.3.1.3D. All sumps, including those referenced in the previous sections, that may contact industrial process materials or wastes will be directed to Outfall 001, passing through oil/water separating systems before it combines with the Outfall 001 discharge flow. If LNG or LPG contamination is detected by the thermal detectors, or known to exist due to other operational releases, the stormwater will be held in the dike for evaluation of appropriate disposal methods. All discharge through Outfall 001 will be monitored for compliance with the discharge criteria as they are defined in Attachment 13 of the EMP or according to the permit issued for operation in the Bahamas. Outfall 002 and 003 are provided for drainage of non-process stormwater that falls from areas such as roadways.

[27 August 03] **Comment – 44**

D.1. Outfall 001 – Plant Water Discharge

Page 2-44, paragraphs 1-3: Identify all materials that could potentially be included in the low volume waste streams (referenced and generally described in this sub section) that are to be directed to Outfall 001. Provide details about the physical and chemical characteristics of each of those materials. Describe how all low volume waste streams will be minimized, controlled, treated and monitored before entering the collection system for Outfall 001. Describe how the combined high volume waste stream will be monitored before discharge at Outfall 000. Include that information in the EMP.

BEST
25 September 2003

Date Completed

Response

The original site facility design described in the EIA anticipated the potential future construction of a Power Generating Plant and use of a water-based system to warm LNG for re-gasification. These elements of the design and future capacity has been removed from the current design and therefore the pipe size for discharge to Outfall 001 and flow capacity will be smaller, approximately 1 meter in diameter. The currently anticipated waste streams and ranges of waste quantities contributed to the discharge at Outfall 001 are summarized in the attached Revised Table 3-11, as also described in our response to your comment on Section 2.3.1.3A (Comment #34). In addition, a management tool has been created for the EMP, comprised of the attached updated Table 3-10, "Ocean LNG Product and Waste Tracking." The specific discharge materials and characteristics are shown on the updated Table 3-10 at Item lines 33, 52, 79, 80, and 91. Under the new LNG warming plan, the discharges on lines 33, 79, and 80 are eliminated (eliminates approximately 20 billion gallons of discharge per year), and discharges on lines 52 and 91 are reduced by 92% to 99%. This table is provided to supply BEST with adequate detail for EIA review and completion, and will continue to be refined as the facility design is further developed, and during operation of the facility.

All discharge through Outfall 001 will be monitored for compliance with the discharge criteria as they are defined in Attachment 13 of the EMP. Waste generation will be minimized in accordance with the Waste Minimization Plan, Attachment 7 of the EMP.

[09 July 03] **Comment – 45**

D.3. Outfall 003 – Storm Water Discharge

Page 2-46, paragraph 1: Relocate this paragraph to subsection 2.4.1.1 Site Preparation. Indicate that best practices will be utilized in the event that contaminated materials are encountered during the excavation of foundations or other site preparation and/or construction activities. Delete the sentence "Any suspected contaminated groundwater would be segregated to a separate settling area." (Transferring contaminated groundwater from a construction site to a settling area could result in contaminating another site if best practices are not followed). Outline the best practices to be followed. Include instructions for construction personnel to stop work immediately when contaminated materials are discovered on the job and notify safety and environmental project supervisors. Include instruction for safety and environment supervisors to immediately notify government agency personnel to arrange for timely site inspection.

Response

AES agrees that the paragraph regarding potential groundwater contamination discovered during construction is more appropriate to the discussion in Section 2.4.1.1. As described below, known site contamination identified through environmental investigations will be

BEST
25 September 2003

Date Completed

addressed in accordance with the AES Ocean LNG Remediation Work Plan, as submitted to BEST. If unanticipated environmental contamination is discovered during project construction, the procedures described in the Contaminated Sediment and Soil Management Plan will be implemented for such other sources of contamination.

AES Ocean LNG Remediation Work Plan

AES plans to remove detected free diesel fuel product in the subsurface and known associated contaminated soil. These materials will be treated and disposed of in accordance with the AES Ocean LNG Remediation Work Plan.

Contaminated Sediment and Soil Management Plan (Submitted as Attachment 6 to Appendix U of the EIA)

During construction of the facility, all contaminated groundwater encountered will be segregated, to the degree possible, in the immediate area of detection in containers. Groundwater encountered during construction will be evaluated for potential contamination through sampling and analysis by head space PID in the field. If the field technicians determine that groundwater is contaminated, it will be contained and directed to on-site treatment systems capable of removing the contamination prior to discharge. As indicated in Figure 2 of Attachment 6 to the EMP, upon the discovery of unanticipated contamination work will be stopped in the affected area, and AES's safety and environment supervisors will notify GOB government agency personnel. If the groundwater is determined to be free of contamination, work will proceed unless the construction inspector/environmental monitor notes changes in conditions.

[04 June 03] **Comment – 46**

B. 60mm (2 in) Natural Gas and 219 mm (8 in) Potable water Pipelines to Bimini

Pages 2-48 thru 2-49: Provide references to marine studies that address potential impacts to nearby marine environments as a result of the proposed submarine trenching and material backfilling activities.

Response

The baseline aquatic resource descriptions along the pipeline route to N. Bimini are included in Section 4.1.6 and Appendix L, Characteristics of Benthic & Planktonic Communities and Appendix M, Summary of Existing Benthic Habitats. The potential impacts of trenching and backfilling during pipeline construction are discussed in Section 5.2.4.2A. Mitigation measures for potential impacts, including the use of concrete matting to avoid trenching, are discussed in Section 6.1.4.

BEST
25 September 2003

Date Completed

[04 June 03] **Comment – 47**

A. Dikes and Control Weirs

Page 2-57, paragraph 2: Identify in this sub section, the applicable turbidity standard referenced in the Environmental Management Plan (Appendix U, Attachment 14). Indicate that the turbidity standard referenced in the EMP is the same one utilized as the performance benchmark for the design engineering and construction of all turbidity control structures and devices including, but not limited to, dikes; retaining ponds; control weirs, etc.

Response

Please refer to our response to your comment on Section 2.3.1.1B (Comment #13)

[24July 03] **Comment – 48**

B. Site Filling (reclamation)

Page 2-57, paragraph 3: Clarify how dredge materials required establishing the perimeter boundaries of the reclaimed land will be dewatered prior to filling the interior regions of the island.

Response

The material used to form the perimeter barriers or bunds of the reclaimed land will be rocky dredge material placed hydraulically using a downspout located close to the bottom. The rocky dredge material will consist primarily of limestone. Due to technological limitations turbidity control measures will not be available during hydraulic placement of the rocky limestone perimeter barriers or bunds. The expected particle size gradation of the rocky limestone material and related potential for turbidity will depend on the specific selected dredge equipment, however for purposes of EIA review and approval the following detail is provided. Rocky limestone will be removed from submarine areas by cutter head dredge and directly placed for barrier/bund construction. The direct limestone rock placement during perimeter bund construction will be the only portion of reclamation activity for which effective turbidity control is not technologically feasible. Each complete barrier/bund will comprise a section, behind which dredge material will be placed using turbidity controls. It is estimated that less than 10% to 15% of the barrier material will be comprised of bund limestone rock placed without turbidity control. It is expected that the total construction time to place the bund material will be approximately 50 days (approximately 10 sections taking 5 days per section to build); however these construction activities will be phased over a 10 month period.

Date Completed

AES intent is to target, for bund rock supply, those areas where there is little silt cover and/or areas where the overlying sand has been removed for island improvements. This will also help to minimize the potential for turbidity generation during bund construction. The EMP will include the specific refined construction procedures and the associated methods of turbidity control.

[24July 03] **Comment – 49**

C. Ground Improvements

Page 2-59, paragraph 4: Indicate the physical and chemical characteristics of the bentonite clay based drilling mud to be utilized for the drilling of boreholes and subsequently to be used as fill on the island.

Response

AES anticipates limited use of drilled piles for foundation support on Ocean Cay. If these installations are required, a synthetic based drilling fluid will be used due to the potential contact with brackish groundwater. Product information for the proposed product (EZ-Mud DP) is included as Attachment #49 to this response letter. We do not anticipate that this material will be used as fill on the island.

Drilled shafts may be used to support loading/unloading platforms and breasting dolphins for the LNG and LPG terminals that will be located along the southern and eastern shores of the island, respectively. Drilled shafts may be needed also in the Small Vessel Harbor. Although the detailed engineering has not been completed, information is provided herein for completion of EIA review. It is estimated that 75 to 150 drilled shafts to be installed may require the use of drilling fluids.

It is anticipated that drilling fluids used during construction of drilled shafts will consist of polymer muds such as Poly-Bore or Bio-Bore manufactured by Baroid Industrial Drilling Products. At locations where a thicker drilling fluid is required to stabilize boreholes, bentonite drilling mud such as Aqua-Gel may be used. In addition, additives such as N-Seal or Quik-Trol may be used to enhance drilling mud performance. These drilling muds are principally comprised of cellulose, polyacrylamide, glass fibers, and silica that are not environmentally damaging. Copies of Material Safety Data Sheets (MSDS) for each of these products are enclosed and contain more detailed information.

These drilling fluids will be re-used in drilling multiple shafts. At the completion of the drilling operations, the drilling fluids will be solidified and, if acceptable, based on consultation with the Environmental Inspector for the GOB, the material will be used as general fill onshore. The fill will be placed in an area near the hostel and away from the shore, and the final location will be documented in the EMP.

BEST
25 September 2003

Date Completed

[04 June 03] **Comment – 50**

Page 2-60, paragraph 2: In the event that select stone materials need to be imported to Ocean Cay for the construction of stone columns, indicate the source of that select material and the measures that will be taken to insure the imported materials are free of contaminants and/or invasive species.

Response

AES will not use stone columns as support structures on Ocean Cay and will not import stone for this purpose.

[04 June 03] **Comment – 51**

E. Excess Materials Shoal:

Reference comments included in subsection B. Dredging: Page 2-6, paragraph 6 (above).

Response

As previously stated in our response to your comment on Section 2.3.1.1 B, excess material will be stockpiled on Ocean Cay or sold. No excess materials shoal will be constructed, as had been previously described in the EIA.

[04 June 03] **Comment – 52**

2.4.1.4 Support Vessel Harbor

B. Shore Protection Features

Page 2-62, paragraph 1: Clarify the dimensions of the proposed reinforced concrete caissons.

Response

Due to design modifications in the planned shore protection structures, concrete caissons will not be used as had been previously indicated in the EIA. The shore protection systems will consist of sheet pile bulkheads and concrete revetments.

[09 July 03] **Comment – 53**

C. Onshore Support Systems

BEST
25 September 2003

Date Completed

Page 2-62, paragraphs 3-4: Provide details or make reference to the waste management plan for all solid and liquid wastes that will be generated in the support vessel harbor, including the following: waste lubricating oils, contaminated fuel, contaminated bilge waters, glycol, batteries, solvents, coating materials, batteries, filters, etc. Include that information in the EMP.

Response

All wastes generated at the Small Vessel Harbor will be handled in a manner consistent with the waste management practices during construction and operation outlined in Section 3.7. During construction, the contractor, and during operation, AES will be responsible for the proper characterization, collection, storage, and ultimate disposal of all waste materials. Disposal will be conducted in accordance with the requirements of the Government of the Bahamas.

The waste streams and ranges of waste quantities that are currently anticipated for the SVH are summarized in a Revised Table 3-9 "Estimate of Waste Quantities" and Table 3-10 "Ocean LNG Product and Waste Tracking" at lines 54 through 63. All waste generation and disposition at the SVH will be monitored for compliance with the management criteria defined in the EMP. Waste generation will be minimized in accordance with the Waste Minimization Plan, Attachment 7 of the EMP. Wastes generated by vessels such as ballast, bilge and waste waters will be managed in accordance with IMO-MARPOL standards and applicable Bahamian regulations Again, as the design is refined, additional detail will be added to Table 3-10, the EMP will be refined and the attached table made part of the EIA.

[04 June 03] **Comment – 54**

A. Tank Construction Overview

Page 2-66, paragraph 5: Consider specifying stainless steel rather than galvanized anchor bolts for the LNG/ LPG tank foundations (and all other foundations). Inspections of industrial facilities throughout The Bahamas indicate that galvanized anchor bolts cast in concrete foundations oxidize very rapidly, particularly in near shore environments such as Ocean Cay. Anchor bolt replacements are among the most common unscheduled maintenance requirements experienced by facilities operating in The Bahamas. This upgrade will significantly reduce the potential for process equipment related failures and associated hazards and accidents.

Response

A final determination for the anchor bolt material will be made during the detail engineering design phase. As noted, hot dipped galvanizing does not adequately withstand use in a marine environment without a semi-annual painting/touch-up. Stainless steel material 316L or

Date Completed

equivalent will be considered. The issue of dissimilar metals will be addressed.

[04 June 03] **Comment – 55**

B. Hydrotest Procedure

Page 2-67, paragraph 3: Identify and describe all chemical agents (if any) that may be utilized in the cleaning and hydrotesting of all tanks and piping including, but not limited to biocides, degreasing agents, descaling agents, etc. If chemical agents are to be utilized, describe the waste management plan for wastewaters generated by the cleaning and hydrotesting of tanks and piping.

Response

AES currently has no plans to use chemical agents during the tank cleaning and hydrostatic testing procedures. Tanks will be swept clean of debris prior to filling with seawater for the hydrotest. Seawater, obtained through the seawater intake structure will be treated with the sodium hypochlorite dosage planned for routine operations while filling the tanks. The water will be filtered prior to discharge and potable water will be used to rinse the tanks after hydrotest and prior to commissioning. The procedures for tank hydrotest are included in Section 2.4.2.2 B of the EIA.

04 June 03] **Comment – 56**

C. Tank Painting and Corrosion Protection

Page 2-68, paragraph 1: Reference comments above regarding anchor bolt corrosion (A. Tank Construction Overview). This upgrade will significantly reduce the potential for process equipment related failures and associated hazards and accidents.

Response

Please reference our response to your comment regarding Section 2.4.2.2 A (Comment #54) for a discussion of this issue.

[04 June 03] **Comment – 57**

B. Process Equipment

Page 2-68, paragraph 5: Consider specifying stainless steel anchor bolts for all process equipment to be anchored to concrete slabs, caissons, foundations, etc. This upgrade will significantly reduce the potential for process equipment related failures and associated hazards and accidents. Reference comments above regarding anchor bolt corrosion (A. Tank

BEST
25 September 2003

Date Completed

Construction Overview; and C. Tank Painting and Corrosion Protection).

Response
Please reference our response to your comment regarding Section 2.4.2.2 A (Comment #54) for a discussion of this issue.

[24July 03] **Comment – 58**

D. Systems Painting and Corrosion Protection

Page 2-70, paragraph 1: Detail or make reference to how coating materials and associated catalysts and solvents will be managed. Detail or make reference to the standard operating procedures required for safe storage, handling, application, cleanup, and disposal of coating materials, adhesives, catalysts, and solvents as well as spent containers and equipment utilized and/or generated during the construction, commissioning and operations phases of the project. Mismanagement of such materials is frequently related to industrial accidents and injuries in The Bahamas. Include that information in the EMP.

Response

Waste minimization is the key to reducing the generation of surplus paint materials and subsequent disposal costs. Waste minimization programs involve inventory control, accurate materials purchasing, solvent recovery and reuse, the return of unused material to the supplier, material exchanges, and other efforts to reduce the generation of waste paint materials

Every effort will be made to purchase accurate volumes of paint materials for each job. When possible, purchase orders should designate that unused sealed paint will be returned to the supplier for credit. When painting operations involve multi-part paints, care should be taken to mix only the amounts of paint that can be used within the allowable application time frame and applied to the items to be painted.

The following items are part of the normal procedures that will be in place for site painting operations:

- *Mix and store paints and solvents on impervious surfaces.*
- *Secondary containments must be present around all hazardous materials.*
- *Storage in excess of 5 gallons shall be in separate equipment shanties or trailers used exclusively for storage.*
- *All containers are to be labeled.*
- *Do not paint on an unprotected ground surface.*
- *Avoid all discharges onto ground surfaces.*
- *Do not mix materials for disposal.*

BEST
25 September 2003

Date Completed

- *Do not accumulate waste on the jobsite.*
- *No open burning is allowed on a jobsite without authorization of the GOB.*
- *No materials or debris are to be discharged on/in the surrounding waters of Ocean Cay.*
- *Effluents from spray guns are to be discharged into containers during cleaning operations.*
- *When conducting abrasive blasting, in populated areas, the construction project manager is to work closely with the GOB, advising them what to expect, and seeking their cooperation. The overall project manager is to be aware of public sentiment, as well as any restrictive regulations. Generally, contractors are cited for violations when the GOB responds to complaints where the contractor has not been exercising reasonable restraint.*
- *In the event that any waste is to be disposed from the jobsite, the BEST environmental coordinator should be advised on the activity.*
- *All permits/approvals (EIA/EMP) should be readily available on site.*
- *The MSDS for the blasting abrasive should be evaluated to make sure that the spent abrasive will not cause contamination of the ground surface.*

Solvent/paint mixtures are generated from painting operations due to spray gun cleaning and general cleanup activities. When this mixture is no longer usable and if it contains a listed hazardous waste or exhibits hazardous characteristics, the mixture is a hazardous waste and must be handled accordingly.

Characterization and disposal of these wastes will be conducted as outlined in Section 3.7 of the EIA. Anticipated quantities of wastes that may be generated by the different operations associated with painting and corrosion protection systems are listed in the Revised Table 3-9 and Table 3-10.

[04 June 03] **Comment – 59**

E. Electrical and Instrumentation

Page 2-70, paragraph 1-4: Indicate the applicable standards for the installation of all electrical and instrumentation systems.

Response

Electrical installations will be in accordance with the response to Comment #42. Instrumentation will be installed in accordance with Comment #31

[04 June 03] **Comment – 60**

2.4.2 LNG Ancillaries

Page 2-70 thru 2-75: Provide details, or references to further information, about a number of LNG ancillary buildings and/or systems not yet included or adequately described in this

BEST
25 September 2003

Date Completed

section including the following: fire pump house; chlorination building; water treatment building; waste treatment area; water/glycol pumps; WEG/SW plate frame heat exchangers; LNG Vaporizer & HP pump structure; etc.

Response

Since the meeting of 24 July and as a result of discussions with BEST, AES has determined to change the proposed LNG re-gasification to an air-warmed rather than water-warmed process. A general description of the air system appears in the response to Comment #138. This revision will allow significant reduction of seawater usage and chemical additives for treatment and discharge and modifies some of the features described below regarding LNG gasification and LPG heating. Please see responses to Comments #34-#38 and #138 for supporting information.

.Descriptions for LNG ancillary buildings follows:

Administration and Control Building

The building is intended to include the main control facilities, administrative area and general support facility area.

Approximate dimensions: 70 ft. x 180 ft. x 30 ft. (W x L x H), 2 stories

***Exterior**:*

Walls - concrete block stucco finish

Roof - slope concrete slab, waterproofed

Painting - vinyl color painting for coastal environment.

***Interior**:*

Walls - concrete block, gypsum wallboard on metal stud framing, plaster cement-sand mixture smooth finish.

Ceilings - modular acoustic panel with fluorescent natural lighting.

Floors - concrete paving brushing cement finishes

Doors and Windows - hollow metal doors with panic hardware devices, architectural aluminum glass windows and doors at exterior walls

Painting - vinyl color painting for coastal environment.

Administration Area

BEST
25 September 2003

Date Completed

The administration area will provide workspace for those on the site in an administrative capacity and for receiving visitors. The administration area will occupy portions of the first floor and the second floor of the administration and control building. The following will be included in the administration area first floor:

Reception/waiting room

Security staff

Women and men restrooms

Conference and training room

The following will be included in the administration area second floor:

Offices for plant management and safety

Secretary area

Copy and fax area

Plant records storage

Kitchen facilities

Temporary lodging for weather emergency

Control Room

The control room will be located on the second floor and will provide workspace for the operations staff and house main control facility of the plant. The area will include the following:

Control room

Electronics room

Instrument maintenance room

Battery room

Office

Training room

Women and men restrooms

Electrical Room

The enclosed building will house the local service electrical equipment, the batteries and the control/meter/protection panels for the entire project.

Heating, Ventilating and Air Conditioning (HVAC) System

BEST
25 September 2003

Date Completed

Building heating, ventilating and air conditioning (HVAC) systems are designed to satisfy the workspace environmental requirements for personnel occupancy and equipment operation. Temperatures will be maintained well below operating limits so that equipment reliability will not jeopardized.

The indoor temperature design conditions in the control building and electronics enclosures will be in accordance with equipment operating requirements. The indoor and outdoor design temperatures in non-process areas will comply with applicable local energy code requirements. Ventilation systems will be designed to provide adequate ventilation air to dissipate the excess heat developed by the plant equipment and components during plant operations.

LNG Pier, LPG pier Control and Electrical Building

The LNG and LPG Pier control/electrical building will be of concrete block construction and will provide space for control system components and electrical equipment associated with the LNG and LPG piers.

Approximate dimensions: 80 ft. x 30 ft. x 12 ft.; (L x W x H), 1 story

Warehouse and Maintenance Building

The warehouse and maintenance building will be of concrete block construction and will provide workspace for the maintenance staff and storage area for spares and equipment kept on site. The warehouse will be large enough to contain spare parts and a reasonable inventory of consumables required to operate and maintain the plant.

Warehouse management office

Warehouse storage area

Mechanical equipment room (including building services and HVAC)

Storage room

Men and women's restrooms, showers, and locker rooms

Approximate dimensions: 105 ft. x 50 ft. x 30 ft.; (L x W x H), 1 story

HP Pump Structure

The High Pressure pump structure will be of steel construction and will provide weather protection for the vertical can pumps. The shelter will be open on the lower one half portion of the walls to facilitate ventilation. A gantry crane will be provided for maintenance of the pumps.

Date Completed

Approximate dimensions: 50 ft. x 20 ft. x 30 ft. (L x W x H), 1 story

Compressor Shelter

The BOG Compressor shelter will be of steel construction and will provide weather protection for the BOG Compressors, cryogenic compressor and the cold gas blowers. The shelter will be open on the lower one half portion of the walls to facilitate ventilation. A gantry crane will be provided for maintenance of the compressors and blowers.

Approximate dimensions: 160 ft. x 50 ft. x 30 ft. (L x W x H), 1 story

Water Treatment Building

The water treatment building will be of concrete block construction and will house the water treatment system, service water pumps, water chemistry laboratory, sodium hypochlorite equipment, chemical storage, and and control panel. The chemical storage areas will have coated concrete basins for containment of chemical spill.

Approximate dimensions: 90 ft. x 50 ft. x 12 ft. (L x W x H), 1 story

Intake Water Pump House

The intake seawater pump building will be a concrete block building and will house the seawater pump and filters. A gantry crane is provided for maintenance of the seawater pumps and screens.

Approximate dimensions: 105 ft. x 55 ft. x 30 ft. (L x W x H), 1 story

Fire Pump House

The building will house the firewater pumps and accessories. This building will be supported on mat foundation or spread footings with structural steel framing and metal roof and siding. A roll-up door will also be provided.

Approximate dimensions: 25 ft. x 25 ft. x 20 ft. (L x W x H), 1 story

Guard Houses (two)

These units will be prefab modular units with steel base frame and normal timber frame construction with painted steel siding.
Approximate dimensions: 20 ft. x 20 ft. x 12 ft. (L x W x H), 1 story

Water/Glycol System

BEST
25 September 2003

Date Completed

The water/glycol system provides heat to the fuel gas heater and cooling for the BOG compressors and other equipment. The system comprises two 150hp centrifugal water/glycol circulation pumps (one pump is a spare) and two (one is a spare) plate and frame heat exchangers which exchange heat against seawater. This equipment is located outdoors.

LNG HP Pumps

The high pressure LNG pumps will deliver LNG to the vaporizers at pipeline pressure. These pumps are seal-less, submerged motor cryogenic pumps, each rated at approx. 3000 hp, 1400 gpm. A total of seven pumps (including one spare) will be installed. The pumps are mounted vertically, outdoors, above ground and are supported by a structural steel frame.

LNG Vaporizers

The LNG vaporizers are stainless steel, shell and tube heat exchangers designed to vaporize a combined total flow of LNG equivalent to 930 MMSCFD. A total of six vaporizers (including one spare) are foreseen. The units are mounted outdoors, in the vertical position and are supported by a structural steel frame.

Again, the reader is requested to view information in responses to Comments #34-#38 and #138 for information regarding the changes that have been made to the LNG and LPG systems as a result of the design modification to an air-warmed LNG system.

[09 July 03] **Comment – 61**

2.4.3.1 Water Intake and Discharge System

Page 2-72, paragraph 1: Detail or make reference to the standard operating procedures to be utilized for separating inorganic (man made) wastes from organic (naturally occurring) wastes from the mixed waste materials washed from the traveling screens and directed through the "trash trough" for disposal via Outfall 002. Include that information in the EMP.

Response

Rotating traveling rake removes any debris coming into the intake pit and brings it to the top where is washed off by spraying seawater. Debris is collected in a channel next to the intake structure from where it is removed manually. The waste separation protocol, which will be referenced in the EMP, calls for the waste material to be segregated, on a daily basis, with organic waste (aquatic) returned to the sea and inorganic waste disposed with the other solid waste material from the island.

[09 July 03] **Comment – 62**

BEST
25 September 2003

Date Completed

2.4.3.2 Desalination Plant

Page 2-72 thru 2-73: Provide details or references to further information about the standard operating procedures for safely managing all materials that may be utilized for, and wastes that may be generated by, the operation of the desalination system including the following: seawater pretreatment processes; acids and bases required to operate the reverse osmosis units; spent membranes, etc. Include that information in the EMP. Also reference comments provided above for Subsection 2.3.1.3 LNG Ancillaries: B.1., B.2., B.3., and B.4.

Response

Information about the standard operating procedures for safely managing all materials that may be utilized for, and wastes that may be generated by, the operation of the desalination system including the seawater pretreatment processes; acids and bases required to operate the reverse osmosis units; spent membranes, etc. is presented in previous responses to comments received form the BEST Commission. Specifically the Pretreatment system is addressed in the response to BEST Comment No. 35, the Service Water system is addressed in the response to BEST Comment No. 36, the electrodeionization is addressed in the response to BEST Comment No. 37, and the discharge from the desalination system is addressed in the response to BEST Comment No. 38.

Anticipated waste streams generated and discharged from the desalination system have been characterized to the extent possible and are included in the Table 3-10 and Table 3-11. As the design is refined, additional detail will be added to Table 3-10, and it will be included in the EMP.

Also, the reader is requested to view information in responses to Comments #34-#38 and #138 for information regarding the changes that have been made to the LNG and LPG systems as a result of the design modification to an air-warmed LNG system.

[04 June 03] **Comment – 63**

2.4.3.3 Electrical Generation

Page 2-74, paragraph 2: Consider distributing electrical power utilizing plastic conduit installed below grade rather than on poles installed above ground. Power lines are installed below ground whenever possible in The Bahamas in order to minimize risks associated with loss of power, fire and/or electrocution in the event of damages resulting from frequent tropical storms and hurricanes.

Response

BEST
25 September 2003

Date Completed

Site power distribution from electrical gear to individual loads will typically be aboveground in cable trays installed on pipe racks, not via poles. This allows for ease of installation/inspection/service/future installation. Where aboveground installation is not practical, underground routing of cables, power and instrumentation, via PVC conduit or direct burial will be applied. Aboveground installation is an industrial standard for LNG facilities and is typically used as a design standard in other areas comparable in location and environmental exposure as this site.

Primary power distribution within the facility, from the GTG's and from stepdown transformers to electrical distribution switchgear will typically be installed in underground PVC duct banks or with direct burial cable systems.

Cabling installed in fixed cable trays is not as exposed to environmental (weather) damage as open wiring on distribution poles.

[09 July 03] **Comment – 64**

2.4.3 Pipelines

G. Pipeline Hydrostatic Testing

Page 2-83, paragraph 2 & 3: Amend these paragraphs to indicate what types of additives, concentrations and management practices and procedures are typically utilized for similar pipeline hydrostatic testing operations undertaken in US controlled marine waters. Include that information in the EMP. Prepare and submit appropriate amendments to the EIA and EMP as soon as the pipeline additive types, concentrations and management procedures are defined during the final design process.

Response

AES is completing final design and selection of the chemical additives and dosages for the pipeline hydrotest procedure. As AES refines the facility design, it will provide further details regarding materials, initial dosages and residual discharge expected following characterization of the seawater to be utilized during the hydrotest. Currently AES expects that the following materials will be utilized:

- *Oxygen scavenger containing the active ingredient ammonium bisulfate or sodium bisulfite at 100 mg/l,*
- *Biocide with the active ingredient polymeric biguanide hydrochloride at 20 mg/l, and*
- *Corrosion inhibitors containing methanol, isopropyl alcohol, and ammonium bisulfate, which would also provide oxygen scavenging activity, at 500-3500 mg/l.*

BEST
25 September 2003

Date Completed

These compounds are routinely approved for use in the United States. Treatment or neutralization of these materials may be required based on final evaluation of required dosage. The additives will be selected and used in such concentrations as appropriate to avoid or minimize any potential impacts to natural resources and the environment, as well as to the pipeline. Wastes anticipated from the use of these compounds, and anticipated ranges of quantity are summarized in Revised Table 3-9 and Table 3-10. AES has provided specific information on the hydrotest procedure in Attachment #64, including types of additives, concentrations and management practices and procedures that will be utilized for the pipeline hydrostatic testing operations. If refinements are made to the test design, associated changes in materials usage and estimated waste generation will be incorporated in Table 3-10 as developed, and the table itself will become a management tool in the EMP.

[04 June 03] **Comment - 65**

H. Construction Schedule and Manpower

Page 2-83, paragraph 4: Indicate the estimated number of months required to complete the construction of the natural gas pipeline to Florida. Reference the project management task schedule (Gantt chart).

Response

The number of months estimated to complete the pipeline construction from Ocean Cay to Florida is currently 18 months from start to finish including engineering and procurement activities. The timing of this and other installation operations will be reflected in the project schedule.

[04 June 03] **Comment – 66**

2.4.4.2 60mm(2in) Gas Pipeline and 219mm (8in) Potable Water Pipeline to Bimini

Page 2-83, paragraph 5: Identify or make reference to the applicable international and local codes and standards to be used for the design, construction and operation of the gas and water pipelines.

Response

The Ocean Cay Pipeline project will be designed and constructed to meet or exceed the natural gas pipeline safety standards established by the U.S. DOT in 49 C.F.R. Part 192, and the MMS in 30 C.F.R. Part 250, Subpart J. The pipeline will comply with applicable regulations governing material selection and qualification, design requirements, and protection from internal, external and atmospheric corrosion.

BEST
25 September 2003

Date Completed

Carbon steel pipe will be manufactured to conform to American Petroleum Institute (API) Specification 5L.

[04 June 03] **Comment – 67**

D. Shore Approach At North Bimini

Shore Approach by Trench and Pull

Page 2-87, paragraph 4: Provide details about the excavation method(s) to be utilized to construct the trench in sand (1.5 m deep and 2.5 m wide and 300 m long).

Response

Shore Pull Arrangement Pre-trenching before pipeline installation is used at most landfalls / shore crossings. It allows burial and improves pipe stability during installation storm conditions. Depending on the soil conditions it may be necessary to use sheet piling to ensure the trench remains open for the length of the shore pull operation.

Shore based equipment (backhoes) can be used for trenching on the near shore and barge mounted hoes for the deeper section. Any areas of exposed rock may have to be "smoothed" using the backhoes, to avoid damaging the pipe during pull in.

As an alternative the shore approach trench can be excavated using a specifically designed plow (available in the pipeline and cable industry) to make the trench for the pipeline. This plow would be pulled to shore by a winch with the pipeline attached to it. Thus the pipeline, from offshore, is pulled directly in to the trench, up to the onshore point.

[09 July 03] **Comment – 68**

E. Onshore Installation – North Bimini

Page 2-88, paragraph 5: Provide details about, or make reference to, construction and operating activities within the onshore pipeline right-of-way (ROW) including the following:

- Width, length and total number of acres included in the ROW.
- Description of the habitat impacted as a result of clearing and grading the ROW for construction activities.
- Post construction erosion control and habitat reclamation program.
- Installation of subterranean hazard warning strips and above ground signage indicating the presence of buried pipelines and pipeline related improvements
- Pipeline related improvements located within the ROW (block valves; pressure

BEST
25 September 2003

Date Completed

regulating valves; metering equipment; electrical and telephone service, etc.)

- Post construction control of access to improvements located within the ROW.
- Training local police, fire and other emergency response personnel about responding to emergencies related to the pipelines before commissioning the pipelines.

Response

AES has conferred with the Government of the Bahamas and, through economic analysis, the parties have concluded the construction of the gas pipeline to North Bimini is not economically viable. The 8-in (20.3CM) potable water pipeline will be constructed, with the preliminary design having the following parameters relative to the requested information:

The Bimini pipeline length is approximately 268 meters (880 feet) from the shoreline to its terminus. With a typical construction work space width of 40 feet, approximately 0.8 acres of land will be impacted. However, since the route parallels existing road and power line rights of way, minimal impact is expected in undisturbed areas.

There appear to be no significant obstructions along the pipeline route and very little clearing, grubbing, or grading is expected. Those areas damaged during construction will be graded to original contours (with erosion control measures installed as necessary) and given the opportunity to naturally revegetate.

Due to the short length of the line, no above ground appurtenances (valves, meter stations, etc.) will be located in the right-of-way outside the plant. Consequently, the above measures should allow the right-of-way to be visibly restored to its original condition. For this size line (8-inch) and required depth of cover (3 feet minimum), ditching will most likely be performed with a small rubber-tired backhoe, or similar piece of equipment, and stringing the coated pipe will be done using small equipment and hand labor. The streets and road sections are assumed to be open cut. Crossings will be performed at a time to minimize any inconvenience to the public. Signs will be posted to alert the residences of when the road crossing will be performed. Standard ells purchased will be cut to fit vertical and horizontal bends. These ells and field joints will be coated with cold applied epoxy. In order to protect the public from construction hazards, ditching will not proceed beyond the welding that can be performed each day.

Once lowering of the line and backfill is complete, warning signs will be installed at strategic locations along the pipeline. The signs will give the line location, describe the pipeline contents, and give contact information relative to the pipeline operator. Access to the pipeline will be restricted since the pipeline will be buried and the meter station and isolation valve systems will be located within the fenced property of the utility's facility. Close coordination will also be maintained with road and power line maintenance crews to make sure they are aware of the pipeline location and not allow encroachment on the right-of-way. AES will notify local authorities (fire, police, etc) prior to initiation of construction and will install

Date Completed

barricades to protect the construction operations and the public. After installation, the potable water pipeline will not pose security issues. Additionally, local police and fire personnel will be given emergency contacts in case the water line needs to be shut off at any time.

[04 June 03] **Comment – 69**

F. Hydrostatic Testing

Page 2-89 & 2-90: Amend these paragraphs to indicate what types of additives, concentrations and management practices and procedures are typically utilized for similar pipeline hydrostatic testing operations undertaken in US controlled marine waters. Include that information in the EMP. Prepare and submit appropriate amendments to the EIA and EMP as soon as the pipeline additive types, concentrations and management procedures are defined during the final design process.

Response

*Please refer to our response to your comment on **Section 2.4.3. G.***

[04 June 03] **Comment – 70**

2.4.4.3 Construction Schedule and Manpower

Page 2-90, paragraph 5: Provide a complete copy of the project management task schedule (Gantt chart) and provide, via internet, weekly updates of that increasingly detailed task schedule on a continuing basis through completion of the commissioning phase of the project.

Response

Prior to the start of construction a Gantt chart schedule will be provided indicating the timing and duration of tasks. This schedule will be updated on a continual basis through the construction period and these updates will be provided to the designated BEST representative in a timely fashion. AES will submit a list of the major construction and commissioning activities to BEST. BEST will designate which activities they wish to witness. AES will notify the BEST representative on a weekly basis when the activity has been scheduled, or if there has been a change in the activity schedule.

[04 June 03] **Comment – 71**

BEST
25 September 2003

Date Completed

2.4.5 Housing

Page 2-90 thru 2-92: Provide details about, or make reference to, construction and operating activities for the proposed housing development including the following:

- A site plan indicating the location of all permanent improvements.
- Description of the habitat impacted as a result of clearing and grading the site for construction.
- Post construction erosion control and landscaping program.

Response

AES has selected two potential locations for the permanent housing installations planned at South Bimini but has not purchased either site. AES expects to make these purchases following the issuance of permits to allow the project to proceed in the Bahamas. Once the purchase has been made or option to purchase has been completed, AES will commission appropriate studies, including archeological and terrestrial biology studies to determine the potential impacts and appropriate mitigation measures required for the construction. The specific information requested in this comment will be provided prior to the start of housing construction on South Bimini.

[04 June 03] **Comment – 72**

2.5 Description of Project Alternatives

Page 2-92, paragraph 3: Preliminary review of the project alternatives referenced generically in this subsection and included in Section 8 indicates that AES Ocean Ltd. has identified and considered numerous project alternatives. However, the summary evaluations of project alternatives included in Section 8 indicate that comparative evaluation of project alternatives was perfunctory; qualitative; and subjective in nature rather than thorough; quantitative and objective in nature. As a result, the evaluation of project alternatives appears to be biased in favor of supporting predetermined project designs rather than objectively identifying the best available project design alternatives.

Several alternative systems warrant feasibility assessments and evaluations utilizing energy industry best practices (ie. comparative capital & operating budget analyses) designed to compare project alternatives in quantitative terms over the life of the project on an objective "technology neutral" basis. Those alternatives are described in greater detail below:

Alternatives identified by AES and requiring comparative quantitative analysis and evaluation:

1) Vaporizing LNG utilizing ambient air as the heating medium and fin tubing units as the heat exchanging technology versus the base case (filtered and chlorinated seawater as the heating medium and liquid to liquid heat exchanger units).

BEST
25 September 2003

Date Completed

Alternatives not yet identified and evaluated by AES:

2) Producing potable water via waste heat recovery and utilizing three simple cycle 15MW gas turbine generators (GTGs); a heat recovery steam generator (HRSG); duct burner units; and, vacuum flash distillation (VFD) units equipped with low maintenance titanium condensation plates. This alternative system utilizes a simple cycle / economizer conceptual design rather than a traditional combined cycle conceptual design; no steam turbine generators, condensers and associated combined cycle equipment are required. This alternative system must be compared to the base case system (seawater reverse osmosis) including quantitative comparisons of capital costs as well as operating and maintenance costs over the life of the project. AES has evaluated two alternative systems for producing potable water (reference: Section 8, page 8-13 thru 8-15). However, AES has not yet not considered the alternative system described above, one that could prove more cost effective and efficient, and minimize wastes to a greater extent than the proposed system.

2) Vaporizing LNG via waste heat recovery and utilizing three simple cycle 15MW gas turbines; a heat recovery heat exchanger containing glycol or synthetic oil; duct burners (if necessary); and glycol-to-LNG or hot oil-to-LNG heat exchangers. This is a simple cycle / economizer conceptual design rather than a traditional combined cycle conceptual design; no steam turbine generators, heat recovery steam generators, condensers and associated combined cycle equipment are required.

AES has evaluated a similar system for vaporizing LNG (reference: Section 8, page 8-22, Alternative 3). However, that summary evaluation falls short of industry best practices. The summary evaluation does not specifically identify the components included in the alternative system's conceptual design. The summary evaluation does not provide quantitative information or logical reasoning that explains why "…the operating and maintenance issues are expected to be higher than that associated with typical installations involving similar technology in similar applications." The summary evaluation is qualitative rather than quantitative in nature and does not compare the capital cost or operating and maintenance costs of alternative systems to those of the base case (seawater-to-LNG) system. Finally, the summary evaluation provides no justifiable conclusions supporting assertions that vaporizing LNG via waste heat recovery is not cost effective, is less reliable than the base case system, or is otherwise not feasible.

Evaluation of the alternative systems should be undertaken and the results shared with the BEST Commission as soon as possible.

Response

BEST
25 September 2003

Date Completed

AES is continuing to review design modifications that may eliminate the additional engineering evaluations requested in this comment. Once AES has completed its evaluation, we will submit the design changes to BEST for discussion and evaluation.

[04 June 03] **Additional Comment: – 73**

Provide the BEST Commission with a complete copy of the project management task schedule (Gantt chart) and to provide, via internet, weekly updates of that increasingly detailed task schedule on a continuing basis through completion of the commissioning phase of the project.

Response

Please reference our response to your comment on Section 2.4.4.3.

[All comments and responses from this point forward are NEW as of 16 June 2003]

SECTION 3.0 PROJECT BOUNDARIES AND OPERATIONAL CHARACTERISTICS

General Comments on Section 3.0

[27 August 03] **Comment - 74**

- The proposed liquid sodium hypochlorite product generation system and chlorinated process water waste streams require improved monitoring, metering and control systems.

Response

Detail related to the liquid sodium hypochlorite generation system and chlorinated process water waste streams has been summarized from the EIA and supplemented herein. Specifically, the new design to use air-based instead of water-based warming of LNG has resulted in significant change of water handling and treatment, and reduction of resulting discharges by 92 to 99%. These changes, including hypochlorite generation and chlorinated water processing, are addressed in responses to Comments #34 through #38, and Comments #88 and #89 herein. Real-time monitoring of Cl concentrations in discharge will be performed – see the response to Comment #31. Please refer to the responses to these Comments.

[24July 03] **Comment – 75**

BEST
25 September 2003

Date Completed

- The summary of the thermal plume modeling undertaken to date raises numerous questions that, in order to be resolved, require continuing investigation and evaluation.

Response

Comments regarding the existing thermal plume modeling are addressed in the response to BEST Comment No. 104.

[24July 03] **Comment - 76**

- The proposed use of all petroleum products and chemical materials to be used during the construction, commissioning, operations and decommissioning phases requires development and implementation of a comprehensive integrated spreadsheets designed to track petroleum products and chemical materials from "cradle to grave" and provides for quarterly reporting to the BEST Commission. The spreadsheets must distinguish between non-hazardous and hazardous materials and become an integral part of the Environmental Management Plan (EMP) implemented on a continuing basis.

Response

Ocean LNG understands that all chemicals and petroleum products used during construction, commissioning, operations, and decommissioning will require cradle to grave management. Ocean LNG has developed an Environmental Management Plan (EMP) included as Appendix U of the EIA. The EMP includes the Spill Response Control and Countermeasures Plan for Construction and Operations (Attachment 1 to Appendix U), the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan (Attachment 2 to Appendix U), and the Waste Minimization Plan (Attachment 7 to Appendix U). These plans discuss the handling of chemicals and petroleum products during construction, commissioning and operations. Ocean LNG has also developed a spreadsheet that will be utilized to track all chemical and petroleum products used in association with the project that will include the following information:

- *General Chemical Category;*
- *Chemical Name;*
- *Use Location;*
- *Volume Received;*
- *Volume used (monthly);*
- *Waste Generated; and*
- *Disposition of Waste (Hazardous or Non-Hazardous).*

BEST
25 September 2003

Date Completed

A sample of the spreadsheet is included in the attached Revised Table 3-9, "Estimated Quantity of Waste Generated" and Table 3-10 "Ocean LNG Product and Waste Tracking." These spreadsheets summarize categories of currently anticipated waste, waste types, anticipated quantity ranges, and will be utilized to provide the BEST Commission with quarterly reports regarding chemical and waste management associated with the Project. This dynamic system for tracking chemical and petroleum products and the waste generated from those products will be incorporated as an integral part of the EMP.

[09 July 03] **Comment - 77**

- The proposed management of all wastes generated during the construction, commissioning, operations and decommissioning phases requires development and implementation of a comprehensive integrated spreadsheet that tracks wastes from "cradle to grave" and provides for quarterly reporting to the Best Commission. The spreadsheets must distinguish between hazardous and non hazardous wastes and become an integral part of the EMP implemented on a continuing basis.

Response

From BEST's comments herein we acknowledge and understand the need to provide an effective system to track generation, management and proper disposal of wastes associated with construction and operation of the AES Ocean LNG project. A method to provide this overall management has been developed and consists of components of the EMP appended to the EIA and supplemented in responses herein, particularly the attached Table 3-10 "Ocean LNG Product and Waste Tracking." Please refer to response to Comment 76 for details.

[09 July 03] **Comment - 78**

- The review of Sections #3 suggests that AES has not yet recognized the importance of the EMP as the principal tool to be used by AES and the GOB alike in the continuing environmental management of the proposed LNG project. The EMP is not yet adequately referenced in the EIA.

Response

After intensive discussion with BEST and it consultants, Ocean LNG understands the importance of the EMP as the principal permitting vehicle to be used by Ocean LNG and the GOB in continuing environmental management of the proposed Project. References to the EMP have been incorporated throughout the responses to the BEST Commission's comments on Section 3 of the EIA. The EMP will be further refined, and supplemented as done with responses herein, to serve as a tool for monitoring activities associated with construction, commissioning, operation and decommissioning of the Project. Additional information will be developed as design of the Project progresses (i.e. SOPs, specific refined volumes and characteristics, monitoring and reporting protocols, and operation and maintenance manuals).

BEST
25 September 2003

Date Completed

This information will be incorporated to the EMP as a continuous improvement process so that the EMP remains up-to-date and a dynamic management tool for Ocean LNG operation.

[09 July 03] **Comment - 79**

- The review of Section #3 suggests that AES has not yet recognized the importance of an integrated approach to environmental, security, risk and emergency management. The approach entails developing and implementing an EMP that includes an integrated Risk and Emergency Management Plan addressing all hazards and all stages of risk and emergency management and includes as components an Inspection/Prevention Plan, Materials Management Plan, Waste Management Plan, Security Plan, Emergency Response Plans including a Contingency Plan, a Fire Prevention Control and Counter Measure Plan (FPCC), a Spill Prevention Control and Counter Measure Plan (SPCC), as well as an "all hazards approach" Training Plan for all project personnel.

Response

As discussed below in the response to Comment No. 92, Ocean LNG concurs that the Environmental Management Plan should include an integrated approach to environmental, security, risk, and emergency management. The EMP addresses many of the concerns raised by the BEST Commission; however, at the request of BEST, additional information related to operation specific Operation and Maintenance Manuals, Waste Management Plans, and Training Programs will be included in the EMP.

[24July 03] **Comment - 80**

- References to developing and implementing an appropriate "all hazards approach" training program should be included in Section 3. All project personnel should participate in such a training program before being authorized to start work. Such a training program should be developed as soon as possible and submitted to the BEST Commission for review and comment prior to implementing the training program and starting construction activities.

Response

Ocean LNG currently has outlines for training and orientation programs in the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan (Attachment 2 to Appendix U of the EIA) and the Worker Safety Plan (Attachment 10 to Appendix U of the EIA). The training for all project personnel prior to initiation of work will include discussion of the following topics:

- *hazards associated with LNG and LPG, safety measures,*

BEST
25 September 2003

Date Completed

- *spill response procedures,*
- *emergency response procedures,*
- *chemical and petroleum product handling procedures,*
- *waste management procedures and the requirements of the EMP.*

A section included in the training entitled "Position Descriptions" will describe the certifications required by personnel performing their job task. The full training program will be included as part of the EMP prior to construction to ensure that content acceptable to the GOB is provided.
This comment is related to Comments #92 and #112. Further information to provide a consolidated approach may be found in the response to Comment #112.

Specific observations and recommendations referencing specific subsections in Section 3.0

3.2 Areas of Potential Influence

[24July 03] **Comment - 81**

Page 3-3, paragraph 4: Amend this paragraph to address the following: the area of influence, which will likely be different for different types of impacts. The definition of the area of influence for each type of impact must take into consideration both direct and indirect potential impacts. Therefore, the area of influence for a particular type of impact may extend beyond the projects physical boundaries. This amendment is necessary in order to be factual and consistent with information provided in many other subsections of the EIA. Amend the second and third sentences of this paragraph to address impacts to ambient air in the vicinity of Ocean Cay.

Response

Paragraph 4 on page 3-3 has been revised as follows:

"Physical activities during construction and operation of the project will be confined to the project boundaries described above in Section 3.1 (with the exception of marine vessel traffic to and from Ocean Cay and The Biminis). The area of influence of the project, which will likely be different for different types of impacts, may extend beyond the project's physical boundaries. The definition of the area of influence for each type of impact described herein takes into consideration both direct and indirect potential impacts. Additional areas of potential influence will include the ambient air, waters and sea floor in the vicinity of Ocean Cay and along the proposed pipeline routes. Specifically, these include the areas near the seawater intake and the water discharge structures on Ocean Cay, the areas to be dredged (approach channel, turning basin, support vessel harbor), the ambient air in the vicinity of Ocean Cay, and the pipeline corridors."

BEST
25 September 2003

Date Completed

[24July 03] **Comment 82**

3.3 Air Emissions

Pages 3-4 & 3-5: This subsection should detail or provide references to appropriate sections in the EIA regarding to air emissions and visible plumes as a result of marine vessels cold ironing while anchored off coast and/or moored to Ocean Cay. Additionally, address potential air emissions as a result of processes associated with the LPG removal system (other than emissions from the natural gas fueled LPG hot oil heater). Include appropriate references to air emissions generated during the commissioning, operations and decommissioning phases in the EMP.

Response

A supplementary air quality impact analysis was performed for the operating phase of the proposed Ocean LNG project to evaluate the combined impacts from proposed stationary sources on Ocean Cay (gas turbines and LPG hot oil heater previously modeled in the initial EIA) and those due to LNG and LPG tanker ships while stationary at port during loading and unloading operations. Cold ironing (use of shore power while tanker ships are at dock) will not be utilized as part of the Ocean LNG Project, LNG and LPG tanker ships will remain under their own power while docked at Ocean Cay. As such the additional modeling was based on the typical power generators utilized by LNG and LPG tanker ships. These tanker ships typically utilize steam power plants, operated with fuels ranging from high-sulfur heavy marine bunker oil to natural gas, to power pumps and other auxiliary loads while transferring LNG from ship tanks to storage on Ocean Cay or LPG from storage to ship tanks. This estimated emissions from the ships, operational characteristics, changes to modeling procedures and other assumptions, and the results of the revised analysis are presented below.

LNG and LPG Ships – Emissions and Operational Characteristics

LNG tanker ships will be used by the Ocean LNG project to transport LNG to Ocean Cay for storage and distribution into the pipeline and for processing to LPG. LPG produced by Ocean LNG will be transported off site using LPG tanker ships. Ocean LNG estimates that LNG and LPG tanker ships will arrive at port with a maximum frequency of one LNG ship every three days and one LPG ship every six days. Each ship will remain stationary at port for a maximum of 24 hours, 12 hours of which for transferring of fuels. The locations of the LNG and LPG tanker ship piers are on the south side of the island, as indicated in the proposed facility layout plan (Figure 1.4) presented in the initial EIA submittal.

Information was obtained by Ocean LNG from LNG and LPG tanker ship owners on the type of power generation, fuel types, operating scenarios and other stack parameters necessary to estimate emissions and perform the air quality modeling analysis. Currently, tanker ships

typically include conventional steam-electric power plants to power fuel transfer pumps and other auxiliary loads while stationary at port. Two high pressure boilers with 3 MW steam turbines operating at 85 percent capacity were assumed to conservatively represent the power needs for a typical LNG tanker ship during its 12-hour LNG transfer operation. Since LPG transfer will be powered by Ocean LNG project generators rather than those on the tanker ship, auxiliary loads for the typical LPG tanker ship were assumed to be 20 percent of the load associated with an LNG ship. In addition, no more than one LNG or LPG ship will be stationary at Ocean Cay at the same time. Therefore, the worst-case scenario for the air quality impact analysis was assumed to be when one LNG and one LPG tanker are at port, simultaneously at Ocean Cay.

AES is currently evaluating the availability of dual fuel LNG tankers that can operate exclusively on natural gas, as additional information is obtained it will be submitted to the BEST Commission. The boilers on LNG tanker ships are typically dual-fuel fired with the ability to combust marine heavy fuel oil (4.5 percent sulfur content), low sulfur marine heavy fuel oil (1.5 percent sulfur) or natural gas. To account for the worst case emissions scenario, all three fuel types were modeled. However, Ocean LNG believes it will be able to reasonably negotiate fuel transport contracts in which tankers will operate preferably with natural gas and alternately with low sulfur fuel oil while stationary at Ocean Cay in order to minimize emissions and air quality impacts. Emissions from each boiler and each fuel type were estimated using US EPA emission factors for large external combustion boilers and are summarized in Table 1. Other stack parameters pertinent for the modeling analysis are also summarized in Tables 1 and 2.

Revised Air Quality Impact Analysis

The modeling analysis included in the initial EIA submittal was revised to evaluate the combined impacts from the LNG tanker ships and the Ocean LNG project sources originally included in the analysis (gas turbine generators and LPG removal hot oil heater). There were no changes to the selection of the refined dispersion model (ISC-PRIME), the meteorological input data or background air quality data used to conduct the original analysis. Due to the higher emissions and impacts from the worst-case LNG tanker boiler fuel (4.5 percent sulfur), the receptor network was extended out to 20 km from the project site with receptors added at 1 km intervals between 10 km and 20 km at 10 degree radials.

The refined ISC-PRIME modeling results for each tanker ship fuel scenario are summarized in Table 3. If LNG or LPG tanker ship boilers are exclusively fired with natural gas while stationary at Ocean Cay, the refined modeling analysis predicts that maximum ambient concentrations due to the combined emissions from the Ocean LNG gas turbines, LPG re-boiler and tanker ships will be less than the applicable EPA significant impact levels for all pollutants and all averaging periods. If the tanker ship boilers are restricted to firing the boilers with 1.5% sulfur marine heavy fuel oil, maximum sulfur dioxide (SO_2) ambient impacts for 3-hour, 24-hour and annual averaging periods are predicted to exceed the applicable

significant impact levels. Similarly, combustion of the worst-case 4.5% sulfur marine heavy fuel oil in the boilers will result in predicted SO_2 and 24-hour PM_{10} impacts greater than the applicable significant impact levels.

EPA and FL DEP air quality modeling procedures require a cumulative impact analysis to assess the combined impacts from proposed new sources with other existing "nearby" sources when predicted impacts from the new sources under review are greater than the EPA significant impact levels. The procedure requires the identification and modeling of major sources located within 50 km of the significant impact area predicted by the refined modeling of the sources under review. In this case, as summarized above, impacts were predicted to exceed significant impact levels for SO_2 (for the 1.5% and 4.5% sulfur LNG tanker ship fuel oil cases) and PM_{10} (only for the 4.5% sulfur fuel oil case). Therefore, EPA and FL DEP modeling guidance would require a cumulative modeling analysis for these pollutants. The significant impact areas for SO_2 and PM_{10} were estimated by the refined modeling of the Ocean LNG project sources and LNG ships to extend out to about 10 km from the Ocean LNG project site for the 1.5% sulfur LNG ship fuel oil case and to about 20 km for the 4.5% sulfur fuel oil case. As discussed in Section 4.2.1.1 of the EIA, the only other significant source of air pollution within 70 km (0 km to significant impact level plus 50 km) from the Ocean LNG project site is a relatively small diesel engine power plant located on North Bimini, about 35 km to the north of Ocean Cay. The required stack parameters for Ocean Cay turbine dispersion modeling were conservatively estimated using EPA emission factors and standard engineering calculations, based on the number and sizes of diesel engines identified. Reasonable assumptions were made to estimate parameters that were not readily available, but required for model input. The modeling parameters for the North Bimini power plant are summarized in Table 4 and the results of the cumulative modeling analysis are summarized in Table 5. Based on the estimated stack parameters and emission rates for the North Bimini generators, the model results predict that the combined SO_2 and PM_{10} impacts from the Ocean LNG project sources, LNG tanker ships and the North Bimini power plant will comply with Ambient Air Quality Standards when added to estimated background concentrations. In fact, due to meteorological effects (e.g., predominate wind directions) and the distance between North Bimini and Ocean Cay, the modeling indicated that the emissions from the North Bimini power plant would not interact with those from the Ocean LNG project. In other words, the maximum impacts predicted for the combination of all modeled sources (including North Bimini) were the same as those previously predicted for the combination of the Ocean LNG project sources and LNG tanker ship. Based on these results, the cumulative source modeling performed for the Ocean LNG project demonstrates compliance with all Ambient Air Quality Standards.

As discussed previously, Ocean LNG will attempt to further mitigate emissions impacts from the tanker ships through reasonable negotiation of fuel transport contracts that restrict tankers to operate preferably with natural gas and alternately with low sulfur fuel oil while stationary at Ocean Cay.

BEST
25 September 2003

Date Completed

Additionally, Section 5.5 of the EIA addresses potential air emissions as a result of construction and operation of the Project. Appropriate references to air emissions generated during the commissioning, operations and decommissioning phases will be included in the EMP.

No emissions from the LPG removal system are anticipated under the new design, because this component of the system is eliminated.

[24July 03] **Comment - 83**

3.3.1 Gas Turbine Generators
3.3.2 LPG Removal Hot Oil Heater
3.3.3 Diesel Engine Fire Pump and Emergency Generator
3.3.4 Flare

Pages 3-4 thru 3-12: These subsections are skillfully scoped and written in a comprehensive and concise manner and effectively provide the necessary level of detail required in the EIA. Include appropriate references to the operating systems discussed in these subsections in the EMP.

Response

When finalized the Environmental Management Plan will include references to the operating systems for the Gas Turbine Generators, LPG Removal Hot Oil Heater, Diesel Engine Fire Pump and Emergency Generator, and the Flare.

3.4 Water Withdrawal and Wastewater Discharge

3.4.1.1 RO Desalination

[09 July 03] **Comment - 84**

Page 3-14, paragraph 1, Service Water: Provide details about or make references to the oil water separators referenced in this subsection (e.g., design, relevant standards, number, location, operation and maintenance, and management of separated wastes). Include that information in the EMP.

BEST
25 September 2003

Date Completed

Response

Ocean LNG proposes the use of OS Series Oil/Water Separators, or equivalent, at Ocean Cay. The oil water separators will each measure 72-in x 40-in x 43-in with a maximum flow rate of 370m^3/day. This model will remove oil to concentrations of 10 mg/l or less of oil droplets 30 micron and larger of non-emulsified, free and dispersed oils. A specification sheet for a typical oil water separator is included as line 84 in Table 3-10.

Design
The rectangular oil-water separator is designed per API #421 "Design & Operation of Oil/Water Separators Manual and stokes law. The design will incorporate flexible flow rating capability based on application parameters. The tank shell, baffles, cover and external structural members are constructed of A36 carbon steel. Interior surfaces are coated with self-priming, coal tar epoxy (12DFT) and the exterior surfaces are primer coated and final coated with industrial epoxy (6 DFT).

Influent Chamber
Influent flow enters the clog proof influent diffuser and is spread out across the depth and width of the chamber. Any readily settleable solids drop to the bottom of the V-shaped solids accumulation chamber located directly under the coalescing media pack.

Oil/Water Separation Chamber
The separation chamber is packed with cross-fluted coalescing media. The media pack creates a quiescent zone, to facilitate the impingement of oil on the media and provides impact sites and changes of flow direction. The media has a 60° cross-flute angle.

Solids Accumulation Chamber
The separator has a V-shaped solids accumulation chamber directly below the coalescing media. This chamber provides temporary solids storage. The chamber walls are pitched at 45° to assure simple and thorough solids removal. Dual outlet ports are provided for sludge removal.

Clean Water Effluent Chamber
Cleaned water will flow under the oil retention baffle, over the water weir and into the effluent chamber. The chamber has a volume of approximately 275 gallons.

Oil Reservoir
A fixed weir oil skimmer with an integral oil reservoir is provided for the temporary storage of separated oils. The chamber is located at the effluent end of the separator and will have fittings for pump suction, high/low level switches and a vent. Oil will be pumped directly from the oil reservoir to an oil holding tank.

BEST
25 September 2003

Date Completed

Holding Tank
The holding tank is approximately 200 gallon capacity and is complete with a high level alarm to the control room. The alarm will provide personnel with sufficient time to drain the oil from the holding tank into drum for disposal off-site at an approved waste disposal facility.

After solids/droplet removal, the cleaned water is then pumped to the outfall piping. Oil from the 200 gallon oil tank will be stored in suitable containers within secondary containment areas and periodically transported off-site for disposal at an approved disposal facility. Estimated waste generation is included in Table 3-10 at Item line #89. As with other similar operational elements, quantities will be refined and tracked in Table 3-10 as a component of the EMP.

[27 August 03] **Comment – 85**

Page 3-14, paragraph 2, Potable Water: This paragraph should detail or provide references to appropriate sections in the EIA regarding the design, location maintenance and operation of the sanitary wastewater system referenced in this subsection. Include appropriate references in the waste management plan for the solid wastes separated and collected in the septic system. Include that information in the EMP. Provide this information to the Water and Sewer Corporation for review.

Response

The requested information is similar to that requested for Comment #101. The permanent facility will have a conventional septic tank and deep well injection of the graywater that passes the septic tank solids separation. The original EIA description include a conventional leach field, however Bahamas code typically calls for deep well injection, so this design will conform to Bahamas practice. The septic tank will have a capacity of approximately 6000 gallons with high level alarms to prevent overfilling. The septic tank and the injection well will be located near the hostel. Sanitary waste from the control building and other areas will be transferred to the septic tank via lift stations.

We estimate annual total waste generation through this system of 529,250 gal based on 100 employees. Please refer to Table 3-10 for a summary of waste generation associated with the system. Any concentrated solids that collect in the unit will be periodically pumped out, containerized, and taken off the island for disposal by an approved waste transportation company. We understand that convention in the Bahamas is for pump-out services to transport recovered solids to Bahamian sanitary landfills. This practice will be followed or shipment will be to permitted facilities in the US, if feasible.

The system design information will be provided to BEST as soon as it is complete so that BEST can provide to the Water and Sewer Corporation for review and approval prior to Construction.

BEST
25 September 2003

Date Completed

3.4.1.2 LNG Vaporizer

[27 August 03] **Comment - 86**

Page 3-15, paragraph 1: This paragraph should detail or provide references to appropriate sections in the EIA regarding all equipment and heat exchangers included in the water glycol loop that are referenced collectively in this subsection as "miscellaneous heat exchangers" and indicated in Figure 3.2. Include appropriate references to the operation and maintenance of the primary seawater to water/ethylene glycol heat exchanger as well as all other heat exchangers indicated in Figure 3.2 in the EMP.

Response

The modified heating / cooling medium system consists of a 40wt% Ethylene Glycol / 60wt% Water mixture. The system is shown on Figure EMP-2 "Overall Effluent Flow for Ocean LNG, Ocean Cay, The Bahamas" and consists of a closed loop with five main users:

- *High Pressure Vaporizers*
- *BOG Compressor Aftercooler*
- *BOG Compressor Oil Cooler*
- *Fuel Gas Heater*
- *LPG Start-up Heater*

This modified system eliminates the seawater to glycol heat exchange loop. A summary description of the modified system appears in the response to Comment #138. Because the glycol to seawater heat exchange has been eliminated, associated maintenance and chemical additives required for corrosion prevention, etc. are also eliminated – these changes have been reflected in the updated Table 3-10.

.

3.4.1.3 Auxiliary Cooling System

[27 August 03] **Comment - 87**

Page 3-15, paragraph 2: This paragraph should detail or provide references to appropriate sections in the EIA regarding the water glycol loop that are referenced collectively in this subsection as "various equipment and heat exchangers". Include appropriate references to the operation and maintenance of all heat exchanger systems in the EMP.

Response

BEST
25 September 2003

Date Completed

We understand BEST's desire for clarity in this comment. Information on the elimination of the seawater glycol loop is also provided above, so to be comprehensive, we combined responses in one location. Please refer to the response to Comment No. 86.

3.4.1.4. Sodium Hypochlorite Generator

[24July 03] **Comment - 88**

Page 3-15, paragraph 3: This paragraph should detail or provide references to appropriate sections in the EIA regarding the design, construction, operation and maintenance of the sodium hypochlorite generator and ancillary equipment (e.g. specifications, standards and protocol utilized and/or recommended by the manufacturer of the equipment; the State of Florida; the US EPA, etc). Include information about the hypochlorite storage tank(s), the containment system and the spill response plan. Include proper references to the operation and maintenance of the sodium hypochlorite generator and ancillary equipment in the EMP.

Response

Additional information regarding the construction of the sodium hypochlorite generator is included Section 2.3.1.3.A of the EIA. Information regarding the storage tanks, containment system and spill response procedures is included in the Integrated Spill Control, Response, Pollution prevention and Stormwater Management Plan, Attachment 2 to the EMP (Appendix U of the EIA). A specification sheet for a typical sodium hypochlorite generator is included as Attachment #88 to this Response.

The sodium hypochlorite solution will be stored in a 60,000 gal. fiberglass tank supported on a concrete slab with secondary containment as described in the SPCC in the EMP (Appendix U to the EIA). Specific operation and maintenance of the generator and equipment is dependant on final design. Specific information on the operation of the sodium hypochlorite generator is provided above in the response to Comment #35.

[24July 03] **Comment 89**

Figure 3.3 "Sodium Hypochlorite Generation from Seawater", Figure 3.4 "Seawater Intake Sodium Hypochlorite Addition Points, and Figure 2.15 "Process Flow Chart Water Balance" provide valuable information about the proposed process. However, information about how the processes will be metered, monitored and controlled must be expanded. Specifically, indicate the flow rate and concentration of sodium hypochlorite at each injection point as well as the target chlorine concentrations for process water entering the LNG system, the RO System, and Auxiliary Cooling System (if required). Indicate how chlorine concentrations will be monitored, controlled and recorded in the process water supply lines (#2; 3; and 25). Indicate how chlorine concentrations will be monitored and recorded in the process water drain lines #2, 22, 24, and 25. Indicate how those chlorine concentration data streams (7 in

Date Completed

number) will be fed back to the sodium hypochlorite metering and dispensing systems at the injection points (4 in number). Include appropriate references to the related P&IDs.

Response

- *Information regarding the preliminary design, operation, and waste management of the Sodium Hypochlorite Generator is contained in the response to BEST Comment No. 35, please refer to that response for the answer to this comment.*

[09 July 03] **Comment - 90**

Page 3-16, paragraph 2: Figure 3.4 indicates hypochlorite will be injected into the RO System and the LNG System (sic. LNG Heating System). If the Auxiliary Cooling System also requires hypochlorite injection, amend Figure 3.4 to reflect that fact and include details about that liquid sodium hypochlorite metering and monitoring system in the narrative of this subsection. Indicate in quantitative terms (e.g. liters/hour or gallons/day) how much 1500ppm liquid sodium hypochlorite will flow through each injection point as well as the total volume of liquid sodium hypochlorite utilized. Dilution of process waters prior to discharge to tidewaters to meet any target effluent standard is unacceptable. Maintaining chlorine residuals in the discharge waters less than 0.2 ppm on a 24-hour average basis must be accomplished through means other than dilution (e.g., by minimizing the injection of liquid sodium hypochlorite).

Response

The Auxiliary Cooling System will utilize the closed loop ethylene glycol cooling water system as described in Sections 3.4.1.2 and 3.4.1.3 of the EIA. Therefore the system will not require hypochlorite injection.

[09 July 03] **Comment - 91**

Include appropriate references to the operation and maintenance of all components of the sodium hypochlorite generator system and related ancillary equipment in the EMP.

Response

Operational elements of the sodium hypochlorite generator are described in the response to Comment #35. Maintenance performed will be in accordance with the manufacturer's recommendations, such as monthly acid cleaning of electrolytic cells, periodic cleaning of seawater inlet strainer, routine maintenance on acid pump and valve packings and routine maintenance on electrical gear, instruments and controls. Actual maintenance will ultimately be performed according to vendor specifications and Standard Operating Procedures included in the EMP when final design is complete.

BEST
25 September 2003

Date Completed

3.4.1.4 Emergency Firewater

[24July 03] **Comment - 92**

Page 3-16, paragraph 3: This paragraph should provide references to appropriate sections in the EIA regarding the Emergency Response Plan that includes fire prevention, control and counter measures. Develop and implement an integrated approach to environmental, security, risk and emergency management. The approach entails developing and implementing an EMP that includes an integrated Risk and Emergency Management Plan addressing all hazards and all stages of risk and emergency management and includes as components an Inspection/Prevention Plan, Materials Management Plan, Waste Management Plan, Security Plan, Emergency Response Plans including a Contingency Plan, a Fire Prevention Control and Counter Measure Plan (FPCC), a Spill Prevention Control and Counter Measure Plan (SPCC), as well as an "all hazards approach" Training Plan for all project personnel.

Response

Ocean LNG concurs that the Environmental Management Plan should include an integrated approach to environmental, security, risk, and emergency management. Ocean LNG submitted the Environmental Management Plan (EMP) as Appendix U of the EIA. The EMP currently includes the following sections:

- *Attachment 1: Construction Spill Prevention, Control and Countermeasures (SPCC) Plan;*
- *Attachment 2: Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan;*
- *Attachment 3: Contractor Health and Safety Plan;*
- *Attachment 4: Sediment, Erosion and Stormwater Control Plan;*
- *Attachment 5: Marine Biological (Cetacean and Sea Turtle) Monitoring Plan;*
- *Attachment 6: Contaminated Sediment and Soil Management Plan;*
- *Attachment 7: Waste Minimization Plan;*
- *Attachment 8: Seagrass Mitigation Plan;*
- *Attachment 9: Marine Safety Plan;*
- *Attachment 10: Worker Safety Plan;*
- *Attachment 11: Emergency Plan;*
- *Attachment 12: Security Plan;*
- *Attachment 13: Intake and Discharge Monitoring Plan; and*
- *Attachment 14: Marine Turbidity Monitoring Program.*

The EMP addresses many of the concerns raised by the BEST Commission. Ocean LNG will continue to make additions to the EMP as further details of the design of the project become available including: Operation and Maintenance Manuals, Waste Management Plans, and Training Programs. This comment is related to Comments #80 and #112. Further information to provide a consolidated approach may be found in the response to Comment #112.

BEST
25 September 2003

Date Completed

3.4.2 Construction Uses

[09 July 03] **Comment – 93**

Page 3-16, paragraph 5: Provide details about the type, use and management of the chemical additives referenced in this subsection. Provide details about the volume, physical and chemical composition and management of the backwash materials. Include appropriate references to the management of chemical additives and backwash materials in the EMP.

Response

The reverse osmosis desalinator mounted on the barge is a complete system that will be wired into the electrical and plumbing systems of the barge. The unit will produce up to 17,000 U.S. gallons of fresh water per day, that will be stored in the potable water tank in the below deck section of the barge.

Typical performance specifications are as follows:

Rated Performance / Product Water Produced: +/- 15% at 820 psig/58 bar, 77 degree F / 25 degree C & 35,000 ppm TDS typical sea water

Salt Rejection (Chloride ion): Per individual R.O. Membrane element. High rejection systems minimum 99.2%, average 99.5%

Product Water Temperature: Ambient to feed water temperature

Salinity monitoring: Automatic electronic monitoring. Temperature compensated with solid state "DOT LED" continuous readout in micromhos per cm3 and if a fail-safe design.

System Feed Water:

Flow: High Rejection systems: 28-36 GPM/106-136 LPM
Salinity Range: Designed for seawater use up to 50,000 ppm TDS (NaCl)
Temperature Range: Max. 122 degrees F / 50 degrees C, Min. 33 degrees F / .5 degrees C
pH Range: 3-11 (typical seawater pH is 8)
Reverse Osmosis Membrane: Type: Selected aromatic tri-polyamid, thin film composite, spiral wound, single pass reverse osmosis membrane high rejection elements.
Chlorine Tolerance: 0.1 ppm

System Pressure:

Feed Water: Maximum 35 psi
System Operation: Seawater nominal 820 psi; Brackish varies with ppm

BEST
25 September 2003

Date Completed

Typical operation and waste generation anticipated includes:

- *Total number of membrane elements: 3*
- *Estimated average element life: 4 to 5 years*
- *Elements disposed of per year: 1 dependent on overall use*

- *Water cartridge filter elements: 2*
- *Estimated average filter life: 2 weeks*
- *Elements disposed of per year: 54*

The spent filter elements and membrane element will be stored with other solid waste from the barge and transported from Ocean Cay to a suitable solid waste disposal facility.

Water cartridge filters will be backwashed using reject brine from the RO unit. No chemicals or additives will be used and the brine will be pumped back to the sea as no treatment is required.

RO element membranes are anticipated to be cleaned every 6 months by circulating a citric acid solution (2% by weight) and a solution (0.1% by weight) of sodium hydroxide (caustic). The chemicals used are food grade or better. After cleaning, the solutions are neutralized to a pH of between 6 and 8 and disposed of by discharging slowly into the seawater outfall stream.
The estimated volume of neutralized citric acid solution discharged per year is approximately 350 gallons. The estimated volume of neutralized caustic solution discharged per year is anticipated to be 350 gallons.

The feed to the RO units must be dechlorinated by injecting 6ppm (based on 2ppm chlorine in seawater) Sodium Bisulfite upstream RO unit. Sodium Bisulfite injection will be adjusted automatically to match chlorination dose and frequency. This method is widely used to remove chlorine residuals from discharge waters and there are no harmful effects. The sulfite is changed to sulfate which is already present in natural seawater.

The same type of unit will be used for the mancamp built on the island. The anticipated product usage and waste generation from this system is broken down in Table 3-10 "Ocean LNG Product and Waste Tracking", attached. This document provides summary of the materials associated with the system and will be updated and modified as needed through the term of operation of the system.

[24July 03] **Comment - 94**

Page 3-17, paragraph 1: This paragraph should detail or provide references to appropriate sections in the EIA regarding the sodium hypochlorite generator, storage, dispensing and

monitoring system on board the self-contained barge mounted RO system. Include appropriate references to the maintenance and operation of the barge mounted RO system in the EMP.

Response

A description of the barge mounted RO system is included in Sections 2.3.1.1.A and 2.4.1.1 of the EIA. The potential impacts associated with the use of the barge mounted RO system are discussed in Section 5.2.1.1. of the EIA. For anticipated operational characteristics of the system, please refer to the response to Comment #93 above.

If sodium hypochlorite addition is required to prevent biofouling of the RO system, the sodium hypochlorite will be stored on board the barge containing the RO system. If the sodium hypochlorite generator becomes operational while the barge is still in use, then the generator will supply the sodium hypochlorite for the barge mounted RO system. As described in the SPCC plan of the EMP, containers used to store sodium hypochlorite will have secondary containment and personnel will be trained on dispensing, monitoring and usage of the system. Anticipated maintenance, cleaning and chemical concentrations to be used are summarized above in the response to Comment #93 and remaining comment response is addressed in the response to Comment #35 . Additional information concerning the operation and maintenance of the barge mounted RO systems will be incorporated in the EMP when they become available.

[09 July 03] **Comment - 95**

Page 2-17, paragraph 2: Please indicate whether seawater to be used for hydrostatic testing of the LNG and LPG tanks prior to commissioning with be treated with liquid sodium hypochlorite and if so at what concentrations.

Response

The seawater used for hydrostatic testing will be used for a short duration (24 to 48 hours); therefore addition of liquid sodium hypochlorite or other biocides will not be required.

3.4.3 Facility Water Discharge System

[24July 03] **Comment - 96**

Page 3-17, paragraph 1: Identify the applicable standards to be met for the discharges of chlorine, cyclohexylamine, oil & grease, acids and caustics and all other waste stream constituents expected to be among the wastewater discharge referenced in this subsection.

Response

Ocean LNG will monitor the process discharges associated with project in accordance with the Intake and Discharge Monitoring Plan included as Attachment 13 to Appendix U of the Environmental Management Plan in the Environmental Impact Assessment. Attachment 2 to

BEST
25 September 2003

Date Completed

Appendix U (SPCC Plan) contains World Bank and State of Florida discharge criteria applicable to chlorine, oil & grease, and several other compounds (some individual acids and caustics) in Table 1 of the plan. The Table does not include all compounds and but can be updated as design is finalized. Upon completion of final design, the Intake and Discharge Monitoring Plan will be updated to include applicable target concentration levels for chemicals that may be present in the effluent based upon operations.

The facility discharge, Outfall 001, will be used to discharge a combination stream of cooled water from the Liquefied Natural Gas (LNG) vaporizers, warmed water from the auxiliary cooling system, waste brines and backwashes from the desalination plant, and pretreated wastewater from the plant equipment and floor drains, as described in Section 3.4.8 of the EIA.

Average discharge will depend on operational parameters such as power generation needs, LNG deliveries, gas transmission demands, and seawater quality, among others.

Monitoring Requirements

Ocean LNG proposes to use will use the Florida Department of Environmental Protection (FLDEP) and U.S. Environmental Protection Agency (USEPA) regulatory limits, and World Bank Guidelines as guidance for the monitoring program for the project. The discharge will be monitored in accordance with 40 CFR 122, as well as Rule 62-4.246 and Chapter 62-160 of the Florida Administrative Code (FAC). ***The discharge monitoring will provide data*** *in order to comply* ***with the Florida discharge criteria. In addition, chemical feeds to the various site systems will also be monitored to control and optimize processes (e.g. see description of feed monitoring for chlorine and hypochlorite described in the response to Comment #35). This dual function will provide data for process optimization, and waste/discharge minimization.***

The State of Florida does not have specific regulations relative to discharge water that is cooler than ambient water. The type of water at the proposed project would be considered a Class III Marine surface water.

The brine or mixture of the brine and the cooling water will utilize the Chapter 62-302 FAC criteria as a guideline at the edge of the mixing zone, which is at the seaward edges of the approach channel and turning basin. Since the brine discharge will be mixed with the cooling water, the discharge will also be subject to biological monitoring and evaluation of the diversity of living organisms. The evaluation will utilize the Shannon-Weaver Diversity Index, or similar measure determined to be applicable to the environment in the area of this discharge. The area will be monitored following commissioning of the project facilities. Monitoring events will include:

- *Daily monitoring for temperature, pH, flow, and chlorine (residual)*
- *Monthly monitoring for Oil and Grease, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chlorine (total residual), Chlorine.*

BEST
25 September 2003

Date Completed

- *Annual biological monitoring and evaluation using the Shannon-Weaver Index or similar.*

[27 August 03] **Comment – 97**

Page 3-17, paragraph 2: Provide a characterization (i.e., annual volumetric flow rate, identify constituents and expected average and maximum concentrations) of each of the waste streams identified in this subsection.

Response

The attached Figure EMP-2 "Overall Effluent Flow for Ocean LNG, Ocean Cay, The Bahamas" contains a table that indicates the maximum and average flow rates from each of the components to be installed on Ocean Cay under the revised air warming system for LNG re-gasification.

The potential impacts from construction and operation of the Facility Process Water System/Desalination including the LNG cooling water system, desalination plant, and electrical generation system are also described in Section 5.2.3.1 of the EIA, but are modified by the proposed system shown on Figure EMP-2. Anticipated flow quantities of the waste streams identified in this section have all been incorporated in the attached updated Table 3-10 and 3-11 to provide a management tool associating island processes and operations with wastes generated. Table 3-10 will continue to be refined as design and construction are completed, and refinement will continue during operations and product consumption and waste generation will be dynamically tracked.

[24July 03] **Comment – 98**

Page 3-18, paragraph 1: The facility water discharge system must include a continuous liquid effluent monitoring system with feed back capacity to a process water quality control system. The integrated process and instrumentation system should incorporate alarms and enable select data streams to be provided to GOB monitoring personnel on a real time basis via modem.

Response

Per the meeting with the BEST Commission held on 4 June 2003, Ocean LNG is refining design of the water discharge systems proposed for Ocean Cay. The new systems will include individual monitoring of waste streams and control of chemical injection to those streams as well as a means to monitor the combined discharge. Included in the redesign of the monitoring controls will be a means for the GOB to remotely monitor alarms and select data streams on a real time basis, as described in the response to Comment #31. Ocean LNG will hold a workshop in the future with the BEST Commission to determine the mechanisms of implementing provision of data streams the GOB would like provided to them. The agreed upon data streams will be incorporated into the EMP.

BEST
25 September 2003

Date Completed

[09 July 03] **Comment 99**

Page 3-18, paragraph 3-4: This paragraph should detail or provide references to appropriate sections in the EIA regarding the design and operation and maintenance of the oil water separators described in these paragraphs. Include that information in the EMP.

Response

Information on design and operation of the oil water separators is provided above in response to Comment #84. This information will be refined as design advances and will be included in the EMP.

[24July 03] **Comment – 100**

Page 3-19, paragraph 1: Make reference in this subsection to the maintenance procedures for the GTGs and specifically to the handling and disposal of all liquid wastes generated by the maintenance of the GTGs.

Response

The management of chemicals and petroleum products associated with the GTGs is discussed in the Integrated Spill Control Response Pollution Prevention and Stormwater Management Plan provided in Attachment 2 to Appendix U of the EMP. Information on anticipated wastes generated from the GTG operation has been incorporated in Table 3-10, on lines 1, 2, and 3.

[09 July 03] **Comment – 101**

Page 3-19, paragraph 2: The design of septic systems must be submitted to the Water and Sewer Corporation for review before a permit can be issued enabling construction of septic systems to begin.

Response

Please see the response to Comment #85 for additional information relative to this comment. The system design information will be provided to the Water and Sewer Corporation for review and approval once final design has been completed and prior to construction of this system.

[09 July 03] **Comment – 102**

Page 3-19, paragraph 4: The word "permit" should be deleted from the first sentence. Only the

BEST
25 September 2003

Date Completed

Government of The Bahamas has the authority to permit the discharge of wastewaters in The Bahamas. Designs do not permit the discharge of wastewaters.

Response

The first sentence of paragraph 4 on page 3-19 has been revised as follows:

"The outfall structure will be designed to allow the discharge of the combined wastewater streams without undermining the pipeline, washing away the seabed, or creating undesirable disturbances in the approach channel."

[24 July 03] **Comment – 103**

Page 3-20, Table 3-6: This table should be revised to include the flow rate, concentration, and load of each of the contaminants to be discharged per year (e.g. gallons of 1500ppm liquid sodium hypochlorite/year; liters of 99.5% cyclohexylamine/year; etc.). This information should be presented using consistent units. Provide analogous detailed information about the chemical composition and concentration of pH balanced acidic and caustic constituents of waste waster discharges. Describe the applications for cyclohexylamine as an intermediate in proposed process systems, define all waste constituents that could result from the use of cyclohexylamine in those process systems, and define how those wastes will be managed. Describe the applications for acidic and caustic products to be used in proposed process systems and define all waste constituents that could result from the use of those products and how those wastes will be managed. Include this additional information in the EMP.

Response

Cyclohexylamine was proposed to prevent biofouling in the non-contact cooling water system. By utilizing the water/glycol loop system described in Section 3.4.1.3, the use of cyclohexylamine will not be required.

Acids and caustics will be utilized for desalination as described in Sections 2.3.1.3.B. and 2.4.3.2 of the EIA.

Current estimates of the amount of waste resulting from these processes are summarized in Revised Table 3-9. Current estimates of product usage and waste generation for the constituents in wastewater streams are summarized in Table 3-10, and monitoring is summarized in the response to Comment #96 above.

3.4.4 Thermal Plume Modeling

[27 August 03] **Comment – 104**

Page 3-21, paragraph 1: The World Bank guideline referenced in this paragraph provides for the maximum allowable *increase* in temperature of receiving water at the edge of a mixing

BEST
25 September 2003

Date Completed

zone. Wastewater discharge from Outfall 001 will result in a temperature *decrease* at the edge of the mixing zone. Accordingly, the World Bank guideline referenced in this section is not necessarily applicable to proposed operating conditions at Ocean Cay where AES proposes to discharge cold effluents to tidewaters. Please summarize the review of the Florida State regulations referenced in this paragraph including both state and federal requirements for treating thermal discharges into Floridian waters. Identify any applicable standard (utilized in the USA, EU or elsewhere) addressing cold process waters released into receiving waters and/or maximum allowable *decreases* in temperature of receiving water at the edge of a mixing zone. If no applicable standards for cold process waters exist, please indicate that fact and propose a standard to be used for this project, indicating the scientific and/or practical basis for the proposed standard.

Response

Since the last comment response and as a result of discussions with BEST, AES has determined to change the proposed LNG re-gasification to an air-warmed rather than water-warmed process. This change results in a net decrease in water discharge (sand filter backwash and brine reject) to the marine environment from 521 million gallons to 2.5 million gallons per year (a 99% reduction). The review and revision process has therefore rendered thermal plume modeling for the island discharge moot due to the minimal volume of water to be discharged, however results of the original modeling have been maintained below.

A general description of the air system appears in the response to Comment #138. This revision allows significant reduction of seawater usage and chemical additives for treatment and discharge. As a result, AES has revised its estimation of the mass flows and physical and chemical characteristics of all liquid waste streams entering the resulting seawater discharge. Discussion of the original modeling appears below, and even with the original higher discharge volume, this analysis concluded that the thermal impact met the State of Florida criteria for thermal change at the edge of the mixing zone. With the new system, discharge volume will be reduced by over 99%, therefore the modified system will also meet the State of Florida criteria.

As indicated in the original modeling, water temperature at the point of discharge during the operational phase of the LNG facility was conservatively modeled at 15.6 ºC (28 ºF) below the intake temperature. Actual anticipated temperatures are expected to be closer to ambient conditions under the revised design. The discharge water under the original modeling would have been cooler than the intake due to the chilling from regasification of the LNG. The shape and volume of the thermal plume caused by the discharge and the anticipated water temperature differential within the plume is discussed in the Technical Report – Thermal and Cold Discharge Modeling, included in Appendix H of the EIA. The results of the modeling conducted on the discharge show that the maximum temperature decrease in the immediate vicinity of the discharge is 1.59 ºC (2.86 ºF) at the bottom of the turning basin and 0.17 ºC (0.31 ºF) at the surface. The plume dimensions of the original modeling comply with Florida State, US Federal and World Bank Guidelines, in that there is 95 percent probability that the

BEST
25 September 2003

Date Completed

temperature increase at the edge of the mixing zone is less than 3 ºC (5.4 ºF) at the surface, sub-surface or bottom. In this case, the temperature decrease is less than 3ºC (5.4 ºF) at the edge of the mixing zone. Ocean LNG investigated Florida State, US Federal, European Union and World Bank Guidelines for regulations and policies for discharges with decreased temperature and none were located. Ocean LNG proposes that the regulations and guidelines should be utilized based on a temperature decrease at the edge of the mixing zone that is no less than 3 ºC (5.4 ºF) at the surface, sub-surface or bottom. Ocean LNG investigated the potential impacts to biological resources in the Project area resulting from the proposed discharge as described below.

The area of maximum temperature differential is contained within the turning basin. Since the thermal plume generated will be colder than the ambient seawater, the plume will be more significant at depth than at the surface. Marine habitats in the area of the discharge will have been previously disturbed during the dredging of the turning basin and approach channel (refer to Section 5.2.1.2 of the EIA), therefore no short term additional impacts were expected to occur with the original design. Over the longer term, there may have been occasional short-term impacts during storm events which may temporarily change the distribution of the thermal plume or cause an upwelling of the cooler water at the bottom of the channel. Potential long term impacts from the discharge of the cooling water would have been limited to the localized area of the thermal plume, however some species that have lower tolerance to temperature variations (corals, plankton, and seagrasses) may have been affected. With the original design such potential impacts would have been expected to be limited to the immediate area in close proximity to the ship berthing facilities within the turning basin which will have been previously disturbed during construction by dredging activities. With the revised design, no such impacts are anticipated.

[24 July 03] **Comment – 105**

Page 3-21, paragraph 6-7: Please investigate whether the thermal plume model (utilizing the same selected scenario and modeling assumptions) supports the following conclusion: "…that there are no 95% probability occurrences of 3 ^{o}C (5.4 ^{o}F) temperature *decrease* plumes at the surface, subsurface and the bottom of the water column." Indicate the conclusions of that investigation in this subsection. Amend the technical report detailing the thermal plume modeling procedures and results presented in Appendix H to include the procedures and results of the modeling investigation requested above.

Response

The current configuration and resulting modeling results does show less than a 3°C change at the edge of the modeled plume. Please refer to the response to Comment 104 above.

BEST
25 September 2003

Date Completed

3.5 Stormwater Management

[09 July 03] **Comment – 106**

Pages 3-22 thru 3-23: This subsection should detail or provide references to appropriate sections in the EIA regarding the design, location, construction and operation and maintenance of oil water separators referenced previously in the EIA. Include all elements of the stormwater management plan in the EMP.

Response

Please refer to the response to Comment No. 84 for information regarding the oil water separator. Ocean LNG has developed the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan included as Attachment 2 to Appendix U of the EIA. This plan includes all elements of the stormwater management program for operations on Ocean Cay.

3.6 Petroleum and Chemical Storage and Use
3.6.1 Construction
3.6.1.1 Decommissioning and Disposition of Construction materials
3.6.2 Operation

[09 July 03] **Comment – 107**

Pages. 3-24 thru 3-29: Develop and implement a comprehensive Petroleum and Chemical Management Plan that expands upon and details the chemical management "strategies" referenced in these subsections and integrate that plan into the EMP. Provide details about the "approximate" (sic. generic) types and quantities of petroleum and chemical materials to be stored and utilized at Ocean Cay. Develop tables 3-7 and 3-8, into spreadsheets that include for example:

- Each specific type of petroleum and chemical product to be utilized on site during the construction, commissioning, operations, and decommissioning phases
- Identification of non-hazardous and hazardous materials
- References to corresponding MSDS sheets for each and every petroleum and chemical material.
- the volume and location of each of those petroleum and chemical products to stored in inventory in a separate column
- The volume of each of each petroleum and chemical products utilized on a weekly or

BEST
25 September 2003

Date Completed

monthly basis in a separate column.

Maintain that spreadsheet on a continuing basis to reflect the addition or deletion of particular petroleum and chemical products utilized, changes in quantities of petroleum or chemical products in inventory as well as the volumes of each petroleum or chemical product utilized during the construction, commissioning, operations and decommissioning phases of the project. Include the spreadsheets in the EMP. Provide the BEST Commission with quarterly reports that highlight updates and amendments to the EMP during that period throughout the construction, commissioning, operations, and decommissioning phases of the project.

Response

Ocean LNG has developed the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan included as Attachment 2 to Appendix U of the EIA. Section 2.5 of the Plan includes details about the "approximate" (sic. generic) types and quantities of petroleum and chemical materials to be stored and utilized at Ocean Cay. Ocean LNG has developed a spreadsheet (Table 3-10) that will be utilized to track all chemical and petroleum products used in association with the Project. This system provides a dynamic tool for tracking chemical and petroleum products and the waste generated from those products, and will be incorporated as an integral part of the EMP. Ocean LNG will maintain copies of MSDS sheets on site in accordance with the Contractor Health and Safety Plan, Attachment 3 to the EMP and the Worker Safety Plan, Attachment 10 to the EMP.

[09 July 03] **Comment – 108**

Page 3-26, paragraph 4: Incorporate procedures for decommissioning construction contractors utilized during the construction, operations and decommissioning phases of the project into the EMP. Include review of the waste lists submitted by each construction contractor followed by appropriate site inspections and reporting undertaken by the AES Environmental Inspector in the EMP. The AES Environmental Inspector should advise the BEST Commission in advance about decommissioning site inspections and provide BEST with copies of final reports.

Response

AES Ocean LNG will incorporate procedures for decommissioning construction contractors utilized during the construction, operations and decommissioning phases of the project into the EMP. The EMP will require the review of the waste lists submitted by each construction contractor followed by appropriate site inspections and reporting undertaken by the AES Environmental Inspectors. The AES Environmental Inspectors should advise the BEST Commission in advance about decommissioning site inspections and provide BEST with copies

BEST
25 September 2003

Date Completed

of final reports.

3.7 Solid and Chemical Waste Management
3.7.1 Construction Related Waste
3.7.2 Operational Related Waste

[09 July 03] **Comment – 109**

Page 3-29, paragraph 3: Amend both sentences in this paragraph to read … "in compliance with the EMP and with Department of Environmental Health Services (DEHS) regulations…"

Response

The paragraph has been amended as follows:

"The construction contractor, under the oversight of Ocean LNG, will be responsible for the proper characterization, collection, storage, and ultimate disposal of all construction-related waste materials, in compliance with the EMP and with Department of Environmental Health Services (DEHS) regulations. Ocean LNG's facility personnel will be responsible for proper waste management practices during the operation of the completed project facility in compliance with the EMP and with Department of Environmental Health Services (DEHS) regulations."

[24 July 03] **Comment – 110**

Page 3-29, paragraph 4: If bulky construction wastes that could be characterized as "clean fill materials" are to be reused on Ocean Cay as fill, clearly identify and characterize the waste to be used as fill and the proposed location(s) for placement. Coordinate with BEST and with DEHS prior to implementing any waste fill strategies. The location of those "clean fill materials" should be located in as built drawings for future reference.

Response

The current structures and materials on Ocean Cay that may be affected by island expansion and construction are comprised of masonry, wood and metal buildings; mining equipment; and scrap metal.

The mining equipment that will not be used for future island operations will be decommissioned and sold for re-use or salvage to off-island facilities. Therefore, none of this equipment or material is anticipated to be bulky waste or used for "fill" on the island.

Scrap metal will be managed in accordance with the "AES LNG, Ltd. Ocean Cay Scrap Metal Management Plan, June 2003" discussed with BEST representatives at our meeting on 4 June

BEST
25 September 2003

Date Completed

2003, and submitted to BEST under separate cover on 16 June 2003. There is a possibility that, if scrap metal volume is low enough, the scrap is clean, and there is sufficient space on island, some or all of the metal may be buried on island, with BEST permission in accordance with the Scrap Metal Management Plan. See the plan for details of planned scrap segregation, accumulation and disposition.

Demolition of existing buildings on Ocean Cay that will not have future use would generate masonry, wood and/or metal construction & demolition debris ("C&D Debris" or "bulky waste"). Florida Solid Waste regulations under F.A.C 62-701 allow C&D debris to be disposed on the site of generation, however we anticipate applying this to only concrete. Remaining materials (wood, roofing, etc.) will be disposed of off island at a permitted solid waste management facility other than the Biminis. If this material is used as fill, BEST/DEHS will be notified of the final fill location(s) and fill methods.

[09 July 03] **Comment - 111**

Page 3-32, Table 3-9. Include all elements of the waste management plan in the EMP. Develop tables 3-9, into a spreadsheet that includes for example:

- Each specific type of waste generated on site during the construction, commissioning, operations, and decommissioning phases
- Identification of non-hazardous and hazardous waste
- The source of the waste
- The volume of waste
- Destination of waste
  - Vented to atmosphere
  - Discharged to tidewater
  - Incinerated
  - Buried on site (if any)
  - Stored for transport off island
  - Storage location
  - Schedule for transport of wastes from Ocean Cay
  - Destination of wastes transported from Ocean Cay.

Develop and maintain a "cradle-to-grave" integrated spreadsheet of petroleum products, chemical materials and wastes (based on detailed expansion of Tables 3-7, 3-8 and 3-9) for continuing use during construction, commissioning, operations and decommissioning. This is considered an essential element of the EMP. Provide the "cradle-to-grave" integrated spreadsheet of petroleum products, chemical materials and wastes to Bahamian Government

BEST
25 September 2003

Date Completed

officials upon demand and to the BEST Commission in the form of quarterly EMP reports on a continuing basis throughout the construction, commissioning, operations and decommissioning phases of the facility.

Response

As described in the Response to BEST Comment No. 76 and 107, Ocean LNG has developed the Revised Table 3-9 and a new spreadsheet, Table 3-10 that will be utilized to track all chemical and petroleum products used in association with the Project. This system for tracking chemical and petroleum products, the waste generated from those products, and the disposition of the waste will be incorporated as an integral part of the EMP. Records will be managed in accordance with the requirements of the BASIL Convention, US Federal Regulations, Florida State Regulations and in compliance with the EMP and with Department of Environmental Health Services (DEHS) regulations.

General Recommendations

[27 August 03] **Comment – 112**

References to developing and implementing an appropriate training program on the subject of project safety and environmental practices and protocol were not included in previous sections of the EIA and should be included in Section 3. All project personnel should participate in such a training program before being authorized to start work. Such a training program should be developed as soon as possible and submitted to the BEST Commission for review and comment prior to implementing the training program and starting construction activities. Some project personnel will require special training and professional certifications. AES should reference such specially trained personnel throughout the EIA and in a section entitled "Position Descriptions" or the equivalent.

Response

The importance of training for island operation and safety is clearly understood and will be a significant component of AES operation of the facility. The EMP and training will be a continuing priority and will be updated routinely. These elements will apply to AES personnel and contractors, government staff directly associated with the project (environmental inspectors, etc.), or other visitors to the island. In general, training will include on and off island training, sending prospective island personnel through different "schools" off island as well as on-island training for the systems, equipment, procedures and maintenance that will be expected with the new facility.
Areas of training/review for construction personnel will include, but not be limited to:

- *Scope of the Project*
- *Roles & Responsibilities*

BEST
25 September 2003

Date Completed

- *Agency requirements*
- *Plan requirements (SPCC, Erosion Control, Turbidity Monitoring, Health & Safety, Hydrostatic test, etc.)*
- *Environmental Monitoring, Inspector duties*
- *Notifications (Emergency, agency, internal, etc.)*
- *Reporting*

Areas of training/review for island operations personnel will include the areas above that also apply to island operations:

- *Fire protection*
- *LNG handling*
- *Security*
- *Technical Schools for Equipment*
- *Systems operation*
- *Management Training*
- *Computer Training courses*

In general, island operations personnel will need to complete training required for NFPA Part 59A and related sections, and DOT requirements.

Personnel will be required to demonstrate competency in their subject areas through examination and other proficiency demonstration or testing. Documentation of initial training prior to start-up (and refresher training after operational start-up) will be maintained at the island. Newly trained personnel will also be teamed with experienced ex-patriot personnel for training, start-up, and operational shake-down phases to ensure appropriate transition of operations to new personnel AES policy is to maintain a ratio of 1 ex-patriots to 4 in-country personnel to provide positions to native personnel during the construction and start up phase. The number of ex-patriots will be reduced to the agreed upon level during the operational phase. Limited additional information on training has also been addressed above - please refer to the response to Comment No. 26.

This comment is also related to Comments #80 and #92. In order to provide an integrated "All Hazards" approach to the required training for both the construction and operational phases of the LNG project, Figures 3-5 and 3-6 has been developed to show the framework of project organization, responsible personnel positions for the construction phase of the project, and the relevant training that will apply to these positions, as well as project elements and applicable plans under the EMP. This is provided to BEST to show AES approach to this element of project and island management, for BEST review and feedback. As shown on the Figures provided, all personnel will receive awareness level training on the overall project, overall health, safety, and environmental protection through the EMP. Beyond the awareness training, additional training for health, safety, environmental and operation aspects of the project will be given based on position and function. However all project personnel will be

	BEST 25 September 2003
Date Completed	
	schooled in common aspects of project objectives, health, safety and environmental protection, and response aspects of the project. BEST requested that reference be provided to new International Maritime Organization (IMO) requirements, as applicable, to training associated to facility operations. IMO has adopted new requirements and guidance through the 2002 Safety of Life At Sea (SOLAS) convention, including provisions pertaining to security on board ship and at port facilities. Applicable requirements to Ocean Cay as a receiving port will be included in the All Hazards training program.

BEST
25 September 2003

Date Completed

[All comments and responses from this point forward are NEW as of 27 June 2003]

SECTION 4.0 BASELINE DESCRIPTION OF THE DEVELOPMENT SITE

[09 July 03] **Comment – 113**
4.1.2.6 Currents

Page 4-14, paragraph 3-6: Verify that the marine current information contained in this section is consistent with, and appropriately cross referenced to, marine current information contained in previous subsections of the EIA (e.g. thermal plume model; channel widening, silt control measures).

Response

The marine current information presented in Section 4.1.2.6 is a summary of the current information presented in the Report on MetOcean Conditions at Ocean Cay, Bahamas (MetOcean Report) included as Appendix A to the EIA. The information presented in the section and the aforementioned report is consistent with the design conditions referenced in Section 2.3.1.1.B.1.2, Section 2.3.1.3.A, Section 2.4.3.1, Section 2.4.4.1.A, Section 3.2 and Section 4.1.1. The information presented in the MetOcean Report will be utilized as the design basis for all sediment controls and structures that are proposed for construction in the vicinity of Ocean Cay. Modeling in the MetOcean Report utilized a grid spacing to encompass a broad area around Ocean Cay to allow simulation of storm conditions and variability to allow design of island expansion, armoring, etc.

The marine current information that was utilized to conduct the thermal plume model is described in Section 4 of the Thermal and Cold Discharge Modeling Technical Report, included as Appendix H to the EIA. It is based on a finer grid-node spacing to allow specific refined understanding of effects over the smaller area encompassing the intake and discharge areas. The model used in this report computes detailed currents, salinity and temperatures over an area encompassing the intake and discharge locations from observed tides, winds, the proposed plant discharge rate and temperature change.

[24 July 03] **Comment – 114**
4.1.3.1 Ocean Cay

Page 4-17, paragraph 2: Amend this subsection to provide details about or appropriate references to the decommissioning plan for all underground storage tanks (USTs) and the remediation plan for contaminated soils, sediments and ground water at Ocean Cay. Amend this subsection to include appropriate references to designing; constructing and operating integrated fuel storage, containment, dispensing systems for the existing aragonite mining

BEST
25 September 2003

Date Completed

operation and the proposed LNG operation on Ocean Cay. Develop and implement an integrated EMP for all AES operations on Ocean Cay.

Response

Remedial Action Plan

Decommissioning for all underground storage tanks (USTs) and the remediation for contaminated soils, sediments and ground water at Ocean Cay will be addressed in accordance with the AES Ocean LNG Remediation Work Plan, as submitted to BEST on 10 June 2003. If unanticipated environmental contamination is discovered during project construction, the procedures described in the Contaminated Sediment and Soil Management Plan, Attachment 6 to the EMP, will be implemented for such other sources of contamination.

AES Ocean LNG Fueling Systems

Ocean LNG has proposed the installation of new fuel storage and dispensing systems including a 300,00 gallon aboveground diesel fuel storage tank and two 20,000 gallon aboveground diesel storage tanks, as described in Sections 2.3.1.3.C.3. and 2.3.1.3.C.4 of the EIA. Figure 2.16 of the EIA presents a schematic of the proposed fuel tanks and associated dispensing systems. The operational characteristics of the fuel storage tanks are presented in Sections 3.6, 3.6.1 and 3.6.2 of the EIA. Additional details relative to the design of the fuel storage tanks are included in the response to BEST Comment No. 16. The management of these systems during construction and operation of the facilities is described in the Construction Spill Prevention, Control and Countermeasures Plan and the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan Attachments 1 and 2, respectively, to the EMP contained in Appendix U of the EIA. In addition, management will include tracking of fuel product placed into storage in the tanks, usage, and waste that may be generated through operation of the tanks, as summarized in Revised Table 3-9, and new tables 3-10 and 3-11, attached. The proposed systems will be sufficient to provide fuel for the facilities, vehicles and vessels that will operate at Ocean Cay, including those operated by the mining operations.

[09 July 03] **Comment – 115**
4.1.4.2. Site Specific Geology

Page 4-21, paragraph 1 & 2: Make reference to the analysis of geotechnical cores and samples with respect to the potential need for silt control measures. Specifically, identify the percentage of silts and range of silt particle sizes revealed by analysis of geotechnical cores and samples. Utilize silt control standards and guidelines utilized by the State of Florida for construction of new industrial facilities. During the course of the additional geotechnical

investigations referenced in this and other subsections, identify and consider the percentage of silts and range of silt sizes encountered in the analysis of additional samples. Evaluate that information to assess the need for silt control measures at Ocean Cay. If silt control measures are required, provide appropriate references in this subsection to silt control related data as well as the design, construction, operating and monitoring plan for best practice silt control measures.

Response

Test boring logs and grain size analysis results for subsurface explorations can be found in the Geotechnical Data Report (Volumes I and II) for the LNG tanks and generating station, revision date December 2002, and Geotechnical Data Report for the LPG Storage Tank and Marine Features, dated December 2002. Additional explorations are currently being conducted on Ocean Cay and a data report will be prepared to summarize the findings upon completion of the drilling and testing program, however results pertaining to the range of bedrock and soil types encountered are expected to be consistent with past explorations completed.

Based on conditions encountered at test borings, the soils on the island generally contain soils where less than approximately 20 percent by weight of the material passed a U.S. #200 size sieve, with many of the samples in the 0 to 10 percent range (grain size that passes #200 sieve comprises the silt and finer-grain fraction of the sample – the sample fraction that does not pass the #200 sieve is sand size or larger). It is anticipated that fill material placed to raise grade at Ocean Cay will have a similar gradation. Samples where up to 100 percent of the sample passed the U.S. #200 size sieve were encountered at several test borings at varying depths. In several instances, these silty areas appear to be in locations of former settlement ponds used to remove fines from rinse waters generated by the aragonite mining operation. These finer grained materials will be managed so as to prevent siltation or generation of turbid runoff, as summarized below.

During construction, silt control measures will be implemented in accordance with State of Florida requirements for construction of new industrial facilities. These measures will include installation of silt fencing around the work area. A monitoring program that will include routine inspection of silt control measures will be implemented, and the control measures will be adjusted as necessary to satisfy regulatory requirements in accordance with the Sediment, Erosion and Stormwater Control Plan included as Attachment 4 to the EMP, Appendix U of the EIA.

Silt encountered in areas of settlement-sensitive equipment and structures will be removed and replaced on the island, beyond the footprint of proposed site development. Over-excavated silt will not be disposed of in the waters surrounding the island. Silt fencing will be placed

around stockpiles of over-excavated materials, and the stockpiles will be covered as necessary in accordance with the aforementioned Plan.

4.1.5 Hydrology /Surface Waters

[09 July 03] **Comment – 116**
4.1.5.1 Ocean Cay

Page 4-21 thru 4-22: Provide references to silt control measures to be utilized for the surface impoundments and settling basins utilized for all aragonite stockpiling areas. Silt control measures for existing and future aragonite mining operations must be consistent with silt control measures utilized for the island expansion phase of the proposed LNG project.

Response

Section 4.1.5.1 presents the dewatering measures utilized by the existing aragonite mining operation on Ocean Cay. To provide consistent siltation control for both the LNG and the mining operations, future mining operation catch basins and settling ponds used for dewatering mined material will be installed and silt curtains will be added as needed to manage the generation of silty runoff, and prevent the discharge of silty runoff back into the ocean from the mining operation. Monitoring of mining-related dewatering will include routine inspection of silt control measures as in response to comment #115 above, and the control measures will be adjusted as necessary to satisfy regulatory requirements in accordance with the Sediment, Erosion and Stormwater Control Plan included as Attachment 4 to the EMP, Appendix U of the EIA.

To the extent that dewatering pond(s) need to be cleaned of accumulated silt, the silt will not be disposed of in the waters surrounding the island. Silt fencing will be placed around stockpiles of excavated materials, and the stockpiles will be covered as necessary in accordance with the aforementioned Plan.

[09 July 03] **Comment – 117**
4.1.5.2 The Biminis

Page 4-22: Please prepare to report on the status of continuing cooperation and correspondence with the Bimini Administrator during the next meeting of the EIA work group.

BEST
25 September 2003

Date Completed

Response

Originally Ocean LNG was advised not to contact the Bimini Administrator directly. As such AES requested and subsequently received permission from BEST to contact the Bimini Administrator to submit a letter requesting information pertaining to the existing infrastructure of the Bimini Islands. A letter was submitted in June 2002 to the Bimini Administrator, no reply was received. AES will attempt to contact this individual again and provide an update to BEST at our next meeting regarding our progress.

As part of the AES Ocean LNG project communications effort, a public meeting in Bimini is currently scheduled for 8 July 2003.

4.1.6 Biological Aspects
4.1.6.3 Biological Resources Evaluated in the Vicinity of Each Major Project Element

[09 July 03] **Comment – 118**
E. Excess Material Shoal
Pages 4-37: Amend this subsection to reflect the decision to eliminate the excess material shoal from the proposed project.

Response

As described in the response to BEST Comment No. 51, final design of the Project has commenced, and Ocean LNG has re-evaluated the need to create the excess material shoal south of the turning basin. Ocean LNG will not create the excess material shoal, as had been previously described in the EIA.

[09 July 03] **Comment – 119**
4.1.6.4 At Risk Species
Page 4-44: Amend the last sentence on this page to identify specifically the pipeline route (or pipeline routes) referenced.

Response

The last sentence on page 4-44 has been amended as follows:

"These corals were not observed along the 610 mm (24 in) Natural Gas Pipeline route to Florida, as described in Section 2.3.1.4.A or the 60 mm (2 in) Natural Gas and 219 mm (8 in) Potable Water Pipeline routes to Bimini as described in Section 2.3.1.4.B of the EIA."

BEST
25 September 2003

Date Completed

4.2 Air, Noise and Environmental Contamination

[09 July 03] Comment – 120

4.2.2.1 Baseline Noise Conditions

Page 4-64, paragraph 2: The World Bank Environmental Guidelines included in this subsection are not relevant and should be deleted. Amend this subsection to include appropriate references to, and comparative analysis of, noise emission standards adopted by the State of Florida and/or the USEPA.

Response

The Noise Control Act of 1972 has led to the establishment of noise emission criteria for products and specific pieces of equipment as presented in USEPA regulations at 40 CFR parts 200 through 219. 40 CFR 204 Noise Emission Standards for Construction Equipment focuses specifically on the allowable noise emissions from air compressors. Regulations for the emissions of community noise have not been established by the USEPA; however, a guidance document has been produced by USEPA for cities and counties so they may establish noise emission standards in their local ordinances. The State of Florida has not established noise emission criteria either. Broward County, Florida has established noise emission standards as mandated by the Broward County Code, Article VII, "Noise", Sections 27-231 to 27-240. Per the Broward County Code the allowable noise level from construction operations at a residential land use is 55 dBA at all times.

Ocean LNG compared the Broward County criteria to the World Bank Guidelines, which require noise levels from construction operations to be maintained below a 55 dBA threshold during daytime operations and 45 dBA during nighttime operations at the nearest residential receptor. Ocean LNG determined that the World Bank Guideline were more restrictive than the Broward County Code. Therefore the World Bank Guidelines were utilized to evaluate the baseline and projected noise emissions from construction and operation of the facility. As discussed in Section 5.6 of the EIA the worst case expected noise level at South Cat Cay , the nearest residential receptor, during construction operations is 22 dBA which is well below both the daytime and nighttime limits prescribed by the World Bank Guidelines.

[09 July 03] Comment – 121

4.2.3 Environmental Contamination

Pages 4-64 thru 4-65: Amend this subsection to include appropriate references to additional appendixes currently under development that identify the types and locations of all solid an liquid wastes, the scope and concentrations of contaminants in soil, sediment and ground water resources and the proposed clean up and remediation plan for all wastes and

BEST
25 September 2003

Date Completed

contaminants located the terrestrial and marine environments on or in the vicinity of Ocean Cay.

Response

The nature and extent of the contaminated soil, sediment and groundwater and the proposed remediation plan for the terrestrial and marine environments on Ocean Cay are presented in the Remediation Work Plan submitted to the BEST Commission in June 2003. If unanticipated environmental contamination is discovered during project construction, the procedures described in the Contaminated Sediment and Soil Management Plan, Attachment 6 to the EMP, will be implemented for such other sources of contamination.

As discussed in the responses to BEST Comments No. 76 and 77, Ocean LNG has developed a product and waste tracking system to be used to manage products and related wastes generated on Ocean Cay during construction and operations. The tools associated with waste generation and tracking are the attached Revised Table 3-9, Table 3-10 and Table 3-11. These tables are currently populated with estimated amounts of product and waste that are anticipated for construction and operational elements of the island, however they comprise a dynamic tool that island management will be able to use on an ongoing basis to track different materials, or quantities different than those currently estimated. The waste tracking system will become an integral component of the EMP. The Waste Minimization Plan, Attachment 7 to the EMP, describes the procedures that will be utilized to reduce the volume of wastes generated on Ocean Cay.

4.5 Provision of Services (Existing Infrastructure and Utilities)
4.5.2 Sewerage and Solid Waste

[09 July 03] Comment – 122
4.5.2.1 Ocean Cay

Pages 4-84 thru 4-85: Amend this subsection to include appropriate references to decommissioning all existing sanitary waste systems on Ocean Cay and designing, constructing and operating integrated waste collection, containment, treatment and transportation systems that will responsibly manage all wastes generated by the existing aragonite mining operation and the proposed LNG operation on Ocean Cay. Develop and implement an integrated EMP for all AES operations on Ocean Cay.

Response

The existing sanitary waste systems on Ocean Cay are described in Section 4.5.2.1 of the EIA. Prior to initiation of the ground improvements and island reclamation described in Section

BEST
25 September 2003

Date Completed

2.4.1.3 of the EIA these facilities will be decommissioned. The decommissioning will include the pump out of the three USTs and subsequent disposal of the sanitary waste/sewage, removal of the underground tanks and any discharge piping associated with the sanitary waste systems. Any concentrated solids that are present in the system will be pumped out into shipping drums and taken off island for disposal by an approved waste transportation company. We understand that the convention in the Bahamas is for pump out services to transfer collected solids to Bahamian sanitary landfills. This practice will be followed or shipment will be to permitted facilities in the US, if feasible. The tanks, piping and structural components will be removed, steam cleaned and then sectioned for disposal off island with other demolition debris. Rinse waters and materials removed during the steam cleaning operations will be containerized and managed in the same manner as the solid waste that was removed from the system. Prior to backfill of the tank graves the soils will sampled for evidence of contamination. If contamination is present the procedures described in the Contaminated Sediment and Soil Management Plan, Attachment 6 to the EMP, will be implemented.

The proposed sewage treatment system that will be installed on Ocean Cay to handle the sanitary wastes generated by all operations on the island is described in the response to BEST Comment No. 101. All wastes generated on Ocean Cay will be managed through a centralized waste management system as described in the response to BEST Comment No. 76 and above in response to Comment #121.

[09 July 03] **Comment – 123**
4.6.3.1 Heads of Agreement

Page 4-94: Revise the first two lines of this page to read…"design, construct, operate and maintain the LNG Project in a manner consistent with the environmental laws, standards, regulations and guidelines of The Bahamas and The State of Florida."

Response

Section 4.6.3, Applicable Regulations, has been revised as follows:

"Ocean LNG will design, construct, operate and maintain the LNG Project in a manner consistent with the environmental laws, standards, regulations and guidelines of The Bahamas and The State of Florida."

BEST
25 September 2003

Date Completed

[09 July 03] **Comment – 124**
4.6.3.5 World Bank Criteria

Pages 4-96 and 4-97: World Bank guidelines are useful for edification and advisory purposes. Amend this subsection to be consistent with the revision of subsection 4.6.3.1 Heads of Agreement (above).

Response

The first paragraph of Section 4.6.3.5, World Bank Criteria, has been modified as follows:

"The World Bank has developed guidelines for a number of sector-wide environmental analysis topics. These are typically applied in the context of programs involving a number of sub-projects. Sectoral guidelines have been developed for both electric power transmission systems and thermoelectric projects. These guidelines have been utilized for advisory and reference purposes in the initial phases of the design of the Ocean LNG Project. Ocean LNG will design, construct, operate and maintain the LNG Project in a manner consistent with the environmental laws, standards, regulations and guidelines of The Bahamas and The State of Florida."

[24 July 03] **Comment 125**
5.1 Methodology for Impact Assessment

Page 5-1, paragraph 2: Amend assumption #2 to read, "The project will be constructed as described in Section 2 *and amended by the EIA and EMP review and revision process*; and" (italics indicate the proposed amendment). Amend assumption #3 to read, " AES Ocean LNG, Ltd. will implement the mitigation measures described in Section 6 *and amended by the EIA and EMP review and revision process."* (italics indicate the proposed amendment)

Response

Page 5-1 paragraph 2 assumption #2 has been amended as follows:
"The project will be constructed as described in Section2 and amended by the EIA and EMP review and revision process; and"
Page 5-1 paragraph 2 assumption #3 has been amended as follows:
"AES Ocean LNG, Ltd. will implement the mitigation measures described in Section 6 and amended by the EIA and EMP review and revision process."

[24 July 03] **Comment 126**
5.2.1.1 Site Preparation

BEST
25 September 2003

Date Completed

Page 5-3, paragraph 4: Amend this paragraph to include a discussion about integrating into the project all site clean up activities for the terrestrial and marine environments and include appropriate references to the proposed scrap metal and waste oil remediation work plans. Identify or make reference to the positive impacts resulting from implementing the proposed clean up work plans and resulting site remediation.

Response

Ocean Cay will have certain activities associated with island site preparation that will have a significant net positive impact on island appearance and environmental conditions. These activities include collection and responsible environmental management of scrap metal that has accumulated on and around Ocean Cay, and remediation of past diesel fuel leakage from underground storage tanks (USTs). Both of these categories of cleanup developed from past operation of the aragonite mining operation prior to AES purchasing the island for the LNG project.

These activities will be conducted under plans already filed with BEST entitled ***AES Ocean Ltd. Scrap Metal Management Plan Ocean Cay, Bahamas*** *and* ***AES Ocean Ltd. Remediation Work Plan Ocean Cay, Bahamas.*** *The first plan is designed to clean up scrap metal located on land and in the sea near Ocean Cay. The second plan is designed to decommission leaking USTs and associated above ground and underground piping and clean up ground water and soil contaminated by diesel fuel leaking from USTs and piping. The two plans will be implemented in integrated fashion upon approval by the Government of the Bahamas and at the initiation of AES's island preparation. Results of implementation will be responsible collection and disposal or recycling of the scrap metal that is currently scattered on and around the island, and cleanup of what had been an ongoing loss of diesel fuel, affecting soil and groundwater quality. The plans describe the objectives of the cleanups, criteria to be followed, schedules for implementation and disposition of materials and wastes to be managed for each project.*

[24 July 03] **Comment 127**

Page 5-4, paragraph 5: Identify or make reference to the individual (by position) to be responsible for monitoring the chorine concentration of the discharge in the event that sodium hypochlorite addition is required to prevent biofouling of the barge mounted RO desalination unit. Define or make reference to the specific chlorine concentration standard to be met in the discharge and the monitoring instrumentation, methodology and reporting protocol to be utilized. Include that information in the EMP.

Response

The individual responsible for the adherence to the environmental management plan and in turn the monitoring of chlorine concentration from the discharge of the RO unit is the

BEST
25 September 2003

Date Completed

Contractor Safety and Environmental Manager. This individual will have a technician working under his direction who will do the physical testing.

As a means of internal verification, the Environmental Inspectors will be responsible to monitor the chlorine concentration at the point of discharge on a periodic basis.

Ocean LNG proposes to use will use the Florida Department of Environmental Protection (FLDEP) and U.S. Environmental Protection Agency (USEPA) regulatory limits, and World Bank Guidelines as guidance for the monitoring program for the project. The discharge will be monitored in accordance with 40 CFR 122, as well as Rule 62-4.246 and Chapter 62-160 of the Florida Administrative Code (FAC)The target chlorine residual concentration referenced in Section 3.4.1.4 is 0.2 parts per million (ppm). This level is consistent with the residual chlorine levels routinely assigned to discharge permits issued within the United States. It is also consistent with the World Bank guidelines for these discharges. The discharge criteria in the State of Florida is defined as 0.01 ppm at the perimeter of the mixing zone which may be up to 125,600 square meters in Class III marine coastal waters or 502,655 square meters in open waters. The 0.2 ppm discharge proposed will meet the State of Florida requirements through dilution within the mixing zone. The discharge will be monitored for compliance with the 0.2 ppm concentration in the waste stream prior to mixing. This information is being included in the EMP.

[24 July 03] **Comment 128**

Page 5-5, paragraph 1: Identify or make reference to the management of waste wash down waters generated by the concrete batch plant barge. If concrete additives (e.g., accelerants, corrosion inhibitors such as zinc containing compounds and/or acrylic solutions) are to be utilized in the preparation of concrete batches, identify those materials, and amend the materials and waste management tables and MSDS annex of the EMP accordingly.

Response

Waste wash down waters generated by the concrete batch plant barge will be collected onshore in a settling pond with an impermeable liner. The solids will be allowed to settle out, and the water will be allowed to evaporate. After the solids have dried, they will be disposed of in an appropriate manner. Quantities of the additives to be used in the concrete batch plant have not yet been determined. The typical additives that would be used in an environment such as Ocean Cay would be a plasticizer such as Rheobuild 716 and an air-entrainer such as Micro-Air. MSDS's for these materials are included in Attachment #128 to this response and the additives have been listed on Table 3-10.

BEST
25 September 2003

Date Completed

[24 July 03] **Comment 129**

Page 5-7, paragraph 2: Identify the source of the statement, "the typical adopted effluent concentration in the water column is on the order of 30 NTU (Nephelometric Turbidity Unit) above background" that is included in this paragraph.

Response

AES derived the typical adopted effluent standard from the regulation applicable for the proposed construction in Florida. Chapter 27 of the Broward County Natural Resource Protection Code (2001) governs pollution. Article XI, Aquatic and Wetland Resource Protection Chapter 27 regulates water pollution. Under Article XI, discharges from those activities described in Article XI are subject to a water quality standard of 29 NTUs above natural background. It is Ocean Express' interpretation that the 29 NTU turbidity standard set forth in Article XI applies to the construction of the proposed project facilities. These same standards for compliance will be utilized for construction in The Bahamas.

[24 July 03] **Comment 130**

Page 5-7, paragraphs 3 & 4: Amend these paragraphs to reflect the decision to omit the excess material shoal from the EPC plan.

Response

As described in the response to BEST Comment No. 5 and Comment No. 118, final design of the Project has commenced, and Ocean LNG has re-evaluated the need to create the excess material shoal south of the turning basin. Ocean LNG will not create the excess material shoal, as had been previously described in the EIA.

[24 July 03] **Comment 131**

Page 5-8, paragraph 2: In the event that blasting is required, indicate how AES intends to determine if there is "evidence at-risk species, such as marine mammals may be present in the region during blasting. Define the boundaries of the "region" referred to in this section. Identify the regulatory standards and protocol utilized in the State of Florida for blasting in the marine environment. Develop and implement a plan designed to notify local divers about the schedule of all blasting activities. Include that notification plan in the EMP. Blasting within the confines of Freeport Harbor cannot be considered analogous to blasting near Ocean Cay in open waters adjacent to the Gulf Stream. Recognize that, recently, numerous marine mammals died as a result of sonic testing undertaken by the US Navy in Bahamian wasters and the issue of sonic disturbances in the marine environment remains a particularly sensitive issue in The Bahamas.

BEST
25 September 2003

Date Completed

Response

Based on the results of the geotechnical investigation blasting is not expected to be required during dredging operations. In the unlikely event that blasting is required, Ocean LNG has created contingency plans for the protection of Marine mammals as described in Attachment 5 to the EMP, Marine Biological Monitoring Plan. Ocean LNG will notify the BEST Commission, local divers, and recreational navigators of the blasting. The notification will be part of the EMP when complete. Ocean LNG will conform to the standard conditions for marine blasting published by the Florida Fish and Wildlife Conservation Commission, included as Attachment #131 to this response.

Ocean LNG understands that in March 2000, four different species of whales and dolphins were stranded on beaches in the Bahamas after a U.S. Navy battle group used active sonar in the area (Navy sonic testing referenced in BEST comment above). Scientists are concerned that, under the right circumstances, even the transient use of high-intensity active sonar can have a severe impact on populations of marine mammals. This system, called Surveillance Towed Array Sensor System Low Frequency Active Sonar (or "LFA," for short), produces powerful waves of energy that can spread across hundreds of thousands of square miles of ocean. LFA sonar functions like a floodlight, scanning the ocean at vast distances with intense sound. Each loudspeaker in the system's long array is capable of generating up to 215 decibels of sound. This high frequency sound energy is suspected of causing harm to marine mammals and can travel hundreds of miles at peak volumes. The nature of the active sonar requires long term emission of these noise levels which may cause extended exposure to marine organisms.

The marine noise generated by blasting activities will not generate noise levels to the same extent. Blasting noise is generally short term in duration at lower frequency. If blasting is required, borehole will be drilled in the seabed and small charges will be placed within the borehole. Based on the compressive strength of the rock under the seabed the strength of the charge will be determined. The blasting will be for a short term duration to create fissures in the rock to allow for dredging to occur. Based upon accepted practices in Florida a calculation based on the of weight of explosive charges will determine a safe buffer distance to avoid impacts to marine mammals. Ocean LNG will adopt the practices outlined in Attachment #131 to avoid impacts to marine mammals.

[24 July 03] **Comment 132**

Page 5-10, paragraph 3: Consider the utility of beginning Deep Dynamic Compaction (DDC) of reclaimed soils prior to undertaking any blasting on Ocean Cay (should it be required). Continuing DDC could function to cause marine mammals to move away from and avoid the area around Ocean Cay without causing them physical harm. If consensus among consulting marine scientists concludes that this potential protective measure has merit, include it in the EPC plan and the EMP.

BEST
25 September 2003

Date Completed

Response

Please refer to the response to BEST Comment No. 131.

[24 July 03] **Comment 133**
B. Potential Operational Impacts

Page 5-14, paragraph 3: Bilge or wastewater discharges of any type or volume are prohibited in Bahamian harbors. Revise this section to reflect that prohibition. The operation of marine vessels in Bahamian water, and especially with respect to the management of all wastewaters, bilge waters, and/or solid wastes is to be undertaken in strict compliance with IMO-MARPOL standards. Indicate or make specific reference to MARPOL standards for operating marine vessels in harbors in this subsection. Indicate that MARPOL Annex VI, covering the prevention of air pollution from ships, is expected to enter into force during 2004. AES, their subcontractors and/or suppliers must comply with MARPOL standards as amended and adopted by the IMO throughout the life of the project. Include this requirement in the EMP.

Response

As shown in Table 3-10 bilge water and waste water generated by the vessels operating in the Small Vessel Harbor will be pumped from each vessel, containerized, and disposed of at an appropriate location. Paragraph 3 on page 5-14 will be amended as follows:

" To minimize such potential adverse impacts, ballasting, bilge and waste waters will be managed in accordance with IMO-MARPOL standards and applicable Bahamian regulations."

In 1991 the IMO's Marine Environment Protection Committee (MEPC) adopted IMO Assembly Resolution A.719 (17) on Prevention of Air Pollution from Ships. The Resolution called on the MEPC to prepare a new draft Annex to MARPOL 73/78 on prevention of air pollution from ships. The new draft Annex was developed over the next six years and was adopted at a Conference in September 1997. It was agreed to adopt the new Annex (Annex VI) through adding a Protocol to the MARPOL 73/78 Convention, which included the new Annex. This enabled specific entry into force conditions to be set out in the protocol.

When it comes into force, MARPOL Annex VI on Regulations for the Prevention of Air Pollution from Ships will set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances. The annex includes a global cap of 4.5 percent m/m on the sulphur content of fuel oil and calls on IMO to monitor the worldwide average sulphur content of fuel once the Protocol comes into force.

The Protocol of 1997 and MARPOL Annex VI to MARPOL 73/78 will enter into force 12 months after being accepted by 15 states with not less than 50 percent of world merchant

Date Completed

shipping tonnage. As of 30 June 2003, 11 states (including the Bahamas) have accepted MARPOL Annex VI with a 53.84 percent of world merchant shipping tonnage. 12 months after four additional states accept MARPOL Annex VI, it will come into force. This means that the earliest MARPOL Annex VI could come into effect would be 31 July 2004,only if the Annex is accepted by the remaining four states by July 2003.

[24 July 03] **Comment 134**

A. Potential Construction Impacts:

Page 5-15, paragraph 3 & 4: Amend the materials and waste management tables and MSDS annex of the EMP to include all drilling mud and drilling mud additive products utilized in the construction process.

Response

Table 3-10 was developed to track and manage wastes resulting from usage of various materials in the Ocean LNG project. Drilling muds are subject to management under the EMP, and are included on line 94 in Table 3-10.

[24 July 03] **Comment 135**

Page 5-15, paragraph 1: Amend the sentences regarding blasting contained in this paragraph to be consistent with comments provided for Page 5-8, paragraph 2 (above).

Response

Please refer to BEST Comment No. 132.

[24 July 03] **Comment 136**

Page 5-17, paragraph 3: This paragraph indicates that galvanizing of metal structures (sic., metal structural components) is to take place on site during the construction process. Provide details about the galvanizing process. If a "hot dip" galvanizing system is to be staged and operated at Ocean Cay, provide details about the design, construction and operation of the galvanizing equipment and include operating protocol in the EMP. All painting, coating, and corrosion protection products utilized during construction and operations must be identified and included in the materials and waste management tables and MSDS annex of the EMP. Include health and safety aspects associated with all coating operations in the EMP.

Response

AES' intent is not to perform hot dip galvanizing on Ocean Cay. Structural metal components requiring galvanizing will be shipped to Ocean Cay with the galvanizing already applied. Painting of structures will take place on Ocean Cay and MSDS sheets associated with paints

BEST
25 September 2003

Date Completed

or other structural/surface finishes to be applied will be included in the EMP. The typical painting system will incorporate a base coat of an inorganic zinc primer, followed by one coat of either and epoxy paint or polyurethane paint. Estimated quantities of the paint material to be used on Ocean Cay have been included as line items 95, 96 and 97 in Table 3-10.

[24 July 03] Comment 137

LNG Regasification and Sendout

Page 5-18, paragraph 1: Revise this paragraph to reflect the current plan to utilize ambient air rather than seawater as the medium to be used for heating LNG in the regasification system.
Quantify the positive aspects this new design configuration affords in reducing wastes streams and minimizing potential negative impacts to the environment. This affords AES an opportunity to highlight the benefits afforded by design revisions directed at minimizing waste streams
undertaken as a result of the EIA review process.

Response

This comment is related to Comment #86 and a consolidated response to this item is included in the response to#86.

[27 August 03] Comment 138
5.2.2.4 LPG Removal

Page 5-18, paragraph 2: Revise this paragraph to reflect the current plan to utilize waste heat recovered from the turbine generator exhaust to provide heat necessary for the LPG removal system. Quantify the positive aspects this new design configuration affords in reducing wastes streams and minimizing potential negative impacts to the environment. This affords AES an opportunity to highlight the benefits afforded by design revisions directed at minimizing waste streams undertaken as a result of the EIA review process.

Response

The modified heating / cooling medium system consists of a 40wt% Ethylene Glycol / 60wt% Water mixture. The system is shown on Figure EMP-2 "Overall Effluent Flow for Ocean LNG, Ocean Cay, The Bahamas" and consists of a closed loop with five main users:

- *High Pressure Vaporizers*
- *BOG Compressor Aftercooler*
- *BOG Compressor Oil Cooler*

BEST
25 September 2003

Date Completed

- *Fuel Gas Heater*
- *LPG Start-up Heater*

This modified system eliminates the seawater to glycol heat exchange loop. Because the glycol to seawater heat exchange has been eliminated, associated maintenance and chemical additives required for corrosion prevention, etc. are also eliminated – these changes have been reflected in the updated Table 3-10 and result in reductions of 92% to 99%, depending on water effluent stream.

A summary of the system main users follows and is shown in Figure EMP-2:

The ethylene glycol / water loop is configured so that 6 x 20% circulating pumps (5 operating + 1 spare) take feed from the expansion vessel. The ethylene glycol / water does not flow through the vessel, rather the vessel sits on the suction line to the pumps to provide sufficient NPSH to the pumps. The expansion vessel is vented to atmosphere. The discharge from the pumps, at 35°F, is sent to banks of Air Heaters, where it is heated to 55°F. The Air Heaters are designed for a minimum ambient temperature of 65°F. On days when the ambient temperature is lower than this, supplemental heat will be added to the system from hot water provided by the waste heat recovery units on the gas turbines. A portion of the ethylene glycol / water flow will be diverted to the supplemental heater and will bypass the Air Heater. The reduced flowrate through the Air Heater should ensure that the available surface area is sufficient to provide enough heat transfer to meet the discharge temperature required. In extreme cases, estimated to be less than 500 hours per year, additional heating may be required. This will be supplied by fired heaters that take a proportion of the ethylene glycol / water, heats it up to 200°F and blends it with the remaining cold ethylene glycol / water. This ensures that the feed to the users is always 55°F.

For the High Pressure Vaporizers, the ethylene glycol / water acts as a heating medium, supplying sufficient energy to vaporize 892 MMSCFD of LNG with an ethylene glycol / water differential temperature of 20°F (55°F supply and 35°F return). The total ethylene glycol / water flowrate to the vaporizers is approximately 74,500,000 gpd (51,700 gpm), and this supplies a total heating duty of 131,200 kW (447.7 MMBtu/hr).

For the Fuel Gas Heater, the ethylene glycol / water acts as a heating medium, supplying sufficient energy to vaporize provide 36°C of superheat to the fuel gas, with an ethylene glycol / water differential temperature of 20°F (55°F supply and 35°F return). The total ethylene glycol / water flowrate to the Fuel Gas Heater is approximately 250,000 gpd (174 gpm), and this supplies a total heating duty of 440 kW (1.5 MMBtu/hr).

For the BOG Compressor Aftercooler and BOG Compressor Oil Cooler, the ethylene glycol / water acts as a cooling medium, removing sufficient heat so that the gas leaving the compressor during unloading (BOG Compressor design case) does not exceed 180°F and then to cool the gas to 100°F in the aftercooler. To achieve this, a differential temperature of

BEST
25 September 2003

Date Completed

10°F is used (55°F supply and 65°F return). The total ethylene glycol / water flowrate to the coolers is approximately 4,700,000 gpd (3,300 gpm), and this supplies a total cooling duty of 4,200 kW (14.3 MMBtu/hr).

For the LPG Start-up Heater, the ethylene glycol / water acts as a heating medium, supplying the heat required. To achieve this, a differential temperature of 20°F is used (55°F supply and 35°F return). The total ethylene glycol / water flowrate to the heater is approximately 3,600,000 gpd (2,500 gpm), and this supplies a total heating duty of 6,330 kW (21.6 MMBtu/hr). This requirement is needed at start-up and as a trim heater for control purposes. In order that the heater is available at short notice, the design flowrate will circulate at all times with no temperature drop.

The return from the coolers and heaters passes directly to the suction of the circulation pumps to complete the loop.

Design contingency is built into the duty of the High Pressure Vaporizers and the BOG Compressor Coolers, hence no additional contingency is added to the pumps or Air Heaters.

[24 July 03] **Comment 139**
5.2.3.1 Facility Process Water System/Desalination

Page 5-18, paragraph 3: Revise this paragraph to reflect the current plan to utilize ambient air rather than seawater as the medium to be used for heating LNG in the regasification system.
Quantify the positive aspects this new design configuration affords in reducing demand on the RO system (as originally designed), reducing wastes and minimizing potential negative impacts to the environment. This affords AES an opportunity to highlight the benefits afforded by design revisions directed at minimizing waste streams undertaken as a result of the EIA review process.

AES response to BEST on this comment is pending continued development of design for the systems associated with the comment. Additional response and related materials will be made with future submittals as this design develops and consolidated response to this comment will be included with the response to related Comment #35.

[24 July 03] **Comment 140**
A. Potential Construction Impacts
B. Potential Operational Impacts

Pages 5-19 thru 5-22: Revise these pages to reflect the current plan to utilize ambient air rather than seawater as the medium to be used for heating LNG in the regasification system.

BEST
25 September 2003

Date Completed

Quantify the positive aspects this new design configuration affords in reducing wastes streams and minimizing potential negative impacts to the environment.

Response

AES response to BEST on this comment is pending continued development of design for the systems associated with the comment. Additional response and related materials will be made with future submittals as this design develops and consolidated response to this comment will be included with the response to related Comment #86.

[24 July 03] Comment 141
5.2.3.2 Electric Generation

Page 5-22, paragraph 3: This subsection indicates, "The potential impacts associated with the process water from the electric generation facilities are discussed in Section 5.2.3.1." No such reference is obvious. Previous meetings among members of the work group had indicated that the electric generation system would utilize a closed loop cooling system and not produce process waters for discharge. Please investigate and advise.

Response

We understand BEST's desire for clarity in this comment. The Auxiliary Cooling System will utilize the closed loop ethylene glycol cooling water system as described in Sections 3.4.1.2 and 3.4.1.3 of the EIA. Information on the water glycol loop is also provided above, in the response to Comment No. 86.

[27 August 03] Comment 142
5.2.3.3 Site Stormwater
B. Potential Operational Impacts

Page 5-23, paragraph 3: Including information about the airstrip within Section 5.2.3.3 Site Stormwater is awkward. The EIA does not address construction and operation of the airstrip and associated facilities directly. The airstrip is a transportation facility no less significant to the other proposed transportation facilities such as the marine tanker loading and offloading berths and the small vessel harbor. A section on the subject of the airstrip and associated facilities should appear somewhere in the body of the EIA and Table of Contents. Consider creating a separate "Airstrip" subsection related to impacts associated with the construction and operation of the airstrip. The airstrip must be managed operationally in an integrated manner consistent with and in parallel to the EMP protocol established for the small vessel harbor at Ocean Cay. Include waste management practices for aircraft and airstrip maintenance and operations in a separate section in the EMP that identifies that link in operating protocol

BEST
25 September 2003

Date Completed

Response

A new Section 5.2.1.6 summarizing the airstrip, and construction and operational impacts will be added to the EIA as follows:

5.2.1.6 Airstrip

Improvements to the airstrip runway on Ocean Cay will be completed by increasing its length and landing capacity. A heliport will be added to the island to support helicopter transfers. The proposed airstrip will be designed based on C-130 aircraft loading. The airstrip will be built on reclaimed land that has been densified by DDC, located on the extreme north end of Ocean Cay, and oriented in east-west direction as is the current airstrip. The pavement section will consist of asphalt over a compacted granular sub-base. Details of the pavement section will be developed as project design proceeds.

A. Potential Construction Impacts
Impacts related to construction of the airstrip will be short term and include construction techniques and related impacts described in Section 5.2.1.3(a) related to the island filling, deep-dynamic compaction and paving impacts. Because air temperatures below 40°F are not anticipated, additives for acceleration of curing should not be required. No island onshore habitats are present that may be affected by this construction. Siltation and erosion control measures employed for island expansion will also be in place for the airstrip construction. Once construction of the airstrip is completed there are no anticipated long-term impacts as a result of construction.

B. Potential Operational Impacts
As also indicated in Section 5.2.3.3.B, contract air services will be utilized so that aircraft presence on-island will be limited to scheduled landing and takeoffs, with no planned overnight/extended aircraft residence. Maintenance and refueling will not occur at the airstrip located on the northern portion of Ocean Cay. Use of oil and chemicals is not anticipated in the vicinity of the airstrip because no maintenance will be conducted. In the event of a spill or release from an aircraft while on Ocean Cay, the Integrated Spill Control Response, Pollution Prevention, and Stormwater Management Plan described further in Section 10, Environmental Management Plan, describes oil and chemical management practices at the project facilities, and response that will be taken for spills. Since oil and chemicals will not be used in the vicinity of the airstrip, environmental impacts resulting from sheet flow drainage of stormwater from this area is not anticipated.

The pavement of the airstrip will be conventional asphalt construction. Maintenance activities are expected to be limited due to the relatively low amount of traffic expected. Chemicals for tire-mark removal should not be required, again due to low intensity usage. The climate of Ocean Cay is sufficiently stable and warm that sealants to decrease infiltration and freeze-

BEST
25 September 2003

Date Completed

thaw damage are not anticipated. Some periodic application of sealant may be required. FAA specifications for sealants specify primarily fuel-oil resistant, hot-applied sealants. Because they are hot-applied, once cured, these materials are relatively non-environmentally mobile. If such materials are determined to be necessary for airstrip maintenance, the specific product(s) will be listed in Table 3-10, and MSDS sheets specific to the material added to the EMP. A package including a description of the airstrip expansion, the information above and a figure showing the airstrip (current and proposed expanded replacement strip) has been included with this response as Attachment #142. BEST has reviewed the proposal and approved closing the comment, and the airstrip package has been forwarded to the Ministry of Transportation to be acted upon. AES Ocean LNG will continue to follow up with BEST on status of the review and approval by the GOB.

[24 July 03] **Comment 143**

5.2.4.1 610 mm (24 in) Pipeline to the EEZ Boundary

A. Potential Construction Impacts

Page 5-23, paragraph 4: Define the total distance and location of articulated concrete mat cover. Reference a figure that indicates the pipe lay / trenching method and burial / protection methodology to be used from Ocean Cay to the EEZ.

Response

The offshore pipeline is routed approximately 3.1 miles over the Bahamas shelf from the Ocean Cay landfall to the Bahamas shelf break. Over this 3.1 miles the pipeline will be trenched to a 3-foot depth of cover as per the requirements of Code of Federal Regulations, "Subpart J - Pipelines and Pipeline Right of Way", 30 CFR Part 250 (Ref. 15). Even though this segment of the pipeline is not within CFR's jurisdiction, it will be designed as if it were. Drawing 11142903-401-DRW-01-001; "Ocean Express Pipeline Project Engineering Alignment Sheet 1 of 15, Proposed 24" Gas Pipeline Bahamas to Florida (FEED Study)", shows a plan view as well as a profile of the section in question.

As currently planned, the pipeline will not be covered with articulated concrete mattresses. The section from nearshore to 200 ft water depth will be trenched, using post-lay trenching methods. The pipeline will be trenched to a nominal three (3) foot depth of cover by dredging methods in water depths < 200 feet on the Bahamas Shelf. Depth of cover is defined as the top of the pipeline coating to the original undisturbed seabed. This is due to the ease of backfilling the pipeline directly with the excavated spoils. The pipeline FEED design at the edge of the Bahamas Shelf and backfill of the pipeline trench are discussed in "Offshore Special Installation Requirements", 11142903-413-TRP-001 (Ref.9). Under Florida regulations, the pipeline installation describe requires either 3-ft of cover or articulated mat cover - the installation planned and summarized here meets the Florida requirements.

BEST
25 September 2003

Date Completed

[24 July 03] **Comment 144**
Page 5-24, paragraph 1: Explain why two jetting systems are proposed for trenching purposes. Provide justification for proposing trenching by the potentially more disruptive method (the Venturi Method). This paragraph indicates, "Burial of the pipeline will be achieved by natural backfill." Define what is meant by "natural backfill". If "natural backfill" means that the trench and pipeline will be left open and allowed to fill over time by colluvial and ocean current deposition of marine sediments then state so much. Indicate the estimated time required for the trenches "backfill naturally". Provide references indicating that this submarine backfilling methodology is an approved practice in coastal water managed by the State of Florida or elsewhere.

Response

It should be noted while jetting is an acceptable method of pipeline burial, other trenching methods including combinations may also be acceptable. Burial of the pipeline can be done using various methods, jetting is only one of them. In reality, it would be more likely that the pipeline be trenched and buried using a pipeline plow or conventional clam shell or bucket dredging. The final construction method will be that proposed by the chosen EPC contractor and approved by AES. It is likely that each EPC bidder will propose different methods to achieve the project requirement.

It is envisaged that the dredged material will be used to backfill the trench, supplemented where required with additional graded material (rockdump) to calculated thicknesses to avoid sediment (backfill) erosion as described in "Offshore Special Installation Requirements", 11142903-413-TRP-001 included as Attachment #143 to this response. As indicated above for Comment #143, this installation method is consistent with State of Florida requirements.

[10 Sept 03] **Comment 145**
Page 5-26, paragraph 2: Indicate when the deepwater marine survey results will be submitted to the BEST Commission for review. Review of the EIA cannot be completed until after that information is provided.

Response

The Deep Water Survey report was completed and provided to BEST with the 3 September submittal as Attachment #145. BEST has also been provided videotapes of several segments of the biologic survey of both the 24-in.gas pipeline and 8-in. water pipeline routes to review along with the Deep Water Survey report. This comment has been closed with the acknowledgement that BEST will complete review of the videotapes, and if additional information is needed, it will be provided via the continuing EMP refinement and implementation process.

Date Completed

[24 July 03] **Comment 146**

Page 5-26, paragraph 3: This paragraph indicates that the proposed testing fluid to be used for hydrostatic testing of the pipeline to Florida is fresh water from the desalination plant. This methodology may be inconsistent with the testing fluid (including additives) previously discussed among members of the work group for hydrostatic testing of the pipeline to Bimini. Please explain the apparent inconsistency. At issue are the potential use of additives to the testing fluid, the proposed treatment "as necessary" (no standard cited), the proposed disposal methodology for waste hydrostatic testing fluids and the qualitative statement that impacts to nearby marine communities "are likely to be minimal". Indicate if the testing fluids to be discharged into Bahamian waters include those fluids required for hydrostatic testing of the pipeline on the Florida side of the EEZ.

Response

The procedures that will be utilized for the hydrostatic testing and pre-commissioning of the pipeline are described in Attachment #64 to the Response, submitted to the BEST Commission on 30 June 2003 for review. The plan includes a description of the waters to be used for the testing process, the additives that may be added if necessary and the disposal location for the test waters including the potential impacts associated with the discharge. This procedure to be used in testing of the pipeline on the Bahamas side of the project is the same as will be used on the Florida side of the project for pipeline hydrostatic testing, and has been developed to conform to State of Florida regulatory criteria.

[24 July 03] **Comment 147**

5.2.4.2 60 mm (2 in) & 219 mm (8 in) Pipelines to Bimini

A. Potential Construction Impacts

Page 5-27, paragraph 2: Explain why two jetting systems are proposed for trenching purposes. Provide justification for proposing trenching via the potentially more disruptive method (the Venturi Method). Indicate if both pipelines are to be constructed in the same trench or separate trenches are required.

Response

AES has conferred with the Government of the Bahamas and, through economic analysis, the parties have concluded the construction of the gas pipeline to North Bimini is not economically viable. The 8-in (20.3CM) potable water pipeline will be constructed. Therefore only the 8-in (20.3 cm) potable water pipeline will be installed in the trench. Both methods fluidizing by jetting and the Venturi Method are suitable methods based on the sand seabed conditions to bury the 8-inch water line. The reason for justifying both methods would be to not limit the equipment available to the Contractor's.

BEST
25 September 2003

Date Completed

There are methods that can be implemented to reduce the turbidity effects from the Venturi Method. If turbidity was not an issue the discharge is typically vertical in the water column. However, rather than having the discharge in the vertical several methods have been and will be used to reduce turbidity and are described below:

- *Angle the discharge back into the trench rather than vertically in the water column;*
- *Use a turbidity screen, which encompasses the discharge of the machine (See Attached Figures);*
- *Run a hose from the discharge to a designed box made out of turbidity screen material, which is towed behind the jetting machine and is buoyed at a designed water depth.*

Best management practices will be utilized for silt control during pipeline installation, utilizing the methods above as appropriate to suit conditions at the installation location.

[24 July 03] **Comment 148**

Page 5-28, paragraph 4: Explain how the pipelines are to be buried. See comments provided for Page 5-24, paragraph 1 (above). Correct all references to "pipeline" (singular) contained in this paragraph to "pipelines" (plural).

Response

From preliminary design work the 8-inch water line will be trenched to 1.0m top of pipe in the areas depicted on Table 1.0 below. The reason for trenching the pipeline in these regions is for pipeline stability during storm conditions, because the pipeline cannot be made stable with concrete weight coating. The areas where the pipeline is on a hard "bed rock" surface will require pipeline anchors for pipeline stability during storm conditions. Typical trenching machines with turbidity screens are shown in Attachment #148.

The proposed trenching methods will not backfill the trench to natural seabed level. Typically with these trenching methods the pipeline is at the bottom of the trench and partially backfilled, because of the trenching method of fluidizing the soil. Predicting the duration it will take to naturally backfill would be difficult and is dependent on seabed movement, seabed grain size, currents and storms. However, AES has observed a 24" natural gas line installed in the Long Island Sound, using similar methods, has almost completely been covered within a six month period.

BEST
25 September 2003

Date Completed

[24 July 03] **Comment 149**

Page 5-29, paragraphs 2 & 3: Define the total distance and location of articulated concrete mat cover. Reference a figure that indicates the pipe lay / trenching method and burial / protection methodology to be used from Ocean Cay to Bimini.

Response

Additional engineering performed after issuing the EIA has modified the design philosophy of using articulated mattresses along the bedrock areas. Instead of articulated mattresses, pipeline anchors would be used to satisfy pipeline stability requirements. The use of pipeline anchors will minimize seabed disturbance. The spacing of the anchors would be determined during further design work, minimum spacing is expected to be 300m between anchors. Some articulated mattresses may be used for the cable crossing and at the shore crossing at Bimini. Typical pipeline anchors are depicted in Attachment #149.

Table 1.0 depicts seabed conditions, proposed installation method and trenching/burial/protection methodology along the route from Ocean Cay to Bimini.

Table 1.0

KP	***Seabed Conditions***	***Pipe Lay***	***Trenching/Burial/Protection Method***
0.00-0.486(1)	*Bedrock at Surface*	*Shore Pull with Barge set-up 350-400m from shore*	*Pipeline trenched to 1m top of pipe through the shore crossing region 100-200m.*
0.486-6.357	*Sand layer thickness for burial 1.2-4m*	*S-Lay Installation Method*	*Pipeline trenched to 1m top of pipe*
6.357-9.019	*Bedrock at Surface*	*S-Lay Installation Method*	*Pipeline Anchors(3)*
9.019-28.0	*Sand layer thickness for burial 1.2-6.1m*	*S-Lay Installation Method*	*Pipeline trenched to 1m top of pipe*
28.0-32.046	*Bedrock at Surface*	*S-Lay Installation Method*	*Pipeline Anchors(3)*
32.046-37.108	*Sand layer thickness for burial 1.2-7.5m*	*S-Lay Installation Method*	*Pipeline trenched to 1m top of pipe*
37.108-37.547	*Bedrock at Surface*	*S-Lay Installation Method*	*Pipeline Anchors(3)*
37.547-37.736(2)	*Sand layer thickness for burial 1.2-5m*	*Shore Pull with Barge set-up 350-400m from shore*	*Pipeline trenched to 1-1.5m top of pipe*

(1) *Ocean Cay*

(2) *Bimini*

(3) *A typical pipeline anchor is shown on Drawing No. MCD-398*

BEST
25 September 2003

Date Completed

[24 July 03] **Comment 150**

Page 5-29, paragraph 5: This paragraph indicates that the proposed testing fluid to be used for hydrostatic testing of the pipeline to Florida is fresh water from the desalination plant. This methodology may be inconsistent with the testing fluid (including additives) previously discussed among members of the work group for hydrostatic testing of the pipeline to Bimini. Please explain the apparent inconsistency. At issue are the potential use of additives to the testing fluid, the proposed treatment "as required" (no standard cited), the proposed disposal methodology for waste hydrostatic testing fluids, and the qualitative statement that impacts to nearby marine communities "are likely to be minimal".

Response

We understand BEST's desire for clarity with respect to this test procedure. This comment and its response are addressed in the response to Comment #146 above.

[24 July 03] **Comment 151**

B. Potential Operational Impacts

Page 5-30, paragraph 2: This paragraph indicates juvenile Queen Conch migrate from the Bahamas Bank to the Bahamas Platform. Accordingly, the construction of the pipelines to Bimini should be scheduled to take advantage of that migration in order to minimize potential impacts to the Queen Conch population. Amend Section A. Potential Construction Impacts (pages 5-27 thru 5-30) to reflect Queen Conch migratory information and include appropriate references to a pipeline construction schedule designed to minimize potential impacts to the Queen Conch population.

Response

The aggregation and migration of juvenile queen conch has been studied in the Exuma Sound, Bahamas (Stoner et al., 1996) and elsewhere in the Caribbean, Florida, and South America. Investigations near Lee Stocking Island, which lies between the Bahamas Bank and Exuma Sound, have been used to design an evaluation of queen conch ecology in the Ocean Cay to Bimini region. There are large-scale differences between these two areas however, that create fundamental differences in the local population dynamics of this important commercial species. Significantly, the seagrass meadows, which are known conch habitat, cover a much smaller area of the Bank in the Bimini area than they do in the Lee Stocking Island area. With a smaller amount of essential fish habitat, queen conch populations near Bimini-Ocean Cay, are lower than those found near Lee Stocking Island, although still present. Investigations are currently underway by The Academy of Natural Sciences in the Bimini Ocean Cay area to identify important habitat for queen conchs and to provide information needed for the protection of this species. A report of findings will be available during the

BEST
25 September 2003

Date Completed

Fall, 2003 following the last field-sampling event, which is scheduled for August 2003.

The aggregation and migration or queen conch occurs during a large part of the year among different age classes. Stoner et al. (1988) investigated an aggregation of queen conchs in the 1-year age class that occurred between the months of April-July. This group moved at a speed of 2-4m/day. The scientists concluded that this aggregation represented young juveniles that had just emerged from their settlement stage and amassed to enhance dispersal over appropriate seagrass benthic-habitats, and to minimize predation. Later Stoner (1993) discovered and evaluated a series of aggregations of queen conch in the 2-year age class that persisted from the months of October to March. As juvenile queen conchs approach adult, reproductive stages in the 3.5-4 year age class they migrate to deeper water habitats (Stoner, 1993). Small groups of spawning adults though have also been observed in more shallow water (Wickland et al., 1988). Therefore protection of aggregations in some regions of the Bank could be needed almost year around.

We have completed a number of investigations along the proposed pipeline corridor from Ocean Cay to Bimini between October 2001 and the present. These investigations included video transects, quantitative benthic-habitat analyses using Scuba, observations during sled towing, plankton sampling and analysis, and transects using both Scuba and surface-deployed seabottom viewers. Throughout this work the absence of large populations of queen conch was notable, even in seagrass meadows that have the characteristics of viable juvenile habitat. Queen conch occurrences were observed as scattered low-density communities in most of the seagrass meadows along the proposed pipeline corridor. Nonetheless, no aggregations of conchs have been observed in shallow waters along the Bimini-Ocean Cay corridor although a discovery of abundant conchs in a region south of Ocean Cay near Beach Cay was made in May/June 2003.

Based on the best information currently available, mitigation of potential harm to queen conchs living in the vicinity of the proposed pipeline is planned to be focused on organisms that lie directly in the path of the pipeline and within an appropriate impact zone adjacent to the pipeline trench. The following three-step procedure to protect these organisms is planned for inclusion in the EMP (with appropriate refinement as remaining studies are conducted):

a). Queen conchs that are located in the construction pathway should be identified by divers and physically moved to a location beyond the area of impact. These animals typically move 2-4 m/day while migrating. The relocation should be distant enough to prevent their movement back into the work area while the potential construction impacts remain.

b). In some instances, relocating queen conchs within the same seagrass bed where they are found may not be possible because of the local presence of sand patches or rubble bottom conditions. Here, quantitative data on the seagrass and macroalgae characteristics should be measured exactly where

BEST
25 September 2003

Date Completed

these conchs are found and a comparable seagrass meadow in the area should be identified for their relocation. These conchs should be tagged to monitor their survival from the relocation.

c) A representative number of queen conchs located just beyond the impact area should be tagged and periodically observed to determine if the pipeline trench presents a longer-term barrier to their migration. This will insure that the permanent pipeline corridor, disturbed by trenching, will not impact later migration attempts by the conchs, while seagrass and macroalgae is returning to the area.

[24 July 03] Comment 152

5.3.1 Hurricanes and Flooding

Pages 5-32 thru 5-33: Indicate the proposed elevations of all fuel oil storage tanks, waste oil tanks, and hazardous materials and waste storage facilities. Indicate the anticipated incidence of storm surges flooding these essential service areas. Develop or make reference to a storm preparation plan designed to prepare and protect all facilities from storm events and the potential for failures and related safety and environmental impacts. Include the storm preparation plan in the EMP.

Response

The elevation for all essential facilities is at +6m. This elevation was chosen to stay above the maximum expected storm surge level. Storm preparation plans will be prepared for both the construction phase and the plant operational phase and will be components of the EMP.

[27 August 03] Comment 153

5.5 Air Quality Impacts

Page 5-39 thru 5-57: The methodologies utilized and analyses undertaken for Section 5.5 are impressive in extent and level of detail and appear to be designed to meet US-EPA standards. However, these methodologies and analyses do not adequately address Bahamian air emission and impact concerns. The methodologies, analyses and resulting conclusions included in Section 5.5 have limited utility in characterizing actual air emissions and impacts from operations at Ocean Cay. Specifically, the analyses undertaken for Section 5.5 exclude CO2 emissions from operational emission sources and exclude emissions from operational mobile sources generated by regularly scheduled marine tankers and support vessels entering and exiting the approach channel, turning and mooring, and idling while off loading LNG and loading LPG.

BEST
25 September 2003

Date Completed

Recognize that discharges and wastes generated by ships while operating within or near ports is becoming an increasingly sensitive and important issue in the Bahamas, the USA and throughout the world. Include air emissions from regularly scheduled mobile emission sources in the air quality modeling analyses contained in this section. Include or make reference to a single air emissions table that identifies the source, type and emission rate (mass flows and methods of estimation) of all air emissions both stationary and mobile that are generated during normal operations. Amend the waste materials spreadsheet for the EMP to include that table. Include or make reference to an accompanying pie chart that identifies total annual tons of each emission attributable to all stationary emission sources (gas turbines, LPG removal hot oil system heater, etc.) as well as total annual tons of emissions attributable to scheduled mobile emission sources (LNG tankers, LPG tankers, tugs, mooring vessel, etc.). Amend the EMP to include that pie chart.

Recognize that The Bahamas is a signatory party to the Kyoto Protocol. Include operational CO2 emissions from both stationary and mobile emission sources in the emissions table, EMP waste spreadsheets and pie chart referenced above so that CO2 emissions resulting from operations can be quantified throughout the life of the project. Quantify the positive aspects that new design configurations afford in reducing CO2 emissions. This affords AES an opportunity to highlight the benefits afforded by design revisions directed at minimizing waste streams undertaken as a result of the EIA review process.

Recognize that The Bahamas is a participating member of the IMO and requires all marine operations to comply with IMO-MARPOL standards and guidelines. Indicate in this section that MARPOL Annex VI, covering the prevention of air pollution from ships, is scheduled to enter into force during 2004. AES, their subcontractors and/or suppliers must comply with MARPOL standards as amended and adopted by the IMO throughout the life of the project. Include this requirement in the EMP.

Response

Additional air emission evaluation and modeling has been performed as requested and the results of these efforts appear in the response to Comment #82 and below. Evaluation of CO_2 emissions was also performed as requested. Results for maximum potential emissions are summarized assuming a "worst case" scenario. These are not actual expected emissions because measures will be used to mitigate such impacts (such as dual fuel tankers, operation at less than maximum capacity at all times, etc.). Evaluation continues to reflect minor changes that are expected as a result of the switch from water warming to air warming of LNG for re-gasification, however results of modeling to date are provided to show that the project, as currently configured meets established EPA criteria.

Results of the evaluation including CO_2 emission estimates are reflected in the following tables, attached:

- *Table 3-1 (revised) – Summary of Gas Turbine Emissions and Stack Parameters*

- *Table 3-2 (revised) - Summary of Estimated Expected and Maximum Gas Turbine Emissions*
- *Table 3-4 (revised) - Emission Calculations, Emergency Generator and Firepump Engines*
- *Table 5-6 (revised) - LPG Reboiler - Modeling Input Data and Emission Calculations*
- *Table 1 – LNG Tanker Ship (Unloading at Port) Modeling Input Data and Emission Calculations*
- *Table 2 - LPG Tanker Ship (Unloading at Port) Modeling Input Data and Emission Calculations*

Estimated potential maximum emissions are as follows (in ton/yr):

Maximum Potential[1] Emissions - AES Ocean LNG, Ltd.
(modified to reflect elimination of LPG Reboiler)

Pollutant	Gas Turbines	Emergency Diesel Engines	LNG and LPG Tanker Ships	Total
NOx	264.8	6.2	29.2	300.2
CO	404.2	1.3	3.1	408.6
VOC	30.3	0.5	0.5	31.3
PM-10	93.6	0.4	10.6	104.6
So_2	31	0.4	146.3	177.7
Pb	1.2E-02	1.3E-05	9.4E-04	1.3E-02
CO2	354,140	230	15,528	369,898
Total	354,964	238	15,717	370,919

AES recognizes that The Bahamas is a signatory to the Kyoto Protocol and requested estimation of potential CO_2 emissions (as above). Pie charts indicating relative contributions of each emission parameter by source, according to the maximum estimated quantities above, are also attached with the tables listed, and the charts have been appended to Table 3-10. During the operation life of the facility, annual re-evaluation of actual emissions, based on operational experience and material inputs, will be performed to evaluate and track benefits from operational optimization.

Information on the implementation of MARPOL Annex VI requirements in July 2004 is summarized in the response to Comment #133. These requirements will apply to shippers supplying island operations.

[27 August 03] Comment 154

5.7 Social, Economic and Institutional Resource Impacts

Page 5-62 thru 5-63: Investigate and quantify the impacts AES employees and subcontractors will have on Bimini infrastructure and social services including but not limited to police and

BEST
25 September 2003

Date Completed

emergency services, health clinics, harbor facilities, as well as solid and liquid waste capacity Specifically, quantify potential new personnel and equipment requirements as well as the estimated increase in solid and liquid wastes (in kilograms/year) that will be generated by increasing activities and increases in the population on the island of Bimini. Amend this section to include the results of those investigations. Include appropriate improvements to basic infrastructure on Bimini in the EMP.

Response

Information on existing service and infrastructure characteristics was requested by letter from North Bimini in the past, for preparation of the EIA. No information was received, so a new effort to gather baseline information and evaluate potential impacts has been initiated with a new request letter to BEST and the Bimini Island Administrator, letter dated 18 July 2003. As a result discussions with various ministries, departments and agencies are being coordinated through BEST and a consolidated response will be provided through the response to Comment #166.

[24 July 03] **Comment 155**
5.7.1.1 Jobs Creation

Page 5-63, paragraph 3: Define the estimated total amount of training funds to be made available as well as the destination of the training donations referenced in this paragraph.

Response

AES will spend between $200,000 and $400,000 on jobs training during construction for Bahamian nationals. In fact, AES has committed in the draft Heads of Agreement to spend a minimum of $200,000 for such training purposes and anticipates that it will have no more than 5 non-Bahamian nationals on its operating staff within 3 years of its commercial operation date. The training funds will be spent at various locations depending on the type of training required. In addition to the training funds spent during construction, AES anticipates spending money each operating year on an as-needed basis for employee training. Currently, AES anticipates spending approximately $85,000 per year (in excess of $2 million over a 25 year period) during the operating phase for ongoing training activities. Again, the destination of the training funds will depend on the type of training required.

In addition to the training funds described above, AES has agreed to contribute 50 cents for every construction hour worked by a non-Bahamian national. The objective is help improve job training programs for Bahamians and to back up our plan to hire Bahamian nationals to the maximum extent possible with a "penalty" for not doing so. AES anticipates that contributions related to this commitment will total approximately $400,000. In the draft Heads of Agreement, AES has agreed to contribute these funds to an entity designated by the Bahamas Government to fund industrial training programs for Bahamian nationals.

BEST
25 September 2003

Date Completed

It is also important to mention that in the draft Heads of Agreement, AES has agreed to provide $150,000 to the Bahamas Marine Research Institute within 12 months after the commencement of construction of the LNG Storage Facility.

[27 August 03] Comment 156

5.7.1.4 Service and Infrastructure Requirements

Pages 5-65 thru 5-66: See comments provided for Section 5.7 (above). Amend this section and the EMP accordingly.

Response

Information on existing service and infrastructure characteristics was requested by letter from North Bimini in the past, for preparation of the EIA. No information was received, so a new effort to gather baseline information and evaluate potential impacts has been initiated with a new request letter to BEST. From initial discussions with BEST, we understand the primary issue of concern is the ability of the existing solid waste disposal facility on South Bimini to be able to handle increased solid (household) waste generation that would result from workers to be housed on South Bimini. AES will consider this in its final response to BEST on this comment. As a result discussions with various ministries, departments and agencies are being coordinated through BEST and a consolidated response will be provided through the response to Comment #166.

[24 July 03] Comment 157

5.7.2.1 Government Revenues, Diversification, Balance of Trade

Page 5-67, paragraphs 3 thru 5: Delete specific references to annual turnover and revenue generating figures provided in this section because these figures have not been finalized. Amend this section to make general reference to projected annual turnover and revenue generation as agreed upon and included in the Heads of Agreement.

Response

Paragraph 1 of Section 5.7.2.1 of the EIA on page 5-67 has been amended as follows:

"Under the draft Heads of Agreement, AES has agreed to make payments to the Government of the Bahamas based on the volume of LNG received and annual payments related to the seabed lease as payments in lieu of business license fees. AES believes that the expected

BEST
25 September 2003

Date Completed

figures are substantial and consistent with the targets set by the Government of the Bahamas and will help the Government achieve its goal of business diversification. AES will also pay additional fees for work permits for permanent non-Bahamaian employees"

[27 August 03] Comment 158

5.8.1 Plume Visibility Impact Analysis

Pages 5-70 thru 5-66: See comments provided for Section 5.5 (above). Amend this section and accordingly.

Response

A supplemental visibility impact analysis was conducted to evaluate the visibility of exhaust plumes from LNG and LPG tanker ships while stationary at Ocean Cay during LPG loading and LNG unloading operations. The analysis was performed using the same procedures used to conduct the plume visibility impact analysis presented in Section 5.8.1 of the EIA for the combined exhaust plumes from the three (3) gas turbine stacks. That is, the US EPA VISCREEN model was run to perform a Level 2 screening analysis. A Level 2 analysis requires the input of emission rates for particulates, NO_x, NO_2, soot and particulate sulfate (SO_4) emissions, worst-case meteorological dispersion conditions representative of the region and other default parameters. The VISCREEN model estimates color difference and contrast parameters for comparison to US EPA default criteria. Please note that routine air emission impact analysis requires evaluation of stationary sources only (as has been done in the EIA). At the request of BEST, additional analysis of mobile air emission sources has also been performed herein, and is summarized in this comment response and the response to Comment #82.

The visibility analysis was performed for three (3) cases representing the range of potential fuels that could be combusted in the LNG and LPG tanker ships (4.5% sulfur heavy marine fuel oil, 1.5% sulfur heavy marine fuel oil and natural gas). The worst-case operating assumptions for the on-ship steam boilers and primary pollutant (PM_{10} and NO_x) emission rates input to the model are described in the response to comment no. 82. Based on information presented in US EPA document AP-42 (Compilation of Air Pollutant Emission Factors), primary NO_2 emissions from oil and natural gas fired boilers were assumed to be 5 percent of total NO_x emissions and particulate sulfate emissions were assumed to be 3 percent of total sulfur oxide emissions. Air impact analysis assumes that no more than one ship of a single type is in port at the same time, however it is possible that an LNG and LPG ship could be in port at the same time. Modeling to date has addressed one ship in port at a time, however revision is underway considering impact of one LNG and one LPG in port simultaneously. Because LPG traffic is expected to be significantly lower than LNG traffic,

Date Completed

impacts are expected to be slightly increased but still within agency criteria. Updated modeling will be submitted when completed but model results to date are summarized here.

A visibility impact analysis is typically performed according to EPA procedures to evaluate the plume visibility impacts at designated federal Class I areas, such as national parks, national forests and wildlife areas. Due to the lack of analogous designated areas within The Bahamas, for the purposes of this supplemental visibility impact analysis, the visibility impacts were evaluated at the nearest inhabited island (Cat Cay) and also at the Bimini Islands. The visibility assessment was performed for a hypothetical observer located at a minimum of 11.3 km (7 mi) from the project site, or the closest estimated distance to Cat Cay. The maximum source to observer distance for Cat Cay was estimated to be 18 km (12.4 mi) at the northernmost extent of N. Cat Cay. For the Bimini Islands, the closest distance from an observer to the project site was estimated at 30 km (18.6 mi) and the maximum distance was estimated at 38 km (23.6 mi). A background visibility range of 20 km (12.4 mi) was assumed for the VISCREEN model input. As discussed in Section 5.8.1, the worst-case meteorological conditions for plume dispersion and visibility were determined to be F stability and a 3 m/sec (6.7 mph) wind speed. It was previously noted in Section 5.8.1 that these meteorological conditions occur less than 1 percent of the time when the wind is from the south or south-south-east directions, which would be required for the plume to be visible on Cat Cay. The plume would not be visible from the Bimini Islands.

The results of the supplemental visibility impact analysis for the LNG ship boilers exhaust plume are summarized on the tables below for observers located at Cat Cay and Bimini Islands. For Cat Cay, the results are summarized for the worst-case 4.5% sulfur heavy marine oil combustion case as well as the 1.5% sulfur oil case. For the 4.5% sulfur case, VISCREEN predicts exceedance of one of the visual impacts screening criteria. However, none of the screening criteria are exceeded for the 1.5% sulfur oil or natural gas cases. For the observer located on The Bimini Islands, the VISCREEN model predicts no exceedances of the screening criteria for any of the ship boiler fuel options.

BEST
25 September 2003

Date Completed

VISCREEN Maximum Surrounding Area Visual Impacts[a] AES Ocean LNG, Ltd.
Case 1: Cat Cay, 4.5% Sulfur Oil in LNG Ship Boilers

Background	Theta[b] (degrees)	Azimuth[c] (degrees)	Distance (km)	Alpha[d] (degrees)	Delta E[e]		Contrast[f]	
					Criteria	Plume	Criteria	Plume
Inside Surrounding Area								
Sky	10	145	16.1	24	2.00	0.524	0.05	0.007
Sky	140	145	16.1	24	2.00	0.159	0.05	-0.006
Terrain	10	84	11.3	84	2.00	1.158	0.05	0.013
Terrain	140	84	11.3	84	2.00	0.216	0.05	0.008
Outside Surrounding Area								
Sky	10	1	1.0	168	2.00	1.477	0.05	0.018
Sky	140	1	1.0	168	2.00	0.264	0.05	-0.014
Terrain	10	1	1.0	168	2.00	3.365*	0.05	0.042
Terrain	140	1	1.0	168	2.00	0.881	0.05	0.039

[a] Based on the total LNG ship boiler emissions
[b] Theta is the vertical angle subtended by the plume
[c] Azimuth is the angle between the line connecting the source, observer and the line of sight
[d] Alpha is the angle between the line of sight and the plume centerline
[e] Color difference parameter (dimensionless)
[f] Visual contrast against background parameter (dimensionless)

VISCREEN Maximum Surrounding Area Visual Impacts[a] AES Ocean LNG, Ltd.
Case 2: Cat Cay, 1.5% Sulfur Oil in LNG Ship Boilers

Background	Theta[b] (degrees)	Azimuth[c] (degrees)	Distance (km)	Alpha[d] (degrees)	Delta E[e]		Contrast[f]	
					Criteria	Plume	Criteria	Plume
Inside Surrounding Area								
Sky	10	140	15.1	29	2.00	0.301	0.05	0.002
Sky	140	140	15.1	29	2.00	0.141	0.05	-0.004
Terrain	10	84	11.3	84	2.00	0.589	0.05	0.007
Terrain	140	84	11.3	84	2.00	0.116	0.05	0.004
Outside Surrounding Area								
Sky	10	1	1.0	168	2.00	0.733	0.05	0.007
Sky	140	1	1.0	168	2.00	0.199	0.05	-0.009
Terrain	10	1	1.0	168	2.00	1.904	0.05	0.025
Terrain	140	1	1.0	168	2.00	0.500	0.05	0.024

[a] Based on the total LNG ship boiler emissions
[b] Theta is the vertical angle subtended by the plume
[c] Azimuth is the angle between the line connecting the source, observer and the line of sight
[d] Alpha is the angle between the line of sight and the plume centerline
[e] Color difference parameter (dimensionless)
[f] Visual contrast against background parameter (dimensionless)

BEST
25 September 2003

Date Completed

VISCREEN Maximum Surrounding Area Visual Impacts[a] AES Ocean LNG, Ltd.
Case 3: Bimini Islands, 4.5% Sulfur Oil in LNG Ship Boilers

Background	Theta[b] (degrees)	Azimuth[c] (degrees)	Distance (km)	Alpha[d] (degrees)	Delta E[e]		Contrast[f]	
					Criteria	Plume	Criteria	Plume
Inside Surrounding Area								
Sky	10	134	38.0	34	2.00	0.332	0.05	0.005
Sky	140	134	38.0	34	2.00	0.119	0.05	-0.005
Terrain	10	84	30.0	84	2.00	0.585	0.05	0.007
Terrain	140	84	30.0	84	2.00	0.106	0.05	0.004
Outside Surrounding Area								
Sky	10	1	1.0	168	2.00	0.879	0.05	0.010
Sky	140	1	1.0	168	2.00	0.210	0.05	-0.009
Terrain	10	1	1.0	168	2.00	1.805	0.05	0.020
Terrain	140	1	1.0	168	2.00	0.522	0.05	0.019

[a] Based on the total LNG ship boiler emissions
[b] Theta is the vertical angle subtended by the plume
[c] Azimuth is the angle between the line connecting the source, observer and the line of sight
[d] Alpha is the angle between the line of sight and the plume centerline
[e] Color difference parameter (dimensionless)
[f] Visual contrast against background parameter (dimensionless)

In conclusion, the results of the supplemental plume visibility screening assessment demonstrate that the exhaust plumes from the LNG and LPG tanker ship boilers, while stationary at Ocean Cay, will not impact visibility on Cat Cay when the boilers combust up to 1.5% sulfur heavy marine oil. In the Bimini Islands, the screening assessment predicts that the ship boiler plumes will not impact visibility even if the maximum 4.5% sulfur oil is combusted. In either case it should be emphasized that the plume from LNG or LPG tanker ships while stationary at Ocean Cay would only be visible under meteorological conditions when the wind is from the south or south-south-east directions, which would be required for the plume to be visible on Cat Cay or the Bimini Islands – based on historical data this condition occurs less than 1 percent of the time.

[All comments and responses from this point forward are NEW as of 22 July 2003]

[27 August 03] Comment 159

- Section #6 must be amended to include the significant mitigation measures that have resulted from the EIA review process to date. Specifically, those measures identified and prescribed by the EIA work group designed to minimize waste streams and

Date Completed

negative impacts to the environment and protect worker safety and health. Significant mitigation measures underway to date include the following.

[27 August 03] **159 - 1.** Improvements to proposed construction techniques, such as:

- Scheduling construction of the water pipeline to Bimini to coincide with migration of conch in an effort to minimize impacts to conch populations.

- Eliminating the proposed excess materials shoal in order to minimize generation of fugitive silts resulting from channel dredging activities and eliminating the potential for waste geotextile materials (needed to construct the excess materials shoal) to enter the marine environment.

- Specifying the use of air filter medium during the installation of perlite used for insulating LNG tanks to reduce the potential for fugitive waste perlite littering the terrestrial and marine environments.

[27 August 03] **159 - 2.** Improvements to the proposed design for facilities and operational processes such as:

- Eliminating the proposed seawater-to-LNG heat exchangers in favor of ambient air-to-LNG heat exchangers in order to drastically reduce cold and chlorinated effluent discharges to the marine environment

- Requiring the installation of process and instrumentation systems designed to monitor, meter, control and optimize individual processes and minimize waste generation rather than simply monitor the quality combined waste streams to record uncontrolled process waste discharges.

[27 August 03] **159 - 3.** More than one hundred substantive amendments and revisions designed to improve the proposed EMP and facilitate effective environmental management and control of proposed LNG operations, including (most notably):

- Requiring development and implementation of training and capacity building programs designed to adopt an integrated “all hazards” based approach to training industry and government personnel associated with the LNG project. The training program is being designed to effectively implement the EMP, control environmental management, avoid potential hazards, and facilitate coordinated and effective response to a variety of emergency scenarios.

- Requiring development and continuing maintenance of a comprehensive and dynamic excel spreadsheet of all materials entering the proposed AES Ocean LNG facility and all wastes existing operations. The spreadsheet is to be utilized

by AES facility operators and government officials alike as a tool to effectively implement and control environmental management of AES operations.

- Requiring real-time remote monitoring of operational air emissions liquid effluents, throughput of LNG, CNG and LPG and emergency alarm data streams via a restricted access wide-area-network (WAN) internet link to facilitate effective monitoring, control and emergency response between LNG facility managers and government officials.

- Requiring quantification of emission rates for CO2 on a continuing basis.

Response

AES has worked diligently to develop and present the Ocean LNG project to the Government of the Bahamas in a way that will accomplish AES business objectives, and simultaneously provide meaningful environmental protection. The major elements of proposed construction and operation of the Ocean LNG project accomplish these objectives, however the EIA review and revision process with BEST has also provided significant improvement on the original plan presented to the Bahamas in the EIA. Improvements and modifications to be protective of the environment of the Bahamas range from fundamental process changes (e.g. switching from seawater-LNG heat exchange for re-gasification), to plans for critical species protection (see below). Major elements of these changes, referenced by the comment above, are summarized in the responses below:

159 – 1
Ocean LNG has incorporated improvements to proposed construction techniques in Section 6 of the EIA, including the following:

- *The potential impacts to conch populations will be minimized by implementation of construction scheduling measures and relocation strategies as described in Response to BEST Comment No. 151.*

- *The proposed excess materials shoal has been eliminated from the construction plans as described in the Response to BEST Comment No. 14. This will both simplify construction and eliminate a potential source of sedimentation during construction.*

- *Tank construction procedures and materials have been clarified, and modified to include filter medium during the installation of perlite used for insulating LNG tanks, to reduce the potential for fugitive waste perlite littering the terrestrial and marine environments. This is described in the Response to BEST Comment No. 21.*

159 – 2
Ocean LNG has made improvements to the proposed design for facilities and operational processes described in Section 6 of the EIA as follows:

BEST
25 September 2003

Date Completed

- *Ocean LNG has committed to the elimination of the proposed seawater-to-LNG heat exchangers in favor of ambient air-to-LNG heat exchangers. While this represents a substantially greater capital cost to AES to construct, it will drastically reduce cold and chlorinated effluent discharges to the marine environment. These issues are addressed in the Responses to BEST Comments 34 through 38, and related comments. Please reference these comments and responses for information on the design change. This fundamental change in design strategy results in approximately* ***20 billion gallons/year of reduced*** *water effluent to the marine environment, and* ***92 to 99% reduction of chemical constituent discharges used for water treatment****, over the original design.*

- *Modified process and instrumentation systems are being designed and will be maintained to monitor, meter, control and optimize individual processes and minimize waste generation, rather than simply monitor the quality of combined waste streams to record uncontrolled process waste discharges. These changes are described in the Response to BEST Comment No. 96.*

159 – 3

The Ocean LNG EMP is currently being revised to include the substantive amendments and revisions designed to improve the proposed EMP and facilitate effective environmental management and control of proposed LNG operations, including:

- *An integrated "all hazards" based approach to training facility and government personnel associated with the LNG project as shown on Figures 3.5 and 3.6 included in Attachment #159. The training program is being designed to effectively implement the EMP, control environmental management, avoid potential hazards, and facilitate coordinated and effective response to potential emergency scenarios.*

- *A comprehensive and dynamic Excel spreadsheet that will be used to track all materials entering the proposed AES Ocean LNG facility and all wastes exiting operations has been developed. The spreadsheet, Table 3-10, will be utilized by Ocean LNG facility operators and government officials alike as a tool to effectively implement and control environmental management of the Ocean LNG operations.*

- *Real-time remote monitoring of operational air emissions, liquid effluents, emergency alarm, and selected through-put data streams via a restricted access - network internet link to facilitate effective monitoring, control and emergency response between LNG facility managers and government officials is described in the Response to BEST Comment No. 31.*

BEST
25 September 2003

Date Completed

- *Air impact analysis has been performed on all stationary sources of potential air emissions associated with the project and has resulted in commitments to pursue use of low emission fuels and other controls to limit potential emissions. In addition, while not required by prevailing regulation or practice, at the request of BEST, potential emissions from mobile sources (LNG & LPG tankers), and CO2 emissions have also been evaluated and modeled. These analyses have shown that significant negative impact will not result from the project, but they have also resulted in clarification of what elements of the project contribute most to potential emissions. Please note that Table 3-10 will allow tracking of stationary (not mobile, shipboard) emissions during project performance and refine the focus of process optimization to control emissions over the life of the project. The quantification of emission rates for NOx, SOx, CO_2, and other constituents on a continuing basis are discussed in the Responses to BEST Comments No. 82 and 153.*

[27 August 03] Comment 160

A few subsections contained in Section #6 require clarification, revision or amendment. Those are noted below:

6.1.4 Coral Reef and Hard Bottom Habitats

Page 6-5, paragraph 1: Amend this paragraph to include some explanation of the "specialized techniques" referenced in this section. Describe the basic design features and construction procedure for placement of articulated concrete mats and the anticipated mitigating benefits resulting from the installation of same. Identify or make reference to the specific sections of pipeline that are to be covered by articulated concrete mats. Define or make reference to the number of areas, linear length of pipeline and total area (e.g. square feet or square meters) to be covered by articulated concrete mats. Indicate that the BEST Commission will be advised in advance about the placement of articulated concrete mats over pipelines laid on hard bottom areas. BEST would like to review video of all sections of the pipeline alignment impacting hard bottom areas in 100 feet of water or less, especially those areas including typical coral reef species scheduled to be covered by articulated concrete mat. AES may be required to relocate coral outcrops to nearby locations in a best practice effort to protect and enhance impacted coral reef habitat. This mitigation practice has been implemented at other projects impacting coral reef habitats in The Bahamas.

Response

BEST
25 September 2003

Date Completed

Additional engineering performed after issuance of the EIA has modified the design philosophy of using articulated concrete mattresses along the bedrock areas, the methods for installation are discussed in the Response to BEST Comment No. 149.

Ocean LNG will provide BEST with the video of the pipeline route that may impact hard bottom areas in less than 100 feet of water. Based on the video and dive surveys, the pipeline route has been selected to avoid coral growth. Further the design has been modified to consist of trenched installation in primarily soft bottom areas. Relocation of conch that migrate into the pipeline route has already been planned (see response above to Comment #153 and the response to Comment #143 regarding pipe burial). If it is determined that coral may be affected by the pipeline installation and BEST requires relocation, AES will perform the relocation or modify installation to avoid impact to the coral..

At the pipeline approach to South Bimini, there is a section between stations 30+085.05 and 32+046.85, comprising approximately 300-M (1000-FT) where bedrock at the sea bottom will require concrete matting to protect the pipeline. This section is shown on Figure 2.18 (sheets 11 & 12 of 14). A detail of the concrete mat is shown on Figure 2.36.

This comment has been closed with the acknowledgement that BEST will complete review of the videotapes of biological survey provided to BEST, and if additional information is needed, it will be provided via the continuing EMP refinement and implementation process.

[27 August 03] Comment 161

6.3.1 Gas Turbine Emissions Mitigation

Page 6-9, paragraph 2: Amend the first sentence of this paragraph to read: "In Addition, AES will install, commission, operate and maintain a continuous emission monitoring system (CEMS) to continuously monitor emissions…". Amend this paragraph to make reference to that section of the EMP defining practices and protocol related to the sharing of CEMS data streams with the BEST Commission that are required for environmental monitoring and control of gas turbines emissions. Include the operating and maintenance practices and protocol for operating and maintaining the gas turbine system in the EMP.

Response

The first sentence of the second paragraph on page 6-9 has been amended as follows:

"In Addition, AES will install, commission, operate and maintain a continuous emission monitoring system (CEMS) to continuously monitor emissions of NO_x and CO from the gas turbines as well as the opacity of the stacks."

BEST
25 September 2003

Date Completed

Ocean LNG will provide a system for the GOB to access some data streams from the plant instrumentation systems that are directly related to safety monitors and environmental compliance as described in the Response to BEST Comment No. 31. Additionally, Ocean LNG will include operating and maintenance practices and protocol for operating and maintaining the gas turbine system in the EMP.

[27 August 03] Comment 162

6.3.2 LPG Removal Hot Oil System Heater Emission Mitigation

Page 6-9, paragraph 3: Define the proposed emission rates and performance standards to be adopted for the hot oil system heater. Define the monitoring program for meeting those emission rates and reference that program in the EMP. A variety of low NOx burners are available for hot oil heaters. Identify the manufacturer of the hot oil heater and low NOx burner to be included in the oil heating system. Include the operating and maintenance practices and protocol for operating and maintaining for the hot oil heater system in the EMP.

Response

As indicated above in responses to Comments #34-#38, Comment #138 and others, Ocean Express has reconfigured the LNG Heating and LPG Removal Process from a water based system to an air-based system. As a result of this change the LPG Removal Hot Oil System Heater is no longer in the scope of the island facilities. The new heating system design eliminates the need for the hot oil heater unit. Two of the gas turbines will be equipped with waste heat recovery units. These will be used to provide heat to a hot water loop which replaces the heat from the previous hot oil system, as described in the response to BEST Comment #138. The waste heat recovery units will have supplemental fuel firing to provide additional heat to the hot water loop. The additional heat will be used to heat the water/glycol from the air heaters during periods of low ambient temperature as described in the response to BEST Comment #138. In cases of very low ambient temperatures, additional heat may be required. This will be provided by fired heaters which will heat the water/glycol.

Regarding emissions, elimination of the former LPG Removal process is expected to eliminate approximately 17.5 TPY of NOx, 29.4 TPY of CO, 1.9 TPY of VOCs, and less than a ton of combined Pb and SO2. It is not anticipated that the new heating system will significantly increase the maximum annual emissions estimated for the remaining emission-producing operations on Ocean Cay. Incremental emission generation from this new configuration will essentially only come from the supplemental firing of the duct burners on the HRSG's (anticipated to have a combined total of less than 2000 hours/year of operation), and backup fired heaters which are anticipated to have a combined total of less than 500 hours/year of operation. Again, these are incremental increases in emissions but are less than the emissions

BEST
25 September 2003

Date Completed

eliminated through removal of the LPG heater. However, as indicated in the response to Comment #158, Ocean LNG is remodeling the potential air emissions based on the new equipment and will submit the results of that modeling when completed. Operating and maintenance practices for these systems will be included in the EMP when complete.

[10 Sept 03] Comment 163

6.9.1 Spills

Pages 6-14 through 6-15: Amend this section to make appropriate reference to the newly revised section of the EMP that addresses "all hazards based" emergency response training, capacity building, and contingency plans to be mobilized in the event that an uncontrolled spill occurs in the marine environment or on land. Specifically, identify the emergency command and control protocol (i.e., "who is responsible for doing what, when and where"); the Government agencies in The Bahamas and the USA that will be notified in the event of an uncontrolled spill; and, the contingency plans established to implement a coordinated and effective response to spill related emergencies.

Response

Ocean LNG will implement an integrated "all hazards" based approach to training industry and government personnel associated with the LNG project as shown on Figures 3.5 and 3.6 included in Attachment #159. The training program is being designed to effectively implement the EMP, control environmental management, avoid potential hazards, and facilitate coordinated and effective response to a variety of emergency scenarios.

The emergency command and control protocol including agency notification requirements in the event of a spill is described in the Spill Prevention, Control and Countermeasures (SPCC) Plan, Attachment 1 the EMP, and the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan, Attachment 2 to the EMP. Revisions to the EMP for these elements are being addressed through continuing revisions and amendments of the EMP, via coordination with BEST.

[10 Sept 03] Comment 164

6.9.2 Fire and Explosion

Pages 6-15 through 6-16: Amend this section to make appropriate reference to the newly revised section of the EMP that addresses "all hazards based" emergency response training, capacity building, and contingency plans to be mobilized in the event that an uncontrolled fire or explosion occurs on land or at sea. Specifically, identify the emergency command and control protocol (i.e., "who is responsible for doing what, when and where"); the Government agencies in The Bahamas and the USA that will be notified in the event of an

BEST
25 September 2003

Date Completed

uncontrolled spill; and, the contingency plans established to implement a coordinated and effective response to fire and explosion related emergencies.

Response

Ocean LNG will implement an integrated "all hazards" based approach to training industry and government personnel associated with the LNG project as shown on Figures 3.5 and 3.6 included in Attachment #159. The training program is being designed to effectively implement the EMP, control environmental management, avoid potential hazards, and facilitate coordinated and effective response to a variety of emergency scenarios.

The emergency command and control protocol including agency notification requirements in the event of a fire or explosion is described in the Spill Prevention, Control and Countermeasures (SPCC) Plan, Attachment 1 the EMP, and the Integrated Spill Control, Response, Pollution Prevention and Stormwater Management Plan, Attachment 2 to the EMP, and the Facility Fire Response plan that will be included within the EMP. Revisions to the EMP for these elements are being addressed through continuing revisions and amendments of the EMP, via coordination with BEST.

.

[27 August 03] Comment 165

6.9.4 Worker Safety

Page 6-17, paragraph 1: Amend this section to make appropriate reference to the newly revised section of the EMP that addresses "all hazards based" emergency response training and capacity building designed to help ensure worker health and safety not only during the construction phase, but during the commissioning and operations and decommissioning phases of the project. As discussed during previous meetings of the Technical Work Group, all visitors to Ocean Cay must be required to attend a general training and orientation session that addresses the fundamental "all hazards based" emergency response protocol and standard operation procedures (SOPs) to be adhered to while visiting or working at Ocean Cay.

Response

Ocean LNG will implement an integrated "all hazards" based approach to training industry and government personnel associated with the LNG project as shown on Figures 3.5 and 3.6 included in Attachment #159. The training program is being designed to effectively implement the EMP, control environmental management, avoid potential hazards, and facilitate coordinated and effective response to a variety of emergency scenarios.

BEST
25 September 2003

Date Completed

The Contractor Health and Safety Plan, Attachment 3 to the EMP, and the Worker Safety Plan, Attachment 7 to the EMP, define the measures for protection worker health and safety during construction and operations, respectively. Each of these plans includes information specific to the emergency response protocols that will be implemented on Ocean Cay. An integrated Emergency Response Plan will be included as Attachment 11 to the EMP, that will define the specific response measures and communication requirements if an incident were to occur.

Ocean LNG will develop a general training and orientation program for all visitors to Ocean Cay, as described in the Response to BEST Comment No. 112. This comment response is considered to be consolidated with the response to Comment #112.

[10 Sept 03] Comment 166

6.10 Social, Economic and Institutional Resources

Page 6-17, paragraph 2: Amend this section to reflect the mitigation measures AES has committed to with respect to social economic and institutional resources. For example, the continuing commitment AES has made to assist the GOB in improving the institutional capacity required to undertake effective environmental management of the AES Ocean LNG, Ltd. project and helping to create jobs for Bahamian workers.

Response

Section 6.10 is supplemented herein with the following mitigation undertaken to mitigate socio-economic impacts, and improve institutional capacity for environmental management in the Bahamas and implementation of the LNG project:

AES is currently providing funding to BEST for its resources expended on review of the EIA and related documents provided to the GOB for the LNG project. In addition, AES has committed through the draft Heads of Agreement to provide substantial funding for GOB capacity to institute effective environmental management of the Ocean LNG project.

AES will spend between $200,000 and $400,000 on jobs training during construction for Bahamian nationals. AES has committed in the draft Heads of Agreement to spend a minimum of $200,000 for such training purposes and anticipates that it will have no more than 5 non-Bahamian nationals on its operating staff within 3 years of its commercial operation date. In addition, AES anticipates spending money each operating year on an as-needed basis for employee training. Currently, AES anticipates spending approximately $85,000 per year (in excess of $2 million over a 25 year period) during the operating phase for ongoing training activities.

BEST
25 September 2003

Date Completed

In addition, AES has agreed to contribute 50 cents for every construction hour worked by a non-Bahamian national. The objective is help improve job training programs for Bahamians and to back up our plan to hire Bahamian nationals to the maximum extent possible with a "penalty" for not doing so. AES anticipates that contributions related to this commitment will total approximately $400,000. In the draft Heads of Agreement, AES has agreed to contribute these funds to an entity designated by the Bahamas Government to fund industrial training programs for Bahamian nationals.

Also in the draft Heads of Agreement, AES has agreed to provide $150,000 to the Bahamas Marine Research Institute within 12 months after the commencement of construction of the LNG Storage Facility.

Ocean LNG originally submitted a letter requesting specific socio-economic and infrastructure information from the Bimini Administrator in May 2002. A response was received that provided population data for Bimini. Ocean LNG submitted a letter to the BEST Commission dated 18 July 2003 that requested additional socio-economic and infrastructure information relative to Bimini and the Bahamas and has been provided contacts within the GOB to obtain this information. As a result discussions with various ministries, departments and agencies are being coordinated through BEST and meetings will be held 9 September to develop the information. AES Ocean LNG understands that this will be a continuing process of review and development of mitigating measures for the Biminis, based on anticipated impact, and implemented with AES financial support via the Heads of Agreement. AES Ocean LNG further understands the agency meetings and collection of data for resolution of potential socio-economic impact are not anticipated to delay the 15 September schedule for recommendation from BEST to the GOB relative to approval of the EIA and EMP. Revisions to the EMP for these elements that may flow out of evaluation of socioeconomic information from the agencies is being addressed through continuing revisions and amendments of the EMP, in coordination with BEST.

[27 August 03] Comment 167

6.11 Improvements to Infrastructure and Utilities.

Page 6-17, paragraph 3: Amend this section to reflect the results of the analyses undertaken on future solid waste generation and the effect on sanitary landfill infrastructure on the island of Bimini resulting from the increase in population on Bimini and the propose potential measures designed to mitigate this environmental impact.

Response

BEST
25 September 2003

Date Completed

As described in the Response to BEST Comment No. 166, Ocean LNG originally submitted a letter requesting specific socio-economic and infrastructure information to the Bimini Administrator in May 2002. A response was received that provided population data for Bimini. Ocean LNG submitted a letter to the BEST Commission dated 18 July 2003 that requested additional socio-economic and infrastructure information relative to Bimini and the Bahamas and has been provided contacts within the GOB to obtain this information. We will follow up on this information but have performed the following analysis to provide information of potential impact.

As indicated in EIA Section 2.3.1.5-A.1, housing to be constructed on South Bimini is assumed to be needed for up to 25 island-worker families. Using a figure of 2,000 lb/person of solid waste generation (or 1 TPY/person - average US per-capita value), and assuming an average number of 3 persons/family, the total volume of solid waste generation would be approximately 75 TPY. Moderately compacted solid waste will occupy a volume of 800-1000 lb/CY, therefore the annual production of 75 T is expected to occupy approximately 158 to 197 CY of landfill space per year (this includes an additional 5% volume for cover). At 1-CY depth, this will occupy a footprint of roughly 13 to 15 yards on a side, or less than 0.05 acre of landfill space used per year.

Solids will also be generated from the septic system supporting the housing, however Ocean LNG has not assumed the solids from the septic tank to be disposable at the South Bimini solid waste management facility. These solids will be cleaned from the septic tankage at regular intervals and disposed of at an appropriate facility off-island (not on South Bimini).

Information on existing South Bimini solid waste facility capacity would be needed for more detailed evaluation of this comment, however the anticipated landfill space needed, based on the analysis performed appears to be relatively low. In addition, the analysis above assumes that the total population of employees and their families are entirely new residents to South Bimini. If deemed necessary by BEST, Ocean LNG will develop a mitigation plan for the potential impacts from the increased solid and sanitary waste generation on Bimini.

Remaining response to this comment is being coordinated and consolidated through efforts under Comment #166 – please refer to that comment response for further information.

[All comments and responses from this point forward are NEW as of 26 August 2003]

Section 7.0 CUMULATIVE IMPACTS

[10 Sept 03] Comment 168
Section 7.1.2 Water Pollutants

Page 7-2, paragraphs 1-2: Amend the EMP to reflect the plan to install and operate sediment control structures as part of the mining operation relocation in order to minimize sediment

BEST
25 September 2003

Date Completed

discharge from onshore dewatering of mined aragonite. Amend the EMP to reflect the plan to operate the storage, use and disposal of industrial materials required for the aragonite mining operations in an integrated manner in parallel with the proposed "cradle to grave" materials management plan for LNG operations.

Response

AES has proposed through the EIA and review process to install additional turbidity screens in the vicinity of the mining operations to control sedimentation and turbidity resulting from the mining operations.

The AES Ocean LNG, Ltd. project will result in a net benefit for the existing island operations. As a result of construction of the new facilities on the island there will be a centralized fuel storage system as described in the EIA and EMP. This system will be managed in accordance with the policies and procedures described in the EMP and Ocean LNG will monitor the fuel distribution to the mining operation. As a result of the new fuel supply, existing underground storage tanks and associated piping will be removed from Ocean Cay. Ocean LNG will also share common hostel and sanitary facilities with the mining operation which will result in the removal of the existing hostel and the sanitary outfalls which discharge directly to the waters surrounding Ocean Cay. As a result of the installation of the three natural gas turbine generators proposed for the project, the two existing fuel oil fired generators will be removed from routine operation (they will be maintained for backup generating capacity for the mine operation only) and result in a net decrease of pollutants to the atmosphere. Ocean LNG understands that the BEST Commission wishes the mining operation to manage its waste in accordance with Ocean LNG's waste management plan. However, the mining operation and Ocean LNG are two separate companies; as such Ocean LNG respectfully requests that the BEST Commission regulate the mining operations waste generation and processes, other than those directly mentioned above, through a separate permitting process.

[10 Sept 03] Comment 169
7.1.5 Marine Traffic

Page 7-3, paragraph 2-5: Amend the EMP to include harbor management practices and protocol including navigation control and emergency response capacity. Indicate the human resources, equipment, training requirements, and operating and maintenance procedures that will be adopted and implemented to maintain safe marine traffic control, prevent marine hazards and respond to marine emergencies in a coordinated manner throughout the construction, commissioning, and operating and decommissioning phases of the project.

Response

BEST
25 September 2003

Date Completed

A Harbor Management Plan will be provided in the EMP. Environmental controls for the Harbor Management Plan, in addition to operating in accordance with the EMP will adopt and enforce applicable:

- *Bahamian and international regulations (e.g., International Regulations for Preventing Collisions at Sea, 1972 (1972 COLREGS)) for the maintenance of safe navigation in the harbor.*
- *laws and regulations of The Bahamas, and coordinate with other jurisdictional agencies in the areas of emergency response and preparedness, with special attention to vessels in distress and environmental emergencies.; and*
- *laws and regulations of The Bahamas, and coordinate with other jurisdictional agencies with respect to vessels posing a hazard to public health, safety, environment, or navigation.*

[10 Sept 03] Comment 170
7.1.6 Socioeconomic Issues

Page 7-4, paragraphs 1-3: Amend this section to provide details about, or make appropriate reference to, the plan to mitigate the cumulative impacts associated with responsible disposal of the additional solid wastes that will be generated on Bimini as a result of the proposed housing project and associated increases in Bimini's population related to the project.

Response

Please reference our response to Comment #166 regarding the impacts associated with waste generation and cumulative impacts to Bimini resulting from the Project.

[10 Sept 03] Comment 171
7.2 Cumulative Impacts from Foreseeable Changes to Existing Facilities

Page 7-4, paragraph 4-5: Provide details about the potential increases in the production rate of current mining operations anticipated over the next five years and referenced in this section. Specifically, indicate the projected volume of aragonite, sand and limestone AES anticipates will be extracted for marine transport away from Ocean Cay over the next 5 years. Rewrite paragraph #5 to clarify or correct the apparent directional contradiction contained in the first two sentences of the paragraph as well as subsequent references to the proposed gas pipeline to Bimini.

Response

BEST
25 September 2003

Date Completed

Ocean LNG currently estimates that the mining operations will maintain its currently capacity for production over the next 5 years.

Ocean LNG has removed paragraph 5 of the EIA and replaced it with the net positive cumulative impacts as described in the response to BEST Comment No. 168.

[10 Sept 03] Comment 172
8.0 EVALUATION OF ALTERNATIVES

Page 8-1, paragraph 1: Amend this paragraph to explain the decision to abandon the objective to construct the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini.

Page 8-2, paragraph 1: Amend this paragraph to explain the decision to abandon the objective to construct the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini.

Response

As indicated in the response to Comment #68, AES has conferred with the Government of the Bahamas and, through economic analysis, the parties have concluded the construction of the gas pipeline to North Bimini is not economically viable. Ocean LNG will not install the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini, as had been previously described in the EIA.

[10 Sept 03] Comment 173
8.1 "No Action" Alternative

Page 8-3, paragraphs 2-3: Amend these paragraphs to explain the decision to abandon the objective to construct the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini.

Response

As indicated in the response to Comment #68, AES has conferred with the Government of the Bahamas and, through economic analysis, the parties have concluded the construction of the gas pipeline to North Bimini is not economically viable. Ocean LNG will not install the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini, as had been previously described in the EIA.

BEST
25 September 2003

Date Completed

[10 Sept 03] **Comment 174**

8.2.1 LNG Terminal Siting Alternatives:

Pages 8-4 through 8-13: The identification and analysis of LNG terminal siting alternatives provided in this section is extensive and informative. However, this section does not address the second objective of the project as identified in the first paragraph of this section, that is, to supply an alternative supply of fuel, natural gas, to The Bahamas. Accordingly, provide details about the feasibility assessments of the alternatives identified and designed to meet the second stated objective. Amend the executive summary to reflect those revisions. Section 8 should include references to the feasibility of the proposed compressed natural gas pipeline to Bimini, the potential for a gas pipeline to New Providence Island, as well as the potential for satellite distribution of LNG to New Providence.

Response

Although the natural gas pipeline to the Biminis is not viable at this time, AES will continue to evaluate options of bringing natural gas to various sites in The Bahamas and communicating with the GOB in these efforts. As other opportunities arise, have been explored and the viability evaluated, AES will subject the alternative(s) to further environmental review in cooperation with the GOB.

[10 Sept 03] **Comment 175**

8.2.2.1 Desalination System Alternatives

Pages 8-13 through 8-15: Amend this section to reflect reductions in demand on the desalination system as a result of proposed changes to the LNG regasification system. Amend this section to include a discussion of the feasibility of titanium plate vacuum flash distillation (VFD) technology as a potential alternative to the potable water production systems considered to date (i.e., traditional mechanical vapor compression (MVC) technology and sea water reverse osmosis (SWRO) technology). Titanium plate VFD systems can require less pretreatment of feed water, generate fewer wastes and be less costly to maintain and operate than traditional MVC or SWRO systems especially in industrial operations where waste heat from turbine exhaust is available for heating VFD systems. Prepare a table that compares the relative feasibility of these three alternative desalination systems, each capable of producing the same volume of potable water per year at Ocean Cay. Include in that table the energy and materials required to operate and maintain each desalination alternative as well as the solid, liquid and gaseous wastes that will be generated by each desalination alternative. Include air emissions attributable to the electrical demands required to operate each desalination alternative and the projected membrane element replacement/disposal rate required for continuing operation of the SWRO desalination alternative. The desalination system alternative that generates the least waste and/or provides the lowest operating and maintenance cost should be identified and submitted for review by the BEST Commission.

BEST
25 September 2003

Date Completed

Response

Based on review of available technology and discussions with BEST, AES has changed the proposed LNG re-gasification to an air-warmed rather than water-warmed process. A general description of the air system appears in the response to BEST Comment No. 138. In general, the air-warmed system will produce water through condensation from air and, on average, the amount of water produced will be adequate for site service water demands. For the limited number of days a year that this is not possible (conservatively estimated at approximately 30 days per year when atmospheric humidity is low and water demand from Bimini exceeds storage), backup RO units have been selected to produce service water from seawater for this backup function. AES will consider the use of vacuum flash distillation for water production along with other technology and feasible approaches as design progresses. The evaluation will consider capital, operating expenses, and O&M experience to select a feasible alternative. To the extent that revisions to this system are made, they will be reflected in the EMP.

[10 Sept 03] **Comment 176**
8.2.2.2 Electrical Generating Alternatives

Pages 8-15 through 8-20: Amend this section to reflect the latest selection of turbine generator sets specified to meet operational electrical demand as well as exhaust heat recovery units that may be specified to heat (directly or indirectly) hot oil for the LPG removal system and / or heat feed water for steam required for an alternative desalination system.

Response

Please reference our response to Comment #138 regarding the latest selection of gas turbines to meet operational demands required by the revised Project.

[10 Sept 03] **Comment 177**
8.2.2.3 LNG Regasification Alternatives

Pages 8-20 through 8-25: Amend this section to reflect the decision to utilize fin fans and ambient air as the LNG regasification system alternative of choice. Explain the operational and environmental benefits afforded by building and operating fin fans and heating LNG with ambient air rather than seawater.

Response

BEST
25 September 2003

Date Completed

Please reference our response to Comment #138 which reflects the decision to switch from a water warmed system to an air warmed system and the environmental benefits that are derived from the change in systems.

[10 Sept 03] Comment 178
8.3 Offshore Route Alternatives

Pages 8-25 through 8-32: Amend this section to explain the decision to abandon the objective to construct the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini. Amend the section to emphasize the plan to locate and construct all pipelines in a manner that minimizes negative impacts to marine resources, in particular, negative impacts to lobster and blue crab migrations and populations.

Response

AES has conferred with the Government of the Bahamas and, through economic analysis, the parties have concluded the construction of the gas pipeline to North Bimini is not economically viable. Ocean LNG will not install the 2 inch undersea natural gas pipeline from Ocean Cay to Bimini, as had been previously described in the EIA.

As described in Section 4.1.7.1, AES has evaluated the fishery resources located within the project area and has developed its facilities and construction procedures to avoid or minimize impacts to sensitive biological resources and commercial fisheries to the maximum extent possible. The pipeline routes have been selected based upon avoidance of potential impacts to biological resources and constructability. The proposed pipeline route for the 8-inch potable water pipeline to Bimini has been sited to avoid or minimize impacts to hard bottom areas and seagrass bed which may serve as habitat for spiny lobsters, crabs and queen conch. Likewise the pipeline route for the 24-inch natural gas pipeline has been sited to avoid areas of dense coral populations and seagrass beds to avoid impacts to habitats for spiny lobsters, crabs, and queen conch. As described in the response to BEST Comment 151, AES is also completing a series of planktonic studies to insure that the construction of the pipelines will not affect the breeding, development and migratory patterns of commercially important marine species in the Bahamas such as the Queen Conch.

[10 Sept 03] Comment 179
8.4 Ocean Cay Dredging Technology Alternatives

Pages 8-32 through 8-38: Amend this section to include narrative paragraphs and a comparative table on the subject of silt and sediment control technology alternatives.

BEST
25 September 2003

Date Completed

Response

The text of Section 8.4.3 is revised as follows:

"Given the anticipated soil conditions and the estimated dredging volumes, the project strongly favors the use of a large Cutter Suction Dredge (CSD) for the major dredging tasks proposed at Ocean Cay as described in Section 2.4.1.2 **and Section 5.2.1.2.A**. For dredging the trench for the caisson structure and the trench for the process water intake and outfall **near the island were jetting is not feasible due to shallow water**, a mechanical dredge can be used. At Ocean Cay two types of mechanical dredges can be used, namely bucket dredges and backhoe dredges; however, the **backhoe** dredge is the preferred method for the proposed project. The criteria utilized to evaluate each dredging technique are summarized below in Table **8-9**."

Table 8-9
Analysis of Mechanical and Hydraulic Dredging Alternatives

Mechanical Dredges	Sedimentation Rate	Materials Capable of Being Dredged	Production Rate	Comments	Feasible for proposed Project
Grapple Dredge	High	Very Soft Deposits	Low	Not suitable for hard materials	No
Dragline Dredge	High	Very Soft Deposits	Low	Not suitable for hard materials	No
Dipper Dredge	High	Hard compacted rock	Low	Inefficient use of scows for disposal of materials	No
Bucket Dredge	High	Clays, gravel and coarse materials	Low	High noise, high fuel consumption due to barges for disposal of dredged material	Yes, for caisson and intake pipe trenches
Backhoe Dredge	Moderate	Clays, gravel and coarse materials	Low	Compact size, can be equipped with turbidity controls	Yes, for caisson and intake pipe trenches
Hydraulic Dredges					
Hopper Dredge	Low	Loose sediments and unconsolidated sand	High	Disposal of dredged material may require dredging operations to be suspended	Yes
Cutterhead Suction Dredge	Low	All alluvial materials, compacted deposits and rock-like formations	High	Not designed for heavy sea conditions, floating pipeline can deposit dredge spoils in disposal area	Yes

BEST
25 September 2003

Date Completed

[10 Sept 03] **Comment 180**
9.0 PUBLIC CONSULTATION

Page 9-1: Coordination, planning and implementation of public participation programs should be done in consultation with the Ministry of Health and Environment.

Response

Ocean LNG understands that coordination, planning and implementation of public participation programs should be done in consultation with the Ministry of Health and Environment with BEST leading these efforts.

[10 Sept 03] **Comment 181**
10.0 ENVIRONMENTAL MANAGEMENT PLAN

Page 10-1: The EMP is a dynamic tool requiring continuing maintenance and improvements. However, AES should be commended for it's continuing commitment to expand and refine the EMP as originally submitted.

Response

AES gratefully accepts the commendation from the BEST Commission and reiterates its commitment to continually updating, implementing, maintaining and refining the EMP as design, construction and operation of the Project facilities continue. Throughout the EIA process, several of the BEST comments provided requests, recommendations and guidance on development of the EMP. Attachment #181 to this response provides a summary of EMP sections and plans in which these elements are addressed.