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USAID ENERGY POLICY PROGRAM

MONTHLY PROGRESS REPORT NO. 4 FEBRUARY 2015

ESTABLISHMENT OF FAST TRACK LNG IMPORT TERMINAL

March 2015

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ESTABLISHMENT OF FAST TRACK LNG IMPORT TERMINAL

Contract No: AID-EPP-I-00-03-00004

Order No: AID-391-TO-12-00002

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Establishment of Fast Track EETPL LNG Import Terminal

Monthly Progress Report

February 2015

CONTENTS

Sr. No.	Title	Page No.
1.	Introduction	1
2.	Salient Features of the Project	1
3.	Updated Physical Progress of Field Work (till 28-02-2015).	3
4.	Electromechanical Works	8
5.	Review of Reports, Studies and Comments	8
6.	Material Test Reports of Civil Works	18
7.	Consultants Staffing	18
8.	Contractors Field Establishment & staffing	18
9.	Main Equipment and Construction Facilities at Site	18
10.	Weather Report	18
11.	Tidal Observations	18
12.	Project Progress Photographs	19
13.	Status of Documents Received from EETPL	19
14.	Documents Yet To Be Received from EETPL	20
15.	Conclusion	20

Annexure:

- Figure-A: LNG Jetty shown adjacent to EVTL Chemical and LPG Berth
- Figure-B: Terminal Layout Plan as per IA (Implementation Agreement)
- Figure-C: Terminal Layout Plan
- Figure-D: RLNG Pipeline Route from ETPL Jetty Head to SMS Pakland
- Annex-1: List of Staff
- Annex-2: Project Photographs
- Annex-3: List of Drawings received from PQA.
- Annex-4: Documents Yet to be received.
- Annex-5: EETPL Construction Schedule.
- Annex-6: Comments of Environmental Consultants on Reply by IMC in respect of Report of October 2014.
- Annex-7: GAP Analysis of Submitted Documents.

Establishment of Fast Track EETPL LNG Import Terminal At Port Qasim

PROGRESS REPORT FOR THE MONTH OF FEBRUARY 2015

1. Introduction:

- 1.1 This report covers the activities and progress of the work for the month of February, 2015, which included the updated status of field works. The Sub-consulting Services Contract for Study and Review of past Studies Reports and Quality assurance of project works was awarded to ECIL + Granada Group in association with M/s. Sellhorn, Germany.

The notice to proceed (work order) was issued to the Consultants vide Subcontract No. EPP-CE-SC-010 dated October 15, 2014. Description of services and LNG Specific Services along with budgetary details was provided vide DO No.C1-DO-001 and further specified upto 31st March, 2015 vide Task Order #1.

1.2 Location of Project

The under construction Terminal is located in the Port Operation Zone of Port Qasim, between the existing Engro Vopak (EVTL) Liquid Chemical Jetty and PQA's Iron Ore & Coal berth (IOCB). The distance between the LNG jetty and the open sea is about 40 Km. measured along the navigation channel (refer Fig. A, B, C). The berthing line of the (EETPL) Jetty is about 150m from toe line.

The RLNG pipeline 24" dia. runs from Loading Platform of jetty to the Custody Transfer Station (CTS) with a length of 6.5 Km and 42" dia. Pipeline (SSGC) runs from CTS to SMS Pakland. The total length of both the pipelines is 22.7 Km.

1.3 FSRU + RLNG Vessels & Gas Delivery

- a) The FSRU will have nominal capacity of 173,400 M³ although in the first phase it may handle LNG load 138,000 /151,000 M³.
- b) The RLNG will be delivered to SSGCL gas distribution network at a rate of 400 MMSCFD under pressure ranging between 300 psig & 1200 psig and temperature between +5°C and + 38.8°C.

2. Salient features of the Project:

2.1 General

- | | | |
|----------------|---|---|
| a) Client | : | Advanced Engineering Associates International (AEAI) |
| b) Consultants | : | Engineering Consultants Intl. (Pvt.) Ltd. Pakistan and Granada Group of Companies Inc. USA. |
| c) Developer | : | Engro Elengy Terminal (Pvt.) Limited, Pakistan. |

- d) EPC Contractor (Civil Works) : China Harbour Engineering Company (CHEC)
- e) Date of signing of Implementation Agreement between PQA and EETPL : June 23, 2014
- f) Date of deployment of Consultants : October 20, 2014
- g) Implementation Schedule of the Developer : Annex-5
- h) Tendered Cost of Infrastructure : Confidential.
- i) Completion date as per developers programme : 12-15 March 2015

2.1.1 Other main Parties engaged by EETPL for Project Work

- a) TUV (Austria) : Third Party supervision.
- b) Artelia : Mooring simulation work.
- c) Exelerate : FSRU related work.
- d) Technica : All design work.
- e) Siport 21 : FBMS simulation.

2.2 Major Components of the Project:

- a) Dredging of Berthing Basin.
- b) Construction of coffer Dam and disposal of dredged material,(reclamation keeping environmental protection aspects)
- c) Loading Platform supported on Steel Tubular Piles.
- d) Mooring and Berthing Dolphins with fendering system, supported on Steel Tubular Piles.
- e) Loading arm installed on loading platform.
- f) Trestle supported on prestressed concrete piles.
- g) Walkways – prefabricated steel sections resting on supporting dolphins constructed on steel tubular piles.
- h) RLNG pipelines and Allied works.
- i) Electrical Power Supply, Lighting and Control System
- j) Electro-Mechanical Works
- k) Metering System
- l) Water Bath heater
- m) Back Pressure Skid
- n) Fire Protection / Fire Fighting Arrangement
- o) FSRU along with allied equipment will be brought to Site and stationed on long term basis
- p) Fenders
- q) Bollards
- r) Quick Release Hooks

3. Updated Physical Progress of Field Work (till February 28, 2015).

3.0 Overall Progress

Overall progress of the project upto February 28, 2015, is approximately 99%

3.1 Dredging and Related Works

Dredging was carried out during the period from 20th Aug to 1st October 2014. The dredged area is about 89,000M².and the designed dredged level is -14m CD which will be increased to -15m CD in next phase. Post dredging survey was conducted by PQA. (Note No.5 in Design Drawing 145400-DD-DWZT-2001-2002).

3.1.1 Bathymetric and topographic surveys were carried out during May 2014.

3.1.2 Geotech studies were carried out during May to June 2014.

3.1.3 Construction of coffer dam was carried out during 15 May 2014 to 5 August 2014.

3.2 Jetty Structure:

A) Status / Progress of work up to February 28, 2015

All the activities related to Steel tabular Piles, Concrete works and miscellaneous elements of jetty, Trestle and walkway have been completed. Activities were carefully monitored in the light of quality assurance requirement.

B) Issues of concern recorded during construction work:

- The HSE was not strictly complied with, specifically in Mooring Dolphin works. The workers were not wearing proper PPE and adhering to the required norms.
- **EETPL did not submit the Contract BOQ of all maritime civil works despite requests.**
- **EETPL did not submit the Factory Test Certificates of Fenders and all other fixtures from the manufacturer's installed at LNG terminal.**
- Some of the STP were not driven to the designed toe level of – 30 meter as noticed. EETPL to get a confirmation certification from their designer, that the reduced penetration of STP will remain as good as required in all adverse marine condition.

3.3 Pipeline Works

Overall progress on construction of both the pipelines 24" & 42" dia, remained at about 99% upto February 28, 2015.

Related works are detailed as under:

3.3.1 Major items of Pipeline Works

- Acquired clearance of 15 meter wide ROW, for laying of pipeline in PQ area.
- Digging of trial pits to detect the other underground service lines such as (Electricity Cables, fiber optic cable, oil, gas & water lines) in land of ROW.

- Line pipes were strung on sand bags throughout the ROW.
- Excavation of trenches for laying pipeline. Thrust boring & Horizontal Drilling Direction for Main Road, Railway, & Canal / Nalla Crossing.
- Sand Blasting as SA-2.5 as per Swedish standard & wrapping of Heat shrink sleeve application on welding joints.
- Laying of pipeline in trenches.
- Holiday testing for coating inspection.
- Backfilling with soft sand around the pipeline 6" to 12" to protect the pipeline coating.
- Pig launcher & Pig receiver cleaning (wire brush pig & gauging pig).
- Installation of Cathodic Protection (CP) System.
- Hydrostatic test from LNG Jetty to CTS & from CTS (42" dia pipeline) to SMS Pakland for 24 hours.
- Thrust boring & horizontal drilling at road and other crossings.
- Dewatering with foam pig, & cleaning pig.
- Complete backfilling with developing crown on top of pipeline 1.5 ft high above the surface of natural ground level (NGL) of land.
- Testing & Commissioning.

3.3.2 Status/ Progress:

A.

I) Pipeline

All the activities related to installation of pipelines 24" & 42" dia including welding of joints, radiography, heat shrink sleeves application and allied works, were completed and were carefully monitored in the light of quality assurance requirement.

Observations:

- a) Excavation of trench for pipeline was not generally done 5ft deep altogether (i.e. 2 fts dia of pipeline & 3fts for backfilling top cover) as per requirement of code & standards.
- b) It was noted that inside EVTL premises, excavation & back filling was not done as per code of API-1104 / ASME B31.8, It was back filled as 1.5 fts on top cover of buried pipeline instead of 3.3 ft. as per Quality Inspection Plan (QIP) submitted by EETPL. This reflects a deviation of standards & Codes.
- c) Monolithic Insulating Joint:
Intake Channel of Pakistan Steel, steel truss was placed at channel crossing & 24" dia pipeline without installation of insulation joints. Monolithic Insulating Joints are

used to electrically isolate pipeline segments. The joints are used for the sectioning of main pipelines (gas, oil or water) and service lines, ensuring cathodic protection and providing electrical safety in pipelines.

- d) Monolithic insulating joints must be installed between underground & above ground pipelines to prevent the short circuit and to ensure the cathodic protection of pipeline as per design life of CP System.

II) Thrust Boring

Casing pipeline has been crossed from below Roads & Railway as under:

- PQA Road crossing near Tariq Restaurant.
- Railway crossing near PQA Office.
- Al-Tawarqi Steel Mill road.

Observations:

- Vent pipes were not installed on casing pipes which is the requirement of international Codes & Standards.
- Vent pipes should be installed on both ends of a casing.
- The casing vent holes should be at least one-half the diameter of the vent pipe (25mm [1.0 in] minimum). The casing vent pipe should be a minimum of 50mm (2 in) in diameter.
- Leak test to be monitored at vent pipes at required intervals to determine if a leak exists on carrier pipeline of RLNG.
- The casing to be cleaned and filled with wax type filler accordingly.

III) Trestle line pipes:

Sand blasting have been carried out by AU Engineering as per Swedish Standard SA-2-1/2, after that primer & Epoxy paint were applied on line pipes/ Spools in yard.	Completed
---	-----------

IV) Pipeline lowered in Trench:

Holiday test has been conducted to check integrity of pipeline coating & back filling carried out.	99% completed
--	---------------

V) Cathodic protection system

- | | |
|--|-----------|
| • Installation of Cathodic protection system on 24”& 42”dia pipeline. | Completed |
| • Ground bed developed inside the plant area. Five anodes of HSCI (High Silicon Cast Iron) buried for the 24” dia. pipeline. Ground bed developed for seven HSCI anodes, buried for 42”dia. pipeline, Junction Box (JB) installed for the monitoring of CP System. | Completed |

VI) Hydraulic Test

Hydrostatic test of Pipeline 24" dia. was carried out after all (in first portion from jetty to acquired land limits of EVTL), gauges and allied fittings were installed. Tests completed

VII) Anchor Block

Anchor blocks were required at riser positions, fabrication was done in yard of AU Engineering. Anchor Block 10 numbers were required for holding buoyant pressure in pipeline as per drawing. Work Completed

B. Custody Transfer Station (CTS):

- Custody Transfer Station is in progress for the delivery point / metering station for Regasification. Liquefied Natural Gas (RLNG). It comprises construction of metering skid, intake manifold assembly, filter vessels, pig receiver for 24" dia pipeline & pig launcher for 42" dia pipeline etc. In progress
- Civil foundation work for metering skid & Water bath heater, other equipment's at the CTS. Work Completed

C. Constructions of 42" dia pipeline as per API-1104, from Custody Transfer Station (CTS) to SMS Pakland boundary wall.

- Welding joints works on 42" dia pipeline. Work Completed
- Radiography testing (RT) of welding joint. In progress
- Heat shrink sleeve application on welding joints were in progress, sand/shot blasting was done on welding joints area as per Swiss Standard SA-2-1/2, including the wrapping of the heat shrink sleeve with the help of gas torch. 95% complete
- Horizontal direction drilling (HDD). Completed
- HDD crossing at railway main Track for 42" dia pipeline. Completed
- Main Railway crossing. Completed
- Excavation of trench for pipeline. Completed
- Pipeline lowered in trench and before back filling holiday test has been conducted to check integrity of pipeline coating. Completed
- Cathodic protection system on 42" dia pipeline. Completed.

Observations:

Civil foundation works continued at Custody Transfer Station (CTS). Installation of some equipment such as metering skids, filter assembly, water bath heater, and back pressure skid are placed in position. Piping interconnection works completed. It is to be noted that proper monitoring / QA is difficult without access to the documents listed in Annexure-4 which have been requested earlier and reminded.

4. Electromechanical Works

4.1 Mechanical Works (CTS)

Status is as under:

- | | |
|--|-----------|
| ▪ All equipment foundations. | Completed |
| ▪ JER/JSR placed on foundations on New Trestle. | - do - |
| ▪ LER/LSR placed on foundations on CTS. | - do - |
| ▪ PCS, ESD and communication panels installed at EVTL CCR. | - do - |
| ▪ Construction of Generator Room completed. | - do - |
| ▪ Construction of transformer Rooms completed. | - do - |

4.2 Electrical and instrumentation Works

Status is as under:

- | | |
|--|-------------|
| ▪ Cable Tray installation on existing Trestle. | Completed |
| ▪ Cable Tray installation on New Trestle and 300/514m. | - do - |
| ▪ All cable laying for Fiber Optic, Power & Telephone cables on Existing Trestle. | - do - |
| ▪ Fiber Optic Cable laying is in progress, about 4,500m completed. | - do - |
| ▪ Cable laying at CTS is in progress total 1,400/1,900m cable laid from LER to equipment foundation. | - do - |
| ▪ Cable laying from Coca-Cola grid station to CTS & Bin Qasim Power to CTS. | - do - |
| ▪ Cable laying for lighting work, about 4,500m cable laid. | In progress |
| ▪ 11KVA feeders installed by KE, KE will energize CTS power supply. | Completed |

5. Review of Reports, Studies and Comments.

5.1 Environmental Studies:

Activities on environmental works are described as under:

- Review of IMC's Comments

Environmental Consultant's observation and corresponding response of IMC was reviewed. The details are given in Annex-6.

- PQA visit and weekly meeting
- Visit of the Terminal in particular from environmental point of view including the reclaimed land and mangrove plantation, etc.
- Meeting with ECIL to review the presentation material in the backdrop of upcoming visit of Jim Hicks and AEAI's other higher ups.

5.2 Hydrographic Studies:

There have been no substantial activities during the month of February 2015. Therefore the updated status remains unaltered as that of January 2015 restated as under.

- A) Based on the available PQA documents and charts following works were done.
- Exact location of all jetties/terminals have been marked on the drawing.
 - The existing outer anchorage area and different sites for anchorage/ waiting areas alongside the entire channel has been marked on the drawing.
 - The coordinates of the LNG terminal were plotted on the existing drawing of the main channel.
 - The latest bathymetric data were plotted for the entire PQA channel with all existing navigational facilities which will help to review the critical turns, widening, volume & quantum of dredging involved.
 - The LNG terminal & berthing basin have been incorporated in the PQA channel drawing.
 - Bathymetric chart of Chan Waddo creek has been prepared on scale 1:10000
 - Two reports on soil & Bio-chemical studies received from PQA Hyd. Deptt. were reviewed.
 - Latest Bathymetric digital data of the entire PQA navigational channel for straightening, passing bays for two way traffic, widening & dredging etc. was reviewed.

Following information is still awaited from PQA:

- PQA Wish List from Mr. Jawad, Dir. (Channel Dredging) as per requirement of Director General (Technical), PQA.
- B) List of additional requested information is given in Annex-4 (item-2).

5.3A Port Operation / Marine Consultants Activities:

Reviews, studies, discussions and various visits to Port Qasim are described as under:

- Various visits and meetings were held with Port Qasim Authority Chairman and officials for preparing “PORT TARIFF FOR LNG CARRIER AND FSRU”.
- Various visits and meetings at Port Qasim with the Chairman and officials for preparing and finalizing “PORT QASIM REGULATIONS FOR LNG SHIPS”.
- Discussion with Mr. Mohsin Siddiqui GG/ USA, reference BA CHART PAK-20, PQA CHANNEL.Regarding Dredging and Straightening of Channel at various places for smooth arrival and departure of Conventional LNGC and Q-Flex LNGC.
- Discussion with PQA Security Department regarding “PORT FACILITY SECURITY “Plan and ISPS CODE.
- Visit of LNG Jetty and discussion with EETPL officials along with PQA officials.
- Meetings with Mr. Ahsan Siddiqui, Legal Advisor (MAG) and study of “Port Operation Regulations” for LNG Carriers and FSRU berthing, un-berthing, and Channel maneuvering.

5.3B Meetings at Port Qasim on 4th February, 2015,

Meeting No.1:

- Meeting with DG-OPS/DC, Capt. Nouman Hassan of PQA attended by ECIL officials i.e. Mr. A.N. Qabulio, Capt. Hashmat Ullah Shah and Legal Advisor, Mr. Ahsan Siddiqui.
- In this meeting rough outline and points for the “Port Qasim LNG Regulations” were discussed. One copy of the same was given to Capt. Nouman Hassan to go through and put in any other recommendations he want to incorporate.
- It was requested to Capt. Nouman to provide / supply ECIL, third Party Agreements (SSGC – PSO – EETPL) and as per “Implementation Agreement” between EETPL and PQA, Schedule 14: Security Manual and Schedule 15: Port Operation Manual and PQA Security Plan by Security department with reference to recommendations made by “Excelerate” energy.
- Capt. Nouman advised, that he had gone to Qatar for a meeting to discuss regarding bringing LNGC & FSRU at PQA / LNG Terminal. He advised that presently they are planning to bring in a Conventional LNG ships and after South West Monsoon and familiarization they will discuss about Q-Flex LNGC.
- Regarding Emergency Anchorage Areas in the PQA Channel , he has proposed Turning Basins in front of IOCB (Iron Ore and Coal Berth) and second in front of the Container Terminal.
- He advised to incorporate in the Regulations any Rules regarding “FSRU stationed permanently at the Jetty for a long period of time”, Berthing Agreement with regard to LNGC alongside FSRU.
- When LNG Carrier is discharging cargo, what speed / rules governs to passing ships and impact of vessel discharging.

Meeting No.2:

- Meeting with Capt. Nouman Hassan and ECIL, Mr. Agha Taimur and Capt. Hashmat Ullah Shah , concerning “TARIFF” and finalizing certain parameters of LNG Ships.
- Capt. Nouman Hassan has given guidelines to follow in preparing “ PORT TARIFF”, which will be incorporated in the final Tariff Draft.
- While discussing LNGC’s parameters, on a query, Capt. Nouman Hassan made it clear that PQA is capable to bring Conventional LNGC of 138,000 cum. As per existing Channel parameters. Concerning Q-Flex, PQA require dredging for anchorage along the Channel, straightening abreast LNG Jetty and widening at bends.

Meeting No.3:

- Meeting with Mr. Masood Bhatti, AEAI LNG Advisor and ECIL, Mr. Agha Taimur and Capt. Hashmat Ullah
- Guidelines were sought from PQA in respect of preparing of “PORT TARIFF” and discussions with Capt. Nouman Hassan on the same subject. His suggestions were discussed.

5.4 Extensive Review of Existing Reports and Various Studies carried out by LNG Consultants (Experts), Granada Group of Companies.

As mentioned in our last month's progress report, a number of requests have been sent out to AEAI to arrange for copies of the following documents as soon as possible in order to enable us to plan and schedule our activities according to our Terms of Reference. Appended below is the status of that request:

Overall Project Schedule	Received
Overall Project Schedule.	Received
Currently updated copy of the milestone schedule of project implementation activities :	Not Received
A complete list of all the studies and data used for design basis of the Terminal Jetty infrastructure and site selection.	List of Studies has been received which shows a number of essential studies are missing. Met Ocean Data Acquisition Report and the missing parts of the Mooring Study and Mathematical Model of the Hydraulic Study for Terminal Site have now been received.
A complete list of all the vetted and approved design Drawings.	A list of Civil Engineering and Structural Drawings has been received from ECIL. No drawings or data received for LNG infrastructure details or the equipment and machinery.
A copy of the Testing Schedule of all the machinery and infrastructure along with the planned testing procedures.	Protocol for Testing has now been received. Schedule still remains to be finalized.
A copy of Commissioning Schedule and Commissioning Procedure of the Terminal.	Not received
A copy of the Safety and Operations Manual for the Terminal.	Terminal Operations Manual Draft has now been received and reviewed. ETPL is to forward a revised version for comments shortly.
A list of operational staff and their training details as well as qualifications who are to be responsible for the operation of the Terminal and handling any emergency situations.	Not received

Details of Fire Fighting and Emergency Stations including design and equipment details as well as the training of staff responsible for handling LNG spill and fires.

Not received

Copy of a Full Mission Bridge Simulation (FMBS) Study carried out by the Terminal Developers and results of the same.

Has been received and evaluated. Comments forwarded to AEAI. Fresh FMBS Study has been scheduled to be carried at Spain from 16th February with updated data. Results of the Study are being awaited.

List of additional pertinent drawing and documents has also been submitted by ECIL for obtaining the same from PQA/Engro for review.

Full Status not known at this time. However, EETPL has now agreed to provide access to all the drawings and studies for our review and verification to meet the quality assurance criteria in their data room. Review of Drawings and Data is to commence from 13th March, 2015.

During the month of February, 2015 the Gap study related to NFPA Code 59 A was completed. The documents analyzed during the study are listed below. To accomplish this task, a template was created for the NFPA Codes and the following documents were then studied and compared with the requirements to determine the gaps between the requirements of the codes and the actual studies or data used for the Basis of Design and the operational planning of the LNG Terminal were identified:

REF. # DOCUMENT DESCRIPTION

1. QRA REPORT.....April 2011

This was a 260 pages generic QRA Report - issued by Lloyd's Register of Shipping in April, 2011 - of three possible sites identified by Engro – VOPAK for an LNG Terminal. The report included results of Hazard Identification Study, Risk Assessment Study and Maneuvering Simulation Study for the three identified possible sites.

2. HAZID/HAZOP STUDY.....March 2014

This was a part of 74 – Page documents dated March 14, 2014 with a cover letter Ref. PQA/DGM (PSP)/253/2007 dated March 24, 2014 From ENGRO ELENGY TERMINAL PRIVATE LIMITED along with the following attachments:

- **Attachment 1:** Letter ref: TK/EVTL/March/01 issued by Lloyd's Register of Shipping dated March 19, 2014 summarizing the findings on Consequential analysis Report Doc. No: OLG/DA/10080 Rev.1
- **Attachment 2:** Letter from SEPA dated March 20th, 2014 approving the orientation of the proposed Jetty of the new LNG Terminal from perpendicular to parallel to the main channel of Port Qasim subject to a number of conditions.

- **Attachment 3: HAZID/HAZOP STUDY** – Ref: OGL/DA/10078 dated March, 2014 issued by Lloyd’s Register of Shipping.

3. UPDATED QRA REPORT.31st March 2014

5- Page letter titled **Updated QRA for proposed ETPL Project Site** from ENGRO ELENGY TERMINAL PRIVATE LTD. dated March 31, 2014

4. COSEQUENCE ANALYSIS REPORT22nd Feb. 2014

43 Pages document with a one page cover letter from ENGRO ELENGY TERMINAL PRIVATE LTD. And the attached **Consequence Analysis Report** dated February 22, 2014 issued by Lloyd’s Register under Reference # OGL/DA/10080

5. UPDATE ON HAZID/HAZOP STUDY RECOMMENDATIONS. 26th Dec. 2014

Two Excel Work Sheets giving **update on the HAZID – HAZOP Recommendations** received from PQA through ECIL on December 26, 2014. Most of the open items on the work sheets are claimed to have been closed. The Operability S.O.Ps. are still not finalized. Target date for closing a number items was December 15, 2014. Current status of these items is not known at this time. Annex C was not received.

6. NAVIGATION SIMULATION MODEL TEST.....Dec. 2014/Jan. 2015

37 Pages document entitled **Mooring Layout Verification and Mathematical Mooring Model** prepared and issued by Artelia Eau and Environment Consultants for CHEC on December 01, 2014 and received from PQA through ECIL on December 26, 2014. The basis of Model Test was verbal information given by two witness Pilots only. The result involves conditions for QFlex only and prohibits QMax. Part B of this Study was received last week along with the MET-OCEAN Data comprising mainly of historical environmental and hydraulic data collected in the PQA channels and in the weather station near the FOTCO Terminal. Site Specific data measured and presented is insufficient to conclude the accuracy of the model and studies based on this data. Accuracy of the Mooring Study and the Mooring layout Verification Mathematical Model can neither be accepted nor denied.

7. EXCELERATE SECURITY ASSESSMENT REPORT (SAR).....Dec. 2014

13 - Page document issued by Excelerate Energy on December 17, 2014 and received from PQA through ECIL on December 26, 2014. The report reveals insufficient security and incapability of PQA on a number of security issues. It recommends deployment of a lot of security equipment and personnel/training.

Preliminary Report on the Evaluation of HAZID-HAZOP Study - March 2014 was prepared and forwarded to AEAI on December 04, 2014.

Both consultants of Granada Group were finally given the clearance to arrive in Pakistan during this month to provide the necessary support and the consulting services to AEAI clients including the Ministry of Petroleum, the SSGC, PSO and the PQA. Other activities and tasks carried out during the month included the following:

- Research and collection of data and information to prepare an accurate financial model in order to assist PQA in establishing realistic tariff for their services that are to be provided to LNG Carriers calling the newly developed LNG Terminal for delivering their cargoes.

- Reviewed the STS Procedures and Hose Handling Manual of Excelerate Energy and provided our views, comments and recommendations on the use of hoses for STS transfer of LNG alongside the Terminal jetty located inside the port.
 - Reviewed the Mooring Analysis and Mathematical Model as well as the Met Ocean Data utilized for the development of the analysis and the Mathematical Model. Prepared and forwarded our comments to PQA through AEAI.
 - Reviewed the procedure and the criteria for the new FMBS Study carried out at SIPOINT with PQA pilots in attendance from February 16, 2015. Provided comments to AEAI.
 - Provided update on the tasks in hand related to the TOR to AEAI management, the Managements of Inter-State Gas Co., the SSGC and the PQA as well as the Minister of Petroleum and Natural Resources, Government of Pakistan.
 - Provided the required reviews, comments and support to the Government Team negotiating the SPA for LNG imports with Qatargas.
 - Held meetings with SSGC, PQA and EETPL to agree on the procedure for Acceptance of the Terminal and close-out of the remaining open items identified during gap studies and HAZID-HAZOP Studies.
 - Progressed the preparation of LNG Regulations for implementation in Port Qasim.
 - Assisted PQA to respond to the requirements of Action Register forwarded by Qatar gas.
 - Reviewed the evaluation of the Security Assessment of the LNG Terminal and attended meetings at Port Qasim with the Government Security Agencies to finalize the security plan of Port Qasim and the Terminal.
 - Reviewed the operations manual draft submitted by EETPL to SSGC and Provided comments for improvement.
 - Routine correspondence was carried out through emails and telephone calls with AEAI, ECIL, SSGC, the ISGS and the PQA representatives in order to resolve day to day issues related to LNG Procurement and smooth progression of the Terminal Project Implementation.
8. Quality Assurance Review Of EETPL LNG Terminal Project Documents GAP Analysis of submitted documents against US NFPA Code 59A-2013 template.
Refer Annex-7.

5.5 Activities on Legal Matters

- Continued review and comparison of existing Port Qasim Authority Regulations 1981 and recommended LNG rules Draft.
- Attended meetings at Port Qasim pertaining to recommended LNG Regulations draft.
- Meeting with ECIL officials to discuss and review possible issues on Port Qasim LNG Regulation.
- Reviewed NFPA 59A; Codes & Standards for reference/guidance in developing LNG Regulations.
- Continued Reviewing NFPA 59A; Codes and Standards, for developing LNG regulations final draft.
- Reviewed and discussed PQA Security Assessment report by M/s "Excelerate Energy"; with ECIL for developing safety and security rules pertaining to LNG Vessels operations in port, and incorporate the same in Port Standard operating procedures in recommended LNG rules.
- Drafted Berthing Agreement for Port Qasim.
- Attended meeting at ECIL to review Action register from Qatar Gas.
- Develop the First draft for HSE Policy.

5.6. Activities of Sellhorn

A. Observations:

Subsequent to site visit to Port Qasim / Pakistan and meeting of Mr. Norbert Peetz, with PQA, ECIL, Granada Group and EETPL during 19 to 24 Feb,2015 his observations are as under:

1. With regard to the site visit and general impressions please note that based on the meeting with PQA I got a pretty good impression of the actual needs of POA and how Engro is positioning themselves.
2. Part of the scope of work with regard to the Quality Control of Jetty design has now become more a review and mitigation process.
3. It was noted that major attention is now required on the subject of access channel issues present there related to handling of LNG vessels, and also utilization of alternative channel, directly or indirectly related to LNG Terminal's development and opening up of channel even its utilization as passing bay.
4. Next course of actions:
 - a. With regard to the jetty Sellhorn is awaiting the final input from Engro which will be the basis to elaborate a bit more on the general design approach and particularly applied design parameters. The aim is to compile this input in a kind of "general observation report"
 - b. Currently Sellhorn is in the process of determining the design vessel and resulting navigational requirements such as channel draft, width, bending radius and so on to elaborate in more detail on the present situation and potential improvements to the channel. We believe that we will come up with different scenarios.
 - c. The above will also consider the requirements for emergency anchor places and potential passing bays.
 - d. For the second (alternative) channel we will check on the general requirements and resulting issues and the way forward to study possible scenarios and solution.
 - e. In addition we will consider and elaborate on position and content for additional field measurements, such as waves, currents, tidal data at the inner and outer channel.

B. Activities:

1- Norbert Peetz

- Review of Dolphin design, Document register.
- Travel Hamburg to Karachi.
- Meetings PQA Officials.
- Meeting at ECIL, Meeting with PQA, Site Visit Fotco Jetty (tide, wave and weather recording devices).
- Meeting Engro, Site Visit Engro LNG Jetty, De-briefing at PQA and ECIL.
- Travel Karachi to Hamburg.
- Travel wrap-up, internal briefing.
- Processing of channel issues.

2- Brinkmann Birgitt

- In-house Team meetings and project introduction.
- Briefing on access channel.

6. Material Test Reports of Civil Works.

Reports awaited from EETPL.

7. Consultants Staffing:

List of Local and Expatriate staff involved for the project work, is attached as Annex-1.

8. Contractor's Field Establishment & Staffing.

Not received from the developers.

9. Main Equipment and Construction Facilities used at the Site during construction.

- | | |
|---|---|
| a) Piling rig. | j) Concrete batching and mixing plant on floating pontoon |
| b) Dredger and allied equipment moved out of site | k) Dump trucks |
| c) Tower Crane | l) Earth Excavator |
| d) Floating Pontoon | m) Equipment for thrust boring |
| e) Transmixer | n) Compactors and Vibrators |
| f) Compressor | o) Standby Gen Sets |
| g) Mobile crane | p) Concrete precasting yard |
| h) Pre-stressing Equipment | q) Welding and painting yard |
| i) Bar Bending Yard / Equipment | |

10. Weather Report.

Monthly Weather Report not received from the Developer.

Date	Weather		Temperature		Remarks
	Rain	Wind	Maximum	Minimum	

11. Tidal Observations:

Not yet received from Developer.

12. Project Progress Photographs

Refer Annex-2

13. Status of Documents Received from EETPL.

13.1 General:

- i. Project Quality Plan.
- ii. Procedure for Undertaking Project Management Review
- iii. Procedure for Formulating Plans and Procedure.
- iv. Procedure for Undertaking Contract Review.
- v. Procedure for Control of Documents and Communications.
- vi. Procedure for Control of Purchasing including Evaluation of Sub-contractors and Suppliers.
- vii. Procedure for Materials Receiving Inspection, Testing, Identification and Traceability.
- viii. Procedure of Management Resources and Recording of Works Executed, resources utilized and Site records.
- ix. Procedure for Control of Inspection, Monitoring, Measuring and Test Equipment (IMMTE).
- x. Procedure for control of Non-conforming Product.
- xi. Procedure for Implementing Corrective and Preventive Action.
- xii. Procedure for Handling and Storage of Permanent Materials.
- xiii. Procedure for control of Management Records
- xiv. Procedure for Internal Auditing.
- xv. Procedure for Dealing with Complaints and Enquiries.

13.2 Pipeline:

- i. Pipeline Alignment Drawings: 14 Pages
- ii. Pipeline Construction And Technical Specification (44 Pages)
- iii. Pipeline BOQ (14 Pages)
- iv. 42" Pipeline WPA, PQR & WQT (53 Pages)
- v. 24" Pipeline WPA, PQR & WQT. (25 Pages)
- vi. 24" and 42" Pipeline QIP (45 Pages)
- vii. HDD MSDS (42" and 24") (5 Pages)
- viii. HDD and Thrust Boring Methods Statements (5 Pages)
- ix. Methods Statement for Hydrostatic test.

- x. Materials Safety Data Sheet
- xi. Ultrasonic Weld Inspection Report
- xii. 24" and 42" Dia RLNG Pipeline Construction Manual QA QC Manual.
- xiii. The Horizontal Directions Drilling Process.
- xiv. PQR / WQT Inspection Report.
- xv. Bill Of Quantities For Pipeline Fittings.
- xvi. Welding Procedure Specification.
- xvii. Construction Specifications (RLNG) Re-gasified Liquid Natural (RLNG) Gas Pipeline.

13.3 Refer Annex-3 for list of Drawings of Jetty & related structures.

14. Documents yet to be received from EETPL

Refer Annex-4

15. Conclusion

The progress of work in general is as per construction programme. No major adverse observations regarding quality of the field work has so far been received from the Consultants' field staff. However, Civil Engineer's comments and observations stated under items 3.2.1(c), 3.3.2(I), 3.3.2(II) & Annex-4(B)(vii), need attention / necessary action.

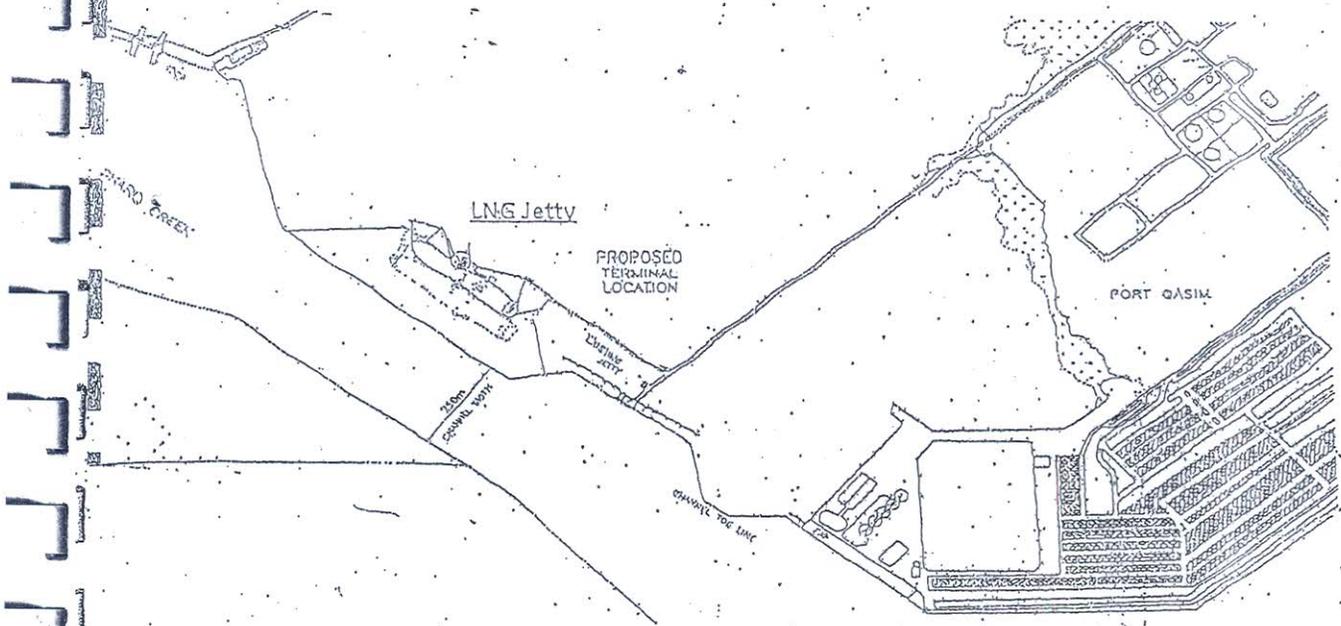
The deployment of the Consultants on the project, was done at much later stage after the actual commencement of work which was done even before the formal signing of IA. Therefore review and comments on various reports, studies and finalization of some vital documents are still outstanding although the construction works are completed. After having mobilized and lot of pursuance, various reports and documents have been received by consultants late, disjointed and in piecemeal, even after the completion of that activity.

The consultants have been mobilized about four months by now with the aim to effectively involve in the quality assurance work which they had to carry out without various documents made available to them. Quite a number of data / reports are yet to be furnished by EETPL. After having received the reports and various documents, the consultants will continue the post authentication of various items of works already completed.

Foreign consultants particularly of Granada Group and Sellhorn could only be mobilized w.e.f. February 17, 2015, when Civil, Pipeline and most of the E&M works were already complete.

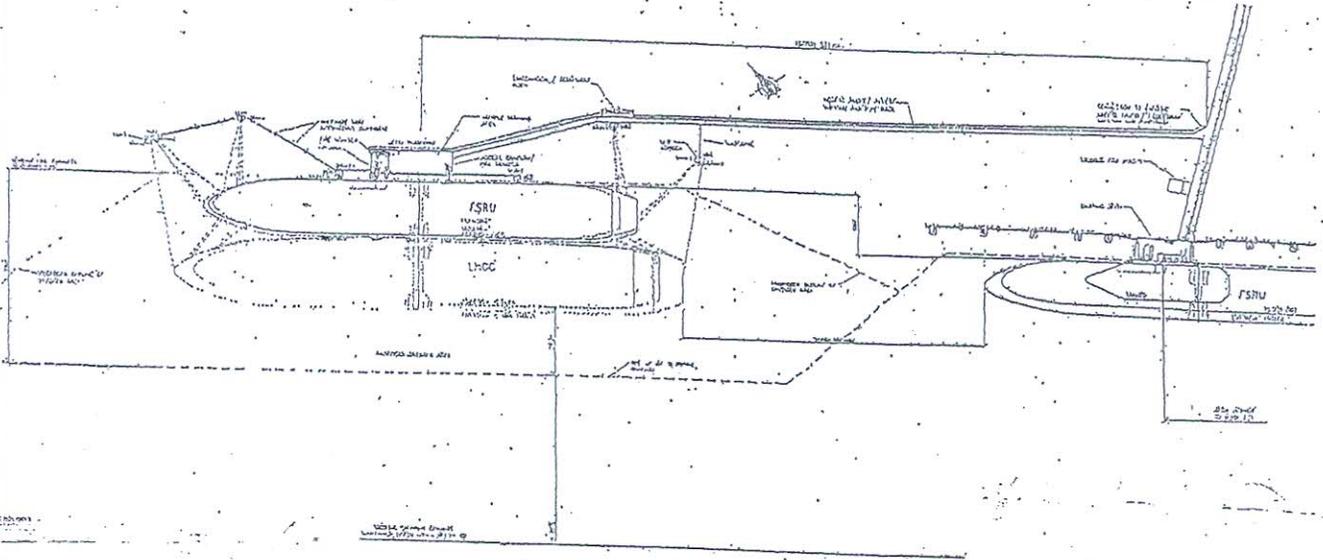
F I G U R E S

Figure "A"



LNG Jetty shown adjacent to EVTL Chemical and LPG Berth

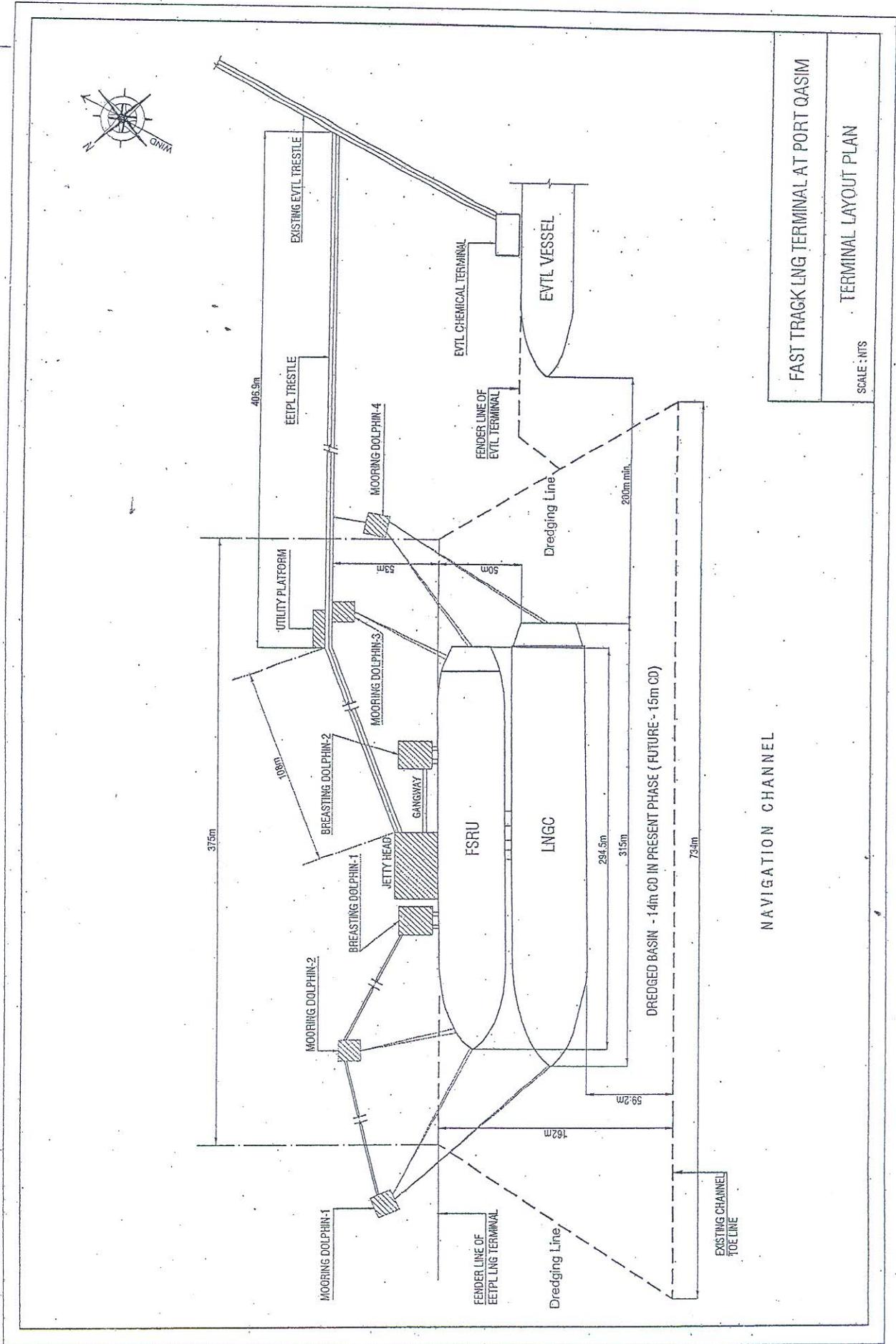
Figure "B"



Layout (Double Bank Arrangement)

NOTE: The Sketch has been copied from IA of EETPL.

Figure "C"



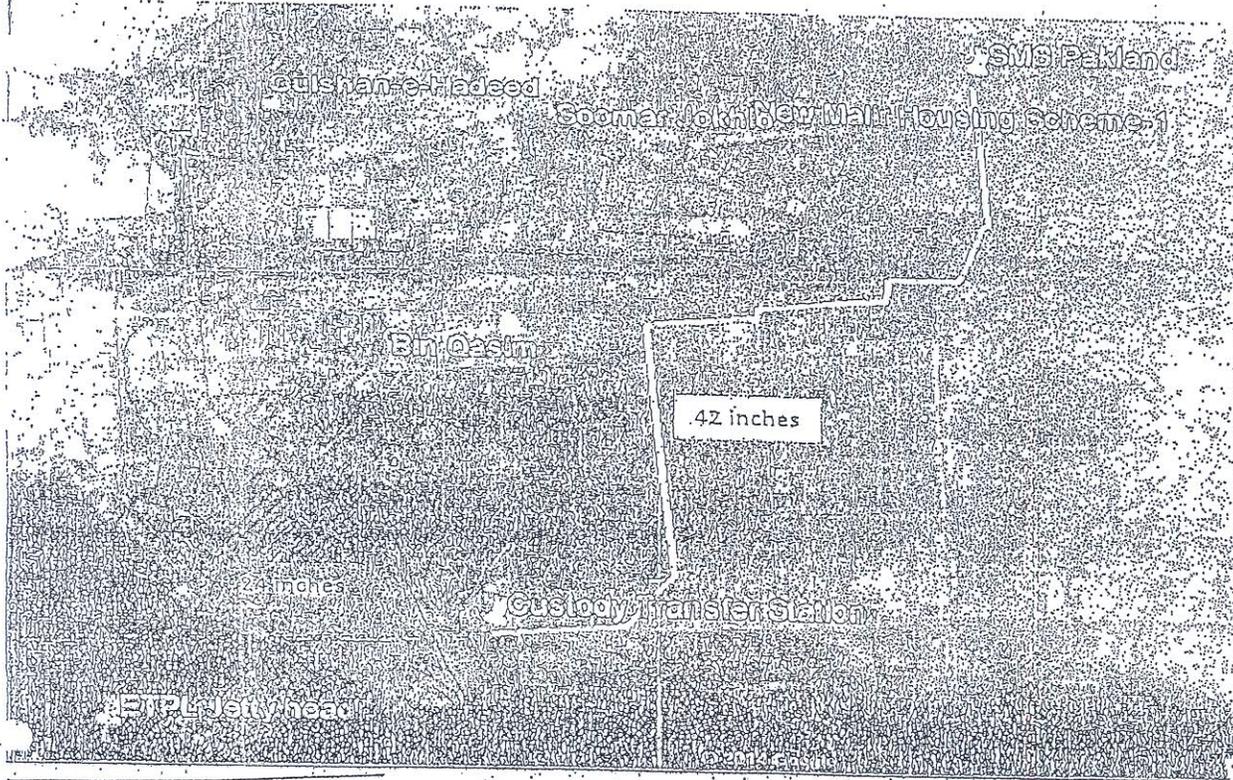
FAST TRACK LNG TERMINAL AT PORT QASIM

TERMINAL LAYOUT PLAN

SCALE : NTS

NAVIGATION CHANNEL

Figure "D"



- RING Pipeline Route from ETPL Jetty Head to SMS Pakland

NOTE: The Sketch has been copied from IA of EETPL.

A N N E X E S

LNG TERMINAL AT PORT QASIM

LIST OF STAFF

Sr.No.	Name	Nationality	Position
ECIL			
1.	A.N. Qabulio	Pakistani	Project Director
2.	Tanweer A. Khan	Pakistani	Port & Harbour Development Engineer
3.	Capt. Hashmat Ullah Shah	Pakistani	Port Operation Expert
4.	Zafar H. Ismail	Pakistani	Financial Expert
5.	Agha Taimur Khan	Pakistani	Port Charges, Royalty, Tarrif
6.	Tufail Ali Zubedi	Pakistani	Environmental Engineer
7.	Shahid H. Mirza	Pakistani	Civil Engineer
8.	Mohammad Shoaib	Pakistani	Electrical Engineer
9.	Jamiluddin	Pakistani	Mechanical Engineer
10.	Zahid Ali Mahesar	Pakistani	Pipeline expert
11.	Muhammad Bakhtiar Hussain	Pakistani	Hydrographer
12.	M.A.G. Siddiqui	Pakistani	Legal Expert
Sellhorn			
13.	Nobert Peetz	German	Civil & Structure Engineer
14.	Birgitt Brinkmann	German	Civil Engineer
Granada Group (Foreign Consultants)			
15	Mohsin M. Siddiqui	USA	Project Coordinator, LNG and FSRU Specialist
16	Capt. Farooq Hussain	USA	LNG Marine, Navigation & FSRU Terminal Specialist
<u>Support Staff</u>			
1.	Sheikh Shahid Hussain	Pakistani	Coordinating Engineer
2.	Shaikh Abdus Salam	Pakistani	Office Secretary

PROJECT PHOTOGRAPHS



Fender in the process of installation on Breasting Dolphin



Fenders installed in position



Catwalk (Steel Walkway) installed



Catwalk (Steel Walkway) installed



QRH installed in position

List of the Drawings received from the office of PQA.

S. No.	DOCUMENT No.	TITLE	REV	PAGES	REMARKS
1	14S400-DD-DW-ZT-1001	General Layout	1	1	Issued for Construction
2	14S400-DD-DW-ZT-1002	Terminal layout	1	1	- do -
3	14S400-DD-DW-ZT-1003	Coordinates of Terminal layout	1	1	- do -
4	14S400-DD-DW-ZT-2001	Dredging Works	1	1	- do -
5	14S400-DD-DW-SG-1001	Plan and Elevation of Jetty	0	1	- do -
6	14S400-DD-DW-SG-1002	Hand Rail Arrangement	0	1	- do -
7	14S400-DD-DW-SG-1003	Structural Drawing for loading Plat form	0	1	- do -
8	14S400-DD-DW-SG-1004	Structural Drawing for Breasting Dolphin 1&2	0	1	- do -
9	14S400-DD-DW-SG-1005	Structural Drawing for Mooring Dolphin 1&4	0	1	- do -
10	14S400-DD-DW-SG-1006	Structural Drawing for Mooring Dolphin 1&3	0	1	- do -
11	14S400-DD-DW-SG-1007	Structural Drawing for Supporting Dolphin 1&2	0	1	- do -
12	14S400-DD-DW-SG-1008	Pile Location Of LNG Jetty	0	1	- do -
13	14S400-DD-DW-SG-1009	Detail of Piles for LNG Jetty	0	1	- do -
14	14S400-DD-DW-SG-1010	Reinforcement of Loading Platform(1)	0	1	- do -
15	14S400-DD-DW-SG-1011	Reinforcement of Loading Platform(2)	0	1	- do -
16	14S400-DD-DW-SG-1012	Reinforcement of Mooring Dolphin(1)	0	1	- do -
17	14S400-DD-DW-SG-1013	Reinforcement of Mooring Dolphin(2)	0	1	- do -
18	14S400-DD-DW-SG-1014	Reinforcement of Mooring Dolphin(3)	0	1	- do -
19	14S400-DD-DW-SG-1015	Reinforcement of Mooring Dolphin(4)	0	1	- do -
20	14S400-DD-DW-SG-1016	Reinforcement of Supporting Dolphin 1&2	0	1	- do -
21	14S400-DD-DW-SG-1017	Structure of Pile Head of Tabular Steel Pile 1250	1	1	- do -
22	14S400-DD-DW-SG-1018	Structure of O 1250 Tabular Steel Piles	0	1	- do -
23	14S400-DD-DW-SG-1019	Structure of O 1200 Tabular Steel Piles	0	1	- do -
24	14S400-DD-DW-SG-1020	Reinforcement of Breasting Dolphin 1(1)	0	1	- do -
25	14S400-DD-DW-SG-1021	Reinforcement of Breasting Dolphin 1(2)	0	1	- do -
26	14S400-DD-DW-SG-1022	Reinforcement of Breasting Dolphin 1(2)	0	1	- do -
27	14S400-DD-DW-SG-1023	Reinforcement of Breasting Dolphin 2(2)	0	1	- do -
28	14S400-DD-DW-SG-1024	Structure of Pile Head of Tabular Steel Piles 1200	1	1	- do -
29	14S400-DD-DW-SG-1025	Structure Detail For 1500KN Triple Quick Release Hook	0	1	- do -
30	14S400-DD-DW-SG-1026	Structure Detail For 1500KN Quadruple Quick Release Hook	0	1	- do -
31	14S400-DD-DW-SG-1027	Cathodic Protections & Anode Installation-Typical	0	1	- do -
32	14S400-DD-DW-SG-1028	Detail of Bracket of Breasting Dolphin 1	0	1	- do -

S. No.	DOCUMENT No.	TITLE	REV	PAGES	REMARKS
33	14S400-DD-DW-SG-1031	Reinforcement of Prominence on Mooring Dolphin 1	0	1	Issued for Construction
34	14S400-DD-DW-SG-1032	Reinforcement of Prominence 1 on Mooring Dolphin 2	0	1	- do -
35	14S400-DD-DW-SG-1033	Reinforcement of Prominence 2 on Mooring Dolphin 2	0	1	- do -
36	14S400-DD-DW-SG-1034	Reinforcement of Slab on Mooring Dolphin 2	0	1	- do -
37	14S400-DD-DW-SG-2001	Plan and Elevation of Trestle	0	1	- do -
38	14S400-DD-DW-SG-2002	Structual Drawing for trestle	0	1	- do -
39	14S400-DD-DW-SG-2003	Pile Location of Trestle	0	1	- do -
40	14S400-DD-DW-SG-2004	Detail of Piles of Trestle	0	1	- do -
41	14S400-DD-DW-SG-2005	Strcture of PHC Pile And PHC Pile Shoes	0	1	- do -
42	14S400-DD-DW-SG-2006	Strcture of Pile Head PHC Pile	2	1	- do -
43	14S400-DD-DW-SG-2007	Beam Arrangement of trestle	0	1	- do -
44	14S400-DD-DW-SG-2008	Reinforcement for Prestress Logitudinal Beam (1)	1	1	- do -
45	14S400-DD-DW-SG-2009	Reinforcement for Prestress Logitudinal Beam (2)	1	1	- do -
46	14S400-DD-DW-SG-2035	Reinforcement for Prestress Logitudinal Beam (4)	1	1	- do -
47	14S400-DD-DW-SG-2034	Reinforcement for Prestress Logitudinal Beam (3)	1	1	- do -
48	14S400-DD-DW-SG-2010	Reinforcement of Logitudinal Beam (6)	1	1	- do -
49	14S400-DD-DW-SG-2011	Reinforcement of Logitudinal Beam (7)	1	1	- do -
50	14S400-DD-DW-SG-2012	Reinforcement of Logitudinal Beam (8)	1	1	- do -
51	14S400-DD-DW-SG-2013	Reinforcement of Logitudinal Beam (9)	1	1	- do -
52	14S400-DD-DW-SG-2014	Reinforcement of Logitudinal Beam (10)	1	1	- do -
53	14S400-DD-DW-SG-2015	Reinforcement of Logitudinal Beam (11)	1	1	- do -
54	14S400-DD-DW-SG-2016	Reinforcement of Logitudinal Beam (12)	1	1	- do -
55	14S400-DD-DW-SG-2017	Reinforcement of Logitudinal Beam (13)	1	1	- do -
56	14S400-DD-DW-SG-2018	Reinforcement of Logitudinal Beam (14)	1	1	- do -
57	14S400-DD-DW-SG-2019	Reinforcement of Logitudinal Beam (15)	1	1	- do -
58	14S400-DD-DW-SG-2020	Reinforcement of Transverse Beam TB1	0	1	- do -
59	14S400-DD-DW-SG-2021	Reinforcement of Transverse Beam TB2(1)	1	1	- do -
60	14S400-DD-DW-SG-2022	Reinforcement of Transverse Beam TB2(2)	1	1	- do -
61	14S400-DD-DW-SG-	Structure for Transverse Beam TB3	-	1	- do -

S. No.	DOCUMENT No.	TITLE	REV	PAGES	REMARKS
62	14S400-DD-DW-SG-2023	Reinforcement of Transverse Beam TB3(1)	0	1	Issued for Construction
63	14S400-DD-DW-SG-2024	Reinforcement of Transverse Beam TB3(2)	1	1	- do -
64	14S400-DD-DW-SG-	Structure of Transverse Beam TB4	-	1	- do -
65	14S400-DD-DW-SG-2025	Reinforcement of Transverse Beam TB4(1)	0	1	- do -
66	14S400-DD-DW-SG-2026	Reinforcement of Transverse Beam TB4(2)	1	1	- do -
67	14S400-DD-DW-SG-	Structure of Transverse Beam TB5	-	1	- do -
68	14S400-DD-DW-SG-2027	Reinforcement of Transverse Beam TB5(1)	0	1	- do -
69	14S400-DD-DW-SG-2028	Reinforcement of Transverse Beam TB5(2)	1	1	- do -
70	14S400-DD-DW-SG-2029	Reinforcement of Transverse Beam TB6	1	1	- do -
71	14S400-DD-DW-SG-2030	Reinforcement of Slab 1	0	1	- do -
72	14S400-DD-DW-SG-2031	Reinforcement of Slab 2(1)	0	1	- do -
73	14S400-DD-DW-SG-2032	Reinforcement of Slab 2(2)	0	1	- do -
74	14S400-DD-DW-SG-2033	Reinforcement of Slab 3	0	1	- do -
75	14S400-DD-DW-SG-2036	Reinforcement for Ribbed Slab (Type-1 & Type-3)	0	1	- do -
76	14S400-DD-DW-SG-2037	Reinforcement for Ribbed Slab (Type-4)	0	1	- do -
77	14S400-DD-DW-SG-2038	Plan for Ribbed Slab of LB(6-10)	0	1	- do -
78	14S400-DD-DW-SG-2039	Plan for Ribbed Slab of LB(11-15)	0	1	- do -
79	14S400-DD-DW-SG-2040	Reinforcement of Transverse Beam TB7(1)	0	1	- do -
80	14S400-DD-DW-SG-2041	Reinforcement of Transverse Beam TB7(2)	0	1	- do -
81	14S400-DD-DW-JG-1001	Layout Plan of Pipe-Rack	0	1	- do -
82	14S400-DD-DW-JG-1002	Elevation And Reinforcement of Pipe-Rack (Part-1)	0	1	- do -
83	14S400-DD-DW-JG-1003	Elevation And Reinforcement of Pipe-Rack (Part-2)	0	1	- do -
84	14S400-DD-DW-QL-1001	General Layout Plan of Steel Walkways	1	1	- do -
85	14S400-DD-DW-QL-1002	The Structure of #1 and #2 Steel Wakway (1)	1	1	- do -
86	14S400-DD-DW-QL-1003	The Structure of #1 and #2 Steel Wakway (2)	1	1	- do -
87	14S400-DD-DW-QL-1004	The Structure of #1 and #2 Steel Wakway (3)	1	1	- do -
88	14S400-DD-DW-QL-1005	The Structure of #1 and #2 Steel Wakway (4)	1	1	- do -
89	14S400-DD-DW-QL-1006	The Structure of #1 and #2 Steel Wakway (5)	1	1	- do -
90	14S400-DD-DW-QL-1007	The Accessory of #1 and #2 Steel Wakway	1	1	- do -
91	14S400-DD-DW-QL-1008	The Structure of #3 and #4 Steel Wakway (1)	1	1	- do -

S. No.	DOCUMENT No.	TITLE	REV	PAGES	REMARKS
92	14S400-DD-DW-QL-1009	The Structure of #3 and #4 Steel Wakway (2)	1	1	Issued for Construction
93	14S400-DD-DW-QL-1010	The Structure of #3 and #4 Steel Wakway (3)	1	1	- do -
94	14S400-DD-DW-QL-1011	The Structure of #3 and #4 Steel Wakway (4)	1	1	- do -
95	0-DD-DW-QL-1012	The Structure of #3 and #4 Steel Wakway (5)	1	1	- do -
96	0-DD-DW-QL-1013	The Accessory of #3 and #4 Steel Wakway	1	1	- do -
97	14S400-DD-DW-QL-1014	The Structure of #5 Steel Wakway (1)	1	1	- do -
98	14S400-DD-DW-QL-1015	The Structure of #5 Steel Wakway (2)	1	1	- do -
99	14S400-DD-DW-QL-1016	The Structure of #5 Steel Wakway (3)	1	1	- do -
100	14S400-DD-DW-QL-1017	The Structure of #5 Steel Wakway (4)	1	1	- do -
101	14S400-DD-DW-QL-1018	The Structure of #5 Steel Wakway (5)	1	1	- do -
102	14S400-DD-DW-QL-1019	The Accessory of #5 Steel Wakway	1	1	- do -
103	14S400-DD-DW-QL-1020	The Structure of #6 Steel Wakway (1)	1	1	- do -
104	14S400-DD-DW-QL-1021	The Structure of #6 Steel Wakway (2)	1	1	- do -
105	14S400-DD-DW-QL-1022	The Accessory of #6 Steel Wakways	1	1	- do -
106	14S400-DD-DW-QL-1023	Anchor Chain and Anti-Seismic Damping Pad	1	1	- do -
107	14S400-DD-DW-QL-1024	The Structure of Steel Ladder (1)	1	1	- do -
108	14S400-DD-DW-QL-1025	The Structure of Steel Ladder (2)	1	1	- do -

A. Documents Yet To Be Received:

4.1 Pipeline Works

(a) Custody Transfer Station (CTS):

- Design & Drawings (Mechanical, Electrical & Instrumentation).
- Pipe & Equipment, Filter Assembly, Metering Skids, Water bath heater Third Party inspection report (factory) etc.
- BOQ – (Mechanical, Electrical & Instrumentation) - supply & installation of equipment
- Welding procedure specification (WPS)
- Procedure Qualification Record PQR-welder
- Welder Qualification Test (WQT)
- Quality Inspection Plan-QIP
- Firefighting system, Fire & Gas detection

(b) 24" dia pipeline from Jetty loading Platform to Custody Transfer Station (CTS) Length 6.5 km:

- Design & Drawings to be provided in A-1 size (Plot Plan, sectional drawings & Detail / shop drawings), Isometric drawings
- Technical specification for all material & Installation / construction of pipeline
- Pipeline 24"dia (MSDS) and three layer P.E. coating manufacturer's inspection report
- Monolithic joints for isolation of underground to above ground pipelines
- Rubber sleeve for isolating casing pipeline & carrier pipeline.
- Heat shrink sleeve
- Tape coating on elbows/ bend (MSDS)
- Vent pipe installation on casing pipe on both sides
- CP system design, drawing, technical specification & BOQ including supply & installation methodology

(c) 42" dia pipeline from Custody Transfer Area (CTS) up to SSGC Network.

- Design & Drawings to be provided in A-1 size (Plot Plan, sectional drawings & detailed shop drawings), Isometric drawings
- Technical specification for all material & Installation / construction of pipeline including:
 - Pipeline pipe 42"dia (MSDS) and Third Party inspection report (factory).
 - BOQ
 - WPS
 - PQR-welder
 - PQR-material, WQT and QIP
 - Monolithic joints for isolation of underground pipeline
 - End seal for isolating casing pipeline & carrier pipeline
 - Heat shrink sleeve, tape coating on elbows & bend.
 - Vent pipe installation on casing pipe on both sides
- CP System Design, Drawing, Technical specification & BOQ including supply & installation methodology

(d) Fire Protection & Firefighting system:

- Drawing, Design
- Technical specification & safety philosophy & applicable codes / standards
- BOQ included supply of material & installation of all material/equipment's etc

(e) Installation at Jetty:

- Submission of Design & Drawings must be in A-1 size including (Plot Plan, sectional drawings & Detail/ shop drawings) and Isometric drawings/detail drawing in A-3 size.
- Technical specification of equipment, installation & details procedures.
- Quality Inspection Plan
- Data sheets (manufacturing)
- List of mechanical equipment to be installed on Jetty along with technical specification.

(f) Methodology & Test Procedures:

- Thrust Boring
- Horizontal drilling direction (HDD)
- Tape coating / application wrapping on elbow /Bends/pipeline
- Hydrostatic test Procedure
- Pile coating/painting application procedure
- Holiday test procedure to check the coating integrity of pipelines

B) Documents partially received.

Following documents were partially received:

(i) Test Report:

Pipeline 24" & 42" dia. of Chemical, Mechanical & Metallurgy factory reports received, but same were not segregated for different dia & wall thicknesses of line pipes.

Required:- Number of pipeline with different schedules, length coated & uncoated / bare manufactured at Factory, Quality Inspection Plan, monitoring procedure & three layer coating application procedures, QIP during manufacturing & test reports.

(ii) WPS PQR, WQT Inspection Record:

- Welding procedure specification (WPS) for 24"dia pipeline API-5LX-70 found ok, but for 24"dia sch.100 material A-333 Gr.6 WPS have not been submitted, commenced the welding work without submitting WPS,WQT.
- Procedure qualification record (PQR) of material (pipeline with different schedule such as (24"dia Sch-100 SMLS material A-333 Gr.6) have not been submitted.

(iii) Material specification of relevant Document:

- a) **24”dia sch.100,SMLS,BE A-333 Gr.6- length-576m (New Trestle)**
WPS, WQT, PQR are still awaited
- b) **24”dia sch.40 SAW, BE API-5L Gr.X-70- length-1080m (Old Trestle) & 1284 m inside underground EVTL area.**
WPS reviewed and found ok
WQT record is missing
PRQ for material & welder missing
- c) **24”dia 10.74 mm ,SAW, BE API-5L Gr.X-70- length-4500m EVTL battery limits to Custody Transfer System(CTS)**
WPS reviewed and found ok
WQT record is missing
PRQ for material & welder missing
- d) **42”dia 16.74 mm wt ,SAW, BE API-5L Gr.X-70- length-1200m CTS battery limits to D.Factor**
WPS reviewed and found ok
WQT record is missing
PRQ for material & welder missing
- e) **42”dia 13.81 mm wt ,SAW, BE API-5L Gr.X-70- length- 4104 m D.Factor to SMS Pakland**
WPS reviewed and found ok
WQT received
PRQ reviewed and found ok

(iv) Technical & Construction Specifications:

Technical specification reviewed. Found following documents missing:

- Pipeline material specification
- Valves & fittings
- Three layer Poly ethylene coating
- Heat shrink sleeve specification
- Monolithic Joints/ Isolation joints
- Spacers for carried and casing pipeline
- End seal material casing pipe & carrier pipelines.
- Pig launcher & Pig receiver
- Anchor block
- Pigging material for (Foam, Cleaning wire, Gauging & Testing pigs)
- CP System (design, drawing, technical specification BOQ material supply & installation)

(v) Pipe Alignment Drawings:

Pipe Alignment drawing have been provided by EETPL in A-3 size from 1 to 14 EVTL Gate to CTS & SMS Pakland, Plant inside area layout drawings were missing. Drawings were required in A-1 size. Shop drawings are in A-3 size to monitor/check the work on site. A-1 size are required.

- In the above drawings Plot plan of pipeline was not provided which shows pipeline from LNG Jetty Platform to SMS PakLand.
- All isometric drawings to be provided.
- Layout Plan of jetty top side drawing submitted in A-3 size which was required in A-1 size. Also isometric drawings of jetty top required

- Layout plan of Custody Transfer Drawing provided in A-3 size, is required in A-1 size & also was required isometric drawings to monitor the works conveniently.

(vi) Quality Inspection Plan (QIP) :

- Quality Inspection Plan (QIP) for 24”dia pipeline received & reviewed. Found satisfactory. 42” dia pipeline QIP have not been submitted, but mentioned in Transmittal #06, dated:09/12/2014.
- QIP Plan submitted on plain paper, without logo or signature of Developer/Engro. All documents need to be submitted in proper way for documentation.

(vii) Bill of Quantity (BOQ):

BOQ submitted. After review it was found incomplete i.e. deficient in purchase of material of pipelines, fitting, Pig Launcher, Receiver, Pig material, Isolating joints, insulators, end seal, Construction / installation material, piping, crossing through Thrust Boring.

(viii) Horizontal Direction Drilling (HDD) / Thrust Boring:

Horizontal direction drilling / Thrust Boring methodology document were reviewed. It was noted that it was written on plain paper, without proper stamping or signature. It did not indicate exact crossing road or railway & canal / nallah, length of crossing, type of equipment and procedures they have followed/applied to conduct Thrust boring & HDD. Signed and stamped copies were needed.

2. Hydrography:

Following information / report / data were required.

- PQA Wish List from Mr. Jawad, Director (Channel Dredging) as per requirement of Director General (Technical), PQA.
- Bathymetric data of Chara / Chhanwaddo Creek to study the prospect of developing navigable channel as alternate passage bay.
- Met-Ocean data, reports or studies.

▪ **Environmental Studies:**

Following information / report were needed.

- Second Quarterly Environmental Monitoring report (Sep/Oct/Nov-2014), the one submitted to SEPA
- Monthly Environmental Monitoring report (Dec 2014)
- Minutes of Meeting dated 7 Jan 2015 & 14 Jan 2015
- Updated schedule of activities at EETPL

- Mooring Simulation.
- Report on 1 UCN responding mangrove replantation.
- EETPL's Response to Nov 2014 Environmental Monitoring Report.
- EETPL to share Dec 2014 Environmental Monitoring Report (monthly report).
- EETPL to share Sep/Oct/ Nov 2014 Environmental Monitoring Report (2nd Quarterly Report).
- EETPL to share copy of receiving of submission of Jun/Jul/Aug Environmental Monitoring Report (First Quarter) to SEPA.
- EETPL to share Mangrove Replantation (scoping) Study by IUCN.
- EETPL to share minutes of meeting 7 Jan, 14 Jan.
- Updated Schedule of activities overall and especially environmental post construction.

3. Piling and Concrete Work:

- Mix design used for different grades of concrete used.
- Representative cube test result of various elements.
- Test result of materials used in concrete i.e. aggregates & cement etc.
- Technical information along with manufacturers' recommendation's for Additive's and curing compound, used in concrete works.
- Test result of deformed and plane steel reinforcement.
- Concrete test result of imported precast concrete piles.
- Field test result of different coats of painting on steel piles
- Test results of spiral welding of steel piles
- Toe level of driven steel and concrete piles.
- Test report of galvanization of various elements used in the project.
- Structural design calculation of all piles and RCC Work.
- Punch list for all completed works.
- As built drawings of jetty and pipeline works including allied works.

4. Third Party Inspection Report & Approved Documents:

- a) Fenders & Accessories.
- b) Prefabricated segments of Walkways.
- c) Imported precast concrete piles.
- d) Imported mechanical and electrical items including those at jetty and STS Sites.
- e) Verified and signed copy of the layout of the Jetty including Breasting & Mooring Dolphins, confirming the coordinates given in Design Drawing.
- f) Verified / signed copy of the post dredging survey (soundings) of the berthing basin.

5. Documents required by Granda Group:

Overall Project Schedule	Received
Currently updated copy of the milestone schedule of project implementation activities.	Not Received
A complete list of all the studies and data used for design basis of the Terminal Jetty infrastructure and site selection.	List of Studies has been received which shows a number of essential studies are missing. Met Ocean Data Acquisition Report and the missing parts of the Mooring Study and Mathematical Model of the Hydraulic Study for Terminal Site has now been received.
A complete list of all the vetted and approved design drawings.	A list of Civil Engineering and Structural Drawings has been received from ECIL. No drawings or data received for LNG infrastructure details or the equipment and machinery.
A copy of the Testing Schedule of all the machinery and infrastructure along with the planned testing procedures.	Protocol for Testing has now been received but the Schedule still remains to be finalized.
A copy of Commissioning Schedule and Commissioning Procedure of the Terminal.	Not received
A copy of the Safety and Operations Manual for the Terminal	Operations Manual has now been received for our review which is in progress.
A list of operational staff and their training details as well as qualifications who are to be responsible for the operation of the Terminal and handling any emergency situations	Not received
Details of Fire Fighting and Emergency Stations including design and equipment details as well as the training of staff responsible for handling LNG spill and fires	Not received

Copy of a Full Mission Bridge Simulation (FMBS) Study carried out by the Terminal Developers and results of the same

Has been received and evaluated. Comments forwarded to AEAI. Fresh FMBS Study has been scheduled to be carried at Spain from 16th February with updated data. Results of the Study are being awaited.

List of additional pertinent drawing and documents has also been submitted by ECIL for obtaining the same from PQA/Engro for review.

Full status not known at this time.

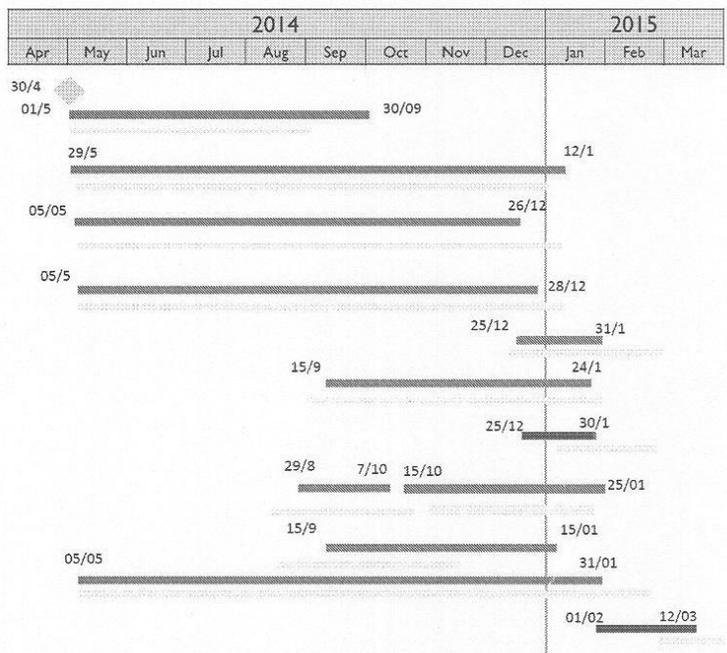
Annex 5

Annex 5

FAST TRACK LNG PROJECT

**Project Update
Project Schedule**

- LSA Signing
- Engineering
- Equipment Procurement & Delivery at Site of (JTS-CTS)
- Marine Works - Jetty Platform
- Marine Works – Trestle
- Marine Works – Other
- CTS Construction Works
- JTS Equipment Erection
- Pipeline 24"
- Pipeline 42"
- Mechanical Completion
- Pre-Commissioning / Commissioning



Current Bar
Baseline
Critical Path

Note: FSRU Arrives without Carrier

CTS - Custody Transfer Station

JTS - Jetty Top Side

Comments of Environmental Consultants on Reply by IMC in respect of Report of October 2014.

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
1.	Pg 2 states that "Mangrove Removal has been completed in July". Details of area affected is missing and need to be provided.	Please see page #3 of October monitoring report where the details of the reclamation are provided in Fig 1.3 The quantity of dredged material is 1.07 million m ³ .	The area from which mangrove ecosystem was destroyed is not identified. The extent of reclamation and its area depends on the exactness of the damaged area,
2.	Work Methodology comprising of data collection, sampling technique and testing methodology is not attached. The report (Annexure 1), contains Monitoring Frequency in the Methodology section.	Sampling of air emissions, wastewater and noise are conducted as per the Sampling Rules. The testing methodology is provided in the testing report (please see Annex I).	1) Work Methodologies comprising of: i. Site data collection ii. Sampling & iii. Testing need to be specified in the report. 2) Please specify as to which 'Sampling Rules' are being followed.
3.	October Report Annexure I (as Sept 2014 report): details the monitoring frequency of environmental parameters. The monitoring frequency do not coincide with the frequency given in ESIA approved by SEPA. These include solid waste, dredged material, Bentic Fauna.	The monitoring frequency as per the revised ESIA report. Solid waste is disposed off as per EETPL waste management Plan (<u>Annex II</u>) Dredged material is tested monthly and was tested for Oil & Grease and TPH in Sep. and Oct. and tested for Oil & grease, TPH and Heavy metals in November.	For Solid Waste, Annexure-II comprising of 'EETPL's Waste Management Plan' was not in the Environmental Monitoring report of Sep. or Oct. or Nov. 2014 reports provided to ECIL Environmental Consultant. For Dredged Material EETPL and EETPL's IMC are requested to provide document /

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
		<p>Benthic Fuana was checked in December as it takes some time for the regeneration for the species after dredging. (<u>Report attached in Annex III</u>)</p>	<p>communication which authorize the change in testing parameters and its frequency within this parameter.</p> <p>For Benthic Fauna: Annexure III was not in the Env. Monitoring report of Sep, Oct or Nov 2014, provided to the ECIL Environmental Consultant.</p> <p>It is the Consultant's opinion that the reports provided to them were not complete as is evident from IMC's reply also.</p>
4.	<p>"Occupational Safety" parameter proposed for monitoring in SEPA approved ESIA is not included in the October Report also.</p>	<p>Please see page 9 (Heading: Temporary Construction Camp site) and 12 (Heading: Health and Safety) of October report in which no photograph of slip trip hazard was identified.</p>	<p>A similar heading of the section might have avoided this confusion.</p> <p>Occupational Safety Parameter comprising of Accident and PPE are covered. Any reference to the third parameter of Occupational Safety i.e. Annoyance, could not be seen.</p>
5.	<p>"Land Reclamation" parameter proposed for monitoring in SEPA approved ESIA is not included in the October Report also.</p>	<p>Land Reclamation – Reclamation site is present and the dredged material is stored there pending instructions from PQA regarding its reuse /disposal/ The dredged material sample is checked</p>	<p>The parameter in Land Reclamation is 'Soil Quality' which is interpreted by IMC as Oil & Grease and Total Hydrocarbons. This Consultant interprets Soil Quality to include minerals also.</p>

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
		monthly. Please see section 2.1.5 for dredged material results.	It needs to be decided by SEPA, what is included in Soil Quality.
6.	<p>Test Parameters of different pollution medium as approved in ESIA by SEPA are not followed in October 2014. These include</p> <ul style="list-style-type: none"> Dredged material (Benthic community, erosion and sedimentation, vegetation,) Marine ecology (biodiversity) Solid waste (quantity and quality) Waste water (Primary pollutants: This needs further interpretation) Soil(contamination, erosion, sedimentation,) Occupational Safety (accidents, PPEs, Annoyance) Land Reclamation (soil quality) 	<p>Benthic Community , marine ecology has been checked in December and Report is attached in <u>Annexure III.</u></p> <ul style="list-style-type: none"> ▪ The reclamation site is lined with geotextile material and the status of the site is checked during monthly visits. ▪ Wastewater is generated only at the temporary constructions site and it is collected in the septic tank and disposed off through KMC . The following parameters are checked for wastewater : pH, BOD, COD , TDS, TSS and Oil and grease against NEQS limits. ▪ Occupational Health and Safety: It is checked and reported on monthly basis under the heading of Temporary Construction Camp Site and Health & Safety. A safety statistics board is 	<p>Annexure III was not in the Env. Monitoring report Sep or Oct or Nov 2014 reports provided to Environmental Consultant of ECIL.</p> <ul style="list-style-type: none"> ▪ PQA may like to comment. ▪ Reference to ECIL Env. Consultant comments, items missing are as follows: <ul style="list-style-type: none"> i. Dredged material (erosion and sedimentation & vegetation). ii. Solid waste (quantity and quality) iii. Soil contamination, erosion and sedimentation,

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
		<p>maintained notifying accidents /incidents against hours worked (Photo attached in page 12 of October report.</p> <ul style="list-style-type: none"> ▪ EETL has a comprehensive project management plan and conduct internal audits, toolbox talks and training sessions regularly. (Photos on page 13 of the October report) 	
7.	<p>Text of observation is the same with minor changes</p> <ol style="list-style-type: none"> a) Temporary construction camp site b) Ambient Air Quality c) Generator Emissions d) Noise e) Waste water f) Water and drinking water g) Solid waste h) Health & Safety i) Mangroves removal and replantation. <p>95% of the text is the same and does not added any value the second time it is repeated. Hence it is better if the same is excluded.</p>	<p>The text of observation remains the same as no major changes have occurred over the past months. The same is included for clarification purposes and summary is included in the quarterly monitoring report to SEPA.</p> <p>It shall be excluded after discussion with EETL</p>	No Comments

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
8.	Ambient Air Quality refers to SEQS pg 14 while Noise refers to NEQS pg 15 while IFC standards proposed for waste water are never referred.	<p>Ambient air quality parameters SEQS were referred in the beginning but after receiving clarification from SEPA regarding the SEQS for ambient air quality, the NEQS for ambient air quality is being followed.</p> <p>IFC standards for wastewater are not being applied here as the wastewater from septic tank is not treated and neither is it being discharged out. The waste water from septic tank is disposed through KMC.</p>	No Comments
9.	October 2014 report does not have laboratory test reports attached to the main report	<p>The reports are being sent to EETL. The test results are reported and discussed in the report.</p> <p>The reports shall be annexed from December.</p>	EETPL should include and provide Test reports with the main Environmental Monitoring Report.
10.	Waste water parameters shown in Oct 2014 report do not comply with NEQS. Environmental Monitoring Report states (pg 16) that "waste water is disposed off via PQA".	The mistake is regretted. The wastewater is disposed off via KMC.	What recommendations / mitigations are being proposed by IMc and implemented by EETPL for wastewater parameters not complying with NEQS?

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
	<p>This transfers the responsibility to PQA the disposal of waste water that is not in compliance with NEQS. Further clarification is needed so as to determine the party responsible for disposal of non-compliant waste water.</p> <p>Corrective measures for complying waste water with PK-NEQS, is in any case, the responsibility of EETPL. Recommendation as to comply waste water with NEQS need to be provided / included in the report for construction as well as operations phase.</p>	<p>The wastewater is collected and disposed via KMC and since no treatment is being done, hence mitigation measures are not recommended .</p> <p>For Operation Phase the wastewater treatment and disposal shall conform to the EMP of the revised ESIA Report.</p>	<p>The comments are repeated.</p> <p>“Corrective measures for complying waste water with PK-NEQS, is in any case, the responsibility of EETPL. Recommendation as to comply waste water with NEQS need to be provided / included in the report for construction as well as operations phase.”</p>
11.	<p>Solid waste was generated in the October and its disposal mechanism is stated (pg 10) to be through contractors. Solid waste inventory is required in line with SEPA NOC dated 07-07-2011 section (xv).</p>	<p>Please see Annex II for Solid Waste Management Plan and inventory.</p>	<p>For Solid Waste: Annexure II comprising of ‘EETL’s Waste Management Plan’ was not in the Env. Monitoring report Sep or Oct or Nov 2014 reports provided to Environmental Consultant of ECIL.</p> <p><u>It is this Consultant’s opinion that the reports provided to us were not complete as is evident from IMC’s reply also.</u></p>
12.	<p>SEPA Approved ESIA stated that baseline monitoring will be done for:</p>	<p>Baseline monitoring of air emissions and noise was conducted during the ESIA</p>	<p>OK, baseline for air and noise emission were established in the revised ESIA Jan</p>

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
	<p>a) Air emissions and b) noise.</p> <p>The report does not refer to any such activity and discussion of incremental effects on environment due to this project is missing in October report also</p>	<p>study of the project. (ESIA Report dated January 2014)</p> <p>The incremental effects on environment from baseline shall be provided in the December Report.</p>	<p>2014 and also provided to the consultants.</p> <p>What about the Oct, Nov reports?</p>
13.	<p>Because the objective of October report also, stated (Page 4), "IMC will monitor implementation of EMP"</p> <p>SEPA NOC section (vi) "<u>EETPL will strictly adhere to minimize negative environmental impacts on marine ecosystem</u>"; hence the responsibility of implementation of Environmental Management and Monitoring Plan lies on EETPL.</p> <p>Mitigation efforts on EETPL's part in light of Environmental Monitoring Report October 2014, is missing for non-complying items such as waste water.</p>	<p>EETL has a comprehensive Project Management Plan and their contractors M/s China Harbour also have their own Project management plans which have been shared with EMC.</p> <p>As reported earlier, please see reply of #10</p>	<p>No Further Comments from the previous one</p>
14.	<p>Some typo / formatting issues found (e.g. page number missing after pg 13, etc) in Oct Report.</p>	<p>Typo error is regretted and shall be rectified.</p>	<p>No Comments.</p>

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
15.	<p>[Carried forward partially from Sept Report]</p> <p>September Report Executive Summary states that dredging commenced in August, however no further discussion is found regarding its quantity, commentary of test results, mode of disposal and approval from SEPA for disposal of the same</p>	<p>The amount of dredged material is 1.07million m³</p> <p>The dredged material is collected in the cofferdam constructed for the purpose and the testing of dredged material commenced from September.</p> <p>The dredged material shall be disposed off as per advice from PQA.</p>	<p>No Further Comments from the previous one.</p>
16.	<p>[Carried forward partially from Sept Report]</p> <p>Engro and its IMC need to see what parameters for <u>Waste Water</u> and <u>Air Emission</u>, it ought to test in light of National Environmental Quality Standards (Self-Monitoring and Reporting by Industries) Rules in line with SEPA NOC dated 07-07-2011 section (xiv)</p>	<p>Wastewater is generated only at the Temporary construction camp and air emissions are generated from the generator at the temporary construction camp and from pipeline laying activity at the jetty</p> <p>The wastewater is collected in septic tank and it is not discharged out but is disposed off through KMC. The primary parameters that are checked are: pH, BOD, COD, TDS, TSS and Oil and Grease.</p> <p>As per the SMART Rules 2001, the wastewater that is discharged out of site</p>	<p>Noted, EETPL has a Zero Liquid Discharge Facility and waste water during its operations phase shall be disposed through contractors to comply with EMP of ESIA.</p>

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
		are to be checked and EVTL is a zero discharge facility	
17.	[Carried forward from Sept Report] Copy of quarterly report submitted to SEPA is required in line with SEPA NOC dated 07-07-2011 section (xiii)	Has been sent and copy provided to EETL with SEPA receipt	Submission of 1 st Quarterly Report still pending. Received copy of Submission of 2 nd Quarterly Report in Jan 2015.
18.	[Carried forward from Sept Report] Copy of submission to SEPA of lab analysis of dredged material along with approval of mode and area for disposal of the same is required in line with SEPA NOC dated 07-07-2011 section (viii)	Quarterly monitoring report is submitted to SEPA. Two reports have so far been submitted June-August 2014 and September to November 2014.	Issue still pending.
19.	[Carried forward from Sept Report] SEPA approval through NOC dated 07-07-2014 states that IUCN / WWF and Forest Department of Govt. of Sindh will be consulted for mangrove replantation. Engro is only going ahead (as per meeting held on site on 24 dec 2014) with IUCN's proposal; to be shared after August 15, 2014.	EETL has signed MOU with IUCN. EETL shall be consulting with WWF and Forest Department as per conditions of SEPA NOC for the project.	Issue still pending.

Sr. No.	Description	Reply by IMC	ECIL Environmental Consultant's Comments on IMC's reply
20.	<p>[Carried forward from Sept Report] September and October report: mangrove section Pg 19 and Pg 13 respectively states that "mangrove atleast 5 times will be replanted" but SEPA NOC states that it will be ten times the area destroyed.</p>	<p>Typo error is regretted. It is <u>ten times the amount removed</u></p>	<p>No Comments.</p>
21.	<p>[Carried forward from Sept Report] Sept / Oct Report : The concept of testing dredged material is to check the underlying minerals in the sea bed that will be re-suspended due to dredging. Mineral testing is missing in September / October 2014 report.</p>	<p>Heavy metals as well as Oil and Grease and TPH have been tested and reported in November report.</p>	<p>Noted.</p>

QUALITY ASSURANCE REVIEW OF EETPL LNG TERMINAL PROJECT DOCUMENTS
GAP ANALYSIS OF SUBMITTED DOCUMENTS AGAINST US NFPA CODE 59 A - 2013 TEMPLATE

1.0 General

The documents in the below listed inventory were received from PQA through AEAI and ECIL for our review and assessment, as part of Quality Assurance Process, for compliance of the EETPL LNG Terminal Project with all the International Codes, Guidelines, Regulations as well as the Industry Best Practices stipulated under the Pakistan LNG Policy 2011 that governs the Implementation of LNG Projects in Pakistan. The reports (released by LRS) and subsequent letters from EETPL claim compliance of the Terminal design, construction and operation with SIGTTO, PIANC, NFPA and other Standards stipulated in the Pakistan LNG Policy 2011. The LR Report concludes that “the ERTL’s FSRU based LNG Terminal is adequately safe for other than normal/usual Risk and Hazards for Operability”. The gaps noted between the claimed and actual level of compliance with the PIANC standards and recommendations are identified and shown in the appended Gap Study which is confined to NFPA Code 59 A – 2013 Edition. Additional Gap Studies have been conducted to evaluate the contents of the documents against the requirements of the SIGTTO and PIANC codes and have been forwarded previously.

The documents were supplied by the PQA progressively. Some documents appear to be incomplete since the attachments / appendices were not annexed to main document. In some case, drawings and sketches also appear to be missing. After continuous requests and reminders for three months, the MET OCEAN Data Collection Report was finally received towards the end of January, 2015 – although was released by the vendors in July, 2014. This report is largely based on historical data of the PQA channels and the FOTCO Terminal Weather Station and is neither recent nor site specific. Accuracy of the studies and the basis of design of moorings and the jetty is therefore questionable – to say the least. However, the documents received were examined and compared with the prescribed Standard and Codes and the best practice. The main documents so received are listed as under:-

2.0 The Document Inventory

REF. #	DOCUMENT DESCRIPTION
1.	QRA REPORT.....April 2011 This was a 260 pages generic QRA Report - issued by Lloyd's Register of Shipping in April, 2011 - of three possible sites identified by Engro – VOPAK for an LNG Terminal. The report included results of Hazard Identification Study, Risk Assessment Study and Maneuvering Simulation Study for the three identified possible sites.
2.	HAZID/HAZOP STUDY.....March 2014 This was a part of 74 – Page documents dated March 14, 2014 with a cover letter Ref. PQA/DGM (PSP)/253/2007 dated March 24, 2014 From ENGRO ELENGY TERMINAL PRIVATE LIMITED along with the following attachments: <ul style="list-style-type: none">• Attachment 1: Letter ref: TK/EVTL/March/01 issued by Lloyd's Register of Shipping dated March 19, 2014 summarizing the findings on Consequential analysis Report Doc. No: OLG/DA/10080 Rev.1• Attachment 2: Letter from SEPA dated March 20th, 2014 approving the orientation of the proposed Jetty of the new LNG Terminal from perpendicular to parallel to the main channel of Port Qasim subject to a number of conditions.• Attachment 3: <u>HAZID/HAZOP STUDY</u> – Ref: OGL/DA/10078 dated March, 2014 issued by Lloyd's Register of Shipping.
3.	UPDATED QRA REPORT.31 st March 2014 5- Page letter titled <u>Updated QRA</u> for proposed ETPL Project Site from ENGRO ELENGY TERMINAL PRIVATE LTD. dated March 31, 2014
4.	COSEQUENCE ANALYSIS REPORT.....22 nd Feb. 2014 43 Pages document with a one page cover letter from ENGRO ELENGY TERMINAL PRIVATE LTD. And the attached <u>Consequence Analysis Report</u> dated February 22, 2014 issued by Lloyd's Register under Reference # OGL/DA/10080

5. UPDATE ON HAZID/HAZOP STUDY RECOMMENDATIONS.26th Dec. 2014
 Two Excel Work Sheets giving update on the HAZID – HAZOP Recommendations received from PQA through ECIL on December 26, 2014. Most of the open items on the work sheets are claimed to have been closed. The Operability S.O.Ps. are still not finalized. Target date for closing a number items was December 15, 2014. Current status of these items is not known at this time. Annex C was not received.
6. NAVIGATION SIMULATION MODEL TEST.Dec. 2014/Jan. 2015
 37 Pages document entitled **Mooring Layout Verification and Mathematical Mooring Model** prepared and issued by Artelia Eau and Environment Consultants for CHEC on December 01, 2014 and received from PQA through ECIL on December 26, 2014. The basis of Model Test was verbal information given by two witness Pilots only. The result involves conditions for Q_{flex} only and prohibits Q_{max} . Part B of this Study was received last week along with the MET-OCEAN Data comprising mainly of historical environmental and hydraulic data collected in the PQA channels and in the weather station near the FOTCO Terminal. Site Specific data measured and presented is insufficient to conclude the accuracy of the model and studies based on this data. Accuracy of the Mooring Study and the Mooring layout Verification Mathematical Model can neither be accepted nor denied.
7. EXCELERATE SECURITY ASSESSMENT REPORT (SAR).Dec. 2014
 13 - Page document issued by Exceletrate Energy on December 17, 2014 and received from PQA through ECIL on December 26, 2014. The report reveals insufficient security and incapability of PQA on a number of security issues. It recommends deployment of a lot of security equipment and personnel/training.

3.0 Development of NFPA Code 59 A 2013 Template

It is to be noted that whilst majority of clauses of NFPA 59A standard are concerned with LNG plant, its storage, processing and distribution, there are certain particular requirements that govern the marine terminals and related infrastructure that is involved in the handling of LNG that is offloaded from the LNG delivery ships in to the Terminal storage for re-gasification and supply to the shore pipelines. Some of these requirements were considered during the HAZID-HAZOP workshop and covered in the open items of the HAZID-HAZOP worksheets. These 'OPEN' items remain to be closed by independent or Class Surveyors prior to final testing and commissioning of the ETPL LNG Terminal

4.0 Conformance Coding System

We encountered multiple versions of the reference documents which were provided to us during various stages of the evaluation. Furthermore, at the time of report writing the LNG project continues to be in final state of implementation. As such it was considered essential to develop a conformity coding system where current status of each activity could be marked out giving subject-wise status of project element / component reviewed such that corresponding inferences can be drawn. Rationale adapted in achieving the coding method is explained at beginning of template.

5.0 Application of Template on Documents

The template was applied on the references together with citations of the NFPA Code 59 A – 2013 standard clauses. The “gaps” identified were remarked in a manner that inferences can be drawn in a collective manner. Based on these findings specific recommendations can be drawn for scoping the outstanding work such that the gaps on conformity are rectified.

6.0 Summary of Findings

Principal Areas of partial / non-conformance observed in the referenced documents were site selection considerations, location of jetty, approaches and navigation channel, collection and use of site specific data, computational hydrodynamic models. It seems EVTL considers it sufficient that since some studies have been carried out, the LNGCs Operations may commence without implementing the recommendations of the studies and those of the subsequent Gap Analysis carried out on these studies. Functioning of LNG Terminal is highly sensitive engineering operation at Sea and Land, which depends on strict adherence to the safety standards during the planning, construction and operational phases of the project. Therefore, compliance of the Standards / Codes, Regulations and Industry Best Practice which is also stipulated in the Pakistan LNG Policy 2011, is extremely essential. From the information available to us we notice that PQA and EVTL have so far not implemented Conditions and Recommendations conveyed to them by the LRS during the HAZID-HAZOP exercise and SEPA. It is very difficult to understand that in the absence of crucial information that remains to be obtained through the remaining studies and implementation of their own recommendations, how LR have gone ahead and declared the Project to have acceptable risk level and permitted the developers to proceed with the construction of the Terminal. Obviously, functioning of the LNG Terminal under these conditions raises concerns about the safety of the Terminal operations. It is therefore recommended that prior to commencement of LNGC's Operation the identified Gaps be addressed satisfactorily. If the non-compliances in the HAZID-HAZOP worksheets have been closed out then EETPL should forward the evidence of CLOSE out by an independent auditor or a recognized Class Society Surveyor.

7.0 Conclusions & Way Forward

- i. In initial review it was strongly recommended that above studies identified by Gap analysis be carried out in parallel to LNG terminal implementation and permanent project record for the LNG Project (the first of its kind in Pakistan) is formulated and kept in par as regards to compliance with international planning, safety, and operability standards.
- ii. Possibility of infringement on safety envelopes and operations on other terminals and operators in the vicinity is a liability which not only ENGRO is to carry but also Port Qasim, as hosting port, will have to deal with the same. Impact of ENGRO LNG Terminal on nearby terminals and industrial installations, populations must therefore be carefully re-evaluated with factual information and realistic mitigations implemented.
- iii. Lastly, the LNG terminal by ENGRO is first of its kind being implemented in Pakistan and this project must set the correct pace and precedence for other LNG terminals to follow. As such it should meet or exceed international best practices and conform to industry codes and standards available as of date.

TEMPLATE BASED ON US NFPA Code 59A 2013 FOR
Berthing & Offloading Operations of LNG Carriers
AT EETPL LNG Marine Terminal at Port Qasim
January – February 2015

As a part of the Quality Assurance program, the above inventory of documents is to be reviewed and the level of their compliance with the required codes and standards will be determined through gap studies between the actual work carried out against templates of the relevant codes and standards. Appended below are the findings of the gap study highlighting the level of compliance of the above studies with US NFPA Code 59A – 2013:

Glossary / Abbreviation, to indicate the level of CONFORMANCE & THE REFERENCES:

OK	The item has been adequately addressed as per practice and SIGTTO/NFPA Standard.
TEA	To elaborate and /or Add to fully comply the SIGTTO/NFPA Standard.
NC	Not Considered. Not Addressed. The item has been either ignored or inadequately addressed.
NR	Not Required or Not Relevant.
IC	Incomplete or needs adjustments to comply the SIGTTO/NFPA Standard..
NK	Not Known. No information available, viz a viz the study recommendation present / latest state.
SC	Study completed and verified. Acquired data is available and utilized in QRA.
SNA	Study not available. Data used in QRA is not verifiable or source of data unknown.
SM	Missing study which needs to be carried out and data required to authenticate the QRA assumptions.
SE	Essential Study to be carried out that has been ignored so far.

Sr. No.	Best Practice as per US NFPA 59A Standard	Level of Response	Remarks	Reference
1	2	3	4	5
	<p>NOTE-II: THE ABBREVIATIONS USED IN THIS COLUMN ARE : NA = NOT APPLICABLE NO = NO WORK / NOT TAKEN INTO ACCOUNT / NOT CONSIDERED. IC = INCOMPLETE WORK / WORK WITHOUT BASIS OR DATA NK = NOT KNOWN AND /OR NOT CONFIRMED. OK = COMPLIED WITH THE REQUIREMENTS</p>			
1.0	<p>Clause 5.3.7 ,NFPA LNG Terminal Planning Considerations..... As regards to Loading and Unloading Facility Spacing, are the following conditions satisfied: a. Minimum 30 m clearance required from any bridge crossing a navigable waterway?.....NA b. Is the loading or unloading manifold at least 61 m from such a bridge?.....NA c. Are the LNG / flammable refrigerant loading and unloading connections at a minimum 15 m away from uncontrolled sources of ignition, process areas, storage containers, control buildings, offices, shops ?.....NO/NK.</p>	<p>..... NA NK NC/IC/SM</p>	<p>..... No consideration of these distances.</p>	1,2,3,5,6,7
2.0	<p>Clause 11.5.1.Berth Design Requirements In design of the LNG terminal (jetty and pier), have the Developers taken into account following Met-Ocean data / design parameters specific to the ELENGY terminal site:? a. Wave characteristics.....NO b. Wind characteristics.....NO c. Prevailing currents.....NO d. Tidal ranges.....NO e. Water depth at the berth and in the approach channel.....IC/NO f. Maximum allowable absorbed energy during berthing and maximum face pressure on the fenders.....IC/NO</p>	<p>..... NC/SM NC/SM NC/SM NC/SM IC/SNA TEA/SNA</p>	<p>..... Assumed Met-Ocean data was used in the design of the jetty and the Mooring Dolphins. OPTIMOOR Analysis could therefore not be carried out due to side by side berthing configuration of the FSRU and the LNG Delivery Vessel. Depth and Energy</p>	1,2,3,5

	g. Arrangement of breasting dolphins.....OK h. Vessel approach velocity.....IC i. Vessel approach angle.....IC J. Minimum tug requirements, including horsepower.....OK k. Safe working envelope of the loading/unloading arms.....IC l. Arrangement of mooring dolphins.....OK.	TEA TEA TEA TEA TEA TEA/SNA	calculations need to be reliable and factual.	
3.0	Clause 11.5.2. Piping and Pipelines a. Are the pipelines located on jetty deck or pier susceptible to damage from vehicular traffic or other possible causes of physical damage?.....OK b. In case of underwater pipelines no exposure to damage from marine Traffic?.....OK c. Have the isolation valves and bleed connections been provided at the loading/unloading manifolds, liquid lines and vapor return lines.....NK d. Are liquid isolation valves equipped with both manual and auto operations?.....OK e. Are Power-operated valves capable of being operated from minimum 15 m from manifold area?.....OK f. Are valve actuators and power supply protected against 10 minute fire exposure?.....NC/NK g. Are valves adequately located at point of hose or arm connection to the manifold?.....NC/NK h. Do the bleeds or vents discharge to a safe area?.....NC/NK i. Has an independent and accessible isolation valve been provided on shore near approach to LNG jetty?.....NK j. For Multiple lines has grouping been made for valves?.....NK k. Have Valves been properly identified for their service?.....NK l. Are over 200 mm valves equipped with powered system?.....NK m. Have manual operation methods provided?.....NO/NK NC/SM NC/SM/SE IC/SM/SE IC/SM TEA/IC/SM TEA/SNA TEA/SNA/SM TEA/SNA/SM TEA/SNA/SM TEA/SE TEA/SE TEA/IC TEA/IC/SE Drawings and SOPs have not been made available for review. Compliance to the Codes/Industry best practice remains to be confirmed.	1,2,3,4,5.

6.0	<p>f. Checking for safe pressure, temperature, and volume values?.....NK g. Agreed procedures and sequence of transfer operations with vessel operator?.....NK h. Agreed procedures and transfer rate with vessel operator?.....NK i. Agreed duties, location, watches with vessel operator?.....NK j. Review of emergency procedures?.....NK k. Agreed communication aspects with vessel operator?.....NK l. Ensuring that transfer connections remain within limits of moorings?.....NK m. Ensure normal operating envelope of loading arms are not exceeded?.....NK n. Ensure alignment of LNG transfer system?.....NK o. Ensure purging of oxygen from liquid and vapor lines, loading arms, shore side piping systems?.....NK p. Warning signs are in place?.....NK q. Verify no source of ignition exists in marine transfer areas?.....NK r. Ensuring presence of personnel on duty as per operating manual?.....NO s. Testing of sensing and alarm systems, ESD system, Communication systems?.....NO/NK</p> <p><u>Operating Specifics</u>.....</p> <p>a. Do procedures specify that during marine loading or unloading, on marine connections all bolt holes in flange to be used?.....NK b. Have use of blind flanges been specified for arms not engaged?..NK c. Purging and draining requirements for marine loading or unloading arms?.....NK d. Provisions for marine loading or unloading operations at atmospheric pressures?.....NK</p>	<p>IC/SM IC/SM TEA/SNA/SE TEA/SNA/SE TEA/SNA/SE NC/SM/SE NC/SM/SE NC/SM/SE NC/SM/SE NC/SM/SE NC/SE NC/SE IC/TEA/SNA IC/TEA/SM IC/SM/SE NK/SE NC/TEA/SM/SE IC/TEA/SNA.</p>	<p>Compliance to the Codes/Industry best practice remains to be confirmed.</p> <p>Operations Procedure manual of the Terminal remains to be reviewed and evaluated. Status of Action item worksheet / updated Hazop is also not known. Close-out of the OPEN items by LRS remains to be confirmed.</p>	<p>1,2,3,4,5,,6</p>
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7.0	Safety Measures during transfer operations.....			1,2,3,4,5.
	<ul style="list-style-type: none"> a. Prohibition of Vehicle traffic within 30 m of loading/ unloading manifold?.....NK. b. Provisions of warning signs / barricades?.....NO. c. No independent means of egress be present?.....NK d. No sources of ignition shall be permitted in marine transfer area during transfer?..... NK. e. No handling of general cargo within 30 m of LNG connections?.....NK. f. System Maintenance Requirements.....NK. g. Have procedures been set for annual inspection of foundation system of each component?.....NK h. Has adequate provisions been made for emergency power.....NK i. Monthly checking and testing of emergency power source at LNG facility?.....NK j. Checking methods and system for insulation systems for impounding surfaces?.....NK k. Checking of Hoses for LNG and refrigerant transfer?.....NK l. Checking of relief valve setting?.....NK 	<ul style="list-style-type: none"> TEA/SNA TEA/SNA NK IC/SE IC/SM NC/SM/SE NC/SNA NC/SM/SE IC/TEA/SNA NC/SM/SE NC/SM/SE NC/SE 		
8.0	Clause 14.9.5 Marine Transfer Training of LNG product.....			1,2,3,4,5.
	<ul style="list-style-type: none"> a. Has provisions been made for Marine Transfer Training of LNG product?.....NO/NK b. Have qualifications experience of all persons been verified who will be involved in marine transfer of LNG to possess specific experience in following: <ul style="list-style-type: none"> -handling of potential hazards.....NK -handling of emergency proceduresNK c. Does the proposed training program cover the following: <ul style="list-style-type: none"> -LNG transfer procedures and exigenciesNK -Monitoring of training by experienced personnel.....NK -Provisions and operatives of contingency plan.....NK 	<ul style="list-style-type: none"> TEA/SNA IC/SE NC/SE 	<p>The standards of Training requirements, experience and qualification of persons operating and maintaining the Terminal remain to be evaluated and confirmed.</p>	

9.0	<p>d. Have shore side transfer operations been evaluated to possess: -Minimum 48 hours of LNG transfer experienceNK -Knowledge of the hazards of LNG.....NK -Knowledge of operational procedures.....NK -Knowledge of emergency manual procedures.....NK</p>	NC/IC/SE		
	<p>Clause 11.9 Communications and Lighting.....</p> <p>a. Has communications equipment provided at loading and unloading locations?.....NK b. Have complete lighting arrangements been provided at LNG terminals and all transfer areas during hours of darkness?.....NK c. Has a reliable ship-to-shore communication system and a separate emergency ship-to-shore communication system been provided?.....NK d. Has a monitoring system for monitoring communication system both aboard ship and at terminal been provided?.....NK.</p>	<p>TEA/SNA/SE TEA/SE TEA/SE TEA/SNA</p>	<p>The Communication system has not been addressed adequately. The report on Security has missed this issue.</p>	1,2,3,4,5,7
10.0	<p>Seismic Design Requirements</p> <p>a. Has selection and use of operating basis earthquake (OBE) been made?..... NO b. Have safe shutdown earthquake (SSE) been adapted?.....NO c. Has containment of LNG and prevention of catastrophic failure of critical facilities under an SSE event been taken?.....NO d. Have aftershock level earthquake (ALE) seismic levels been taken into account?..... NO e. During design life of terminal, have the engineering criteria and procedures catered for facilities to remain in operations for above earthquake scenarios?.....NK f. Has instrumentation capable of measuring ground motion been installed at the facility?.....NK g. In case of ground motion equal to or greater than design OBE ground motion do operating procedures allow LNG container to become out of service and OBE stress levels were not exceeded.....NO</p>	<p>TEA/NC/SM/SE TEA/NC/SM/SE TEA/NC/SM/SE TEA/NC/SM/SE TEA/NC/SM/SE TEA/NC/SM/SE TEA/NC/SM/SE</p>	<p>In the referred documents the "Seismic Design Requirement" have not been addressed adequately or a recommendation made. It seems to be escaped.</p>	1,2,3,4,5,6.

12

	<p>h. Has seismic design loading conditions been accounted for structures such as buildings/ process equipment?.....NO/NK</p>	TEA/NC/SM/SE		
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