MINUTA DE TRABAJO

LUGAR Y FECHA:	EN LA CIUDAD Y PUERTO DE MANZANILLO, ESTADO DE COLIMA, SIENDO LAS DIEZ HORAS DEL DIA VEINTIUNO DE ENERO DEL AÑO DOS MIL DOCE, REUNIDOS EN LA SALA DE JUNTAS DE LA JEFATURA DE LA CAPITANIA DE PUERTO DE MANZANILLO, SITA EN AVENIDA TENIENTE AZUETA S/N. EDIFICIO FEDERAL PLANTA BAJA, COLONIA BURÓCRATA.- -
INTERVIENEN:	LOS CC. CAP. ALT. MARCO ANTONIO VINAZA MARTINEZ, DIRECTOR GENERAL DE MARINA MERCANTE; CAP. ALT. ILDEFONSO CARRILLO MORA, CAPITAN DE PUERTO REGIONAL EN MANZANILLO; CAP. ALT. GREGORIO GILBERTO OROZCO MARTINEZ, CAP. ALT. JOSE LUIS DE LOS SANTOS HERNANDEZ, CAP. ALT. JESUS. CONSTANTINO MORALES GONZALEZ, CAP. ALT. JESUS SALAS BENITEZ, CAP. ALT. GUILLERMO ROMERO LOPEZ, CAP. ALT. RAUL HERNANDEZ JAUREGUI, ESTAS SEIS ULTIMAS PERSONAS EN SU CALIDAD DE PILOTOS DE PUERTO CERTIFICADOS PARA PRESTAR DICHOS SERVICIOS EN MANZANILLO, COL.. -
MOTIVO:	EMITIR DICTAMEN TECNICO SOBRE LA UTILIZACION DE SERVICIOS DE REMOLQUE A LOS CRUCEROS TURISTICOS QUE ARRIBEN AL PUERTO DE MANZANILLO, COL.. -
HECHOS:	EL CAP. ALT. GREGORIO GILBERTO OROZCO MARTINEZ, CON LA PERSONALIDAD ACREDITADA QUE TIENE EN ESTA DEPENDENCIA, QUIEN SE ENCUENTRA DEBIDAMENTE CERTIFICADO PARA EJERCER EL PILOTAJE DESDE JUNIO DE 1985, MENCIONA QUE DESDE ESA FECHA HA REALIZADO 17,500 MANIOBRAS COMPROBADAS A LAS DISTINTAS EMBARCACIONES QUE OPERAN EN ESTE PUERTO, EN LAS QUE SE INCLUYEN LAS CORRESPONDIENTES A LOS CRUCEROS TURISTICOS QUE HAN ARRIBADO DESDE ESA FECHA EN QUE INICIO OPERACIONES COMO PILOTO DE PUERTO, MANIFESTANDO QUE NO HA SIDO NECESARIO EL USO DE LOS REMOLCADORES DE PUERTO EN LOS CRUCEROS TURISTICOS QUE HA MANIOBRADO DESDE LA FECHA SEÑALADA HASTA LA ACTUALIDAD, Y QUE ASISTEN EN CALIDAD DE ACOMPAÑAMIENTO POR LA OBLIGATORIEDAD QUE EXISTE DE SU USO PARA ESTE PUERTO DE CARÁCTER GENERAL A TODAS LAS EMBARACIONES MAYORES A 2,500 UNIDADES DE ARQUEO BRUTO.- ASI MISMO TENGO A LA VISTA Y ANEXO AL PRESENTE, EL REPORTE QUE DEMUESTRA LA SIMULACION QUE SE REALIZO DE ESTE PUERTO EN EL CENTRO RTM “STAR CENTER” EN DANIA, BEACH, FLORIDA U.S.A. EN EL MES DE ABRIL DEL AÑO 2007 CON AUTORIZACION DE UN SIMULADOR EN QUE ASISTI, HABIENDO PARTICIPADO EN DICHOS EJERCICIOS, LA AUTORIDAD MARITIMA DEL PUERTO DE MANZANILLO, COL., REPRESENTADA POR EL CAP. DE ALT. ENRIQUE CASARRUBIAS GARCIA, EL DIRECTOR DE TURISMO DEL ESTADO DE COLIMA, LIC. MARCELINO BRAVO SANDOVAL, Y EL SUSCRITO; EJERCICIOS QUE ESTUVIERON INTEGRADOS POR TRES MODELOS HIDRODINAMICOS QUE CORRESPONDEN A DOS CRUCEROS TURISTICOS Y A UN BUQUE TANQUE PETROLERO, EN DONDE SE DETERMINO, QUE A PESAR DE EXISTIR UN OBLIGATORIEDAD PARA EL USO DE REMOLCADORES EN EL PUERTO DE MANZANILLO, TODA LAS MANIOBRAS SE PUDIERON REALIZAR DE MANERA SEGURA SIN LA ASISTENCIA DE LOS REMOLCADORES QUE SON DE LAS CARACTERISTICAS DE LOS QUE OPERAN EN ESTE PUERTO, NO ASI LA SIMULACION QUE SE REALIZO EN EL BUQUE PETROLERO QUE SE TUVO QUE REQUERIR LA ASISTENCIA DE DOS REMOLCADORES. -

	ES PRECISO SEÑALAR QUE AL MOMENTO DE REALIZAR LOS EJERCICIOS EN LA SIMULACION, EL ACTUAL MUELLE DE CRUCEROS TURISTICOS NO CONTABA CON LA INFRAESTRUCTURA, DEFENSAS Y BITAS DE ATRAQUE CON LAS QUE ACTUALMENTE CUENTA. -- EN BASE A LO ANTERIOR, MANIFIESTO QUE EL ESTUDIO REALIZADO EN EL "STAR CENTER" EN EL AÑO 2007, EN DANIA, BEACH, FLORIDA U.S.A SE CONSIDERA VIGENTE, PARA SER CONSIDERADO EN LOS CRUCEROS TURISTICOS QUE ARRIBEN A ESTE PUERTO, SIEMPRE Y CUANDO SE ENCUENTREN EQUIPADOS CON SISTEMA DE PROPULSION AZIMUTAL O CON PROPULSORES LATERALES EN PROA Y POPA QUE LES PERMITAN MANIOBRAR SIN LA NECESIDAD DE REMOLCADORES, SIEMPRE QUE EXISTAN CONDICIONES FAVORABLES DE VIENTO Y CORRIENTE, LO CUAL SE DETERMINARA POR EL CAPITAN DEL BUQUE, EL PILOTO DE PUERTO DESIGNADO PARA LA MANIOBRA CORRESPONDIENTE Y EL CAPITAN DE PUERTO. -- ASIMISMO, LOS PILOTOS DE PUERTO INTEGRANTES DE LA DELEGACION MANZANILLO, DEBIDAMENTE ACREDITADOS Y PRESENTES EN ESTA REUNION EMITEN SU OPINION CONSISTENTE EN NO SER NECESARIA LA OBLIGATORIEDAD DE REMOLQUE PARA CRUCEROS TURISTICOS EN CONDICIONES NORMALES DE OPERACION, RECONOCIENDO LA VIGENCIA DE LOS ESTUDIOS REALIZADOS EN EL "STAR CENTER" DE. DANIA, BEACH, FLORIDA U.S.A, Y RATIFICANDO LO EXPRESADO POR EL CAP. ALT. GREGORIO GILBERTO OROZCO MARTINEZ, PILOTO DE PUERTO. --
CIERRE DE LA MINUTA DE TRABAJO:	NO HABIENDO OTRO ASUNTO QUE TRATAR, SE DA POR TERMINADA LA PRESENTE MINUTA DE TRABAJO, SIENDO LAS TRECE HORAS CON QUINCE MINUTOS DEL DÍA VEINTIUNO DE ENERO DE DOS MIL DOCE, FIRMANDO AL MARGEN Y AL CALCE LOS QUE EN ELLA INTERVIENEN PARA LEGALIDAD Y CONSTANCIA. --

PILOTOS DE PUERTO

CAP.ALT. GREGORIO GILBERTO OROZCO MARTINEZ

CAP. ALT. JOSE LUIS DE LOS SANTOS HERNANDEZ

CAP.ALT. JESUS CONSTANTINO MORALES GONZALEZ

CAP. ATL. JESUS SALAS BENITEZ

CAP. ALT. GUILLERMO ROMERO LOPEZ

CAP. ALT. RAUL HERNANDEZ JAUREGUI

CAPITANIA DE PUERTO

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DIRECCION GENERAL DE MARINA MERCANTE
CAPITANIA DE PUERTO
MANZANILLO, COL.

EL CAPITAN DE PUERTO REGIONAL

CAP. ALT. ILDEFONSO CARRILLO MORA.

DIRECCION GENERAL DE MARINA MERCANTE

DIRECTOR GENERAL

CAP. ALT. MARCO ANTONIO VINAZA MARTINEZ

MANZANILLO PIER 2007

ESTADOS UNIDOS MEXICANOS

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COORDINACION GENERAL DE
PUERTOS Y MARINA MERCANTE
DIRECCION GENERAL DE
MARINA MERCANTE
CAPITANIA DE PUERTO
MANZANILLO, COL.

1 INTRODUCTION

This Summary Report describes a shiphandling simulator test program that evaluated a planned new cruise ship pier for the Port of Manzanillo, Mexico (see FIGURE 1 below reproduced from NIMA chart 21342, 28th edition). The program was conducted at RTM STAR Center in Dania Beach, Florida, USA, using a state of the art full mission 360-degree field of view shiphandling simulator. Testing consisted of a series of simulator-based maneuvers with an experienced Manzanillo Pilot controlling the simulated ships.

The overall objective of the testing was to verify that the planned pier design could safely and efficiently accommodate large (in the range of 290 meters long) cruise ships that will use the new pier. The planned version of the new pier was tested using two representative cruise ships. In addition, a tanker leaving a nearby PEMEX berth was simulated to determine if the new pier would adversely impact operations at the tanker berth. The results of the tests and associated conclusions and recommendations are contained in this report.

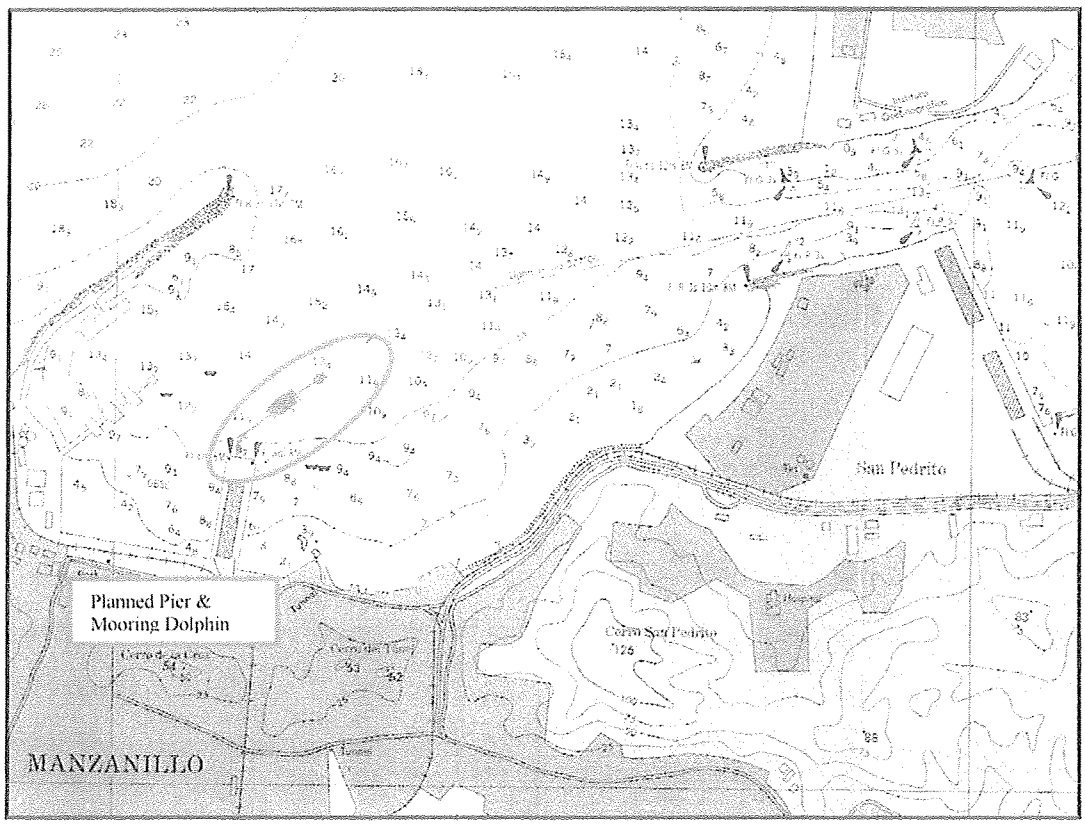

FIGURE 1 – Planned Location Manzanillo Cruise Ship Pier

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2 OVERVIEW OF TEST PROGRAM

The simulator testing took place during daytime test sessions on April 14 and 15, 2007. The participants, the simulator and simulation models, testing procedures and data collection procedures are discussed in this section.

2.1 Participants

An experienced Manzanillo Pilot participated in the evaluation by controlling the simulated ships from the simulator wheelhouse just as he would in actual practice. The Director of Tourism, Colima, the Manzanillo Harbor Master and a representative from the engineering firm, Consultec observed all test runs.

STAR Center personnel observed the simulated transits, noted results and conducted debriefings after each test run. STAR Center also provided an experienced helmsman to execute steering commands and a simulator operator to configure the simulator, monitor proper operation of the simulator, capture data, and make track plots of each test run.

2.2 Simulator Description

Simulation tests were conducted using STAR Center's 360-degree full mission bridge simulator. STAR Center's simulator bridge is a full size replica of a real world ship's wheelhouse. The equipment on the simulator bridge is configured to replicate the propulsion and directional controls and associated displays and the navigation equipment found on modern cruise and merchant ships.

The simulator geographic model provided a realistic Computer Generate Image (CGI) out-of-window view and a matching radar display. The visual and radar models incorporated aids to navigation and key landmarks in the surrounding area such as piers, commercial buildings, mills, smokestacks and other prominent features that could be used by the Pilot as reference when shiphandling. A matching underwater model was also incorporated. It included important hydrographic features that interact with the simulated ship including: current, bathymetry, banks, and pier faces.

The Manzanillo Pilot controlled the simulated vessels from the wheelhouse using real-world commands and procedures, and the transits occurred in "real-time". The simulator provided a 360-degree panoramic out–of-window view from the bridge and coordinated the view with the wheelhouse instrumentation including a radar and ECDIS (Electronic Chart and Data Information System). This provided a highly realistic work environment for the Pilot.

2.3 Simulator Ship Models

Three hydrodynamic ship response models from STAR Center's existing library of vessel were used in this evaluation. These included two cruise ships, and a ballasted tanker. The cruise ship models were selected to be representative of relatively large cruise ships (290 meter LOA) with conventional propeller and thruster arrangements.

The tanker model that was selected was slightly larger than the tankers presently calling at Manzanillo thereby providing a worse-case examination of berth impact. The ballasted condition of this tanker exposed it to the effects of wind more readily than in a loaded condition, further demonstrating worse-case conditions. The principle dimensions and specifications for the test ships used in this evaluation are provided in the following **TABLE 1**.

TABLE 1 – TEST SHIPS

Ship Name	*GOLDEN PRINCESS*	*CARNIVAL CONQUEST*	
Type of Ship	Cruise Ship	Cruise Ship	Ballasted Tanker
LOA/LBP (m)	289.5 / 242.0	290.2 / 247.7	244.0 / 229.5
Beam (m)	36.0	35.5	42.0
Draft (m)	8.5	8.2	5.7 fwd / 8.3 aft
Tonnage	49,265 Disp.	55,785 Disp.	54,260 Disp.
Propulsion	Diesel Electric	Twin Diesel	Slow Speed Diesel
Propeller	2 X Fixed Pitch	2 X variable pitch	1 fixed pitch
Propeller Direction	Outboard Turning	Inboard turning	Clockwise
Shaft HP	56,322 (2 X 28,161)	42,510 (2 X 21,255)	19,713
Rudders	semi-balanced (2)	spade type (2)	conventional (1)
Max Rudder Angle	45 degrees	35 degrees	35 deg.
Bow Thruster (hp)	8,850 (2,950 X 3)	6,921 (2,307 X 3)	None
Stern Thruster (hp)	6,921 (2,307 X 3)	6,921 (2,307 X 3)	None
These ship models have undergone extensive tuning and validation by mariners who were familiar with the maneuvering characteristics of each vessel, and the models' maneuvering characteristics were judged to be accurate during previous training programs and operational evaluations at RTM STAR Center.			

2.3.1 *Simulator Assist Tug Models*

Tug assistance is compulsory in the Port of Monzanillo. Therefore, two tugs were always available to the Pilot during the simulation tests. The simulated tugs were modeled to approximate the actual operational power and performance characteristics of the 4,000 HP (horse power) tractor tugs presently serving the Port.

While the tugs were always standing by and available, all test runs using cruise ships were completed without tug assistance. The single tanker run utilized two assist tugs.

2.4 Simulator Geographic Model

An existing model of Manzanillo inner and outer harbor and adjoining areas was used for this program. STAR Center had previously prepared a detailed simulator geographic model that was used during an earlier program that evaluated future assist tug requirements at the Port. The earlier modeling effort included an on site survey of the Port. STAR Center's modeling staff updated and refined the outer harbor portion of this existing database per engineering plans provided by Consultec. This included adding the new cruise pier and mooring dolphin and updating the underwater profile with more detailed and up-to-date bathymetry in the outer harbor. Additionally, mooring buoys charted just North and South of the new pier were removed in the new plan.

2.5 Test Procedures

The Pilot controlled the simulated ships just as he would in actual practice at the Port of Manzanillo. Real-world wheelhouse procedures were used during all test runs so far as practical. The bridge wing view feature (which moves the observers eye point out to the bridge wing) and radio communications of clearances between the ship and objects in the visual field were used when maneuvering close to the docks, buoys, and other visible objects.

Per the Pilot's and Harbor Master's recommendation, all tests included winds from the NW (northwest) with speeds ranging from 10 to 25 knots. The two tugboats were always available to the pilot, however, they were only used during the final test run, a departing tanker.

2.6 Data Collection Procedures

The simulator recorded information during each test run. This information includes the vessel's trajectory, heading, and information relating to control settings and control forces acting on the vessel including tugs and thrusters. The information was used to generate the attached track plots, and was archived for later analysis.

The Pilot filled out a "Run Evaluation Form" after every test run. This form solicited specific opinions about the just completed test run, based on: adherence to intended track line, vessel controllability, overall safety, and task difficulty.

Results from these forms were used in the analysis of each run. TABLE 2 in the following section lists all of the test runs, with associated test conditions, and the overall safety rating assigned to the test run by the Pilot. The Safety Rating scale is from 1 through 5 where a rating of 5 = "Absolutely Safe" and a Rating of 1 = "Not at All Safe".

The Pilot also summarized his opinion regarding the accuracy of the simulation modeling, and the suitability of the pier arrangement by completing a "Final Evaluation Form" after all simulator testing was completed. Comments on this form were used in the formulation and conclusions appearing in this report. STAR Center's project team kept notes regarding each simulator test, and noted simulator specific factors that might influence the interpretation of simulation results.

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The following table lists all simulation runs and associated conditions. A track plot and the associated Run Evaluation Form for each test run are provided at the end of this report.

TABLE 2 – Manzanillo Cruise Ship Pier Evaluation - Test Maneuvers

Run	Test Ship	Wind (dir/kts)	Berth Side	Operation/ side to berth	Notes/Safety Rating*
1	Golden Princess	NW 15 to 20	NA	Familiarization	
2	Carnival Conquest	NW 10 to 15	NA	Familiarization	
3	Carnival Conquest	NW 15 to 20	NA	Familiarization	
4	Carnival Conquest	NW 10 to 15	north	dock/port side	psr = 4
5	Carnival Conquest	NW 20 to 25	north	undock/port side	psr = 4
6	Carnival Conquest	NW 20 to 25	north	dock/stbd. side	not rated by pilot
7	Carnival Conquest	NW 20 to 25	south	dock/stbd. side	psr = 2
8	Carnival Conquest	NW 20 to 25	south	undock/stbd. side	psr = 3
9	Golden Princess	NW 15 to 20	north	dock/port side	psr = 2
10	Golden Princess	NW 20 to 25	north	undock/port side	psr = 2
11	Golden Princess	NW 15 to 20	north	dock/stbd. side	psr = 2
12	Golden Princess	NW 20 to 25	south	dock/stbd. side	psr = 2
13	Golden Princess	NW 20 to 25	south	undock/stbd. side	not rated by pilot
14	Golden Princess	NW 20 to 25 then reduced NW 15 to 20	south	dock/port side	psr = 1 (low psr because wind at start of test was 20/25 kts.)
15	Golden Princess	NW 20 to 25	south	undock/port side	psr = 3
16	Jupiter	NW 15 to 20	Pemex	undock/stbd side	psr = 3 (tugs assisting)

* Pilot's Safety Rating (psr): Rating of 5 = "Absolutely Safe"; Rating of 1 = "Not at All Safe"
note that the relatively low psr's are due to using worse case wind conditions combined with maneuvering the cruise ships with only thrusters and no tug assistance

3 TEST RESULTS

The Manzanillo Pilot completed 16 maneuvers on the simulator. The first three maneuvers served as familiarization exercises that gave him time to become familiar with the handling characteristics of the cruise ships and with working in the simulator environment. The remaining 13 test runs included five on the CARNIVAL CONQUEST, seven on the GOLDEN PRINCESS and one test on the ballasted tanker JUPITER.

Inbound tests maneuvers started with the bow 200 meters due north of the end of the breakwater. Ground speed at the start of the maneuver was 3 knots. Inbound tests concluded when the ship was close to, and parallel to the berth, at a point where mooring lines would be passed to the berth. Undocking maneuvers stared with the ship parallel to, and several meters off of the berth. Undocking maneuvers were terminated at the point where the ship had safely cleared the berth and could be accelerated out to open water.

The Pilot and Harbor Master recommended that the tests be conducted with a NW wind because it would provide for a worse-case condition with respect to the alignment (wind at right angles to pier) and exposure (open water lies to the northwest) of the new pier.

3.1 North Side Berth

Six runs were devoted to testing the berth on the north side of the new pier. Four of the tests were docking maneuvers and 2 were undocking maneuvers. All maneuvers were successfully completed without tug assistance.

The CARNIVAL CONQUEST and GOLDEN PRINCESS were docked without incident. Each ship was landed both port, and starboard side to the berth. The starboard side landings required that the vessel be turned and backed to the berth (test run # 6 & 11). Port side landings were more straightforward and possibly less challenging (test run # 4 & 9) because the approach to the berth was direct.

The CARNIVAL CONQUEST was docked successfully with a NW wind ranging up to 25 knots, which was the highest velocity tested (test run #6).

Both cruise ships were routinely undocked, backed away from the berth, and turned to sea when docked port side to the berth (test run # 5 & 10). These tests were completed in NW winds ranging up to 25 knots. Undocking with the ship starboard side to the berth was not tested because the undocking maneuver was much more straightforward with the vessels bow pointing out.

3.2 South Side Berth

Six runs were also devoted to testing the berth on the south side of the new pier. Three of the tests were docking maneuvers and 3 were undocking maneuvers. While the maneuvers for the south and north berths were almost identical in terms of executing the turn towards the berth, and the backing-in procedure, the Pilot assigned lower safety ratings to these maneuvers because of the proximity of the shallow waters lying immediately south of the berth.

The CARNIVAL CONQUEST was docked and undocked starboard side to in a NW wind ranging up to 25 knots (test runs # 7 & 8) and the GOLDEN PRINCESS was docked both starboard and port side to in a NW wind ranging up to 20 knots (test run # 12 & 14). The Golden PRINCESS was also undocked in the 25 knot NW wind from both a starboard side and port to lie to the berth (test run # 13 & 15 respectively).

While all maneuvers at the south side berth were successfully completed without tug assistance, it was necessary to reduce the maximum wind velocity from 25 knots to 20 knots during test run #14 when it was determined that the GOLDEN PRINCESS maneuvers were possibly unsafe in this high wind situation.

3.3 PEMEX South Berth

A large ballasted tanker was undocked from the PEMEX south berth in test run #16. The objective was to determine if a cruise ship docked on the north face of the new berth could interfere with ships using this PEMEX berth. The test was conducted with a NW wind ranging between 15 and 20 knots. This created the worse-case condition with a ballasted tanker being set by winds towards a passenger ship at the berth.

The trackplot of this test run shows that this maneuver was safely completed with adequate clearance to the cruise ship lying alongside at the new northern berth. Two 4,000hp tugs were used to assist undocking and turning the ship during this test.

4 CONCLUSIONS AND RECOMMENDATIONS

The overall conclusion from a cruise ship accessibility perspective is that, the proposed pier is a good location and has the best orientation with respect the available deep water, proximity to the breakwater, and the set back from the southernmost PEMEX tanker berth.

The new pier safely, and efficiently accommodated cruise ships in the 290-meter size range in NW winds ranging up to 25 knots during the simulated tests. The wind conditions tested, were representative of the maximum, credible, adverse wind conditions in the Manzanillo area, where cruise ship arrivals and departures would take place. The final determination to move a ship during similar, extreme conditions is always subject to the professional judgment of the Manzanillo Pilots, acting in consultation with the ship's Master.

Specific observations and discussions relating to various pier design elements and operational issues are discussed this section.

4.1 Pier Placement and Alignment

Several operational issues relating to the location of the pier were determined to exist as follows.

4.1.1 *South vs. North Berth*

The berth on the north side of the new pier is easily accessed and it can be the preferred berth, when there is a strong wind from the north due to the shallow waters that lie immediately to the south of the south side berth.

4.1.2 *Adjoining PEMEX Berth*

The single test with a large ballasted tanker demonstrated that there was sufficient space to safely move a tanker past the new berth with a large passenger ship docked alongside the north side of the new pier.

While the tanker movement was safely completed in a 15 to 20 NW wind, the Pilot noted that it would be prudent to wait until the north berth was empty before attempting tanker movements to or from the south PEMEX under similar northerly wind conditions

4.1.3 *Potential for Wave induced Surge at the Berths*

The Pilot and Harbor Master noted that the new pier could be exposed to waves and swells that are generated during northwesterly winds, mostly occurring between November and February. While the breakwater does afford some protection, waves and swell from the north will tend to will wrap around and could affect the area where the new pier is located. It is therefore concluded that, on rare occasions, a strong northwesterly wind may result in excessive ship motions for ships docked at the new pier. Our study addressed the challenges to maneuver and dock at the Northern and Southern berths, and does not directly examine wave and swell effects experienced by vessels while moored in these berths. The possibility that strong swells could occur at the berths does emphasize the need for a fendering system that is both sturdy and provides flexibility/compression cushioning. This issue is beyond our scope, and is only a point worth mentioning as an aside to our study.

4.2 Designated Turning Area

There is no need to designate and maintain a turning basin due to the existing deep water near the new berths. Notwithstanding, the cruise ships were turned in close proximity to the head of the pier where ample maneuver space is available, and some shelter from open ocean swells is provided by the breakwater.

4.3 Pier Dimension Considerations

The Manzanillo participants and RTM STAR Center Staff discussed several issues that should be resolved before finalizing the pier dimensions. RTM STAR Center followed up these discussions with informal inquiries to several cruise ship operators who are also STAR Center customers. Specifically, STAR Center asked the cruise line operators about their experience with finger piers with adjoining berths and their recommendations regarding the pier dimensions and layouts with respect to the following:

- width of the pier apron and fender system and recommended minimum separation between cruise ships when docked on opposite pier faces, and
- recommended location and size of the pier apron area that will accommodate the gangways.

Initial feedback from cruise operators indicate a recommended minimum width of 12 meters. Additional/amplifying information has not as yet been received at the time of this writing, therefore our recommendation will be withheld until, and if further recommendations are received.

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