PILOT STUDY

ALL WEATHER PSC TRAINING PROGRAM USING SIMULATION

AUDIT REPORT

(17-05-2016)

File # A 8012-106-1U

RDIMS: 11983108

INTRODUCTION

A Pilot Study, to determine if a simulation based training program could be used in an Approved MED-PSC course as the primary means to evaluate the competence of students in launching, operating, maneuvring and recovery of lifeboats and rescue boats, was submitted by Georgian College to Transport Canada Marine Safety and Security (TCMSS) for consideration.

TCMSS has decided to conduct an assessment of lifeboat simulator training for launching, operating, maneuvring and recovery of virtual lifeboat for the purpose of checking its effectiveness as well as comparing that with the training involving physical launching, operating, maneuvring and recovery of actual lifeboat and rescue boat.

The said program was initially evaluated on its own merits and, as a result, a TCMSS senior inspector was appointed to observe, inspect and, audit a Pilot Course delivered in Dartmouth Nova Scotia at Survival Systems Training Ltd. (SSTL). The TCMSS inspector appointed to assess the Pilot Course was Charanjeet Kalra who attended the Pilot Course on January 20th and 21st, 2016.

SSTL implemented a program based on an alternative course standard and lesson plan in which aspiring coxswains were trained to launch, operate, maneuver and recover both lifeboats and rescue boats using a simulation system conforming to the requirements contained in TCMSS Audit Report SIMULATION IN SURVIVAL CRAFT TRAINING dated 25-03-2015.

This decision to assess the Pilot Course has been adopted taking into account the following factors:

1. Canadian training providers have sought to expand their ability to provide MED PSC training during winter months when harbour facilities are frozen and they are unable to operate boats in the water as is currently required under TP 4957E. Winter months also represent a period of peak training demand while the Canadian fleet is in winter layup.

2. A key amendment to Table A-VI/2-1 of the Standards of Training, Certification and Watchkeeping for Seafarers Code (STCW Code) indicates that an "*approved simulator training where appropriate*" is a valid method to demonstrate and achieve the desired competence.

That being the case, TCMSS has taken the opportunity to determine, if using a simulated method may be considered acceptable, in order to acquire the specific lifeboat skills in a satisfactory manner.

While this report is the result of the Pilot Project performed at SSTL, simulation is only considered a potential substitute for the training elements related to the launch, recovery, operation and maneuvering of lifeboats and rescue boats. Training elements related to equipment familiarization, survival craft seamanship and survivor management will still be

required to be delivered using an actual lifeboat conforming to the Life Saving Appliances Code (LSA Code).

TECHNICAL INFORMATION

Location:

Survival Systems Training Ltd. 40 Mount Hope Avenue, Dartmouth, NS. B2Y 4K9

Date of Audit: January 20th – 21st, 2016

TCMSS Assessor: Charanjeet Kalra (referred as TC Assessor from here onwards)

Survival Systems Training Staff:

Robert Baxter
Maxim Caissy

Course Instructors: Virtual Marine Technology (VMT)

VMT Instruction Support: Anthony Patterson
VMT Instruction Support: Ryan Kelly
VMT Technical Assistant: Andrew Edwards

EVALUATION PROCESS

Transport Canada had previously evaluated lifeboat simulation using a two stage evaluation process in line with the *Institute of Electrical and Electronics Engineers* (IEEE) Standard 1730-2010 *IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process (DSEEP).*

The initial evaluation, as described in the TCMSS Audit Report SIMULATION IN SURVIVAL CRAFT TRAINING dated 25-03-2015, determined that "*a lifeboat simulator can be used to develop and assess the competencies associated with taking charge of launch and recovery of lifeboat*".

Prior to the Pilot Program, TCMSS considered the results from two scientific studies performed by other organizations which demonstrated that naive students taught how to maneuver a virtual lifeboat using a simulator could transfer their knowledge to an actual lifeboat in the water. The section entitled "Previous Research" summarizes the results of the scientific studies. Transport Canada elected to *validate* the results of the scientific research in a realistic training setting by authorizing a Canadian training provider to

conduct a pilot course in which simulation was used to develop the competencies to launch, recover, operate and maneuver a lifeboat and rescue boat in calm conditions.

PREVIOUS RESEARCH

The following is a summary of the recent research carried in order to validate learning transfer from a simulator to the operation of a lifeboat.

NRC Maneuvering Lifeboats in Ice Study (Field Trials - Validation)

The National Research Council of Canada (NRC), with the combined funding participation from the offshore oil and gas industry and the Federal Government, conducted in 2010 and 2011 an assessment of the simulator training effectiveness related to lifeboat coxswain proficiency to maneuver in ice covered/infested waters. The study compared the performance of a group of students trained to drive a lifeboat in a harbor versus, a second group of students trained to drive a lifeboat in a DNV certified simulator. The exercise included driving a real lifeboat through an ice field, while taking into account its key maneuvering characteristics. The study concluded that the simulator trained students had an overall better performance and higher confidence levels, compared to those trained in the harbor, using real boats.

Petroleum Research Atlantic Canada Learning Transfer Study (Field Trials - Validation)

In 2015, Petroleum Research Atlantic Canada commissioned a behavioural experiment to assess transfer of training from a simulator to control of a lifeboat. A test course was used to compare the performance of a group trained with the simulator to the performance of a group that was not trained with the simulator. The test course was composed of a sequence of tasks that required precise maneuvring of a lifeboat on the water following training in the simulator. Learning was found in the simulator and the simulator trained group required reliably fewer trials to obtain criterion on the test course.

DESCRIPTION OF EQUIPMENT

1. Lifeboat: An operational totally enclosed lifeboat conform to the International Lifesaving Appliances Code ("LSA") and approved by Transport Canada for use in Marine Emergency Duties with respect to Proficiency in Survival Craft and Rescue Boats other than Fast Rescue Boats (MED PSC).

2. Launch facilities: Operational davit facilities which are able to launch the lifeboat (see above) into open water for maneuvering and approved by Transport Canada for use in MED PSC.

3. Open Concept Lifeboat simulator: An operational lifeboat simulator with realistic controls, sensory cuing systems, instructor controls and mathematical models, DNV approved.

4. Hook trainer: An operational hook trainer with realistic equipment and fully integrated with the lifeboat simulator (see above).

5. PLI Training Aid: A computer based training system which allows students to inspect key elements of the davits, lifeboat and engine and recognize fault conditions which must be corrected prior to launch.

EVALUATION METHOD

In order to determine if students trained using a simulation based training program have at least equivalent skills in maneuvring a lifeboat in calm waters as those who were trained by operating an actual lifeboat in the harbor, the following method was used during the Pilot Program:

Training Protocol

1. Prior to the Pilot Program, a 'Simulation' version of MED PSC was developed and submitted to TCMSS for review. The 'Simulation' version consisted of a lifeboat simulator with hook trainer used to deliver the launch, recovery and maneuvering elements for both lifeboat and rescue boat operations. An actual combination lifeboat/rescue boat was used to provide familiarization training in onboard equipment as well as rescue and survival techniques. Under the modified course (simulation method), the actual lifeboat is not used to perform any launch, operation, maneuvering or recovery training.

2. The Pilot Study was conducted during a regularly scheduled MED-PSC course delivered by SSTL during the period January 18 – 21, 2016 at their facilities in Dartmouth.

3. The minimum course size required for the study is 6 students.

4. The class was separated into two groups of equivalent size. To the extent possible, SSTL instructors balanced the experience level in both groups such that neither group had an obvious advantage over the other.

5. The first group ("Boat Group") was designated as the control group and only received lifeboat operation training by launching, recovering and maneuvring an actual lifeboat in the harbour using traditional training program employing davits.

6. The second group ("Simulator Group") was designated as the treatment group and only received lifeboat operation training by launching, recovering and maneuvring a virtual lifeboat in a simulator using a modified training program.

7. All other aspects of the MED-PSC course followed the normal training program provided by SSTL.

8. After the Boat Group and the Simulator Group had completed their lifeboat operational training, their boat maneuvring skills were assessed by a TC Assessor in accordance with the Assessment Protocol (defined in the next section).

Assessment Protocol

For assessing the impact of the training method, the participating students were considered new arrivals, joining the ship for the first time and, conducting their first familiarization drill using the lifeboat.

1. The SSTL instructor provided a safety briefing to ensure the safety of all participants. A Fast Rescue Craft was launched and acted as a safety vessel throughout the assessment trials.

2. The SSTL instructor performed a demonstration launch to ensure that all participants are familiar with the methods of using the equipment in the lifeboat to launch, recover and operate the boat. This familiarization mirrored the training recommended by the boat manufacturers for all new crew members when assigned to a ship.

3. The boat was lowered to the embarkation level and all participants entered the boat.

4. The TC Assessor selected one of the students to act as coxswain, the other students acted as crew members.

5. The TC Assessor quizzed the coxswain on the steps required to prepare the boat for launching. Once the student had answered the questions to the satisfaction of the Auditor, then the coxswain was instructed to launch the boat and clear-away from the launch platform to a suitable location identified by the SSTL instructor.

6. The coxswain then performed a series of trial maneuvers which were evaluated by the TCMSS Auditor.

7. Once the trial maneuvers were completed, the coxswain returned to the launch platform and supervised the recovery of the boat to the embarkation level. *Note: wind speeds during the evaluation trials were NW @ 15 knots with gusts exceeding 20 knots. The TCMSS Auditor permitted the SSTL instructor to coach the students on the correct method to approach the recovery platform taking into account the high wind speeds.*

8. Once the boat had been recovered to the embarkation level, the TCMSS Auditor selected another student to be coxswain and the process of prelaunch quiz, launch, clear-away, trial maneuvers, return to platform and recovery to embarkation was repeated until all students had completed the trial maneuver program.

PILOT STUDY RESULTS

A class of six (6) students were enrolled in the SSTL MED-PSC course. The students were new entrants into the marine industry and were enrolled in the program to meet the minimum qualification requirements demanded by their prospective employers. The students had a mix of prior boating experience, ranging from one student who had extensive experience in operating high speed RHIBs as part of a summer job to a student who had no previous boating (or driving) experience at all. Most students, however, had some previous experience in operating pleasure craft.

All the students arrived at SSTL and began their MED-PSC course on January 18, 2016. To accommodate the schedules of TCMSS and VMT personnel, the normal course schedule was adjusted such that all of the lifeboat launch and maneuvring training was moved to January 20, 2016. On the first day of the course, all students were brought into a lifeboat and familiarized with all of the equipment onboard as well as received associated training in survival and rescue techniques. At no point during the training program did the "Simulator Group" launch, recover or operate an actual lifeboat.

On January 19, 2016, Instructional support staff and technical support staff from VMT arrived to verify the correct operation of the simulator equipment and to load and test the training scenarios to be used during the pilot course. All of the training scenarios had been previous provided to TCMSS for review.

On January 20, 2016, all students attended a classroom session from 0830 to 0930. At the end of the classroom session, the VMT support staff and the TCMSS auditor were introduced to the class. The class then split into two groups of three (3) students, with one group designated as the "Boat Group" and the other designated as the "Simulator Group". The Boat Group proceeded to the SSTL launching platform in Halifax harbour while the Simulator Group proceeded to the simulation training room at the SSTL campus. Both groups broke for a one hour lunch between 1130 and 1230, and both groups were scheduled to reconvene at the classroom at 1530.

The students reporting to the simulator room were provided an overview of the objectives of the simulation program; a safety briefing on the hook trainer; and a demonstration of a full launch/recovery procedure including the use of the pre-launch inspection training aid.

After the briefings were completed, the students then organized into a 'boat crew'. Prior to the start of each simulation exercise, one of the boat crew members was designated as the coxswain and the other two were assigned the roles of crew members. The lesson plan required that each student to rotate through the coxswain position on an equal basis. The lesson plan also required the debriefings to be led by other students in the course. To

accommodate the logistics of the Pilot Course, all debriefings were led by instructional support personnel.

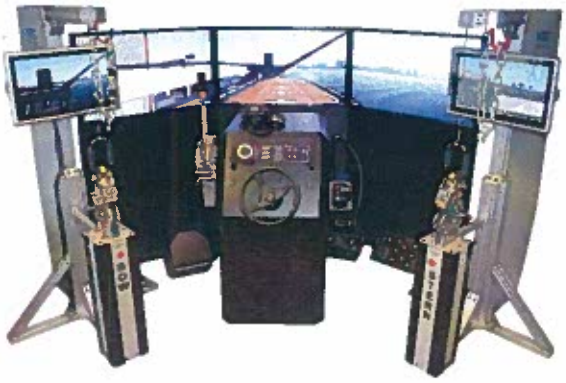
The first group of training exercises were basic launch and recovery drills. The scenarios enabled the students to practice preparing, launching, maneuvring and recovering a lifeboat from both a fixed shore installation as well as from a ship in the harbour. A total of 6 simulations were completed during this section of the course. Each student was able to demonstrate their ability to complete all of the assigned tasks under calm conditions.

The second group of exercises were rescue boat exercises. Prior to the start of the exercises, the students received a short briefing on the types of rescue tasks which could be assigned to the crew of a rescue boat. The rescue boat exercises included a helicopter ditching scenario, a mass casualty rescue scenario and a person-in-water scenario. Each student was required to demonstrate their ability to tow a liferaft, steer by compass and to perform a precision maneuvring task. The instructional staff made an adjustment to the planned sequence of exercises in order to ensure positive student engagement and deferred the more difficult rescue boat exercises to the end of the simulation session. A total of 4 rescue boat exercises were completed during the initial rescue boat training.

In the third group of exercises the students were tasked to abandon ship using a lifeboat in an increasingly difficult sequence of situations. Prior to the start of the emergency scenarios, the students were briefed on some of the key challenges associated with evacuating in rough seas and operating in cold temperatures. A total of 4 emergency evacuation scenarios were completed. All students demonstrated their ability to launch and operate in rough sea conditions.

The fourth, and final, group of scenarios was in-fact the deferred rescue boat scenarios. Each student was required to demonstrate their ability to marshal rafts in the context of a mass rescue incident as well as to maintain a compass heading and perform a precision approach to a dock under high winds. A total of 7 additional rescue boat exercises were completed, and all students demonstrated their ability to tow life rafts, steer by compass and dock a lifeboat in high winds.

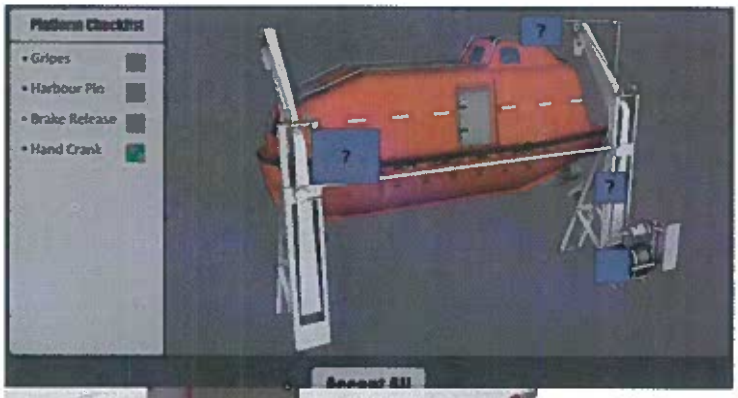
By 1500, a total of 21 scenarios had been completed, exceeding the minimum number required to complete the program. The instructional staff observed that the students were exhibiting signs of fatigue so the students were released from the simulation training 30 minutes early.



SurvivalQuest™ lifeboat simulator[1] used by Survival Systems Training Ltd. during the pilot course.

The photograph illustrates the 'Open Configuration' lifeboat simulator with hook trainer.

The configuration used during the Pilot Course meets the requirements of TP 4957E.



Screen capture from the electronic Pre-Launch Inspection (PLI) training aid used during the Pilot Course. Students were required to check all critical boat and davit systems prior to the launch of the boat. Any errors were presented to the student for correction.

Photograph illustrating the lifeboat and launch facilities used by SSTL during the pilot course. The arrow indicates the lifeboat used to evaluate launch, recovery and maneuvering competencies at the end of the pilot course.

[1] DNV has issued a Statement of Compliance for SurvivalQuest™ indicating that it meets the requirements for the pilot course.

OBSERVATIONS

Competence

The TC Assessor noted that in this pilot course, the simulation trained students were able to launch, operate, maneuver and recover an actual lifeboat into the water using davits, while displaying the same level of competence as those who have been trained using the existing traditional methods.

Accelerated Training

It was noted that one of the students assigned to the simulator group had the least amount of previous boat handling experience in the entire class. That student made dramatic improvements throughout the simulation exercises and was able to perform a difficult precision maneuver by the end of the training program. The TC Assessor believes that the ability to have frequent practice in the simulator as well as the ability observe the techniques used by classmates to maneuver the lifeboat significantly accelerated the learning experience. In training performed using an actual lifeboat, students are unable to observe the techniques used by their peers in maneuvering a lifeboat.

Learning Transfer from Pleasure Craft to Lifeboats

The TC Assessor observed that students with previous experience in operating high power pleasure craft needed to adjust their operating techniques when confronted with the maneuvring characteristics of a LSA approved lifeboat. In general, the students tended to operate with aggressive use of throttle and the presumption of short stopping distances. The TC Assessor further noted that once the maneuvring techniques were adjusted through practice in the simulator, the students were able to transfer their new knowledge to the actual lifeboat.

Pre-Launch Inspection Training

The TC Assessor noted that some of the simulator students were not as attentive as they should have been during pre-launch inspections. While some of the issue may have been attributed to a small class size, the instructional staff and the TC Assessor felt that a course using simulation as the primary training method for launch, recovery and maneuvring would benefit from additional instruction in the dangers of improper inspection of launch equipment. In particular, case studies of actual accidents involving failures of the launch equipment would be a useful addition to the course.

Training Realism

It was noted by both the instructional staff and the TC Assessor that the emergency scenarios presented during the simulation training exposed students to realistic situations. Through simulation, the student was able to develop practical competencies necessary for operations in rough seas, poor visibility, and complex survival situations that would have otherwise been provided through a lecture.

Equipment

Finally, the TC Assessor and instructional staff noted the importance of having a real lifeboat in the MED PSC course. The simulator only replicates a portion of the lifeboat and its equipment. Even though the Pilot Program demonstrated that launch, recovery, maneuvring and operating a lifeboat/rescue boat could be taught and assessed through the use of simulation, it is still important to have an actual lifeboat in the MED PSC program to develop the competencies associated with equipment familiarization, survival seamanship and rescue operations. The lifeboat used in the pilot program, however, was not actually floating in the water during the familiarization training and validated the feasibility of year-round training in areas with frozen harbours during the winter.

FINDINGS

As a result of the technical verification and observation, made by the TC Assessor (see Audit Report) during the pilot course validation, TCMSS has determined the following findings:

1. The use of simulation training to launch, operate, maneuver and recover a virtual lifeboat provides an equivalent degree of safety, security and environmental protection, as the current traditional method of launching, operating, maneuvring and recovering an actual lifeboat in open waters using a davit system.

2. The group of students participating in the study were compared with another group of students who had been trained using the traditional method of launching, operating, maneuvring and recovery of lifeboat and rescue boat. As a result the TC Assessor observed no major differences between the two groups of attending students.

APPROVAL PROCEDURE

A simulator can be used to develop and assess the competencies associated with taking charge of a survival craft or rescue boat during and after launch, including maneuvring in calm and rough seas, subject to the following conditions:

1. Simulation is only considered a substitute for the lifeboat training elements related to launch, operating, maneuvring and recovery. Training elements related to equipment familiarization, survival and rescue will still to be delivered using an actual lifeboat conforming to the LSA Code.

2. The training institution must submit a gap analysis explaining how the following performance standards will be achieved by the students:

   a. use a pre-launch inspection training aid to conduct a visual inspection of the launching system, key boat systems and the engine prior launching;

b. prepare and safely launch a lifeboat and clear the ship's side quickly;

c. prepare and safely launch a lifeboat in rough sea; and

d. safely recover the lifeboat.

3. Additionally:

a. the equipment must be certified by a Classification Society as a Survival Craft Operation Simulator with type designation as a davit launched lifeboat, indicating that the simulator conforms with the requirements contained in STCW Regulation I/12;

b. a copy of this Statement of compliance to be forwarded to TCMSS;

c. the simulator must use physical controls identical of those found on lifeboats conforming with the LSA Code, and must have hook trainers integrated with the simulator to emulate the bow and stern hook positions;

d. simulation exercises must include the use of a pre-launch inspection training aid enabling the students to conduct a visual inspection of the launching system, key boat systems and the engine prior launching;

e. if the simulator is to be deployed in an 'Open Configuration', it must be operated in a dedicated learning space free from distractions;

f. each student must perform the duties of the coxswain in charge of the boat for at least three (3) launches, one of which must include the recovery of the lifeboat and one of which must include launching into rough seas;

g. each student must perform the duties of a crew member for at least three (3) launches;

h. one (1) approved simulator can be used to train a maximum of six (6) students at any one time;

i. training providers incorporating lifeboat simulation into their MED-PSC course and refreshers shall develop a training course manual along with scenarios and instructions for the training of their instructors and submit to TCMSS for approval;

j. TCMSS must be contacted in advance of the scheduled date of delivery of the first course incorporating lifeboat simulation to arrange an audit of the instructor and the course by an inspector/examiner;

k. past incident reports related to lifeboat launching, operating, maneuvring or recovery to be discussed during the course to make students aware of causes, consequences and precautions for prevention of such incidents; and

l. a video showing the preparation for launching of an actual lifeboat, launching of lifeboat including disengaging of lifeboat from the falls once in the water, maneuvring of boat, reconnecting the boat to the falls and recovery of lifeboat from the water.

4. Equipment requirements:

   a. one (1) lifeboat with equipment which meets the functional requirements as stated in SOLAS and which is in compliance with the requirements of the LSA Code for cargo vessels. (Note: The lifeboat does not require to be approved for usage at sea but shall be a training model of what is found on SOLAS cargo vessels);

   b. one (1) davit launched lifeboat simulator, certified by a Classification Society as a Survival Craft Operation Simulator with type designation as a davit launched lifeboat, equipped with a physical hook trainer containing two hook/ring assemblies normally found on a twin fall lifeboat meeting the SOLAS requirements; and

   c. one (1) prelaunch inspection training aid to enable the inspection of davits, boat systems and engine systems prior to launch.

ANNEX A - SIMULATOR COMPONENTS

Simulator Cabin

1. Open or Enclosed Configuration with approximate dimensions of 1.40m x 2.20m x 2.00m (L x W x H)

2. Coxswain seating position with seat and harness (enclosed configuration only)

3. Lifeboat helm and launch controls
   a. Steering wheel
   b. Throttle
   c. Ignition panel
   d. Battery switch
   e. Break release
   f. Hook release
   g. Magnetic compass
   h. VHF radio simulator

4. Visual system that presents a bow, port and starboard fields of view

5. Audio system which presents environmental noise consistent with lifeboat operation

6. Hook trainer integrated with the simulator

Computer Server System

1. Approximate dimensions of 0.65m x 0.50m x 1.20m (L x W x H)

2. Server cabinet

3. Server PCs

QUEST Simulation Software or equivalent

The simulation software architecture provides the following functionality:

1. Real-time simulation of the following physical phenomenon:
   a. 3D wave models based on recognized wave spectra for Beaufort Sea States zero (0) to eight (8);
   b. ocean current effects and wind mathematical models, with wind speed and direction having an effect on the appearance of the sea, environmental elements, and the handling of the ownship; and

c. collisions between parent vessel, ownship, target vessels, and target objects.

2. Realistic 6DOF motion models of marine vessels including:
   a. the ownship vessel as affected by speed heading and waves;
   b. the parent vessel as affected by speed, heading and waves; and
   c. target vessels affected by speed, heading and waves.

Instructor Control Station

The instructor control station includes the following:

1. Hardware
   a. Approximate dimensions of 2.25m x 2.20m x 2.00m (L x W x H)
   b. Display monitors that present the following:
      i. bow, starboard and port views as seen by student in the simulator;
      ii. 'world view' of the simulated lifeboat in the virtual environment;
      iii. third person video feed of the student operating the simulator controls (enclosed configuration only);
      iv. simulation exercise display interface showing position of all simulation entities on a chart display; and
      v. simulation exercise environmental control and equipment fault interface
   c. VHF radio simulator

2. Functionality
   a. Allow instructors to create and edit lifeboat simulation exercises.
      i. select and place ownship and launch platforms;
      ii. place target vessels and assign speed, course and routes;
      iii. define the magnitude and direction of wind, waves and current;
      iv. define visibility by changing time of day, precipitation and fog; and
      v. assign equipment faults.
   b. Allow instructors to load, play, pause and stop simulation exercises
      i. manipulate simulation exercise conditions in real time;
      ii. communicate with student using simulated VHF radio; and
      iii. allow instructors to save and replay simulation exercises

ANNEX B – LESSON DESCRIPTION

1. Prior to the start of the simulation session, the instructor/technician:
   a. starts the simulator in accordance with the manufacturer's instructions and loads the familiarization launch scenario;
   b. starts the Procedure Briefing Station;
   c. opens the Advanced Coxswain Training course package using the provided LMS; and,
   d. enters the name of the training scenario into the LMS and enters the names of each of the students.

2. Six (6) students arrive at the simulator and are greeted by the instructor.

3. The Transport Canada Approved (TCA) instructor provides a safety briefing paying attention to the safety associated with the hook training device.

4. On direction by the TCA instructor, all students gather around the Pre-Launch Inspection Training aid. The TCA instructor describes how to operate the PLI station.

5. The students are each assigned to one of the following roles:
   a. Coxswain (X2)
   b. Crew (X2)
   c. eLearning Student (X2)

6. The Crew students standby the hooks and secondary student station and operate the systems as required by the TCA instructor during the practice drills.

7. The eLearning students go to the PLI training aid and instructed to become familiar with the 'correct' and 'fault' conditions throughout the CBT session. The students work independently until the PLI Lesson is completed (approximately 15 minutes).

8. The eLearning students watch a video tutorial on the operation of the 'on-load release', 'deluge' and 'air' systems (approximately 10 minutes).

9. The Coxswain students are provided an overall briefing outlining the objectives for the upcoming group of exercises "Practice Drill" by the TCA instructor.

10. One of the coxswain students will operate the simulator, while the second coxswain student will observe the launch process and assist the TCA instructor as required to brief the Crew Students on the operation of the hook trainer and secondary student work station. The 'Coxswain' students are instructed how to use the launch/recovery checklist printed on a cue card. Students can rotate positions between scenarios.

11. Once the coxswain students are ready, the TCA instructor starts the scenario and provides prompts and inputs as required. The objective of the first group of exercises is to provide multiple opportunities for the coxswain students to work together to

launch and recover the boat within the allotted 25 minutes. The TCA instructor can vary the environment as desired to match the skill level of the students.

12. At the end of 25 minutes, the students rotate positions and steps 6 through 11 are repeated until all students have completed the eLearning lessons, and have acted as a coxswain and a crew member for the group of "Practice Drill" exercises.

13. At the end of the "Practice Drill" sequence, the students receive a short debrief by the TCA instructor.

14. The students will be allocated into two boat crews of three (3) people. For each of the remaining exercises, one of the students will de designated as coxswain and the other two as crew members. The crew members should be used primarily to conduct Pre-Launch Inspections, operate hooks, operate secondary boat systems and act as look-outs.

15. The next group of scenarios are a rescue boat scenarios designed to enable students to practice marshalling life rafts and conducting searches for persons in the water. One boat crew will be designated to use the simulator to perform rescue tasks while the other boat crew will observe and prepare notes for a TCA instructor guided peer debriefing. Boat crews will rotate from one scenario to the next. The total duration allocated for "Emergency Scenarios" is 75 minutes.

16. The first boat crew will be briefed on the scenario and tasked to prepare the boat for launching. One of the students will be designated as coxswain for the launch. After the coxswain has launched the boat and completed the assigned rescue task, each of the remaining members of the boat crew will rotate through the coxswain position and accomplish their assigned rescue task. The last student in the boat crew will return to the ship and recover the rescue boat.

17. The boat crews will rotate exchange places and the second boat crew will be briefed on the second emergency scenario. As in the previous step, each crew member will be assigned rescue tasks to accomplish as a rescue boat coxswain with the last coxswain recovering the rescue boat.

18. The remaining scenarios are "Emergency Scenarios" and are intended to replicate realistic evacuations from a ship using the lifeboat. The TCA instructor should attempt to enable each student to complete at least 1 scenario as coxswain, and each boat crew should be exposed to rough sea conditions.

19. For each "Emergency Scenario", one boat crew will be designated to use the simulator to evacuate the ship while the other boat crew will observe and prepare notes for a TCA instructor guided peer debriefing. Boat crews will rotate from one scenario to the next. The total duration allocated for "Emergency Scenarios" is 120 minutes.

20. Exercise 3 is designed so that it can be repeated multiple times by the students. The TCA instructor can create variety by adjusting environmental conditions as well as vary the position of the PIW from one scenario to the next.

21. At the end of the last scenario, students receive a short debrief by the TCA instructor to reinforce lessons learned during the simulation exercises.