Offshore Helicopter Safety Inquiry
The Honourable Robert Wells, Q.C., Commissioner

Submissions to the Offshore Helicopter Safety Inquiry by Helly Hansen Canada Limited

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Summary

The following is a summary of the submissions of Helly Hansen Canada Limited with respect to the forthcoming recommendations of the Commissioner of the Offshore Helicopter Safety Inquiry:

1) Remove the requirement for dual approval with respect to the helicopter transportation suits. The suits should only be required to meet the Transport Canada aviation suit standards and not be required to also meet the Transport Canada marine abandonment suit standards.

2) Confirm that offshore workers have a level of personal accountability for their own safety in helicopter transportation.

3) Revise the helicopter transportation suit standards in order to outline the required clothing to be worn under the helicopter transportation suits.

4) Require that future testing of the helicopter transportation suits recreate as realistically as possible the conditions where the suits will be used in order to obtain an accurate assessment of their performance in real world scenarios.

5) Require that the regulatory standards move to a goal-based regime as opposed to the current specification-based regime.

Background

The Offshore Helicopter Safety Inquiry was established by the Canada – Newfoundland and Labrador Offshore Petroleum Board (the "C-NLOPB") pursuant to section 165 of the *Canada – Newfoundland Atlantic Accord Implementation Act* and section 161 of the *Canada – Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* with the following mandate:

> "The Commissioner's mandate will be to inquire into, report on and make recommendations in respect of matters relating to the safety of offshore workers in the context of Operators' accountability for escape, evacuation and rescue procedures while traveling by helicopter over water to installations in the Newfoundland and Labrador Offshore Area, in compliance with occupational health and safety principles and best industry practices."

Helly Hansen Canada Limited sought and received limited standing at the Offshore Helicopter Safety Inquiry (the "Inquiry") on the grounds that Helly Hansen Canada Limited was the supplier of helicopter transportation suits to the operators of the offshore oil installations in the Nova Scotia and Newfoundland and Labrador offshore areas (the "Operators") pursuant to a contract awarded to Helly Hansen Canada Limited on April 23, 2007 (the "Contract").

Terms of the Contract

The terms of the Contract include the following:

1) The helicopter transportation suits were required to have dual approval that meets the Transport Canada aviation suit standard CAN/CGSB 65.17-1999, as well as the Transport Canada marine abandonment suit standard CAN/CGSB 65.16-2005.

2) Helly Hansen Canada Limited was required to supply a sizing chart describing the smallest to the largest sizes that the suits would fit. The smallest size was required to fit a 90 lb person and the largest size was required to fit a 425 lb person. The average size was described as being between 140 lbs and 250 lbs.

3) Helly Hansen Canada Limited was required to supply two (2) personal locater beacons for each seat on the helicopter.

4) Helly Hansen Canada Limited was required to supply a helicopter underwater emergency breathing apparatus ("HUEBA"), which was designated as the Aqua Lung Sea LV-2 compressed air system or other equivalent device as approved by the Operators. The Contract required forty (40) HUEBA units to be supplied per helicopter for passengers traveling offshore, as well as two (2) HUEBA units to be supplied for each pilot.

5) The Contract also required Helly Hansen Canada Limited to maintain and service the helicopter transportation suits.

Helly Hansen Canada Limited produced all of the suits by the required commencement date, including the personal locator beacons and the HUEBAs as required by the terms of the Contract. However, Helly Hansen Canada Limited was instructed by the Operators not to put the HUEBAs into service at the commencement of the Contract.

Upon the commencement of the Contract, Helly Hansen Canada Limited carried out the following procedures with respect to service and maintenance of the helicopter transportation suits:

Service and Maintenance Suit- Every Return Flight

- Removal of Thermal liner for inspection and cleaning
- Visual inspection of suit system including:

  Exhaust Valve, Face Seal and flap, Front zipper, Whistle, Nose clip, PLB attachments, Boot Liners, lining fabric, Lining zipper, bar code, Inflation Mechanism/CO2, Oral Inflation tube, Buddy Line, Safety Light, Reflective tape, Cuffs, Gloves, Exterior/Interior Fabric, Spray Shield.

- Reinstallation of Thermal Liner
- Suit returned to service

Service and Maintenance Suit- after every 8th cycle or 6 months

- Removal of suit from service
- Thermal liner of suit removed for cleaning and inspection
- Visual inspection of suit system including:

  Exhaust Valve, Face Seal and flap, Front zipper, Whistle, Nose clip, PLB attachments, Boot Liners, lining fabric, Lining zipper, bar code, Inflation Mechanism/CO2, Oral Inflation tube, Buddy Line, Safety Light, Reflective tape, Cuffs, Gloves, Exterior/Interior Fabric, Spray Shield.

- "Stole" test completed- inflation and pressure test on Integrated Inflatable Lifejacket
- Leak Testing of Suit- Suit is inflated and sprayed with solution to indicate any punctures or leaks in the suit.
- Reinstallation of Thermal Liner
- Final inspection including:

  Cuffs, Gloves, Exhaust Valve, Nose Clip , Bar Codes, Manual Inflation Components, Spray Shield, Liner Installed, Front zipper, Buddy Line, whistle, Light, reflective tape, Boots, Shell fabric condition, interior fabric inspection.

- Suit returned to service

"Maintenance procedures as per Helly Hansen Canada Limited Maintenance Manuals certified by Transport Canada as part of the Type AP-22 Certificate"

Issues Arising with respect to the Helicopter Transportation Suits

During the first two (2) years of the Contract, Helly Hansen Canada Limited was made aware of a limited number of complaints with respect to the suits, mainly centering around comfort issues. In particular, the Nova Scotia intervention crew, which takes multiple helicopter trips per day, raised comfort issues arising from its repeated use of the suits.

In order to obtain feedback with respect to the suits, Helly Hansen Canada Limited prepared a survey that was distributed to outbound passengers traveling to the offshore area of Newfoundland and Labrador over a 4 week period commencing on June 3, 2008. The surveys were completed by 225 passengers and the survey results did not reveal any strong dissatisfaction with the suits. However, 30% of the respondents indicated that they had some difficulty completing the face seal for take-off and landing. Helly Hansen Canada Limited reviewed the survey results with the Operators who subsequently required passengers to confirm that they could fully don the suit prior to flight.

On October 28, 2008, the Canada-Nova Scotia Offshore Petroleum Board, along with the Nova Scotia operators, requested a proposal from Helly Hansen Canada Limited to address the comfort issues experienced by the Nova Scotia intervention crew. Helly Hansen Canada Limited reviewed the issues, considered the appropriate design changes and prepared a proposal for the HTS-1 suit project on December 5, 2008.

The HTS-1 suit is a modification of the E-452 suit system. Helly Hansen Canada Limited was able to make such modifications after it sought and received approval from the Operators and Transport Canada to produce a suit that would meet the aviation suit standards only, rather than also having to meet the marine abandonment suit standards. The elimination of the requirement to develop the suit to meet two (2) different standards removed the constraints of having to meet a maximum buoyancy requirement for the aviation standards, as well as a minimum buoyancy requirement for the marine abandonment standards. The elimination of the dual standard requirement also removed the necessity to meet the stipulated donning times set out in the marine abandonment standards that are simply not applicable to helicopter transportation suits. As a result of the removal of these constraints, Helly Hansen Canada Limited was able to introduce modifications to the suits that improve the effectiveness of the suits and address the comfort issues raised by the users of the suits. Since the thermal requirements of the aviation standards are the same as those in the marine abandonment standards, the HTS-1 provides the same level of thermal protection as the previous E-452.

The HTS-1 was approved by Transport Canada for usage in the offshore areas of Nova Scotia and Newfoundland and Labrador in November 2009. As can be seen from the survey of the offshore workforce prepared by Aerosafe Risk Management, the majority of the comments with respect to the HTS-1 suits have been positive and confirm that the suits are better fitting and more comfortable.

Helly Hansen Canada Limited submits that the report of this Commission should recommend that helicopter transportation suits only be required to meet the Transport Canada aviation suit standards and not be required to also meet the Transport Canada marine abandonment suit standards.

At the same time that Helly Hansen Canada Limited commenced the HTS-1 suit project, it also commenced a glove project, on its own initiative, in order to improve the ease of donning of the gloves. The new gloves were incorporated into the HTS-1 suit.

Helly Hansen Canada Limited had also received some comments regarding the E-452 suit leaking during training exercises. Helly Hansen Canada Limited evaluated the amount of leakage in the training environment on May 30, 2008 and determined that the suit performance was within specifications. The following points should be noted with respect to this issue:

1. The suits are not developed to be completely leak free and, in fact, the CGSB standards allow for a certain amount of water ingress in the suits as part of the thermal testing of the suits.

2. During training exercises, the suits are used in a manner that is beyond the design specifications of the suits.

3. During the hearings held by the Commission, evidence was introduced that the same fleet of suits are used repeatedly by the Marine Institute for the Helicopter Underwater Escape Training ("HUET"). Bob Rutherford, of the Marine Institute, testified as follows with respect to this issue:

i. The suits used in training are only used for training purposes;

ii. The suits are subject to heavy use in chlorinated water which can break down the seals of the suits;

iii. The suits are given a significant amount of abuse during training - they are subjected to repeated dunks in the pool and the students are required to spend significant periods of time submerged in the suits;

iv. The trainers do not conduct individual suit fittings at the training center. They are not concerned with achieving a perfect fit, as they do not conduct training in a cold water environment; and

v. The fact that the suits may leak during training does not mean that the suits will leak as much during a real scenario. The suits may always leak to a certain extent, but the testing indicates that the leakage is within the limits of the CGSB standards.

In June, 2009, the Operators and the Canadian Association of Petroleum Producers ("CAPP") undertook an assessment of the performance of the E-452 suit during helicopter egress. CAPP arranged testing by Cord Group Limited, who was authorized by Transport Canada and Underwriter Laboratories to conduct approval testing, and who have been involved in the development and approval of various types of immersion protection since 1983. The report from the Cord Group Limited dated August 6, 2009 (the "Cord Report") was tendered into evidence by CAPP during the hearings of the Commission. The Cord Report notes that the objectives of the testing was to develop a realistic scenario, in terms of activity and conditions that would provide a good challenge to the water integrity of the suit system. During the testing, eight (8)

subjects were exposed to a helicopter ditching scenario in a Modular Egress Training Simulator ("METS") at the Survival Training Simulation Theatre in Dartmouth, Nova Scotia. The ditching scenario involved a METS ditching in stormy conditions followed by a 20 meter swim, life raft boarding, and a 30 minute immersion. The environmental conditions used for the tests were as follows:

- Wind – 30-70 kms per hour;
- Waves – .5 -.75 meter, random and confused;
- Rain – continuous and heavy;
- Sound – ocean sounds;
- Light – delayed dim.

The Cord Report notes that the CGSB standards set out a water ingress test as the first part of the thermal protection requirements. The water ingress test in the CGSB standard requires a jump from a height of not less than 3 meters and a 60 minute swim. This provides the raw data to be used in the formula provided in the CGSB standard for calculating the amount of water to be introduced into the suit system prior to the thermal mannequin or human testing. The Cord Report notes that the average mean water ingress value for the eight (8) subjects tested by the above-noted realistic scenarios was 445 grams. The Cord Report notes that these results were below the leakage amount calculated by the CGSB water ingress method during the approval of the E-452 suit. The Cord Report concluded as follows:

> "Knowing that these values are lower than the value that was used for the thermal protection test, it can be safely concluded that the thermal value

would increase with less water leakage, and therefore still exceed the required 0.75 immersed Clo."

The Cord Report notes that the data presented in the results has been produced from tests that were designed to present a complete challenge to the waterproof integrity of the suit system, and to do this by utilizing more realistic scenarios, actions and conditions. The Cord Report notes that this testing could serve well as a foundation and guide in setting future requirements.

Return to Flight

As part of the return to flight process following the crash of Cougar Helicopter Flight 491, the Operators amended the Contract in order to require Helly Hansen Canada Limited to conduct individual suit fittings on all personnel traveling offshore before being cleared to fly. The individual suit fittings were conducted at the Cougar Heliport, at offsite fitting sessions and at the Helly Hansen Canada Limited suit maintenance facilities in St. John's. The fitting process, which was developed by Helly Hansen Canada Limited as part of the return to flight service, consists of the following categories:

1. Donning of the suit;
2. Verification of the ability to zip up the suit;
3. Size verification;
4. Checking of face and wrist seals; and
5. Mobility checks.

In his testimony before the Commission, Mr. Mark Collins, of Helly Hansen Canada Limited, testified that out of approximately 3,000 people traveling offshore, 180 were put on the no fly list

as a result of the individual suit fittings. In other words, the suit fit 90% of the workforce without difficulty. At the time of Mr. Collin's testimony, 180 people remained on the no fly list, with 8 people scheduled to be fitted in a modified suit, 40 people scheduled to have fittings in the new HTS-1 suit, and 115 people cleared to fly in the new HTS-1 suit. Of the remaining 25 people on the no fly list, 13 people were scheduled to be fitted with a modified HTS-1 suit and 12 people required true custom made suits. Mr. Collins testified that it takes several months to obtain approval from Transport Canada with respect to each custom-made suit.

Expert Witnesses

The Commission heard testimony from the following expert witnesses with respect to issues related to the suits:

1. Susan Coleshaw

   Dr. Coleshaw emphasized the importance of good thermal performance of suits in order to protect the wearer from cold shock and hyperthermia. She stated that good thermal performance will depend upon the suit being correctly sealed. She noted how the buoyancy of the suits can be affected by the fit of the suits. She recommended that if buoyancy is to be reduced to a minimum, it is important that the suits are well fitted, thus limiting the air that can be trapped. She recommended that measures be taken to ensure that passengers are wearing the correct suit size. Further in that regard, Dr. Coleshaw testified that she was not aware of the individual suit fittings being conducted by Helly Hansen Canada Limited, and she stated that such individual suit fittings are not normally done in the industry. She stated that suit manufacturers normally provide a range of suits and it is up to the individual to choose their own suit size. She also stated that if an

individual had an ill-fitting suit, there was some responsibility on the individual to ask for a different sized suit. Dr. Coleshaw stated as follows with respect to issues of personal accountability:

i. Members of the workforce must take responsibility for ensuring that they are issued with a well fitting suit;

ii. There are times that passengers are not fully doing up the zippers because the end of the zipper feels uncomfortable in the face. However, some level of discomfort may be necessary to ensure a good seal when used in an emergency; and

iii. Comfort will be dependent upon the level of clothing worn under the suit. There is a balance between thermal comfort in the helicopter and protection from cold in the event of immersion. The passenger must accept some level of discomfort.

As acknowledged by Dr. Coleshaw, the Operators have addressed the fit issue by contracting with Helly Hansen Canada Limited to conduct individual suit fittings for all workers traveling offshore before they are cleared to fly.

Helly Hansen Canada Limited supports Dr. Coleshaw's comments with respect to the issue of personal accountability and submits that the Commissioner should confirm that offshore workers have a level of personal accountability for their own safety in helicopter transportation.

2. Jonathan Power (National Research Council of Canada – Institute for Ocean Technology)

Jonathan Power discusses the knowledge gap that exists between the calm conditions used to test a human's thermal response in immersion suits and a real world scenario where a person could experience high wind and waves. Mr. Power states that it is important for future studies to recreate as realistically as possible the conditions where protective equipment will be used, and to measure the human responses during those tests. As noted above, the E-452 helicopter transportation suits have already been tested in realistic conditions and performed quite well.

Mr. Power suggests that a goal-based regulatory regime may be a better approach than a specification-based regulatory regime, particularly in circumstances that require innovation. He states that a specification-based approach results in manufacturers addressing only the minimum "pass/fail" requirements without delving into the details of the performance required of the equipment. Helly Hansen Canada Limited states that it has not simply addressed the minimum "pass/fail" requirements in relation to the helicopter transportation suits, but rather it has been proactive in taking steps to improve the effectiveness and the comfort of the helicopter transportation suits whenever possible.

Helly Hansen Canada Limited submits that the Commissioner should adopt the NRC's recommendation that future testing of the helicopter transportation suits recreate as realistically as possible the conditions where the suits will be used in order to obtain an accurate assessment of their performance in real world scenarios.

Helly Hansen Canada Limited also submits that the Commissioner should adopt the NRC's recommendation that the industry move to a goal-based regulatory regime as opposed to the current specification-based regime. Helly Hansen Canada Limited

agrees that moving from standards that prescribe the test conditions to performance-based standards would provide manufacturers with more flexibility in producing protective equipment that meets the needs of the industry.

3. Michael Taber

Michael Taber referred to the helicopter transportation suit standards and noted that there is no standard for the required clothing to be worn under the suit. He suggests that a guideline of thermal comfort zone with respect to protection in both hot and cold conditions should be developed. Mr. Taber discussed the issue of personal accountability with regard to helicopter transportation. He states that personal accountability requires that individuals take the time and initiative to explore available information in order to develop a clear guideline by which to judge the behavior of their own actions as well as those of others. He stated that although wearing extra thermal protection may increase thermal loading and the chance of heat strain, with proper hydration these effects are outweighed by the benefits that would be gained in the case of accidental cold water immersion. He also stated that although the sensation of being hot and uncomfortable due to increased skin temperature may be perceived as a hazard in the event of a helicopter ditching, no such hazards have been reported. In the conclusion of his report, Mr. Taber states that the transportation suits meet and exceed CGSB requirements.

Finally, Mr. Taber poses the question of what tests should be performed to ensure that the suits are properly fitted. Helly Hansen Canada Limited submits that the current individual suit fittings conducted by it for all passengers traveling offshore exceed the industry norm and are sufficient in the circumstances.

Helly Hansen Canada Limited supports Mr. Taber's comments with respect to the need for clarity as to the clothing to be worn under the suits. Helly Hansen Canada Limited therefore submits that the Commissioner should recommend that the helicopter transportation suit standards be revised in order to outline the required clothing to be worn under the suits.

Performance of the Helicopter Transportation Suits

While Helly Hansen Canada Limited has been proactive in seeking feedback from the users of the suits and in working to continually improve the effectiveness and the comfort of the suits, it is important to bear in mind that both the HTS-1 suit, and the previous E-452 suit, meet and exceed the CGSB standards. The performance of the suit was illustrated during the testimony of Robert Decker. Mr. Decker testified as follows with respect to the suits:

i. When the pilot of Cougar Helicopter Flight 491 instructed the passengers to don their suits, everyone got their suits on quickly. Mr. Decker did not have any difficulty donning his suit.

ii. Following the ditching into the ocean, the only lights that Mr. Decker could see were the strobe lights on the suits.

iii. Once Mr. Decker released his seatbelt, the buoyancy of the suit helped carry him to the surface.

iv. Upon reaching the surface of the ocean, Mr. Decker easily inflated the life preserver that is integrated in the suit, which kept him lying on his back in the water.

Although Mr. Decker testified that water entered his suit, it is unclear at this time as to whether Mr. Decker was wearing the correct size of suit. As noted by Dr. Coleshaw, suit manufacturers normally provide a range of suits and it is up to the individual to choose their own suit size. Since the crash of Cougar 491, Helly Hansen Canada Limited now conducts individual suit fittings in order to ensure that passengers have chosen the correct size suit. These individual suit fittings exceed the industry norm. It is also noteworthy that recent testing of the suits in realistic conditions has indicated that the amount of water entering the suits is below the leakage amount calculated by the CGSB water ingress method during the CGSB approval of the suits.

Helly Hansen Canada Limited is currently actively involved in the CGSB committee that is reviewing the helicopter transport suit standards. Helly Hansen Canada Limited is committed to continuing to work to improve the effectiveness and comfort of the helicopter transport suits in the future.

All of which is submitted on behalf of Helly Hansen Canada Limited.

DATED at St. John's, Newfoundland and Labrador, this 30 day of July, 2010.

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