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Development of Physical Employment Standards for the Royal Australian Navy: Validation of Identified Whole-of-ship Tasks

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ABSTRACT

The Royal Australian Navy's Advanced Combat Survivability Course was observed to inform the construction of a combat survivability job task analysis survey. From observations, 29 tasks were identified and subsequently incorporated into a pilot survey that was adminsistered to combat survivability subject matter experts. A focus group was then held with those experts to obtain feedback on survey design and content. The pilot survey resulted in a more detailed task list, a restructuring of answer options and a refined introductory script. The refined survey will be administered to a large number of personnel across a range of platforms, rates, ranks and experience levels to gain subjective ratings on key task parameters. The outcomes of the survey will inform the development of comprehensive field observations and simulations of whole-of-ship tasks.

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Executive Summary

Physical Employment Standards (PES) that represent the physical demands of military tasks are currently being developed for the Australian Defence Force. PES assessments are being developed in order to ensure all personnel can effectively carry out those tasks. The development of PES assessments that represent the physical demands of sea-going whole-of-ship activities for the Royal Australian Navy (RAN) is occurring from January 2013 to June 2016.

Nine whole-of-ship activities have been identified as physically demanding through focus groups with Navy personnel. The individual tasks that comprise these nine activities need to be determined to validate physically demanding whole-of-ship tasks. The validation process was undertaken in two phases: the observation of an Advanced Combat Survivability Course and the piloting of a job task analysis survey. The objective of these phases was to inform the development of a job task analysis survey that is to be implemented across a large sample Navy population.

Observation of the Advanced Combat Survivability Course occurred at the RAN's School of Survivability and Ship Safety, HMAS Stirling. Seventeen sailors volunteered to participate in the study. Course components that were observed included: casualty search and evacuation, firefighting and leak stop and repair. The observations together with information from Navy policy (Australian Book of Reference 5476 Vol 1 - Royal Australian Navy Shipboard Combat Survivability—Damage Control Policy) and the previously held focus groups enabled the development of descriptions for the 29 identified combat survivability tasks.

The developed task list was incorporated into a combat survivability based job task analysis survey. The pilot trial for the survey occurred at RAN's School of Survivability and Ship Safety, HMAS Cerberus. Thirteen active management and instructor staff volunteered to participate in the study. The participants completed the online survey, answering questions in regard to task frequency, duration, distance, importance and physical effort. After the completion of the survey, a focus group was held with the participants to obtain feedback on survey design and content. The pilot survey resulted in a more detailed task list, a restructuring of answer options and a refined introductory script.

The work that has been completed to date has helped to refine the survey that will be administered to a large number of Navy personnel across a range of platforms, rates, ranks and experience levels. The data from the survey will subsequently be used to determine subjectively rated differences in whole-of-ship tasks between platforms. These ratings will aid in developing valid field observations and simulations where physical and physiological demands of the tasks will be quantified. Ultimately, this work will lead to the development of a scientifically defensible Navy PES baseline.

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1. Introduction

Physical assessments and standards have historically been used by organisations to assess the capability of personnel for demanding occupations. This is particularly true in military organisations, where it is widely acknowledged that individual physical capability may directly influence the combat effectiveness of the organisation. By defining Physical Employment Standards (PES) that represent the real demand of military tasks, the Australian Defence Force (ADF) can ensure all personnel have the appropriate physical capacity to safely and effectively carry out those tasks. During the period January 2013 to June 2016, a sea-going, whole-of-ship (WOS) PES assessment will be developed based on physical and physiological demands of activities that are applicable to all sea-going Royal Australian Navy (RAN) personnel. The PES process involves a series of major steps and activities. Fundamentally, the research process moves from the identification of physically demanding WOS tasks to field observations and task simulations to setting scientifically defensible physical tests and standards that can be used to support selection, training and remediation.

A number of physically demanding WOS activities have already been identified through focus groups with Navy personnel (Middleton & Carr, 2014). Participants were representative of personnel from a broad range of ranks (SMN – LCDR) and covered each platform of the RAN fleet. The focus groups resulted in a consolidated list of nine physically demanding WOS activities which generally fell into one of five categories (Movement around ship, damage control, medical response, replenishment at sea and movement of stores).

From these nine activities it was necessary to determine the individual tasks that are performed within each activity and assess if they constitute a physically demanding WOS task. Given Navy's directive that the primary focus of the WOS PES baseline should be on combat survivability (CS), the RAN Advanced Combat Survivability Course (ACSC) was observed and quantified. In addition to determining individual CS tasks, this partially satisfied Navy's request to quantify the physical demands of the course in order to draw parity with the WOS PES baseline when developed. Full quantification of the physical demands of the course will occur after the field observation and simulation phase.

Once the observation and quantification of the physical demands of the ACSC is completed, the resulting exhaustive task list will be included in a survey administered to a large number of Navy personnel from a range of platforms, categories, ranks and experience levels. Collected data will include subjective ratings of task importance and physical demand as well as various task parameters. The conduct of this survey will allow consultation with a greater number of Navy personnel—when compared to focus groups alone—to maximise the internal validity of the research process.

The purpose of this report is to describe the processes and results of the observation and quantification of the physical demands of the RAN ACSC (task identification) as well as the pilot study of the RAN WOS PES survey (task and survey validation).

2. Advanced Combat Survivability Course

2.1 Background

The ACSC aims to equip personnel with the knowledge and skills to work efficiently and effectively in damage control scenarios. The practical components of the course focus on the damage control elements of breathing apparatus operation, firefighting, leak stop and repair as well as casualty evacuation from toxic hazards. These components not only need a high degree of skill, they require Navy personnel to possess a certain level of physical fitness in order to be an effective member of a damage control team.

The purpose of observing and quantifying the physical demands of the ACSC is twofold. Firstly, observing the course allows for the identification of tasks that are performed during CS activities. Secondly, quantifying the physical demands of the course through the collection of physical and physiological data will enable comparison between task demands on the course and during on-board duties. These data will be used to determine whether there is parity between the physical and physiological demands of the ACSC (or components of it) and CS tasks performed on-board each platform. If parity is drawn, the ACSC (or components of it) may be used in the development of PES assessments. For the purposes of this report, only the course observation will be detailed. The physical and physiological data of the course, once supplemented with additional data to be collected at a later date, will be reported in a subsequent report.

2.2 Methods

2.2.1 Study location and description

This study was conducted in November 2013 during the ACSC at the RAN's School of Survivability and Ship Safety (RANSSSS), HMAS Stirling, Garden Island, Australia. The ACSC was run over a two-week period with a mix of theory (n=7), exam (n=4), instructional (n=2) and practical (n=10) classes (Appendix A).

2.2.2 Participants

Seventeen sailors (15 male, 2 female; age 27.0 ± 4.4 years; height 177.2 ± 8.6 cm; mass 83.0 ± 12.7 kg; RAN service 6.2 ± 2.9 years; sea-going experience 3.1 ± 2.0 years) participated in this study. Written informed consent to procedures approved by the Australian Defence Human Research Ethics Committee was obtained from each participant before the onset of this study.

2.2.3 Course component descriptions

Course components were carried out according to standard operating procedures and run by qualified instructors at all times. All course equipment was weighed using platform scales (PM150, Wedderburn, New South Wales, Australia).

2.2.3.1 *Toxic Hazard*

During the toxic hazard exercise, six sailors performed a search and rescue of a 6.7 kg OSCAR water training manikin in a fire unit (Figure 1). The six sailors were divided into three teams of two with each individual within each team conducting identical tasks. Each sailor wore an intermediate rig of coveralls, anti-flash, gum boots, Open Circuit Compressed Air Breathing Apparatus (OCCABA) and two Emergency Life Support Respiratory Devices (ELSRDs). The combined mass of clothing and equipment equated to 23.8 kg. Each member of Team 2 also carried two gas monitors (~ 1 kg additional mass per sailor). Team 1 entered the gas boundary and proceeded directly to the suspected source of the hazard then commenced their search for casualties in an up and outward spiral from the hazard source. Team 2 entered the gas boundary and commenced their search for casualties in a downward spiral to the hazard source. Teams 1 and 2 continued to search for casualties until they met, signifying that all compartments had been searched. Team 3 entered the gas boundary and proceeded to the 'casualty' (6.7 kg; Oscar – water-rescue training dummy, Emerald Marine, Washington, USA) that was found in a compartment. Once a new ELSRD was donned on the casualty, Team 3 performed a RAN safety lift and carry of approximately 10 m to the bottom of a ladder, secured a fire hose around the casualty and then performed a fire hose lift through the hatch and out of the compartment (Figure 1).

Figure 1: Toxic hazard exercise showing a team placing an ELSRD on the casualty (a) and performing a RAN Safety lift (b) and fire hose lift (c).

2.2.3.2 *Leak stop and repair (LS&R) and firefighting round robins*

Participants took part in a number of activities that were set up in the leak stop and repair (LS&R) round robin exercise (Figure 2). Activities included the use of a Broco Underwater Cutting System (Broco, Inc., California, USA), a SalvageMaster Underwater Marine Tool (211HD, Ramset, Victoria, Australia) and a Bauer Air Compressor (C-D/DV/NAVY, Bauer Compressors, Inc., Virginia, USA). These activities were deemed to be instructional rather than practical and were not included in subsequent analyses. The practical components of the circuit training included a leak stop and repair exercise where participants were required to cover a leak with rubber and sheet metal then secure with 'bulldog' clips. Participants also conducted a door entry whilst carrying a fire extinguisher (approximately 14 kg) and proceeded to simulate the extinguishment of a fire.

Figure 2: Firefighting and LS&R Round Robins included the use of a Ramset SalvageMaster (a), Broco Underwater Cutting System (b), a Bauer Air Compressor (c) and a Yanmar water pump (d). Participants also performed pipe repairs (e) and firefighting door entry (f).

2.2.3.3 *Firefighting*

Firefighting exercises involved teams of six participants entering a compartment in an attempt to extinguish a fire (Figure 3). Each participant was delegated to roles including Nozzleman, Hose Handler, Support Party IC or Hose Handler/Inductor/Hydrants. All participants entered the fire compartment with the exception of the Hose Handler/Inductor/Hydrants who remained outside to man the hydrant and assist in holding both hoses. This activity was conducted under three conditions: dry, wet and hot. The dry condition was performed without the discharge of water or the presence of fire.

The wet condition was performed with the discharge of water but not in the presence of fire. The hot condition was performed with the discharge of water and the presence of fire. During the hot condition a participant also conducted boundary cooling whereby they continuously opened and closed the nozzle of a hose for five and ten seconds respectively to cool the bulkhead adjacent to the deck above the source of a fire.

The Nozzleman was required to hold the nozzle (4.6 kg) and direct a water stream in an appropriate pattern and flow rate (wet/hot). A Hose Handler was positioned behind each Nozzleman and was required to assist in pushing the hose forward to compensate for the nozzle reaction force (wet/hot), hold the weight of the hose, move the hose as required and assist the Nozzleman in directing the stream (wet/hot). The Support Party IC was required to search the compartment using a thermal imaging camera and physically (push and/or pull) direct the hose team to the source of any fire.

Figure 3: The six members of a Support Party. (From left to right) Back row: Hose Handler/Inductor/Hydrants (6), IC (3), Nozzleman (4), Hose Handler (5). Front row: Nozzleman (1), Hose Handler (2).

2.2.3.4 *LS&R*

The LS&R exercise consisted of two main tasks. Firstly, participants were required to cut an arbitrary length of 4 x 4 inch Oregon timber using a hand saw. They then carried a larger piece of timber (ranging from approximately 0.5 m and 3 kg to 2.0 m and 12 kg) a distance of 10 m and then ascended an external staircase (vertical height of 4 m) into a compartment where they passed the timber to a team member (Figure 4). The second task included team members erecting the timber vertically from the bottom deck and hammering wedges in place between the top of the timber and the top deck. A similar task was performed with breast pieces (timber placed in horizontal orientation) that were hammered between the bulkhead and a vertical piece of timber.

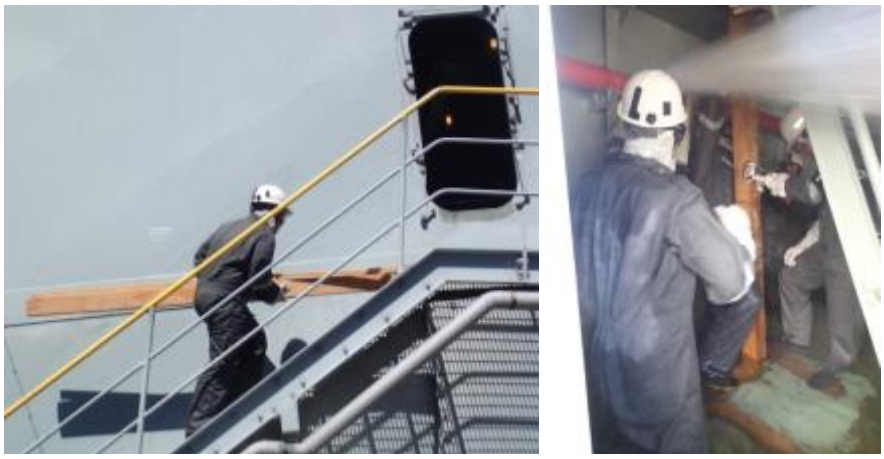


Figure 4: LS&R exercises involved participants carrying 4 x 4 inch timber and erecting timber to stop and repair leaks.

2.2.3.5 *Scenario Training*

The final exercises that were performed by the participants were major damage control simulations that combined the firefighting and LS&R exercises.

2.3 Results

2.3.1 Equipment masses

The mass of each piece of equipment worn and/or used during the ACSC was collected (Table 1).

2.3.2 Combat survivability task list

There were distinct tasks that were performed during each practical component of the ACSC. Together with information gathered from ABR 5476 and the focus groups held previously with Navy personnel (Middleton & Carr, 2014), task descriptions were formulated and collated to form the CS task list (Table 2). Refinement of these task descriptions were obtained in consultation with ACSC staff before being incorporated into the survey.

Table 1: Equipment masses from the ACSC.

Item Type	Item Description	Mass (kg)
Clothing	Fire helmet	1.5
	Mask	0.7
	Fire pants and jacket	3.4
	Gloves	0.3
	Shoring helmet	0.6
	Goggles	0.1
	Gumboots	2.4
	Coveralls	1.2
	Anti-flash	0.3
	OCCABA (fully charged)	14.6
Firefighting	9 L stored pressure fire extinguisher	14.2
	38 mm fire hose (uncharged)	6.6
	64 mm fire hose (uncharged)	16.4
	Typhoon fan	13.6
	Rake	2.6
	Nozzle	4.6
LS&R	4 x 4 timber (2 m in length)	12.3
	Pad piece	2.5
	Splinter box	3.2
	Gunter Batten	1.5
	Roaming bag	6.1
Toxic Hazard	Emergency Life Support Respiratory Device	2.3
	Oscar water rescue training dummy	6.7

Table 2: Combat survivability task list incorporated into the pilot survey.

Task Category	Task #	Task Description
Emergency Situations	**1**	Hands to Action Stations
	2	Hands to Emergency Stations
	3	Hands to Leaving Ship Stations
	4	Conduct a single emergency cable run in five minutes
Firefighting	**5**	While wearing basic rig, lift and carry fire extinguisher a distance of x metres and enter affected compartment within one minute of the alarm being raised (FAA)
	6	While wearing intermediate rig and OCCABA, lift and carry fire extinguisher a distance of x metres and enter affected compartment within three minutes (BA-P)
	7	While wearing full firefighting ensemble and OCCABA lift and carry fire hose a distance of x metres, attach to water main and enter affected compartment in seven minutes (BA-H)
	8	While wearing full firefighting ensemble and OCCABA and acting as a nozzleman, participate in sustained use of charged fire hose
	9	While wearing full firefighting ensemble and OCCABA and acting as IC, move and support nozzlemen
	10	While wearing full firefighting ensemble and OCCABA and acting as a hose handler, move with and support nozzleman's charged hose
	11	While wearing full firefighting ensemble and OCCABA and acting as a Hose Handler/Inductor/Hydrants, hold hoses for an extended period of time.
	12	Lift and carry as a team of two, a de-smoking fan a distance of x metres
	13	While wearing full firefighting ensemble and OCCABA conduct fire overhaul
Leak Stop and Repair	**14**	Enter affected compartment within three minutes of the alarm being raised in search of casualties
	15	Lift and carry as a team of three, a de-watering pump a distance of x metres in three minutes
	16	Cut 4x4 Oregon timber to size using a hand saw
	17	As a team of two, carry timber piece from storage area to required site
	18	As a team of two, carry acro shoring from storage area to required site and erect by twisting
	19	Hammer wedges into place in order to secure vertical and breast pieces
	20	Hammer plugs into place in order to maintain hull integrity
	21	Carry a tool bag and conduct a permanent pipe repair

Task Category	Task #	Task Description
Toxic Hazard	**22**	Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team One (Search), enter affected compartment and spiral upwards to meet Team Two placing ELSRD on first casualty within four minutes
	23	Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team Two (Search), enter gas boundary and spiral downwards to meet Team One placing ELSRD on first casualty within four minutes
	24	Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team Three (Casualty Evacuation), enter gas boundary and evacuate casualty
	25	As a member of Team Four (Repair Team) and wearing intermediate rig and OCCABA, carry a kit bag with tools and repair and clean up toxic hazard
Casualty Evacuation	**26**	While wearing OCCABA individually or in a team of two, perform a fire hose lift as a member of Team One (upper) or Team Two (lower)
	27	While wearing OCCABA individually or in a team of two, perform a Res-Q-Mate stretcher lift as a member of Team One (above) or Team Two (below)
	28	In a team of 6-8, lift and carry a casualty on a Res-Q-mate stretcher from site of injury x metres to first aid post/sick bay
	29	While wearing OCCABA and in a team of two, lift and carry a casualty using a fore-aft carry from site of injury x metres to first aid post/sick bay

3. Pilot Survey

3.1 Background

The rationale for implementing surveys in RAN PES development include the removal of potential bias from focus group data, to allow for a much larger number of respondents to be sampled and maximise the internal validity of the research. To ensure that the results of the survey are able to be analysed with confidence, the survey items must be validated. This was achieved by conducting a pilot survey and follow-up focus group that attained the following:

1. Determination of the suitability of the instruction brief
2. Identification of issues with survey format, layout and functionality
3. Identification of incorrect task descriptions
4. Identification of missing tasks
5. Determination of the suitability of answer options.

3.2 Methods

3.2.1 Pilot study location and description

This study was conducted in April 2014 at the RANSSSS, HMAS Cerberus, Cribb Point, Australia.

3.2.2 Participants

Active management and instructional staff members from the RANSSSS (Fleet Base – South) were chosen to participate in the pilot survey and focus group as they were deemed to be subject matter experts in the area of CS. Thirteen sailors (age 36.7 ± 9.3 years, range 23 – 54; RAN service 16.5 ± 11.2 years, range 5.5 – 38) participated. Written informed consent to procedures approved by the Australian Defence Human Research Ethics Committee was obtained from each participant before the onset of this study. All 13 participants completed the survey with 12 of these participating in the focus group.

3.2.3 Survey

The survey consisted of 52 questions relating to demographics, CS tasks and general movement patterns on platforms. The majority of questions focussed on CS tasks across five areas; emergency procedures, firefighting, LS&R, toxic hazard and casualty evacuation. For each CS task participants were asked questions in relation to:

1. Frequency
2. Duration
3. Distance
4. Importance
5. Physical effort.

Thirteen computer terminals with Defence Restricted Network access were used to access and complete the survey online. The survey was stored on a web-based platform using Qualtrics online survey software (Qualtrics, Utah, U.S.A.). These computers were located across 4 rooms within the same building. All participants were given a slip of paper detailing the web address that was required to access the survey. The survey was initially constructed with the help and assistance of Defence Evaluations, Defence Learning Branch. Participants were given a piece of paper and pen to note any comments/concerns while completing the survey to aid in focus group discussions.

Participants were initially briefed about the PES project and their role in the development of the survey. A pre-prepared information and instruction brief about the survey was read verbatim by a member of the research team. Once fully informed, participants sat at a computer terminal and proceeded to navigate to the survey website address using the link provided. Participants were encouraged to ask questions and write down any thoughts or concerns. Participants' responses were collected via a combination of clustered drop down

boxes and 7-point Likert scales. At the completion of the survey participants were able to type general comments into a text box (Appendix B).

Following survey completion, participants congregated in a lecture room where they took part in a written version of the survey. Participants were given a printed copy of the survey and asked to answer selected questions by writing their answers as a whole number as opposed to a range. The questions selected for this were questions that could only be answered by selecting clustered drop-down options in the online format. Participants were given approximately 15 minutes to complete as much of the survey in writing as possible.

3.2.4 Focus Group

The focus group was conducted in a classroom (Figure 5) and consisted of questions aimed to obtain feedback from participants regarding the design of the survey. A member of the research team acted as the focus group moderator. The focus group was introduced by the moderator and all participants were encouraged to respond openly and honestly. Participants were asked to leave their rank at the door to facilitate an open and candid discussion. Input from all researchers was welcomed and open dialogue was fostered. The focus group followed an unstructured formula rather than adhering to a series of structured questions so that the conversation could flow naturally.

Questions were asked regarding the length, design, layout and content of the survey questions/answers. A sample question for the focus group is, "Do you feel that any response option were restrictive or didn't enable an accurate response to this question?" A portable video camera with tri-pod and audio recorder were used to record the focus group.

Figure 5: Classroom configuration for the post-pilot survey focus group.

3.2.5 Data Analysis

Data from each CS task was examined separately. The ratio of personnel that had performed each task to those that had not was calculated. The range of clustered drop-down responses for each of the four sub-questions for each CS task was calculated and directly compared to the written responses given by each participant. This was done in order to determine whether clustered drop-down responses captured the full range of potential open written responses.

General comments were received to determine if any improvements could be made to the survey with a focus on improving task descriptions. In addition, all members of the research team took notes during the focus group in relation to the survey for further analysis.

3.3 Results

3.3.1 Demographics

The demographic information of each participant was collected in the survey (Tables 3 and 4).

Table 3: Sex and rank frequency data of the pilot survey participants.

Variable	***n***	**Frequency**
Gender	13	
Male		12
Female		1
Rank	13	
Warrant Officer		1
Chief Petty Officer		3
Petty Officer		1
Able Seaman		4
Leading Seaman		4

Table 4: Age and service experience of the pilot survey participants.

	n	**Mean (±sd) / Range**
Average Age (years)	13	
Mean (SD)		36.7 (9.3)
Min		23
Max		54
Time since last at sea (years)	11	
Mean (SD)		4.2 (5.9)
Min		0.25
Max		20.5
Time served in RAN (years)	12	
Mean (SD)		16.5 (11.2)
Min		5.20
Max		38.17
Time in current position (years)	12	
Mean (SD)		1.9 (1.0)
Min		0.08
Max		3.33

3.3.2 Survey

Mean online survey completion time was 32 ± 5 min. Examination of the number of participants that performed each CS task showed at least two participants (15 %) had engaged in each task. The comparison of clustered drop-down response ranges to open answer responses showed that response categories did not capture the full range of potential answers.

3.3.3 Focus Group

Discussion in the focus group revealed that participants were generally happy with the design of the survey. Participants agreed that the survey flowed well and that no questions were repeated. Participants agreed with the suggestion that allowing them to input their answers rather than select from a range of categories would be preferable. Participants where happy with the overall content of the survey and agreed that all questions were clear and did not include any tasks that were not WOS. Similarly there were no tasks that participants felt were omitted.

One participant commented that the fore-aft lift should be described as a RAN safety lift for greater clarity. Furthermore it was suggested that the wording of questions should be as specific as possible in order to minimise any ambiguity as to how questions are interpreted. Participants agreed that many of the questions were generic and the survey would capture a variety of responses across platforms. Finally participants agreed that providing more information towards the intended outcomes of the study may be useful in motivating participants to complete and engage with the survey.

The outcome of the pilot survey resulted in a more defined and detailed CS task list (Table 5), a restructuring of answer options (i.e. text boxes as opposed to clustered drop downs) and a refined introductory script. The final task list also incorporated three non-CS tasks (Tasks 1-3) that were deemed to be physically demanding WOS tasks through the earlier focus groups (Middleton & Carr, 2014).

Table 5: The final task list that will be incorporated into the RAN PES WOS survey.

Task Category	Task #	Task Description
Replenishment at Sea	**1**	Perform line handling.
	2	Participate in the breakdown of a pallet of stores while at sea.
Storing	**3**	Participate in storing a vessel while alongside.
Emergency Situations	**4**	Closing up to action stations.
	5	Closing up to emergency stations.
	6	Closing up to leaving ship stations.
	7	Conduct a single emergency cable run in 5 minutes.
Firefighting	**8**	Lift and carry a fire extinguisher a distance of x metres and enter affected compartment within one minute of the alarm being raised (FAA).
	9	Lift and carry a fire extinguisher a distance of x metres and enter affected compartment within three minutes (BA-P).
	10	Lift and carry a fire hose a distance of x metres, attach to water main and enter affected compartment in seven minutes (BA-H).
	11	As a nozzleman, participate in sustained use of a charged fire hose.
	12	As the IC, move and support nozzlemen.
	13	As a hose handler, move with and support nozzleman's charged hose.
	14	As a Hose Handler/Inductor/Hydrants, hold hoses for an extended period of time.
	15	Conduct boundary cooling.
	16	Conduct fire overhaul.
Leak Stop and Repair	**17**	Enter affected compartment within three minutes of the alarm being raised in search of casualties.
	18	Lift and carry as a team of three, a de-watering pump a distance of x metres in 3 minutes.
	19	Lift and carry as a team of two, a de-smoking fan a distance of x metres.
	20	Cut 4x4 Oregon timber to size using a hand saw.
	21	As a team of two, carry timber piece from storage area to required site.
	22	As a team of two, carry acro shoring from storage area to required site and erect by twisting.
	23	Hammer wedges into place in order to secure vertical and breast pieces.
	24	Hammer plugs into place in order to maintain hull integrity.

Task Category	Task #	Task Description
Toxic Hazard	**25**	Carry a tool bag and conduct a permanent pipe repair.
	26	As a member of Team 1 (Search) and carrying two spare ELSRDs, enter affected compartment and spiral upwards to meet Team 2 placing ELSRD on first casualty within four minutes.
	27	As a member of Team 2 (Search) and carrying two spare ELSRDs, enter gas boundary and spiral downwards to meet Team 1 placing ELSRD on first casualty within four minutes.
	28	As a member of Team 3 (Casualty Evacuation) and carrying two spare ELSRDs, enter gas boundary and evacuate casualty.
	29	As a member of a Team 4 (Repair Team), carry a kit bag with tools and repair and clean up toxic hazard.
Casualty Evacuation	**30**	Individually or in a team of 2, perform a fire hose lift.
	31	Individually or in a team of 2, perform a Res-Q-Mate stretcher lift.
	32	In a team of 6-8, lift and carry a casualty on a Res-Q-Mate stretcher from site of injury x metres to first aid post/sick bay.
	33	In a team of 2, lift and carry a casualty using a RAN Safety Lift (i.e. fore-aft carry) from site of injury x metres to first aid post/sick bay.

4. Conclusion and Future Work

The observation of the ACSC demonstrated that within each CS activity there were a number of discrete tasks. These tasks were incorporated into the pilot survey and validated by CS subject matter experts. These subject matter experts also gave valuable feedback about the design and content of the survey which will allow for a more effective survey to be developed and implemented across the RAN. The intent of the job task analysis survey is to capture task parameters across multiple platforms. There are a number of ways that a large survey could be implemented.

- **OPTION 1 (Email):** Send personnel an email with a link to the survey.
- **OPTIONS 2 (Classroom):** Personnel are scheduled to attend a 1-hour session in a classroom on base. The research team is not present and therefore cannot deliver a brief or clarify questions and give direction.
- **OPTIONS 3 (Classroom):** Personnel are scheduled to attend a 1-hour session in a classroom on base in which they are briefed by the research team. The research team is also available to clarify questions and give direction.
- **OPTION 4 (iPad):** Personnel are scheduled to attend a 1-hour session aboard their vessel in which they are briefed by the research team. The research team is also

available to clarify questions and give direction. Data is captured by third party software for analysis.

The quality of the responses from Navy personnel is of utmost importance. Although not intentional, some inaccuracies in answers may stem from confusion, motivation, or lack of clarity in regard to the questions being asked. To overcome these inaccuracies, it is vital that the research team are in attendance during the completion of these surveys. This allows Navy personnel to seek clarification on questions and advice in order to complete the survey to the best of their abilities. It is therefore desirable to conduct the survey data collection in person with Navy personnel. This may require the conduct of multiple surveys in multiple locations in order to obtain the necessary data quantity and quality. A comparison of the consequences of each implementation strategy in relation to data quality, data quantity and work disruption is presented in Table 6.

Table 6: Consequences of different survey implementation strategies.

OPTIONS	Data Quality	Data Quantity	Work Disruption
1. Email	Low	Med	Low
2. Classroom (Research team not in attendance)	Low-Med	Low-Med	Med
3. Classroom (Research team in attendance)	High	Med	Med
4. On-board using iPad (Research team in attendance)	High	Med	Low

Due to the aforementioned reasons, the preferred data capture method is **OPTION 3 - Conduct survey in a classroom at multiple bases with the research team in attendance.** OPTION 4 is the next best alternative as although on-board distractions may be present, it will still allow for the research team's attendance. It is perceived that OPTIONS 1 & 2 will result in poor data quality and lower response rates so the resource investment may not be justified.

It is envisaged that the additional time required to conduct surveys in person will reduce the time taken to collect data on board vessels during the FO&S stage of PES development. By obtaining accurate data during the survey stage, the disruption of vessels during the FO&S stage will be minimised.

The work that has been completed to date will assist in refining the survey to incorporate the final WOS task list. The data from the survey will be used to determine subjectively rated differences in WOS tasks between platforms. These ratings will aid in developing the field observations and simulations of these tasks to quantify the physical and physiological demand across all platforms. The quantified demands will be used in conjunction with the survey results to understand the total demand of each task and will lay the foundation for the development of the scientifically defensible Navy PES baseline.

5. References

Middleton, K. & Carr, A. (2014). *Development of physical employment standards for the Royal Australian Navy: Identification of whole-of-ship tasks (TN-1264)*. Melbourne, Australia: Defence Science and Technology Organisation.

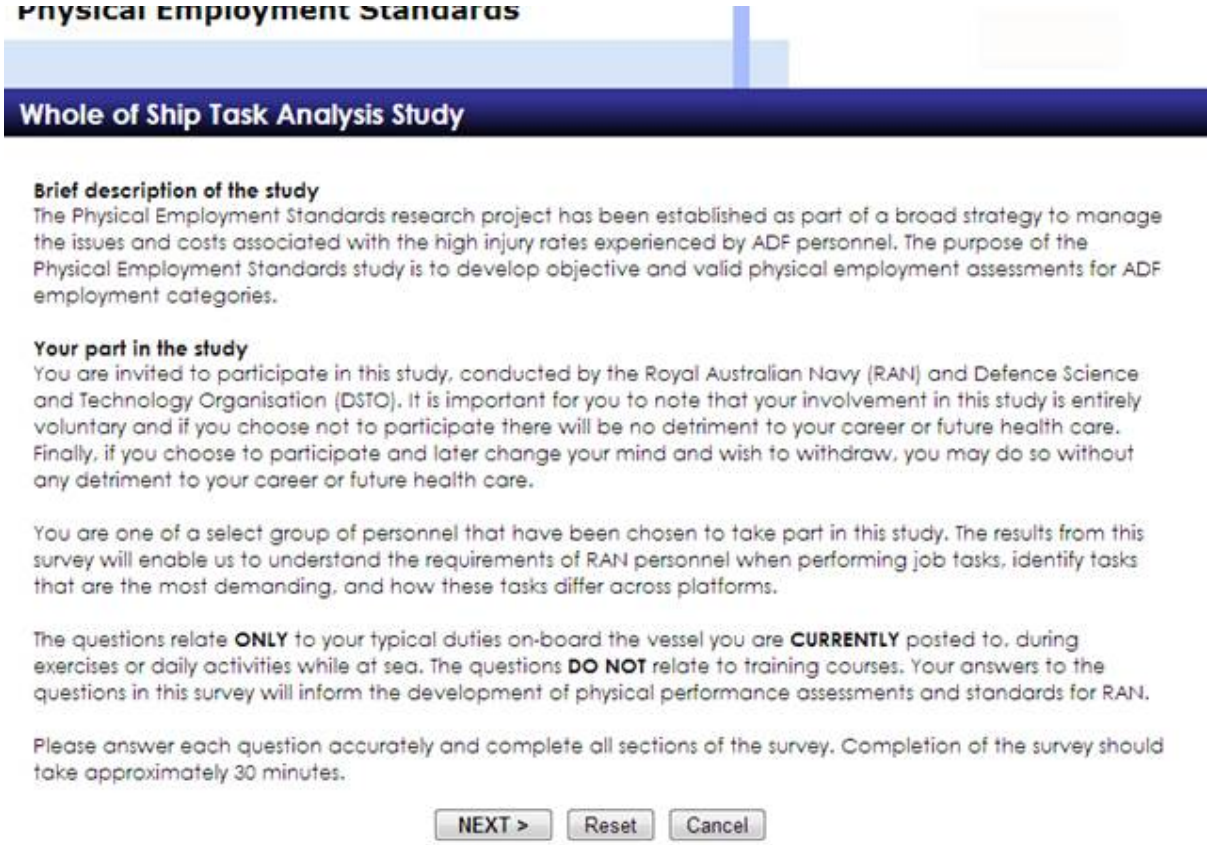
Appendix A: Advanced Combat Survivability Course Schedule

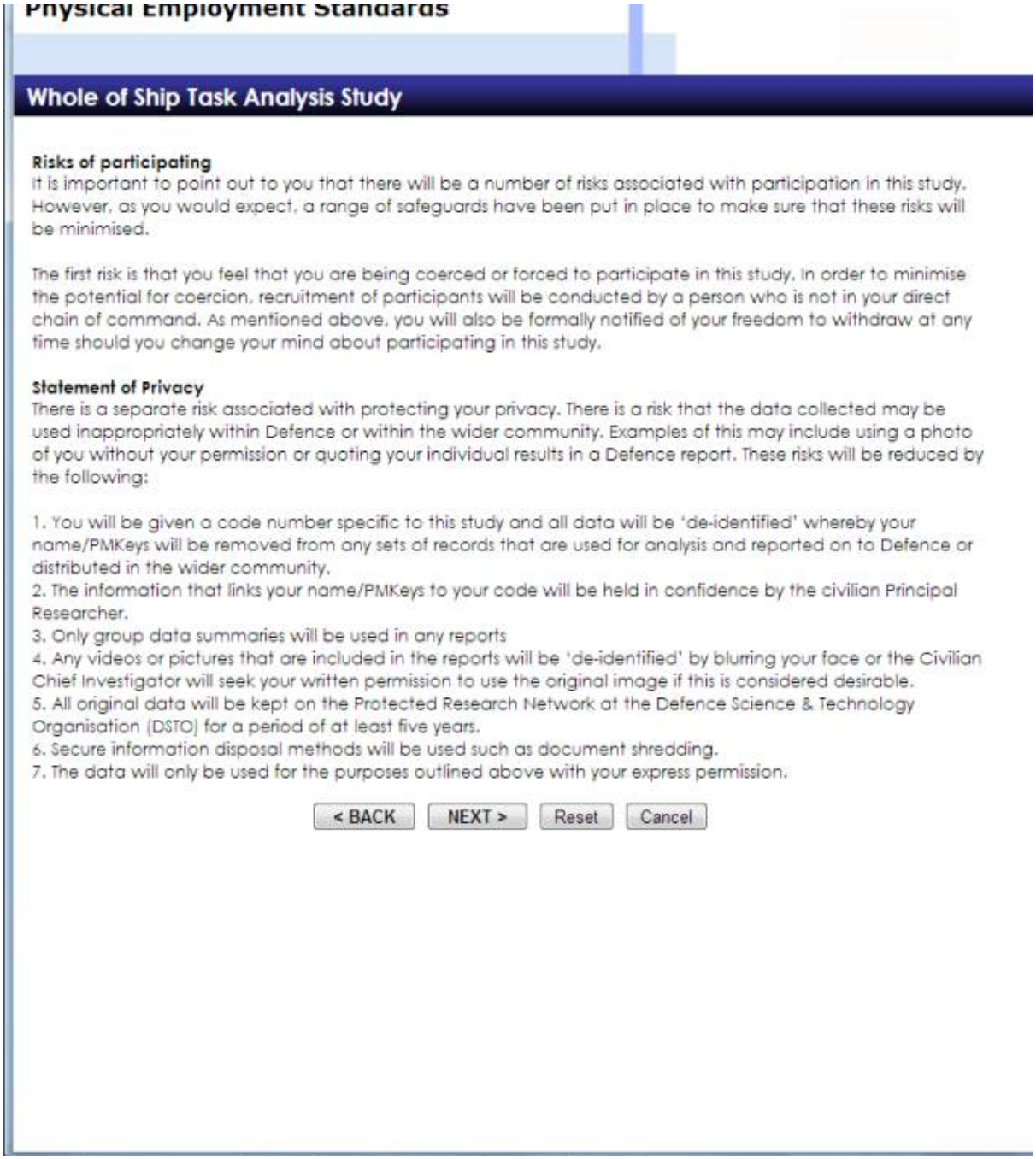
Table A1: Advanced Combat Survivability Course schedule. Practical classes are highlighted in yellow.

<table>
<tr><th>Time</th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th></tr>
<tr><td>0830</td><td>Safety brief</td><td>CBRND Exam</td><td>LS&R Exam</td><td>Toxic Hazard Exam</td><td>Fire Fighting Exam</td></tr>
<tr><td>0900</td><td rowspan="6">CBRND Theory</td><td rowspan="6">LS&R Theory</td><td rowspan="3">Command & Control</td><td rowspan="6">Fire Fighting Theory</td><td rowspan="6">Fire Fighting & LS&R Round Robins</td></tr>
<tr><td>0930</td></tr>
<tr><td>1000</td></tr>
<tr><td>1030</td><td rowspan="3">Toxic Hazard Theory</td></tr>
<tr><td>1100</td></tr>
<tr><td>1130</td></tr>
<tr><td>1200</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1230</td><td rowspan="2">CBRND Theory</td><td rowspan="3">LS&R Theory</td><td rowspan="10">Toxic Hazard Practical</td><td rowspan="10">Fire Fighting Theory</td><td rowspan="3">Fire Fighting & LS&R Round Robins</td></tr>
<tr><td>1300</td></tr>
<tr><td>1330</td><td rowspan="8">CBRND Practical</td></tr>
<tr><td>1400</td><td rowspan="8">Board Plotting</td></tr>
<tr><td>1430</td></tr>
<tr><td>1500</td></tr>
<tr><td>1530</td></tr>
<tr><td>1600</td></tr>
<tr><td>1630</td></tr>
</table>

	Monday	Tuesday	Wednesday	Thursday
0830	LS&R Practical	Scenario Training	Scenario Training	Practical Assessment
0900				
0930				
1000				
1030				
1100				
1130				QC and Debrief
1200				
1230	Fire Fighting Practical	Scenario Training	Scenario Training	
1300				
1330				
1400				
1430				
1500				
1530				
1600				
1630				

Appendix B: Screenshots of Pilot Survey




Physical Employment Standards
Whole of Ship Task Analysis Study
Risks of participating
It is important to point out to you that there will be a number of risks associated with participation in this study. However, as you would expect, a range of safeguards have been put in place to make sure that these risks will be minimised.
The first risk is that you feel that you are being coerced or forced to participate in this study. In order to minimise the potential for coercion, recruitment of participants will be conducted by a person who is not in your direct chain of command. As mentioned above, you will also be formally notified of your freedom to withdraw at any time should you change your mind about participating in this study.
Statement of Privacy
There is a separate risk associated with protecting your privacy. There is a risk that the data collected may be used inappropriately within Defence or within the wider community. Examples of this may include using a photo of you without your permission or quoting your individual results in a Defence report. These risks will be reduced by the following:
1. You will be given a code number specific to this study and all data will be 'de-identified' whereby your name/PMKeys will be removed from any sets of records that are used for analysis and reported on to Defence or distributed in the wider community.
2. The information that links your name/PMKeys to your code will be held in confidence by the civilian Principal Researcher.
3. Only group data summaries will be used in any reports
4. Any videos or pictures that are included in the reports will be 'de-identified' by blurring your face or the Civilian Chief Investigator will seek your written permission to use the original image if this is considered desirable.
5. All original data will be kept on the Protected Research Network at the Defence Science & Technology Organisation (DSTO) for a period of at least five years.
6. Secure information disposal methods will be used such as document shredding.
7. The data will only be used for the purposes outlined above with your express permission.
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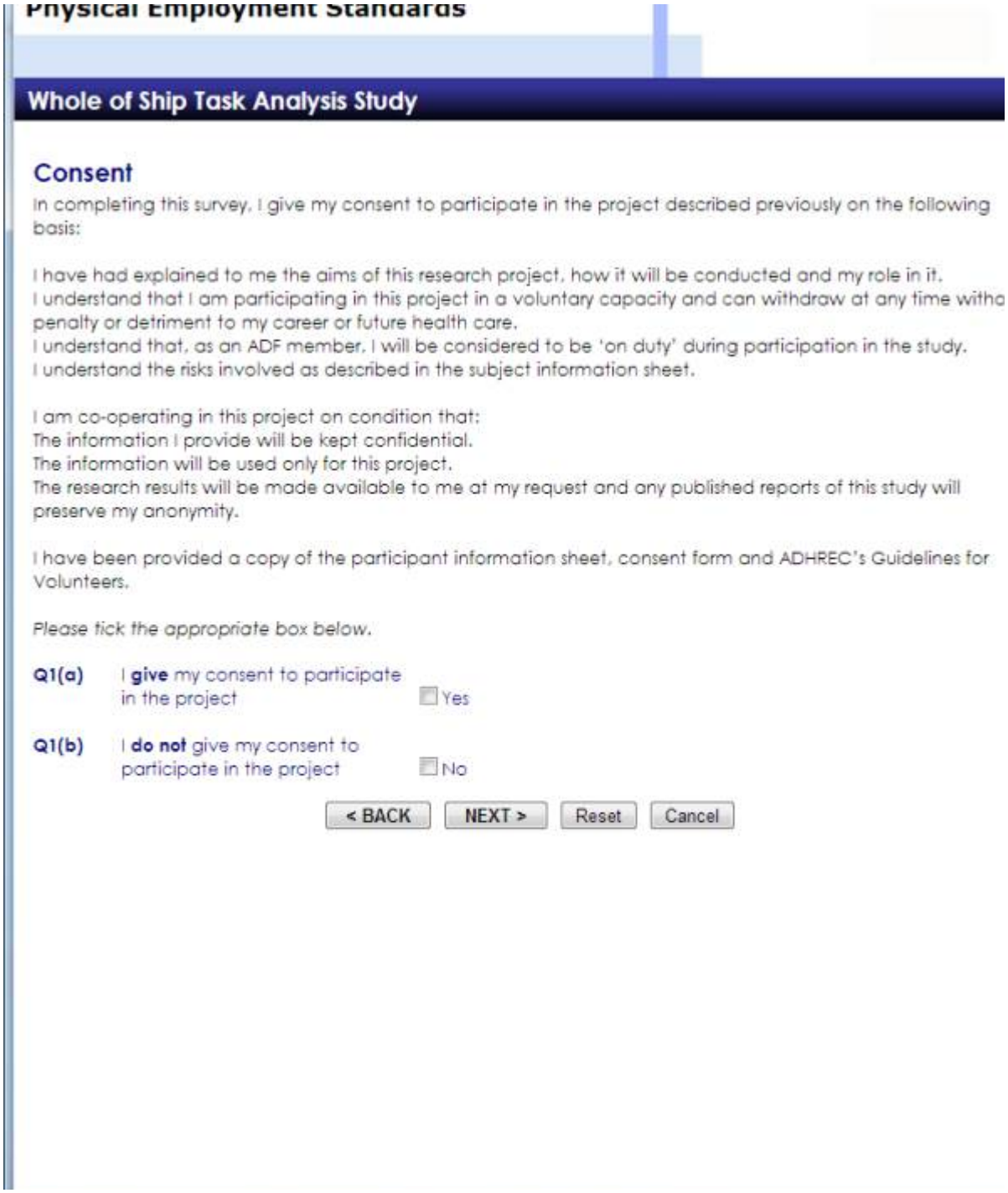
Physical Employment Standards
Whole of Ship Task Analysis Study
Consent
In completing this survey, I give my consent to participate in the project described previously on the following basis:
I have had explained to me the aims of this research project, how it will be conducted and my role in it.
I understand that I am participating in this project in a voluntary capacity and can withdraw at any time witho penalty or detriment to my career or future health care.
I understand that, as an ADF member, I will be considered to be 'on duty' during participation in the study.
I understand the risks involved as described in the subject information sheet.
I am co-operating in this project on condition that:
The information I provide will be kept confidential.
The information will be used only for this project.
The research results will be made available to me at my request and any published reports of this study will preserve my anonymity.
I have been provided a copy of the participant information sheet, consent form and ADHREC's Guidelines for Volunteers.
Please tick the appropriate box below.
Q1(a) I give my consent to participate in the project Yes
Q1(b) I do not give my consent to participate in the project No
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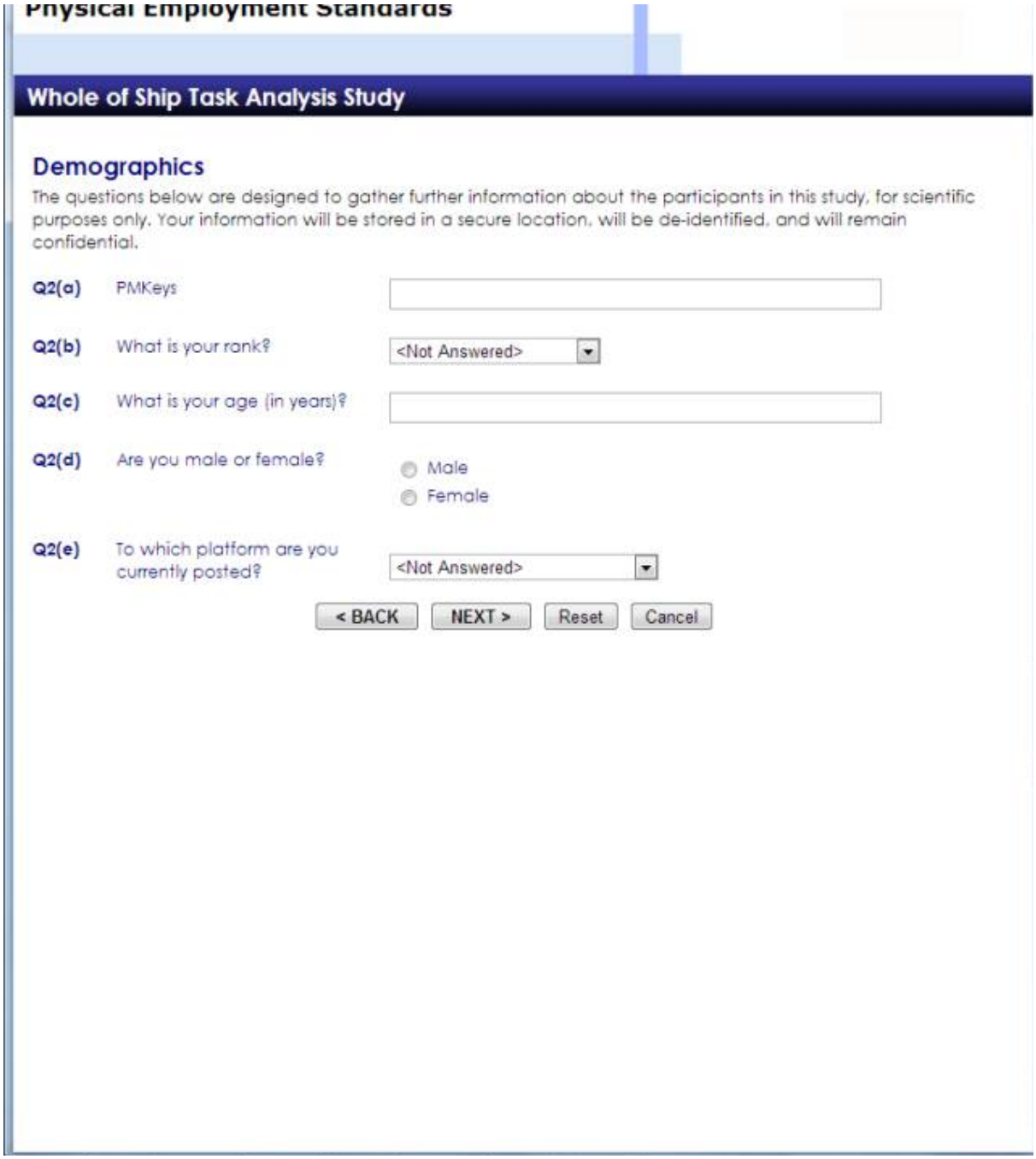
Physical Employment Standards
Whole of Ship Task Analysis Study
Demographics
The questions below are designed to gather further information about the participants in this study, for scientific purposes only. Your information will be stored in a secure location, will be de-identified, and will remain confidential.
Q2(a) PMKeys
Q2(b) What is your rank?
<Not Answered>
Q2(c) What is your age (in years)?
Q2(d) Are you male or female?
Male
Female
Q2(e) To which platform are you currently posted?
<Not Answered>
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Physical Employment Standards
Whole of Ship Task Analysis Study
FFG
Q3(a)
To which ship are you currently posted?
<Not Answered>
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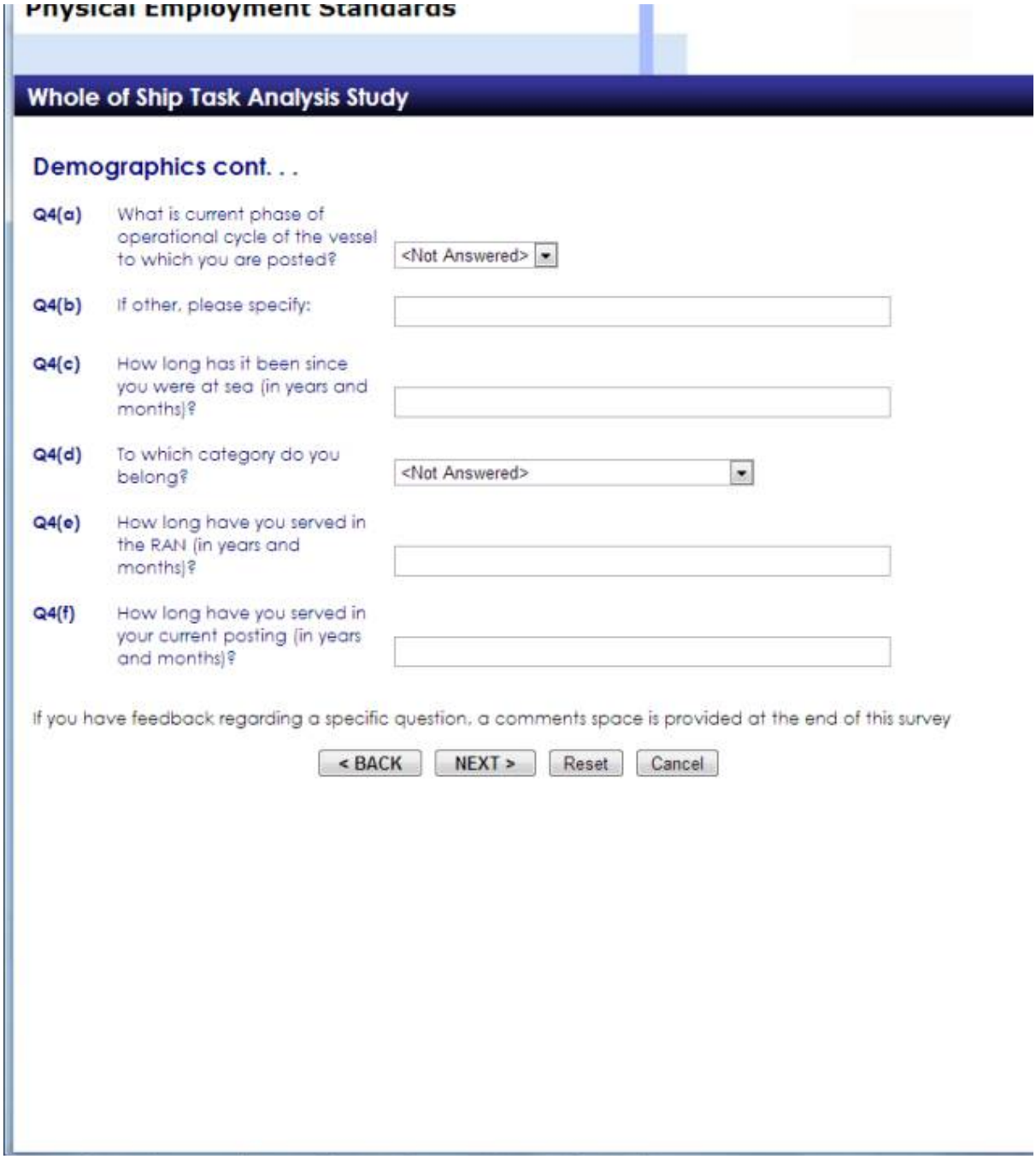
Physical Employment Standards
Whole of Ship Task Analysis Study
Demographics cont. . .
Q4(a) What is current phase of operational cycle of the vessel to which you are posted?
<Not Answered>
Q4(b) If other, please specify:
Q4(c) How long has it been since you were at sea (in years and months)?
Q4(d) To which category do you belong?
<Not Answered>
Q4(e) How long have you served in the RAN (in years and months)?
Q4(f) How long have you served in your current posting (in years and months)?
If you have feedback regarding a specific question, a comments space is provided at the end of this survey
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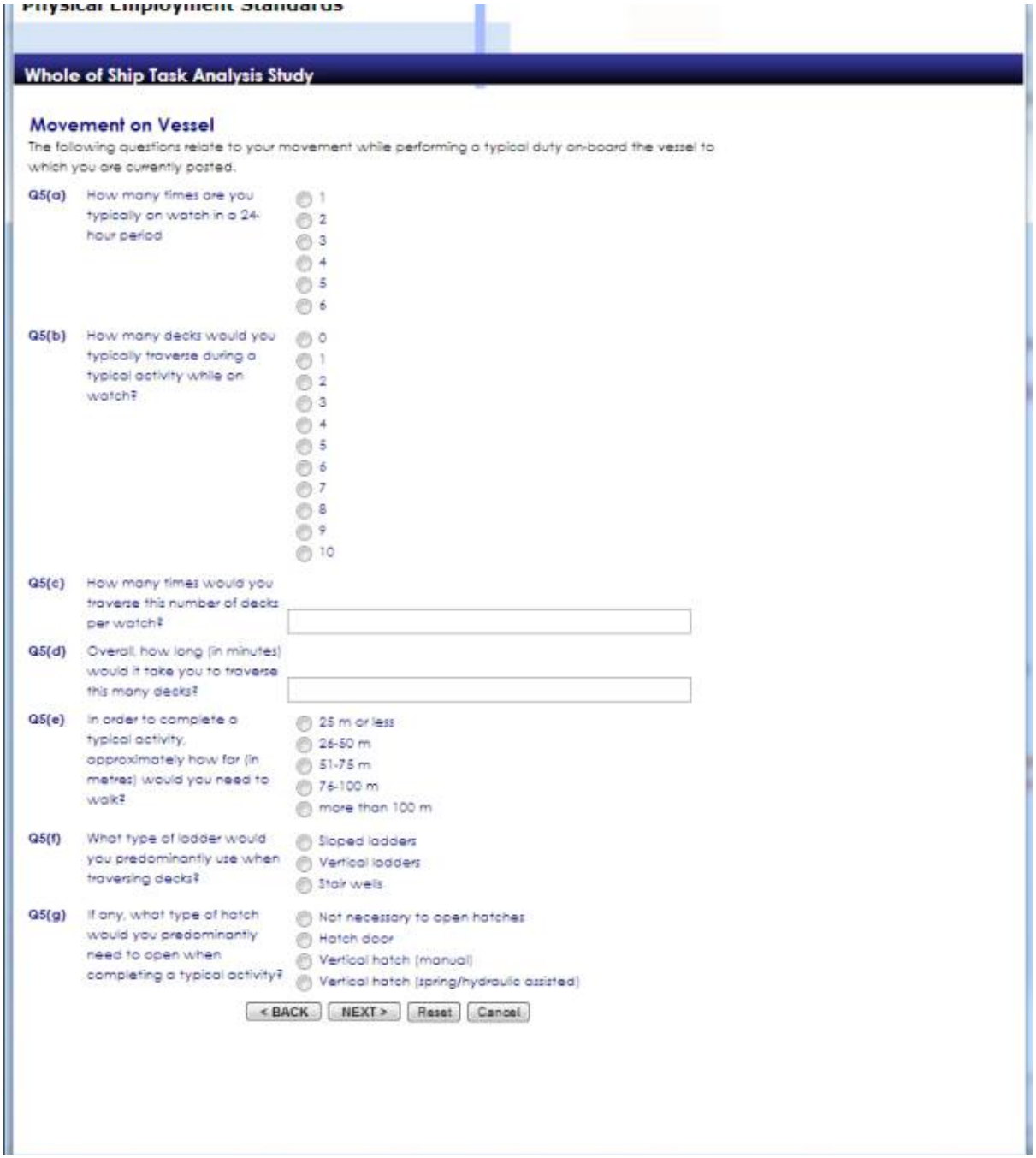
Physical Employment Standards
Whole of Ship Task Analysis Study
Movement on Vessel
The following questions relate to your movement while performing a typical duty on-board the vessel to which you are currently posted.
Q5(a) How many times are you typically on watch in a 24-hour period
1
2
3
4
5
6
Q5(b) How many decks would you typically traverse during a typical activity while on watch?
0
1
2
3
4
5
6
7
8
9
10
Q5(c) How many times would you traverse this number of decks per watch?
Q5(d) Overall, how long (in minutes) would it take you to traverse this many decks?
Q5(e) In order to complete a typical activity, approximately how far (in metres) would you need to walk?
25 m or less
26-50 m
51-75 m
76-100 m
more than 100 m
Q5(f) What type of ladder would you predominantly use when traversing decks?
Sloped ladders
Vertical ladders
Stair wells
Q5(g) If any, what type of hatch would you predominantly need to open when completing a typical activity?
Not necessary to open hatches
Hatch door
Vertical hatch (manual)
Vertical hatch (spring/hydraulic assisted)
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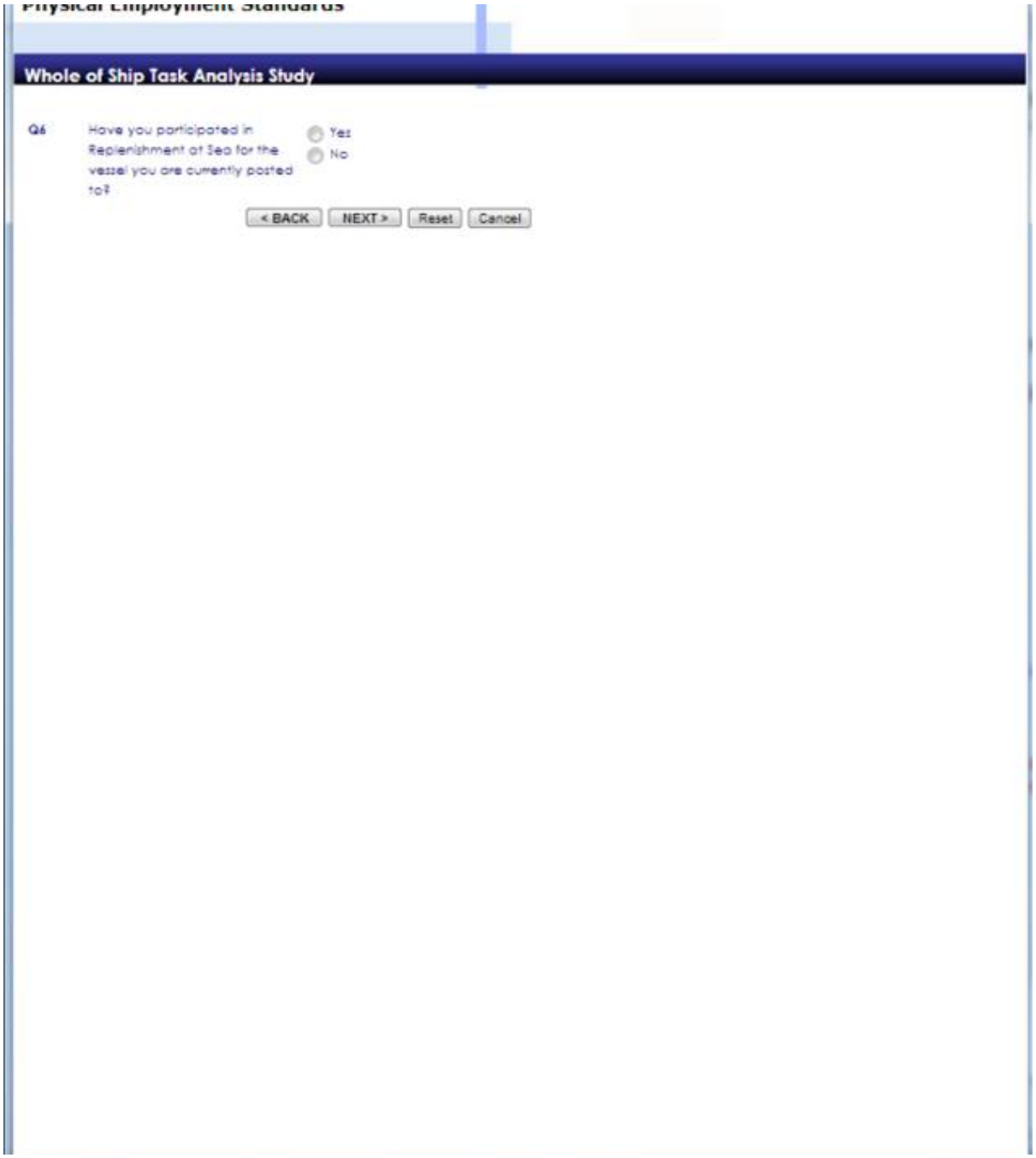
Physical Employment Standards
Whole of Ship Task Analysis Study
Q6
Have you participated in Replenishment at Sea for the vessel you are currently posted to?
Yes
No
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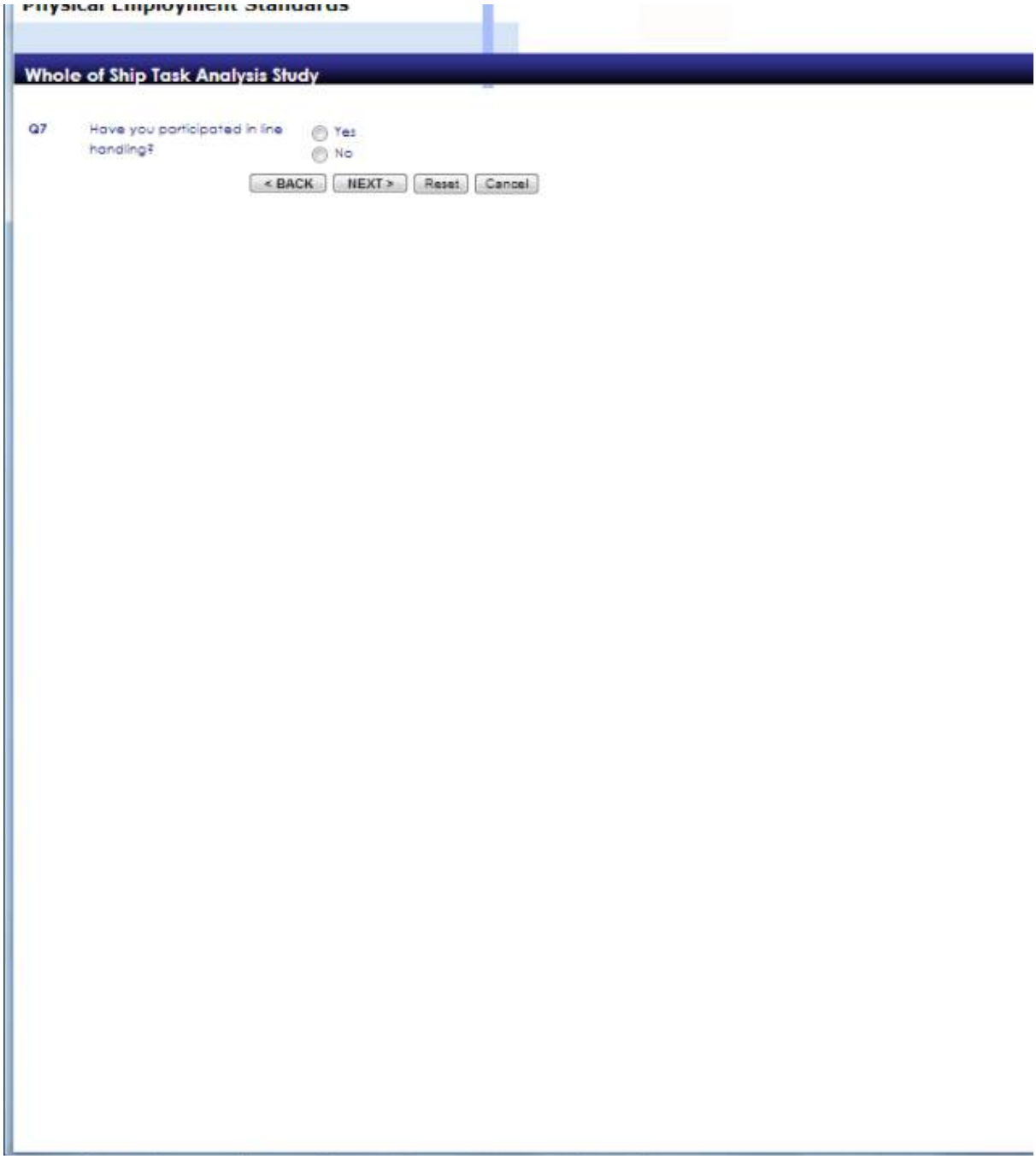
Physical Employment Standards
Whole of Ship Task Analysis Study
Q7
Have you participated in line handling?
Yes
No
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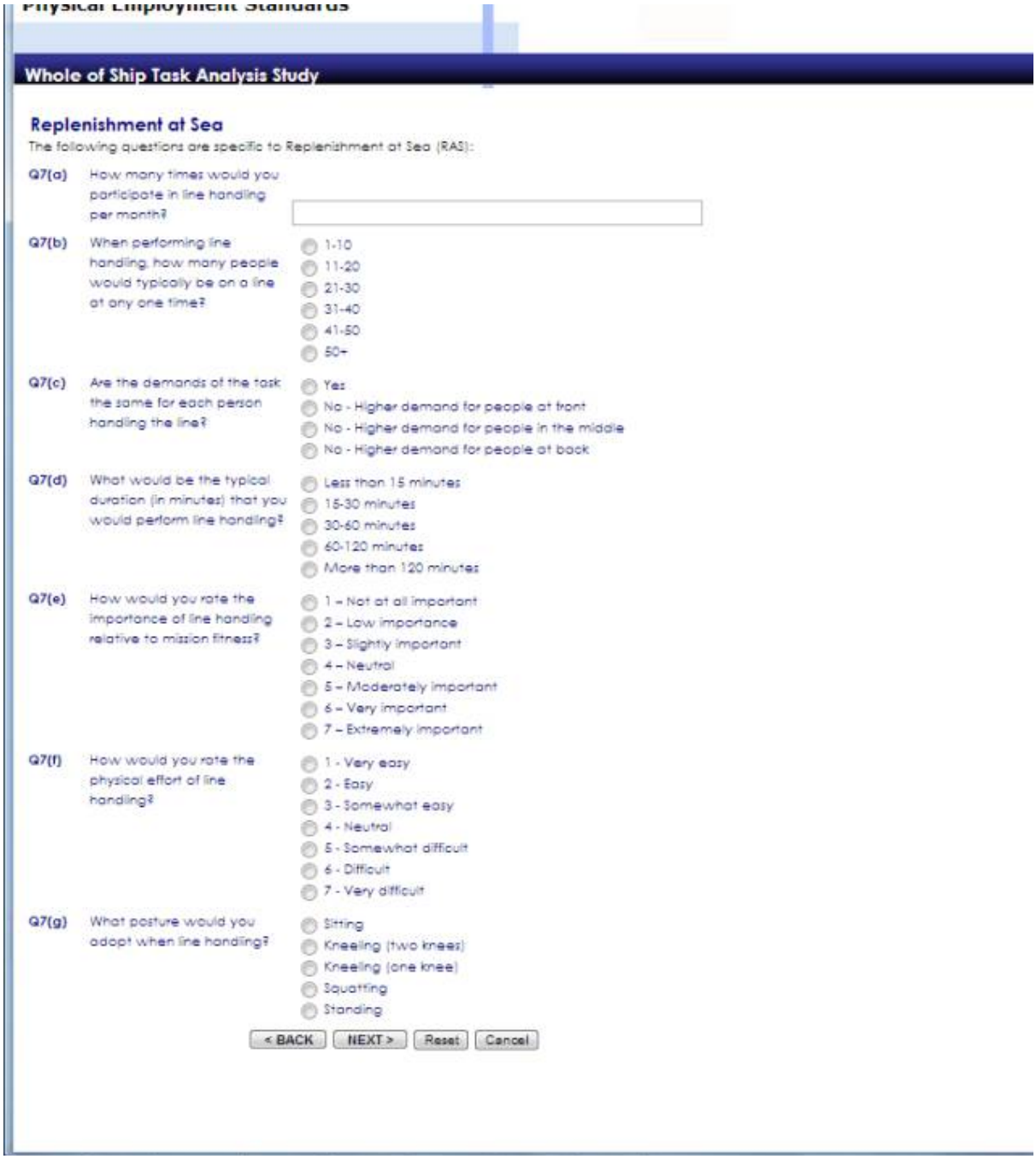
Physical Employment Standards
Whole of Ship Task Analysis Study
Replenishment at Sea
The following questions are specific to Replenishment at Sea (RAS):
Q7(a) How many times would you participate in line handling per month?
Q7(b) When performing line handling, how many people would typically be on a line at any one time?
1-10
11-20
21-30
31-40
41-50
50+
Q7(c) Are the demands of the task the same for each person handling the line?
Yes
No - Higher demand for people at front
No - Higher demand for people in the middle
No - Higher demand for people at back
Q7(d) What would be the typical duration (in minutes) that you would perform line handling?
Less than 15 minutes
15-30 minutes
30-60 minutes
60-120 minutes
More than 120 minutes
Q7(e) How would you rate the importance of line handling relative to mission fitness?
1 – Not at all important
2 – Low importance
3 – Slightly important
4 – Neutral
5 – Moderately important
6 – Very important
7 – Extremely important
Q7(f) How would you rate the physical effort of line handling?
1 - Very easy
2 - Easy
3 - Somewhat easy
4 - Neutral
5 - Somewhat difficult
6 - Difficult
7 - Very difficult
Q7(g) What posture would you adopt when line handling?
Sitting
Kneeling (two knees)
Kneeling (one knee)
Squatting
Standing
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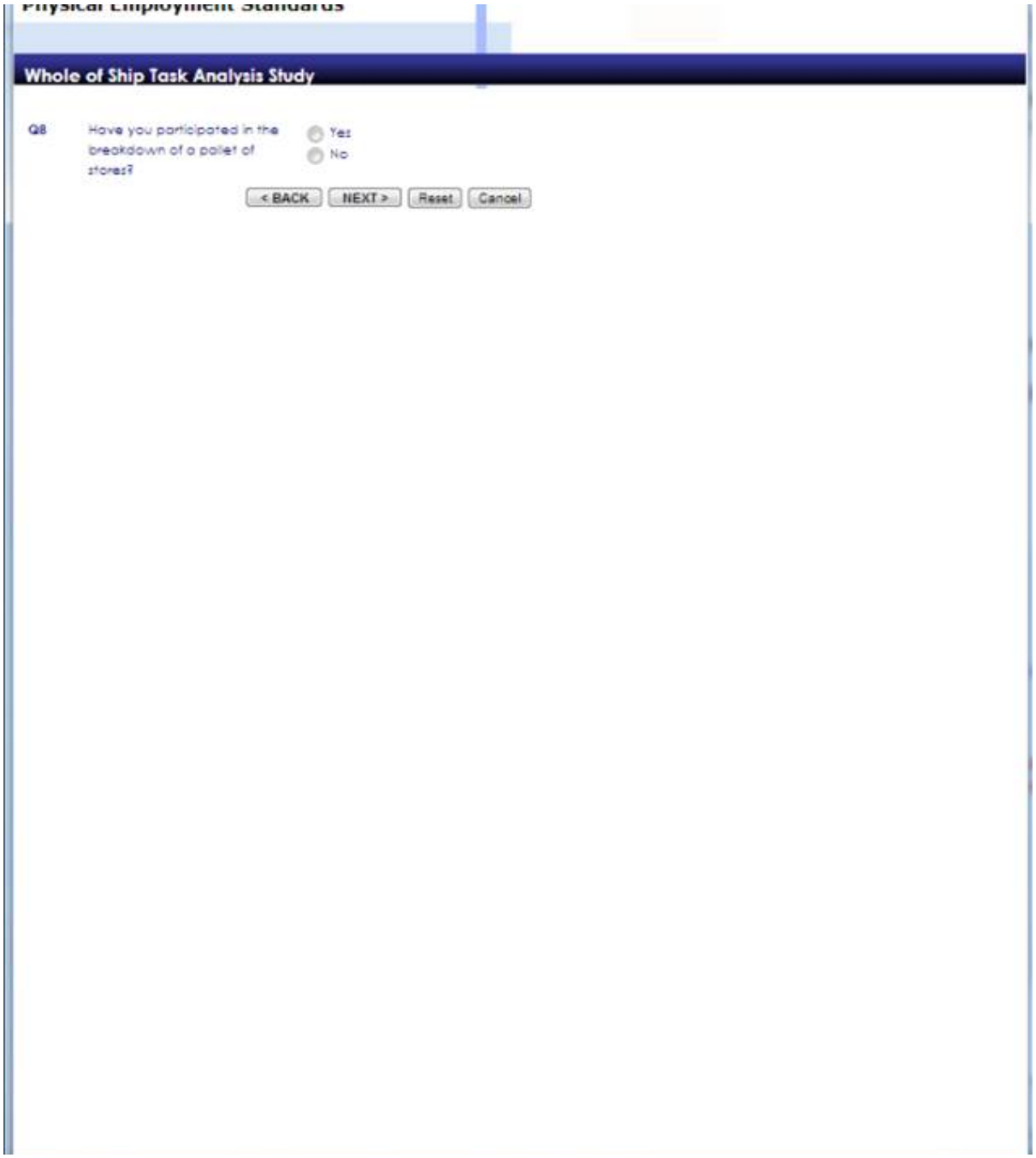
Physical Employment Standards
Whole of Ship Task Analysis Study
Q8
Have you participated in the breakdown of a pallet of stores?
Yes
No
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Physical Employment Standards

Whole of Ship Task Analysis Study

Replenishment at Sea - Pallets

Q8(a) How many times would you participate in breaking down a pallet of stores per month?

Q8(b) How many people are involved in the breakdown of a pallet of stores?

- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 50+

Q8(c) What would be the typical duration (in minutes) that you would be involved in breaking down a pallet of stores?

- 15 minutes or less
- 16-30 minutes
- 30-60 minutes
- 60-120 minutes
- More than 120 minutes

Q8(d) How many items would you typically handle in the timeframe specified above?

- 1-10
- 11-20
- 21-30
- 31-40
- 41-50
- 50+

Q8(e) What is the typical mass (in kilograms) of an item you would hold during RAS?

- 1-5 kg
- 6-10 kg
- 11-15 kg
- 16-20 kg
- 20-25 kg
- 25+ kg

Q8(f) When you are given an item, you are required to:

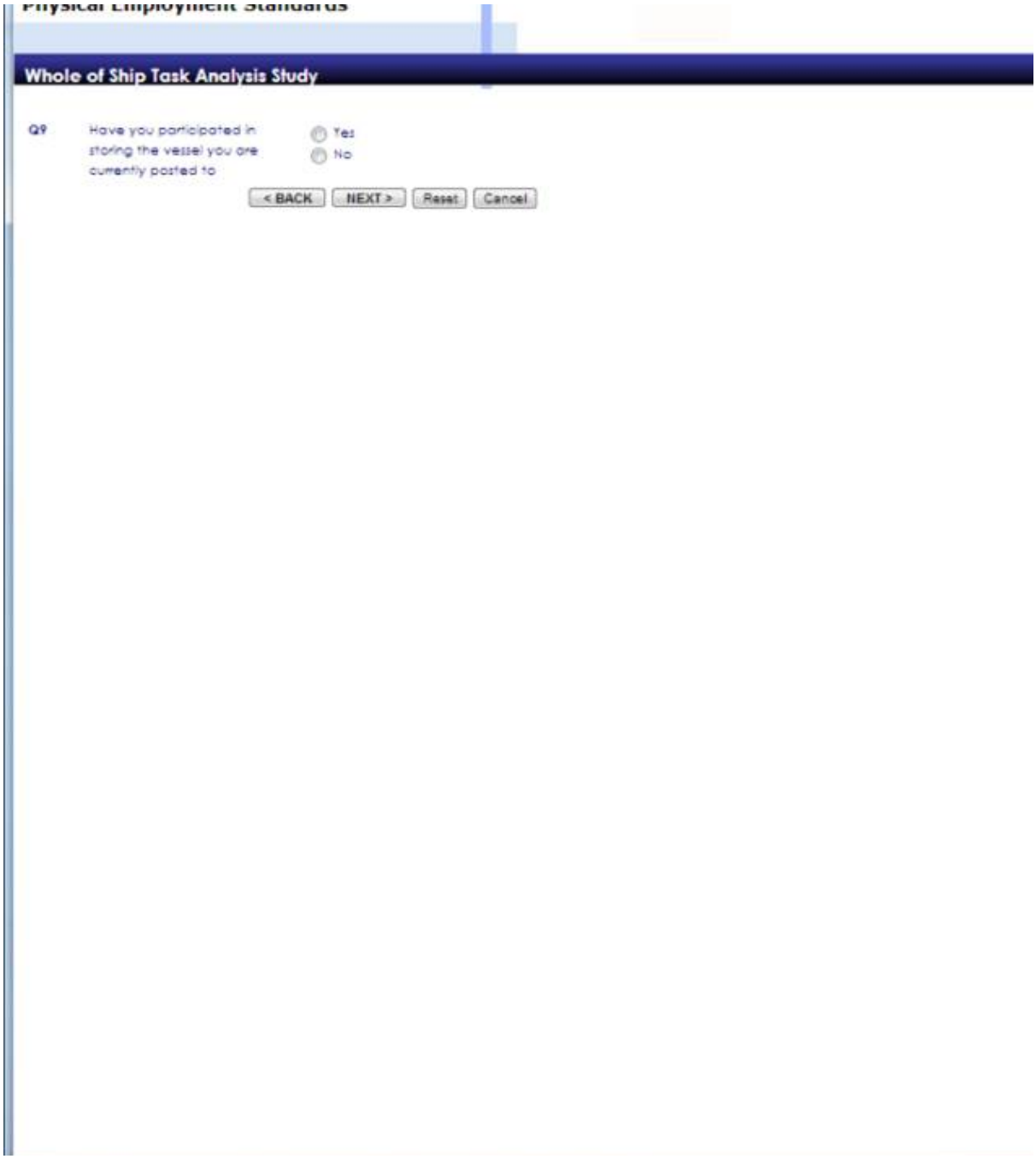
- Pass the item
- Carry less than 5 m then pass the item
- Carry more than 5 m and less than 10 m then pass the item
- Carry more than 10 m then pass the item
- Carry the item to where it is stored

Q8(g) How would you rate the importance of the breakdown of a pallet of stores relative to mission fitness?

- 1 – Not at all important
- 2 – Low importance
- 3 – Slightly important
- 4 – Neutral
- 5 – Moderately important
- 6 – Very important
- 7 – Extremely important

Q8(h) How would you rate the physical effort of breaking down a pallet of stores?

- 1 - Very easy
- 2 - Easy
- 3 - Somewhat easy
- 4 - Neutral
- 5 - Somewhat difficult
- 6 - Difficult


Physical Employment Standards
Whole of Ship Task Analysis Study
Q9
Have you participated in storing the vessel you are currently posted to
Yes
No
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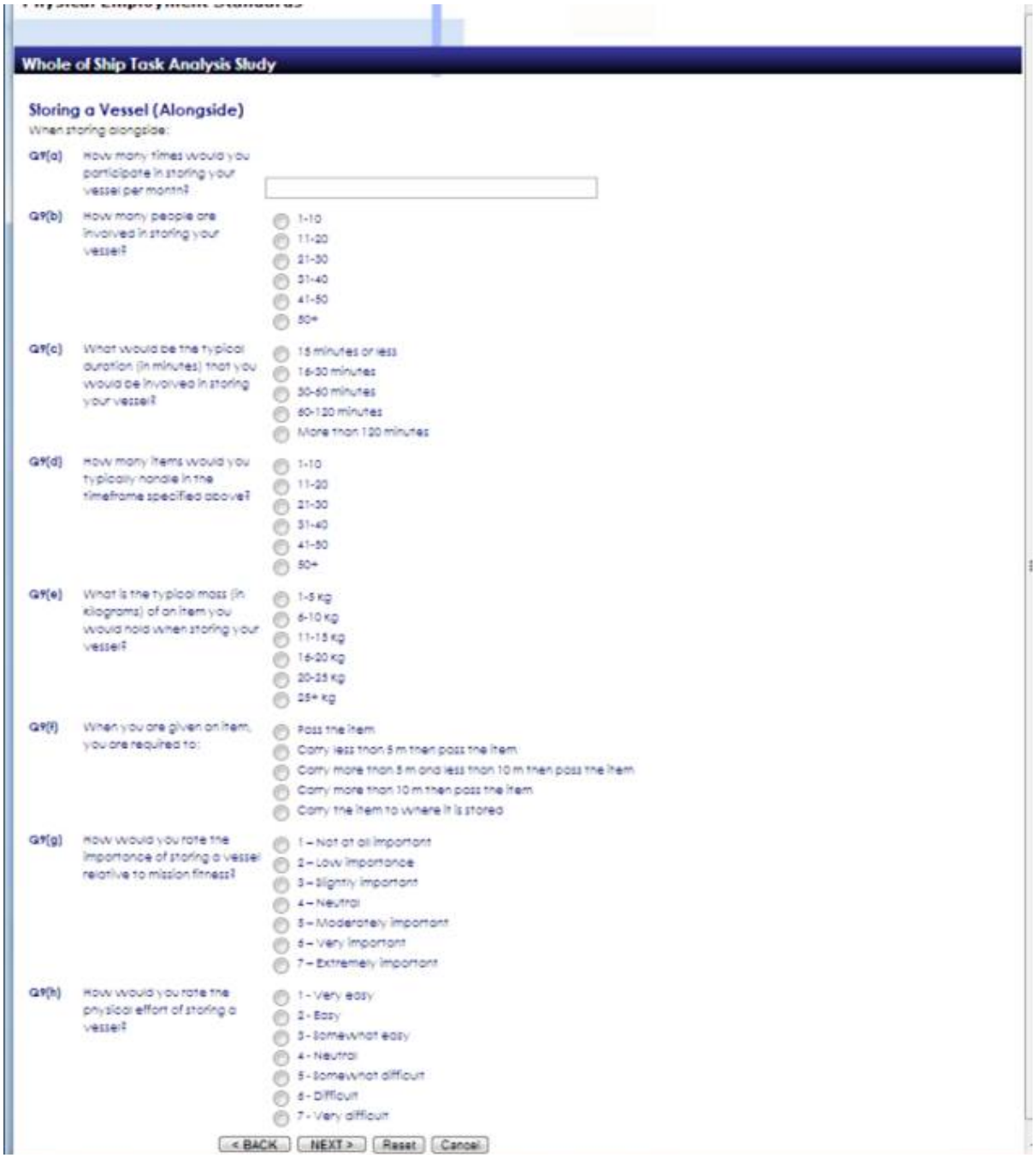
Whole of Ship Task Analysis Study
Storing a Vessel (Alongside)
When storing alongside:
Q#(a) How many times would you participate in storing your vessel per month?
Q#(b) How many people are involved in storing your vessel?
1-10
11-20
21-30
31-40
41-50
50+
Q#(c) What would be the typical duration (in minutes) that you would be involved in storing your vessel?
15 minutes or less
16-30 minutes
30-60 minutes
60-120 minutes
More than 120 minutes
Q#(d) How many items would you typically handle in the timeframe specified above?
1-10
11-20
21-30
31-40
41-50
50+
Q#(e) What is the typical mass (in kilograms) of an item you would hold when storing your vessel?
1-5 kg
6-10 kg
11-15 kg
16-20 kg
20-25 kg
25+ kg
Q#(f) When you are given an item, you are required to:
Pass the item
Carry less than 5 m then pass the item
Carry more than 5 m and less than 10 m then pass the item
Carry more than 10 m then pass the item
Carry the item to where it is stored
Q#(g) How would you rate the importance of storing a vessel relative to mission fitness?
1 – Not at all important
2 – Low importance
3 – Slightly important
4 – Neutral
5 – Moderately important
6 – Very important
7 – Extremely important
Q#(h) How would you rate the physical effort of storing a vessel?
1 - Very easy
2 - Easy
3 - Somewhat easy
4 - Neutral
5 - Somewhat difficult
6 - Difficult
7 - Very difficult
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Whole of Ship Task Analysis Study
Combat Survivability
The questions that follow relate to tasks that have been identified as Whole of Ship tasks through focus groups with experienced RAN personnel. Please review the following tasks and rate them as per below.
i. Frequency: What is the average number of times you perform this task per month?
ii. Duration: In your experience, what is the average duration for which the task is performed (in minutes)?
iii. Vertical Distance: How many decks do you typically traverse during this task?
iv. Horizontal Distance: How far do you typically traverse during this task (in metres)?
v. Importance: We recognise that almost every task is important, but we want you to consider importance only relative to mission fitness.
vi. Physical Effort: On average, how much physical effort is required to perform this task?
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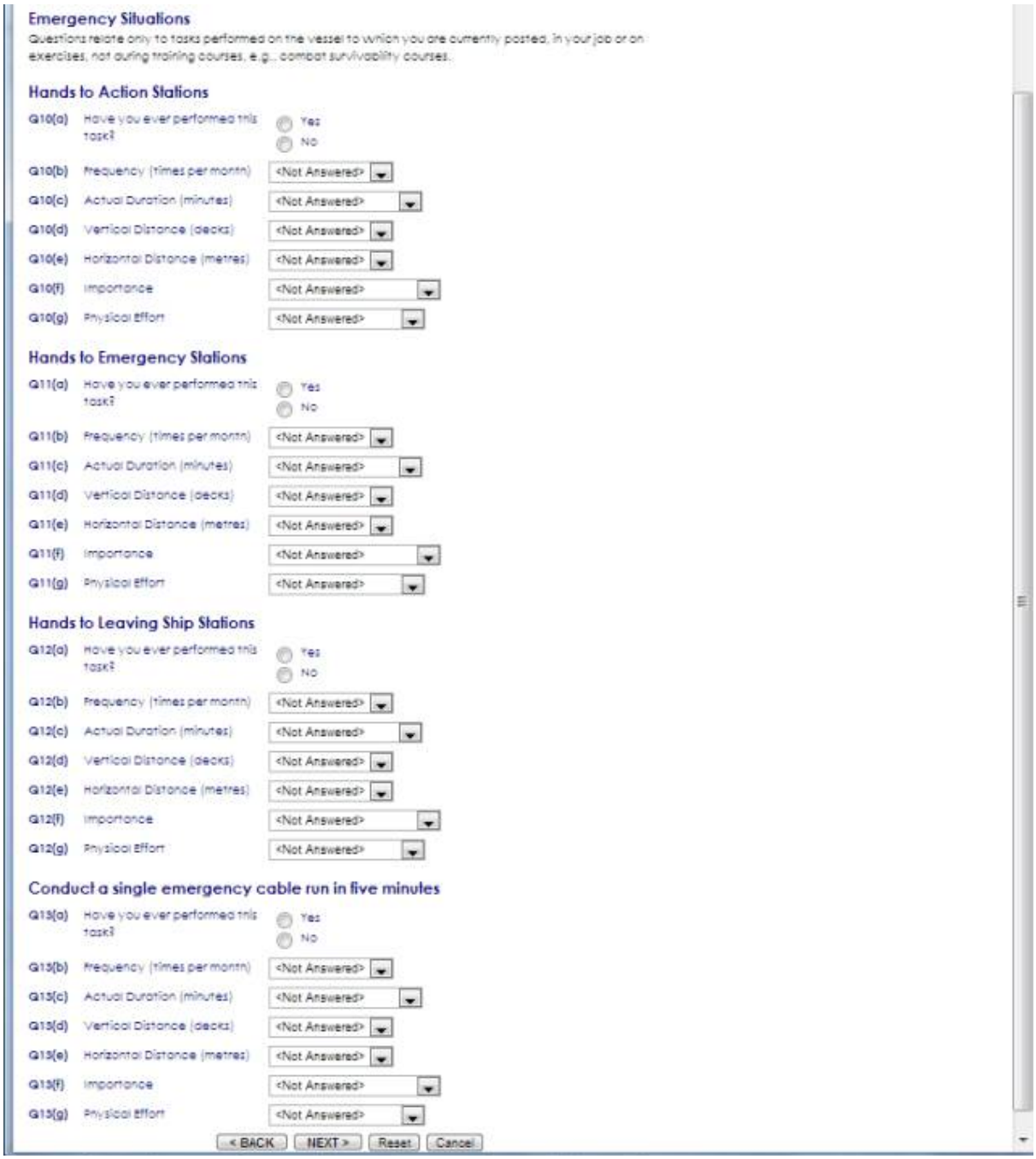

Emergency Situations

Questions relate only to tasks performed on the vessel to which you are currently posted, in your job or on exercises, not during training courses, e.g., combat survivability courses.

Hands to Action Stations

Q10(a)	Have you ever performed this task?	Yes / NO
Q10(b)	Frequency (times per month)	<Not Answered>
Q10(c)	Actual Duration (minutes)	<Not Answered>
Q10(d)	Vertical Distance (decks)	<Not Answered>
Q10(e)	Horizontal Distance (metres)	<Not Answered>
Q10(f)	Importance	<Not Answered>
Q10(g)	Physical Effort	<Not Answered>

Hands to Emergency Stations

Q11(a)	Have you ever performed this task?	Yes / NO
Q11(b)	Frequency (times per month)	<Not Answered>
Q11(c)	Actual Duration (minutes)	<Not Answered>
Q11(d)	Vertical Distance (decks)	<Not Answered>
Q11(e)	Horizontal Distance (metres)	<Not Answered>
Q11(f)	Importance	<Not Answered>
Q11(g)	Physical Effort	<Not Answered>

Hands to Leaving Ship Stations

Q12(a)	Have you ever performed this task?	Yes / NO
Q12(b)	Frequency (times per month)	<Not Answered>
Q12(c)	Actual Duration (minutes)	<Not Answered>
Q12(d)	Vertical Distance (decks)	<Not Answered>
Q12(e)	Horizontal Distance (metres)	<Not Answered>
Q12(f)	Importance	<Not Answered>
Q12(g)	Physical Effort	<Not Answered>

Conduct a single emergency cable run in five minutes

Q13(a)	Have you ever performed this task?	Yes / NO
Q13(b)	Frequency (times per month)	<Not Answered>
Q13(c)	Actual Duration (minutes)	<Not Answered>
Q13(d)	Vertical Distance (decks)	<Not Answered>
Q13(e)	Horizontal Distance (metres)	<Not Answered>
Q13(f)	Importance	<Not Answered>
Q13(g)	Physical Effort	<Not Answered>

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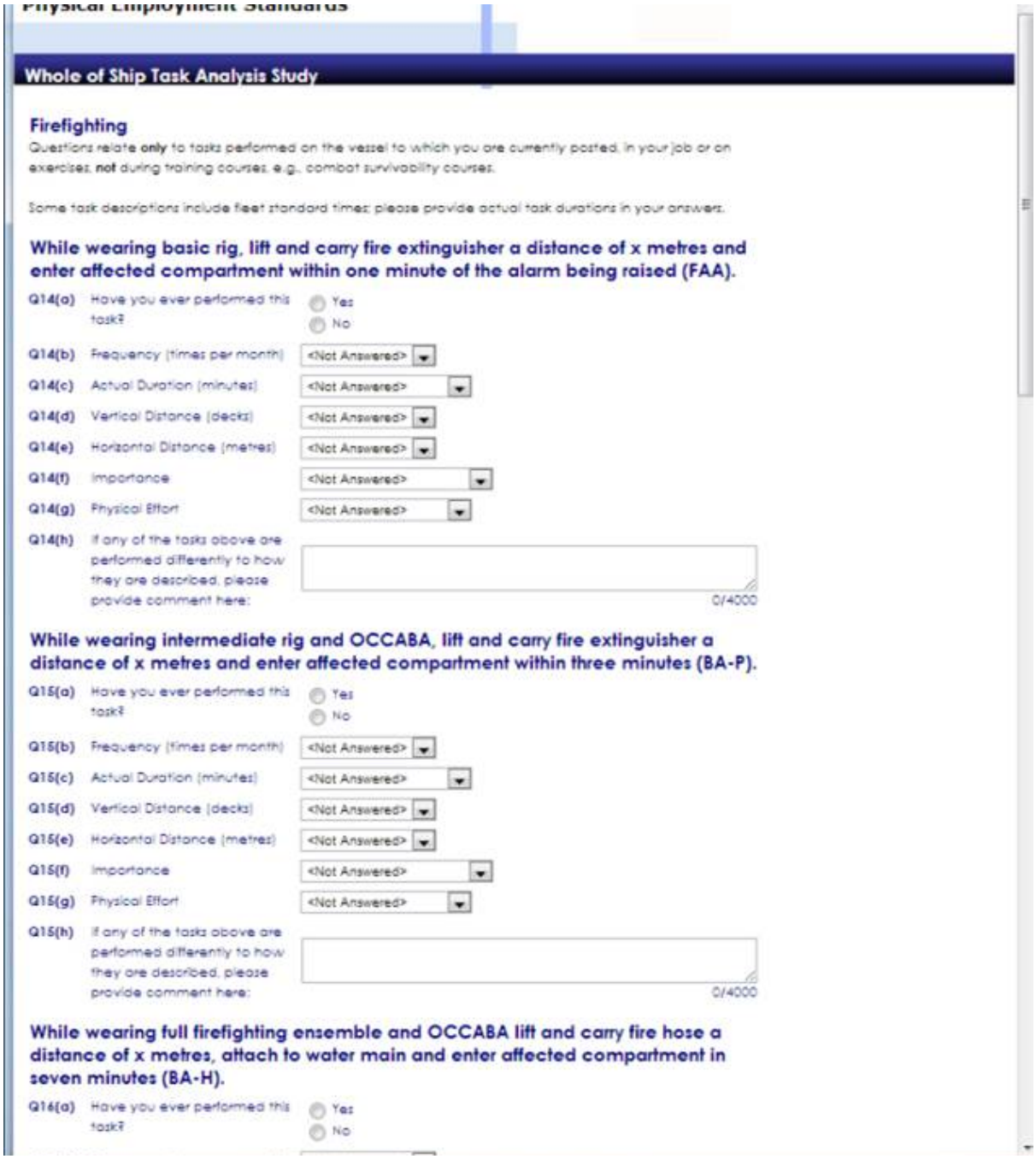
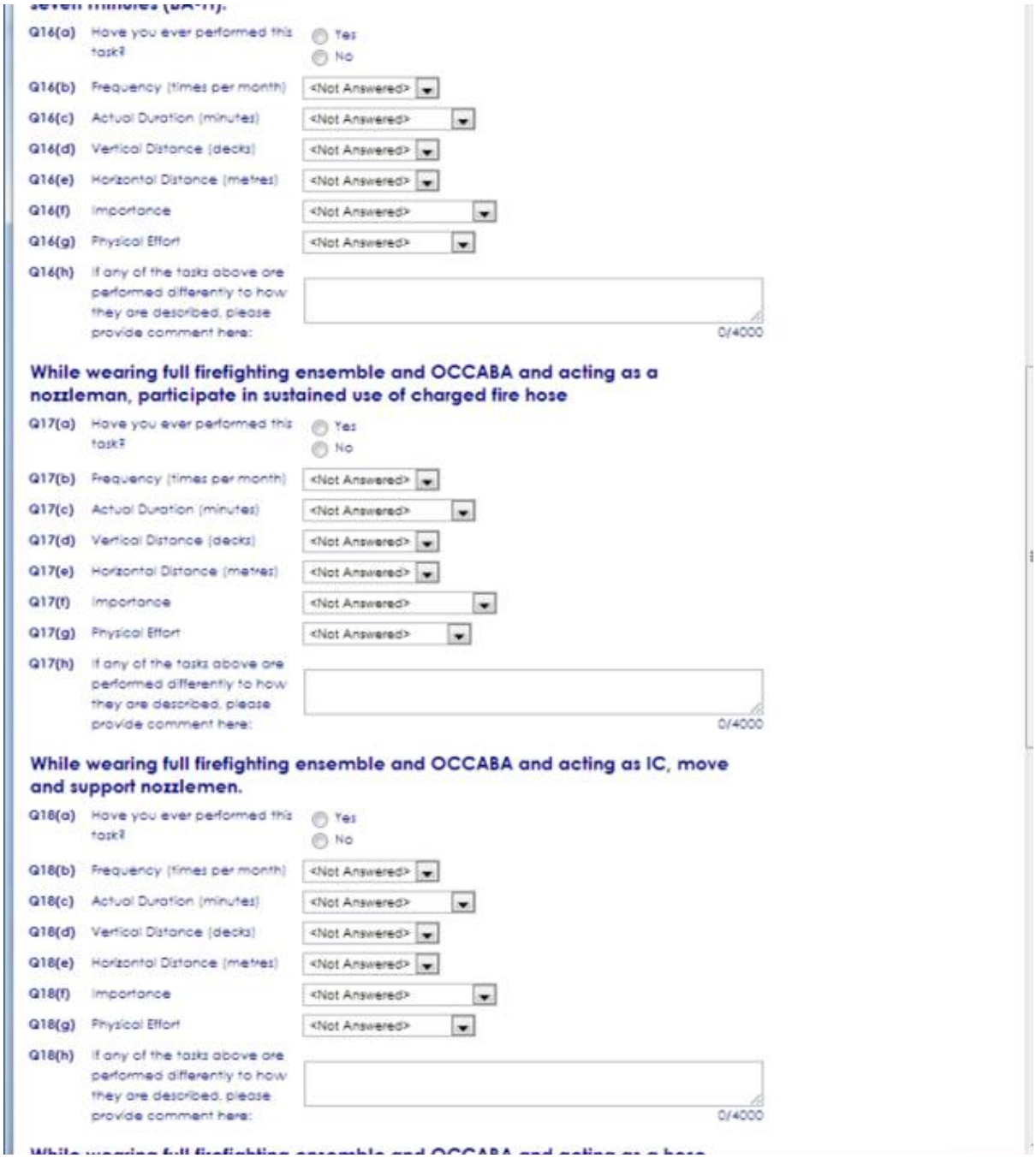

Physical Employment Standards
Whole of Ship Task Analysis Study
Firefighting
Questions relate only to tasks performed on the vessel to which you are currently posted, in your job or on exercises, not during training courses, e.g., combat survivability courses.
Some task descriptions include fleet standard times; please provide actual task durations in your answers.
While wearing basic rig, lift and carry fire extinguisher a distance of x metres and enter affected compartment within one minute of the alarm being raised (FAA).
Q14(a) Have you ever performed this task? Yes No
Q14(b) Frequency (times per month) <Not Answered>
Q14(c) Actual Duration (minutes) <Not Answered>
Q14(d) Vertical Distance (decks) <Not Answered>
Q14(e) Horizontal Distance (metres) <Not Answered>
Q14(f) Importance <Not Answered>
Q14(g) Physical Effort <Not Answered>
Q14(h) If any of the tasks above are performed differently to how they are described, please provide comment here:
0/4000
While wearing intermediate rig and OCCABA, lift and carry fire extinguisher a distance of x metres and enter affected compartment within three minutes (BA-P).
Q15(a) Have you ever performed this task? Yes No
Q15(b) Frequency (times per month) <Not Answered>
Q15(c) Actual Duration (minutes) <Not Answered>
Q15(d) Vertical Distance (decks) <Not Answered>
Q15(e) Horizontal Distance (metres) <Not Answered>
Q15(f) Importance <Not Answered>
Q15(g) Physical Effort <Not Answered>
Q15(h) If any of the tasks above are performed differently to how they are described, please provide comment here:
0/4000
While wearing full firefighting ensemble and OCCABA lift and carry fire hose a distance of x metres, attach to water main and enter affected compartment in seven minutes (BA-H).
Q16(a) Have you ever performed this task? Yes No



seven minutes (BA-1).

Q16(a)	Have you ever performed this task?	Yes / No
Q16(b)	Frequency (times per month)	<Not Answered>
Q16(c)	Actual Duration (minutes)	<Not Answered>
Q16(d)	Vertical Distance (decks)	<Not Answered>
Q16(e)	Horizontal Distance (metres)	<Not Answered>
Q16(f)	Importance	<Not Answered>
Q16(g)	Physical Effort	<Not Answered>
Q16(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000

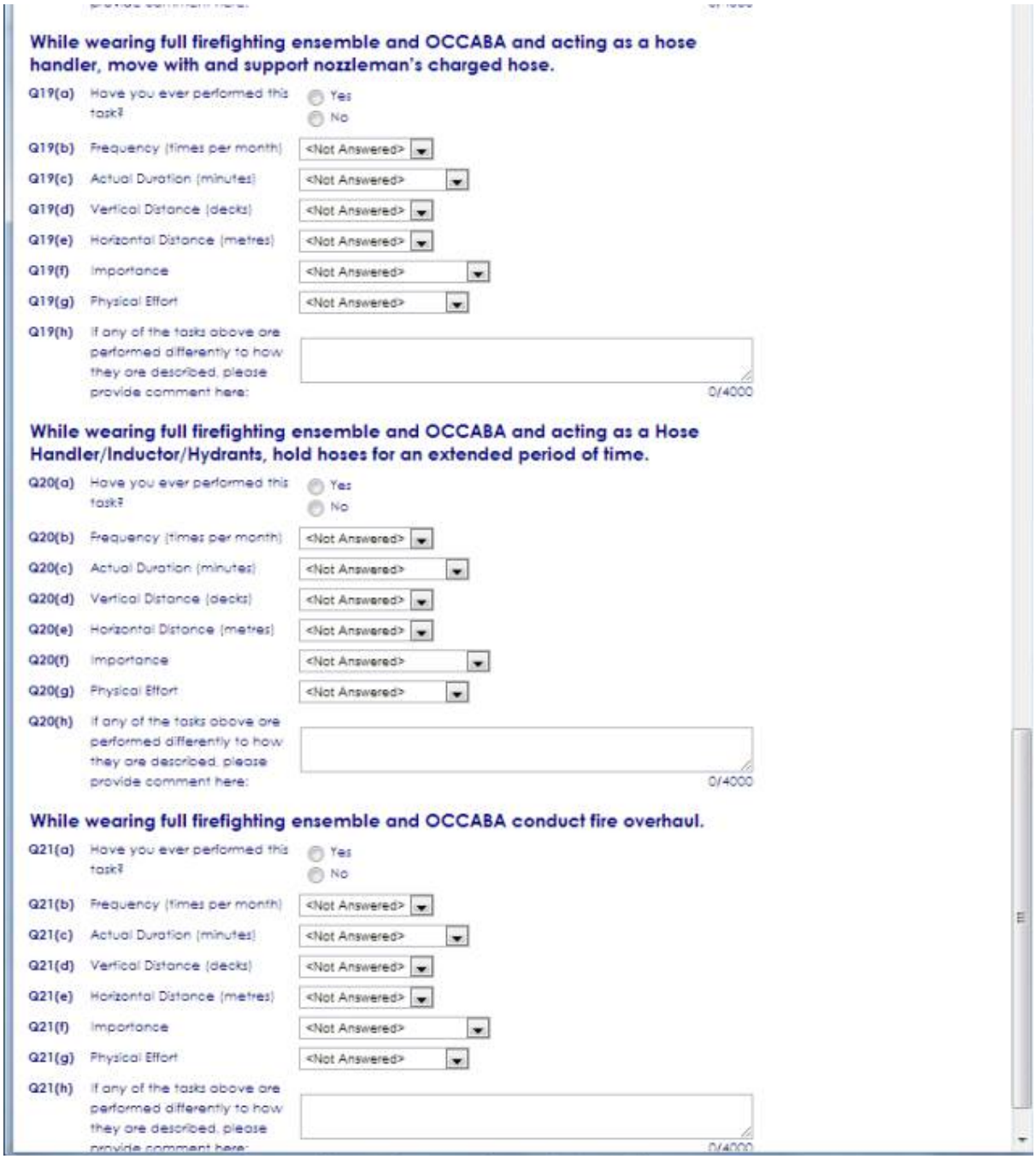
While wearing full firefighting ensemble and OCCABA and acting as a nozzleman, participate in sustained use of charged fire hose

Q17(a)	Have you ever performed this task?	Yes / No
Q17(b)	Frequency (times per month)	<Not Answered>
Q17(c)	Actual Duration (minutes)	<Not Answered>
Q17(d)	Vertical Distance (decks)	<Not Answered>
Q17(e)	Horizontal Distance (metres)	<Not Answered>
Q17(f)	Importance	<Not Answered>
Q17(g)	Physical Effort	<Not Answered>
Q17(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000

While wearing full firefighting ensemble and OCCABA and acting as IC, move and support nozzlemen.

Q18(a)	Have you ever performed this task?	Yes / No
Q18(b)	Frequency (times per month)	<Not Answered>
Q18(c)	Actual Duration (minutes)	<Not Answered>
Q18(d)	Vertical Distance (decks)	<Not Answered>
Q18(e)	Horizontal Distance (metres)	<Not Answered>
Q18(f)	Importance	<Not Answered>
Q18(g)	Physical Effort	<Not Answered>
Q18(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000

While wearing full firefighting ensemble and OCCABA and acting as a hose



While wearing full firefighting ensemble and OCCABA and acting as a hose handler, move with and support nozzleman's charged hose.

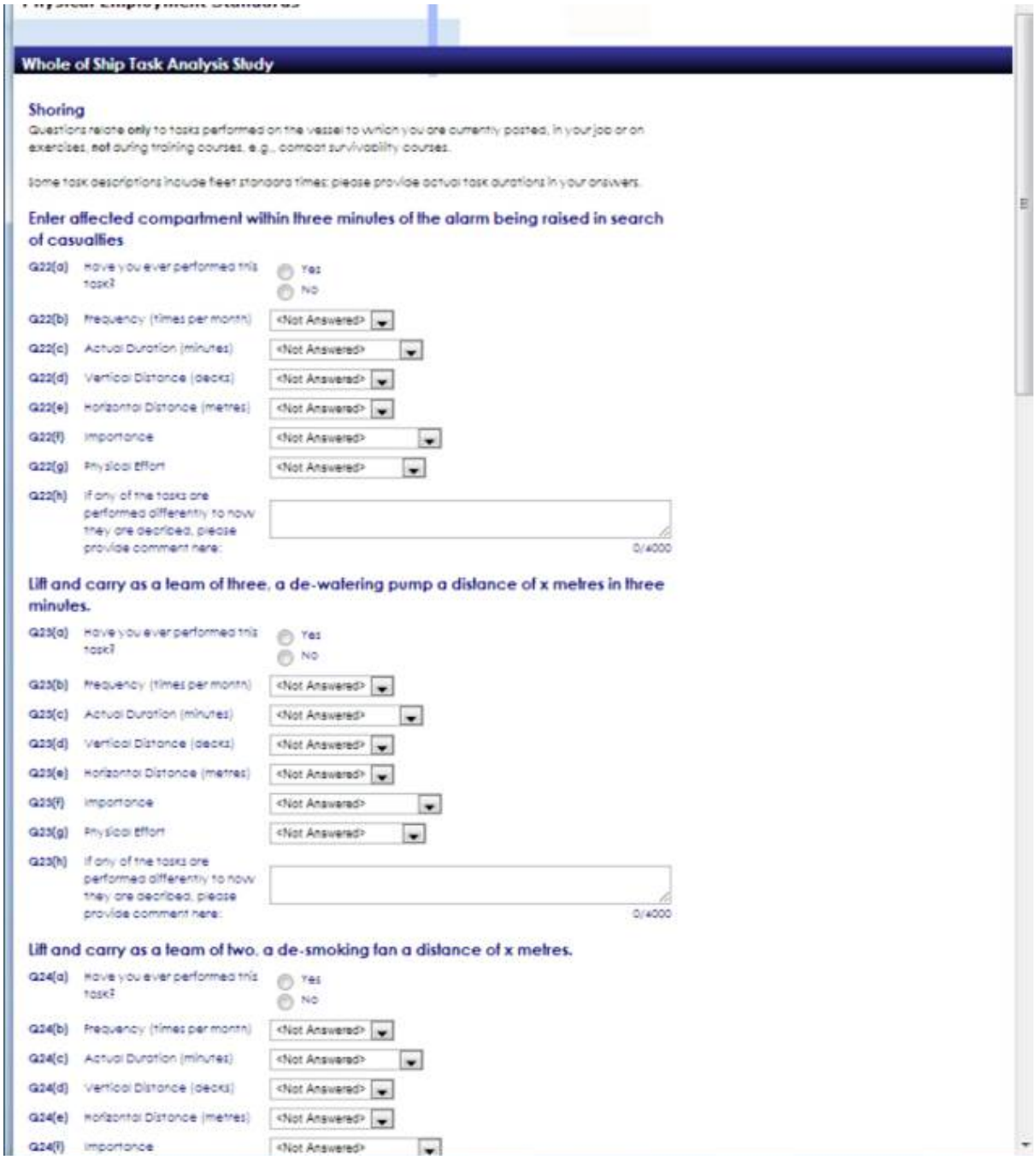
Q19(a)	Have you ever performed this task?	Yes / No
Q19(b)	Frequency (times per month)	<Not Answered>
Q19(c)	Actual Duration (minutes)	<Not Answered>
Q19(d)	Vertical Distance (decks)	<Not Answered>
Q19(e)	Horizontal Distance (metres)	<Not Answered>
Q19(f)	Importance	<Not Answered>
Q19(g)	Physical Effort	<Not Answered>
Q19(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000

While wearing full firefighting ensemble and OCCABA and acting as a Hose Handler/Inductor/Hydrants, hold hoses for an extended period of time.

Q20(a)	Have you ever performed this task?	Yes / No
Q20(b)	Frequency (times per month)	<Not Answered>
Q20(c)	Actual Duration (minutes)	<Not Answered>
Q20(d)	Vertical Distance (decks)	<Not Answered>
Q20(e)	Horizontal Distance (metres)	<Not Answered>
Q20(f)	Importance	<Not Answered>
Q20(g)	Physical Effort	<Not Answered>
Q20(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000

While wearing full firefighting ensemble and OCCABA conduct fire overhaul.

Q21(a)	Have you ever performed this task?	Yes / No
Q21(b)	Frequency (times per month)	<Not Answered>
Q21(c)	Actual Duration (minutes)	<Not Answered>
Q21(d)	Vertical Distance (decks)	<Not Answered>
Q21(e)	Horizontal Distance (metres)	<Not Answered>
Q21(f)	Importance	<Not Answered>
Q21(g)	Physical Effort	<Not Answered>
Q21(h)	If any of the tasks above are performed differently to how they are described, please provide comment here:	0/4000



Whole of Ship Task Analysis Study

Shoring

Questions relate **only** to tasks performed on the vessel to which you are currently posted, in your job or on exercises, **not** during training courses, e.g., combat survivability courses.

Some task descriptions include fleet standard times; please provide actual task durations in your answers.

Enter affected compartment within three minutes of the alarm being raised in search of casualties

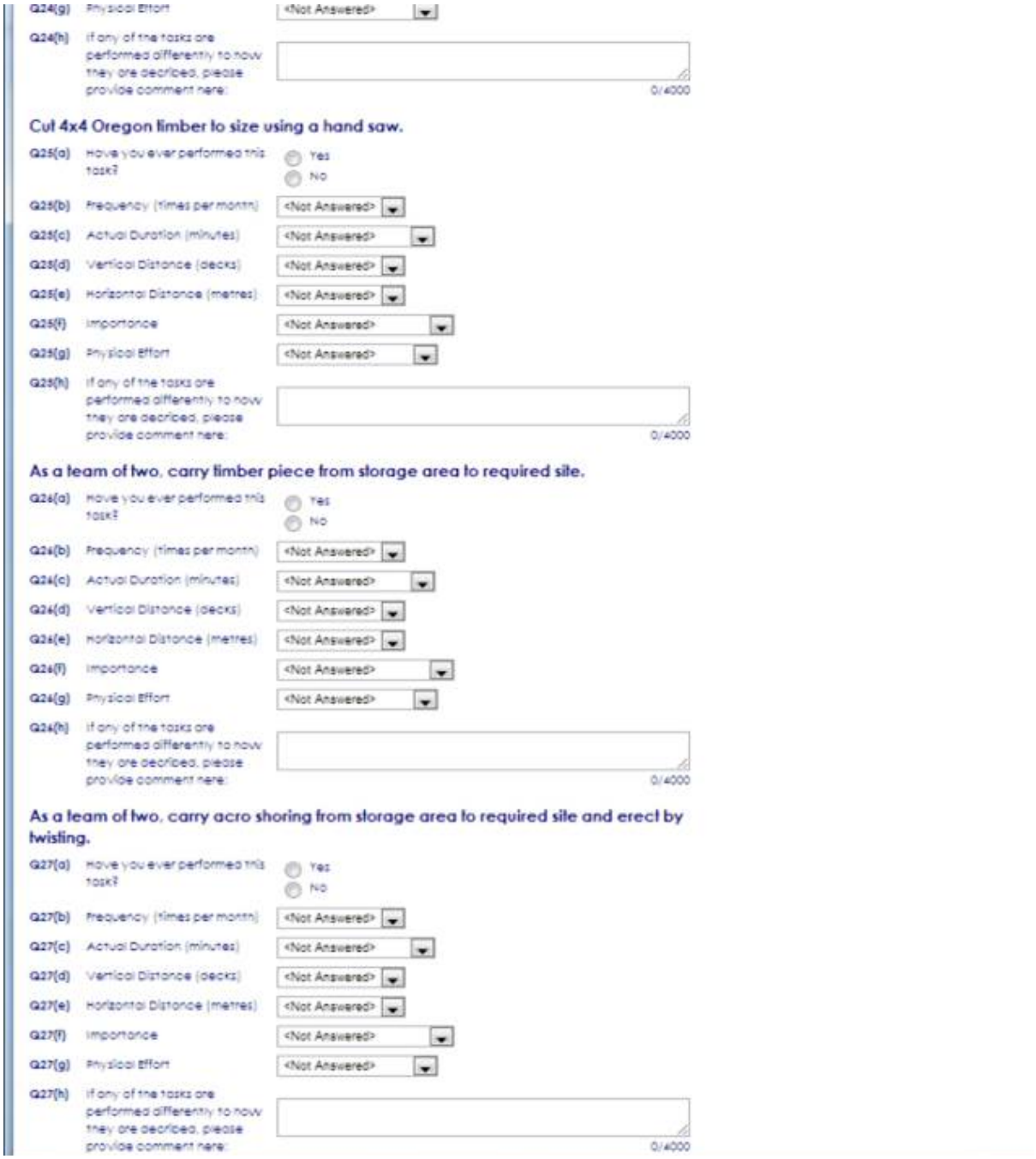
Q22(a)	Have you ever performed this task?	Yes / No
Q22(b)	Frequency (times per month)	<Not Answered>
Q22(c)	Actual Duration (minutes)	<Not Answered>
Q22(d)	Vertical Distance (decks)	<Not Answered>
Q22(e)	Horizontal Distance (metres)	<Not Answered>
Q22(f)	Importance	<Not Answered>
Q22(g)	Physical Effort	<Not Answered>
Q22(h)	If any of the tasks are performed differently to how they are described, please provide comment here:	0/4000

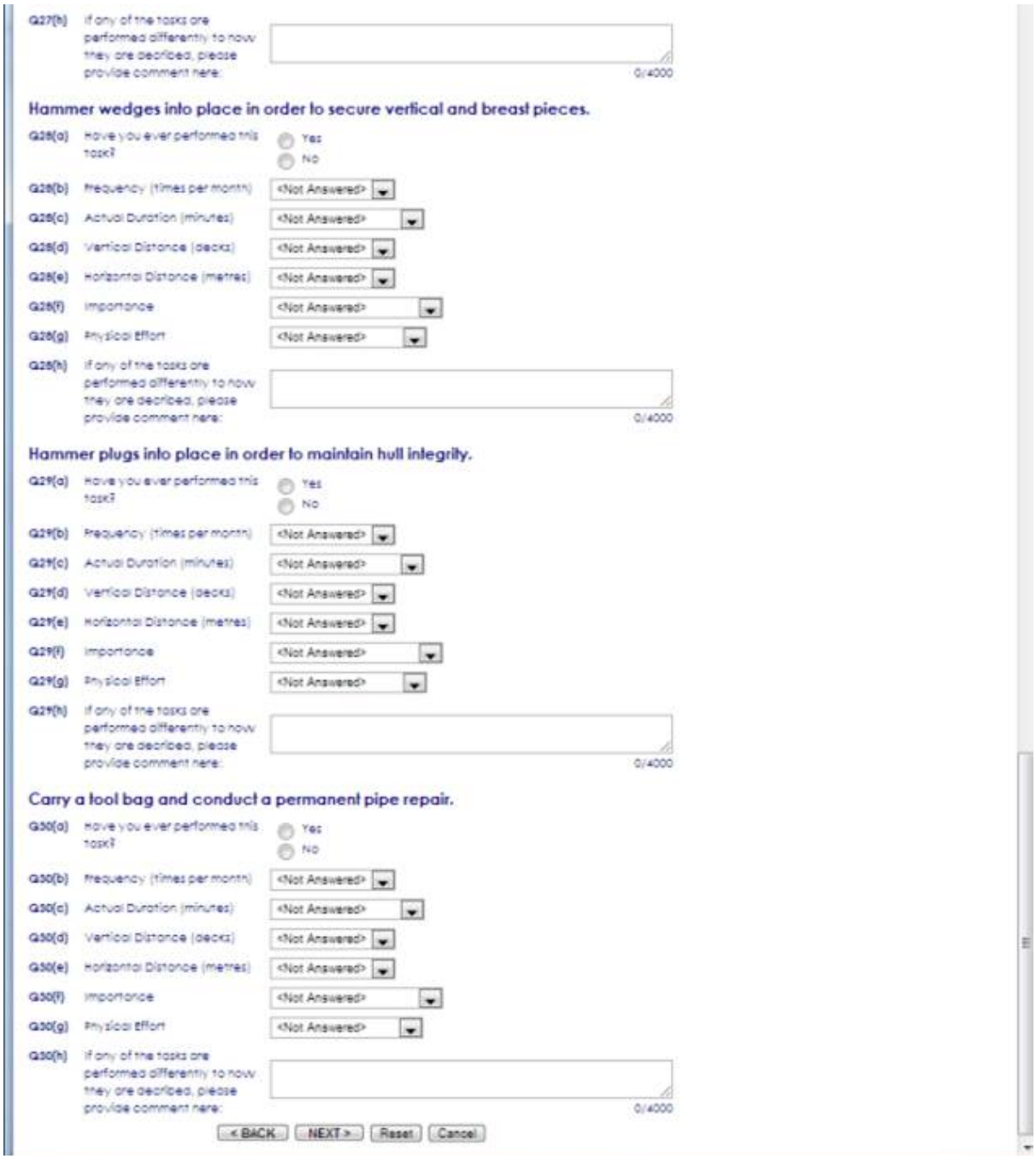
Lift and carry as a team of three, a de-watering pump a distance of x metres in three minutes.

Q23(a)	Have you ever performed this task?	Yes / No
Q23(b)	Frequency (times per month)	<Not Answered>
Q23(c)	Actual Duration (minutes)	<Not Answered>
Q23(d)	Vertical Distance (decks)	<Not Answered>
Q23(e)	Horizontal Distance (metres)	<Not Answered>
Q23(f)	Importance	<Not Answered>
Q23(g)	Physical Effort	<Not Answered>
Q23(h)	If any of the tasks are performed differently to how they are described, please provide comment here:	0/4000

Lift and carry as a team of two, a de-smoking fan a distance of x metres.

Q24(a)	Have you ever performed this task?	Yes / No
Q24(b)	Frequency (times per month)	<Not Answered>
Q24(c)	Actual Duration (minutes)	<Not Answered>
Q24(d)	Vertical Distance (decks)	<Not Answered>
Q24(e)	Horizontal Distance (metres)	<Not Answered>
Q24(f)	Importance	<Not Answered>


Q24(g) Physical Effort <Not Answered>
Q24(h) If any of the tasks are performed differently to how they are decribed, please provide comment here: 0/4000
Cut 4x4 Oregon timber to size using a hand saw.
Q25(a) Have you ever performed this task? Yes No
Q25(b) Frequency (times per month) <Not Answered>
Q25(c) Actual Duration (minutes) <Not Answered>
Q25(d) Vertical Distance (decks) <Not Answered>
Q25(e) Horizontal Distance (metres) <Not Answered>
Q25(f) Importance <Not Answered>
Q25(g) Physical Effort <Not Answered>
Q25(h) If any of the tasks are performed differently to how they are decribed, please provide comment here: 0/4000
As a team of two, carry timber piece from storage area to required site.
Q26(a) Have you ever performed this task? Yes No
Q26(b) Frequency (times per month) <Not Answered>
Q26(c) Actual Duration (minutes) <Not Answered>
Q26(d) Vertical Distance (decks) <Not Answered>
Q26(e) Horizontal Distance (metres) <Not Answered>
Q26(f) Importance <Not Answered>
Q26(g) Physical Effort <Not Answered>
Q26(h) If any of the tasks are performed differently to how they are decribed, please provide comment here: 0/4000
As a team of two, carry acro shoring from storage area to required site and erect by twisting.
Q27(a) Have you ever performed this task? Yes No
Q27(b) Frequency (times per month) <Not Answered>
Q27(c) Actual Duration (minutes) <Not Answered>
Q27(d) Vertical Distance (decks) <Not Answered>
Q27(e) Horizontal Distance (metres) <Not Answered>
Q27(f) Importance <Not Answered>
Q27(g) Physical Effort <Not Answered>
Q27(h) If any of the tasks are performed differently to how they are decribed, please provide comment here: 0/4000


Q27(h) If any of the tasks are performed differently to how they are described, please provide comment here:
0/4000
Hammer wedges into place in order to secure vertical and breast pieces.
Q28(a) Have you ever performed this task? Yes No
Q28(b) Frequency (times per month) <Not Answered>
Q28(c) Actual Duration (minutes) <Not Answered>
Q28(d) Vertical Distance (decks) <Not Answered>
Q28(e) Horizontal Distance (metres) <Not Answered>
Q28(f) Importance <Not Answered>
Q28(g) Physical Effort <Not Answered>
Q28(h) If any of the tasks are performed differently to how they are described, please provide comment here:
0/4000
Hammer plugs into place in order to maintain hull integrity.
Q29(a) Have you ever performed this task? Yes No
Q29(b) Frequency (times per month) <Not Answered>
Q29(c) Actual Duration (minutes) <Not Answered>
Q29(d) Vertical Distance (decks) <Not Answered>
Q29(e) Horizontal Distance (metres) <Not Answered>
Q29(f) Importance <Not Answered>
Q29(g) Physical Effort <Not Answered>
Q29(h) If any of the tasks are performed differently to how they are described, please provide comment here:
0/4000
Carry a tool bag and conduct a permanent pipe repair.
Q30(a) Have you ever performed this task? Yes No
Q30(b) Frequency (times per month) <Not Answered>
Q30(c) Actual Duration (minutes) <Not Answered>
Q30(d) Vertical Distance (decks) <Not Answered>
Q30(e) Horizontal Distance (metres) <Not Answered>
Q30(f) Importance <Not Answered>
Q30(g) Physical Effort <Not Answered>
Q30(h) If any of the tasks are performed differently to how they are described, please provide comment here:
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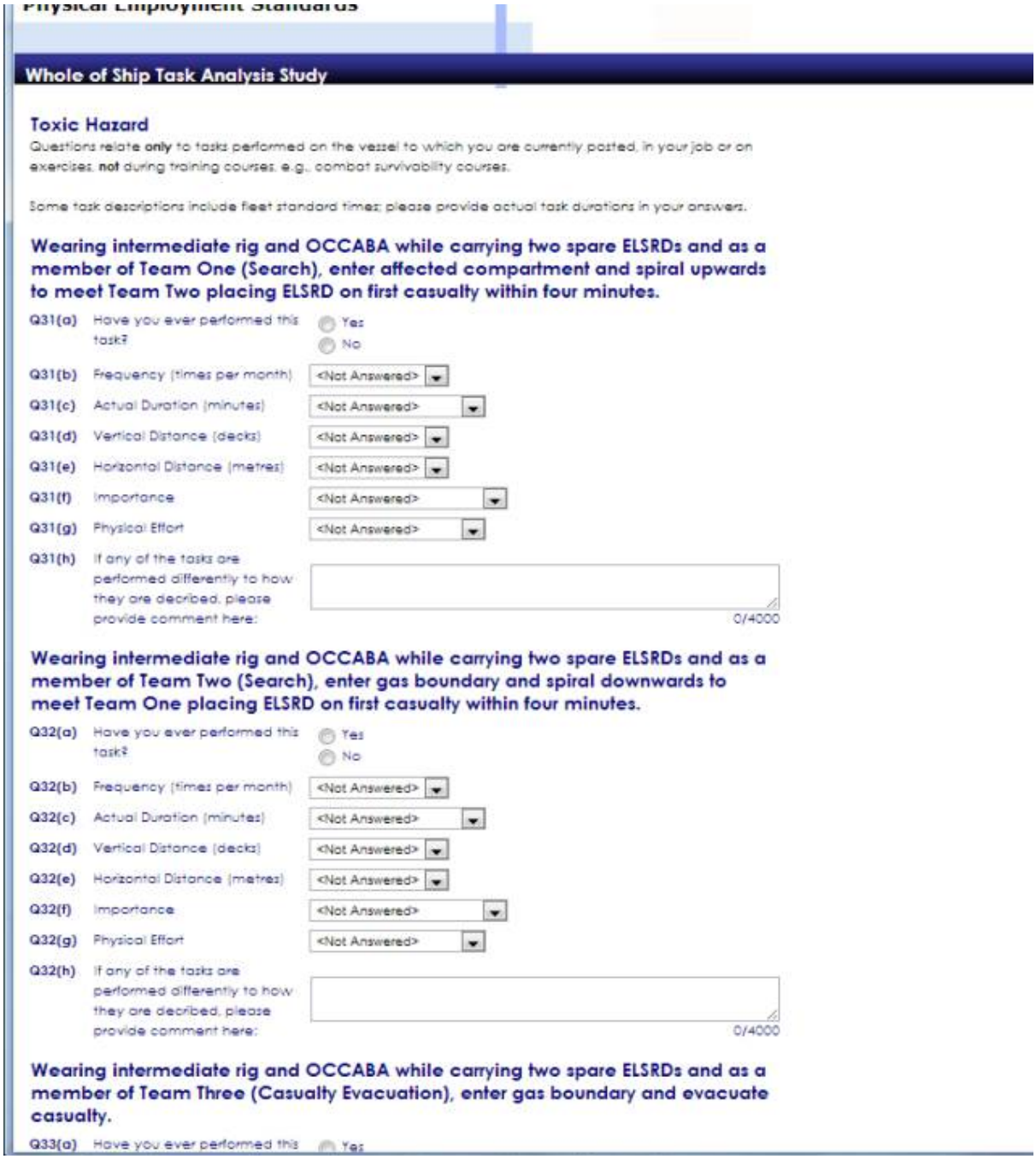


Physical Employment Standards

Whole of Ship Task Analysis Study

Toxic Hazard

Questions relate **only** to tasks performed on the vessel to which you are currently posted, in your job or on exercises, **not** during training courses, e.g., combat survivability courses.

Some task descriptions include fleet standard times; please provide actual task durations in your answers.

Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team One (Search), enter affected compartment and spiral upwards to meet Team Two placing ELSRD on first casualty within four minutes.

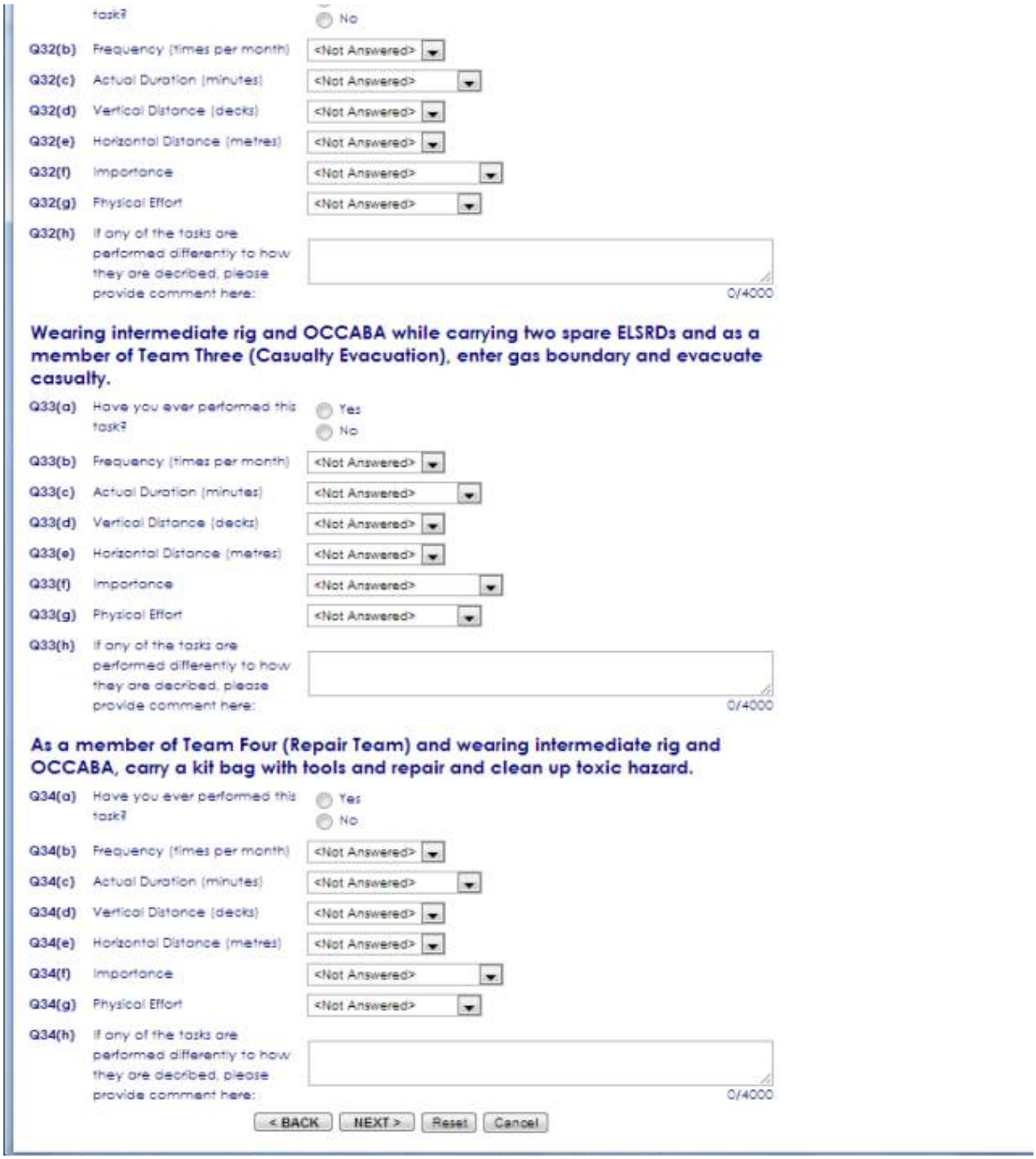
Q31(a)	Have you ever performed this task?	Yes / No
Q31(b)	Frequency (times per month)	<Not Answered>
Q31(c)	Actual Duration (minutes)	<Not Answered>
Q31(d)	Vertical Distance (decks)	<Not Answered>
Q31(e)	Horizontal Distance (metres)	<Not Answered>
Q31(f)	Importance	<Not Answered>
Q31(g)	Physical Effort	<Not Answered>
Q31(h)	If any of the tasks are performed differently to how they are decribed, please provide comment here:	0/4000

Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team Two (Search), enter gas boundary and spiral downwards to meet Team One placing ELSRD on first casualty within four minutes.

Q32(a)	Have you ever performed this task?	Yes / No
Q32(b)	Frequency (times per month)	<Not Answered>
Q32(c)	Actual Duration (minutes)	<Not Answered>
Q32(d)	Vertical Distance (decks)	<Not Answered>
Q32(e)	Horizontal Distance (metres)	<Not Answered>
Q32(f)	Importance	<Not Answered>
Q32(g)	Physical Effort	<Not Answered>
Q32(h)	If any of the tasks are performed differently to how they are decribed, please provide comment here:	0/4000

Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team Three (Casualty Evacuation), enter gas boundary and evacuate casualty.

Q33(a) Have you ever performed this — Yes


task?
No
Q32(b) Frequency (times per month) <Not Answered>
Q32(c) Actual Duration (minutes) <Not Answered>
Q32(d) Vertical Distance (decks) <Not Answered>
Q32(e) Horizontal Distance (metres) <Not Answered>
Q32(f) Importance <Not Answered>
Q32(g) Physical Effort <Not Answered>
Q32(h) If any of the tasks are performed differently to how they are decribed, please provide comment here:
0/4000
Wearing intermediate rig and OCCABA while carrying two spare ELSRDs and as a member of Team Three (Casualty Evacuation), enter gas boundary and evacuate casualty.
Q33(a) Have you ever performed this task?
Yes
No
Q33(b) Frequency (times per month) <Not Answered>
Q33(c) Actual Duration (minutes) <Not Answered>
Q33(d) Vertical Distance (decks) <Not Answered>
Q33(e) Horizontal Distance (metres) <Not Answered>
Q33(f) Importance <Not Answered>
Q33(g) Physical Effort <Not Answered>
Q33(h) If any of the tasks are performed differently to how they are decribed, please provide comment here:
0/4000
As a member of Team Four (Repair Team) and wearing intermediate rig and OCCABA, carry a kit bag with tools and repair and clean up toxic hazard.
Q34(a) Have you ever performed this task?
Yes
No
Q34(b) Frequency (times per month) <Not Answered>
Q34(c) Actual Duration (minutes) <Not Answered>
Q34(d) Vertical Distance (decks) <Not Answered>
Q34(e) Horizontal Distance (metres) <Not Answered>
Q34(f) Importance <Not Answered>
Q34(g) Physical Effort <Not Answered>
Q34(h) If any of the tasks are performed differently to how they are decribed, please provide comment here:
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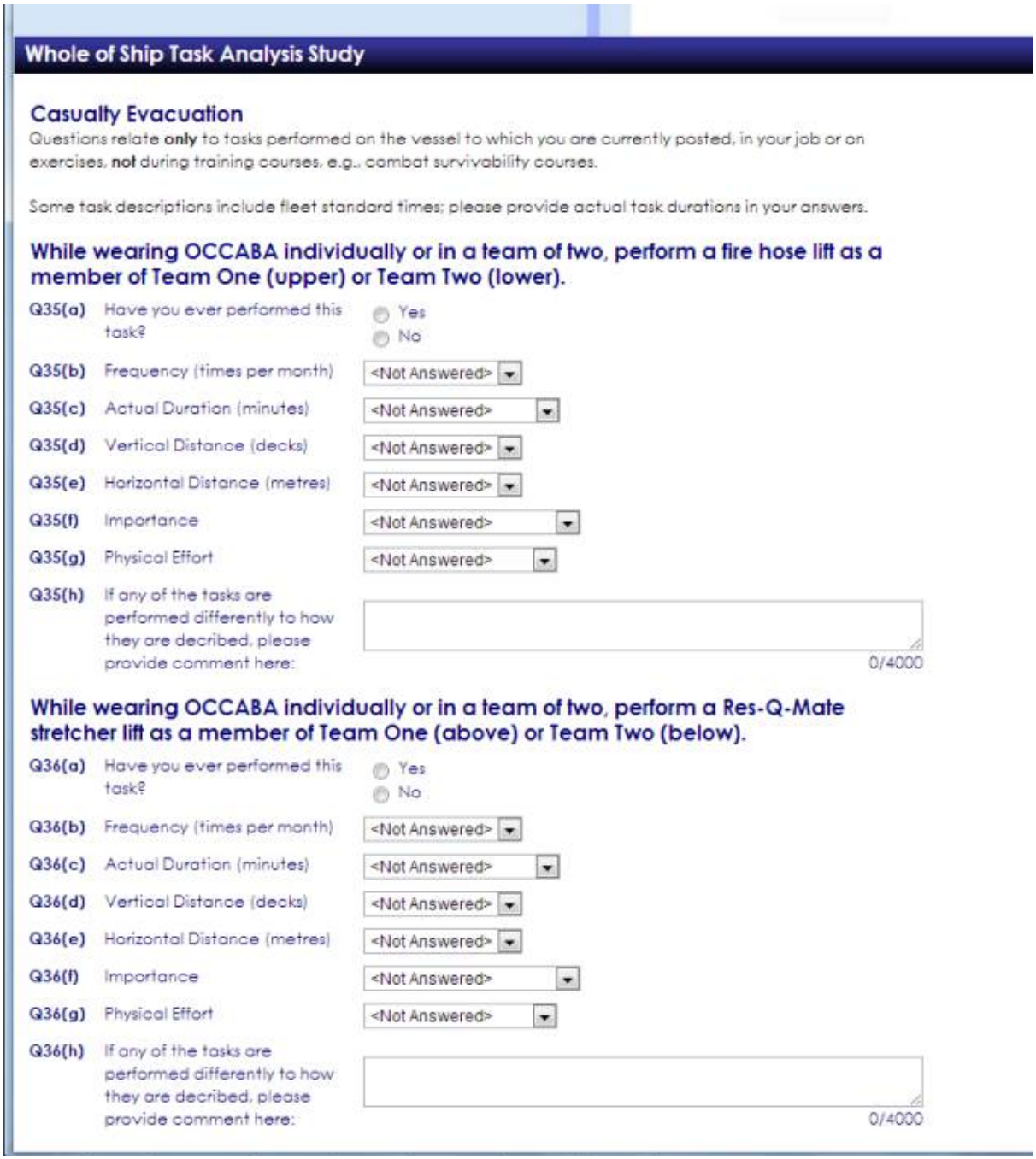


Whole of Ship Task Analysis Study

Casualty Evacuation

Questions relate **only** to tasks performed on the vessel to which you are currently posted, in your job or on exercises, **not** during training courses, e.g., combat survivability courses.

Some task descriptions include fleet standard times; please provide actual task durations in your answers.

While wearing OCCABA individually or in a team of two, perform a fire hose lift as a member of Team One (upper) or Team Two (lower).

Q35(a)	Have you ever performed this task?	○ Yes ○ No
Q35(b)	Frequency (times per month)	<Not Answered>
Q35(c)	Actual Duration (minutes)	<Not Answered>
Q35(d)	Vertical Distance (decks)	<Not Answered>
Q35(e)	Horizontal Distance (metres)	<Not Answered>
Q35(f)	Importance	<Not Answered>
Q35(g)	Physical Effort	<Not Answered>
Q35(h)	If any of the tasks are performed differently to how they are decribed, please provide comment here:	0/4000

While wearing OCCABA individually or in a team of two, perform a Res-Q-Mate stretcher lift as a member of Team One (above) or Team Two (below).

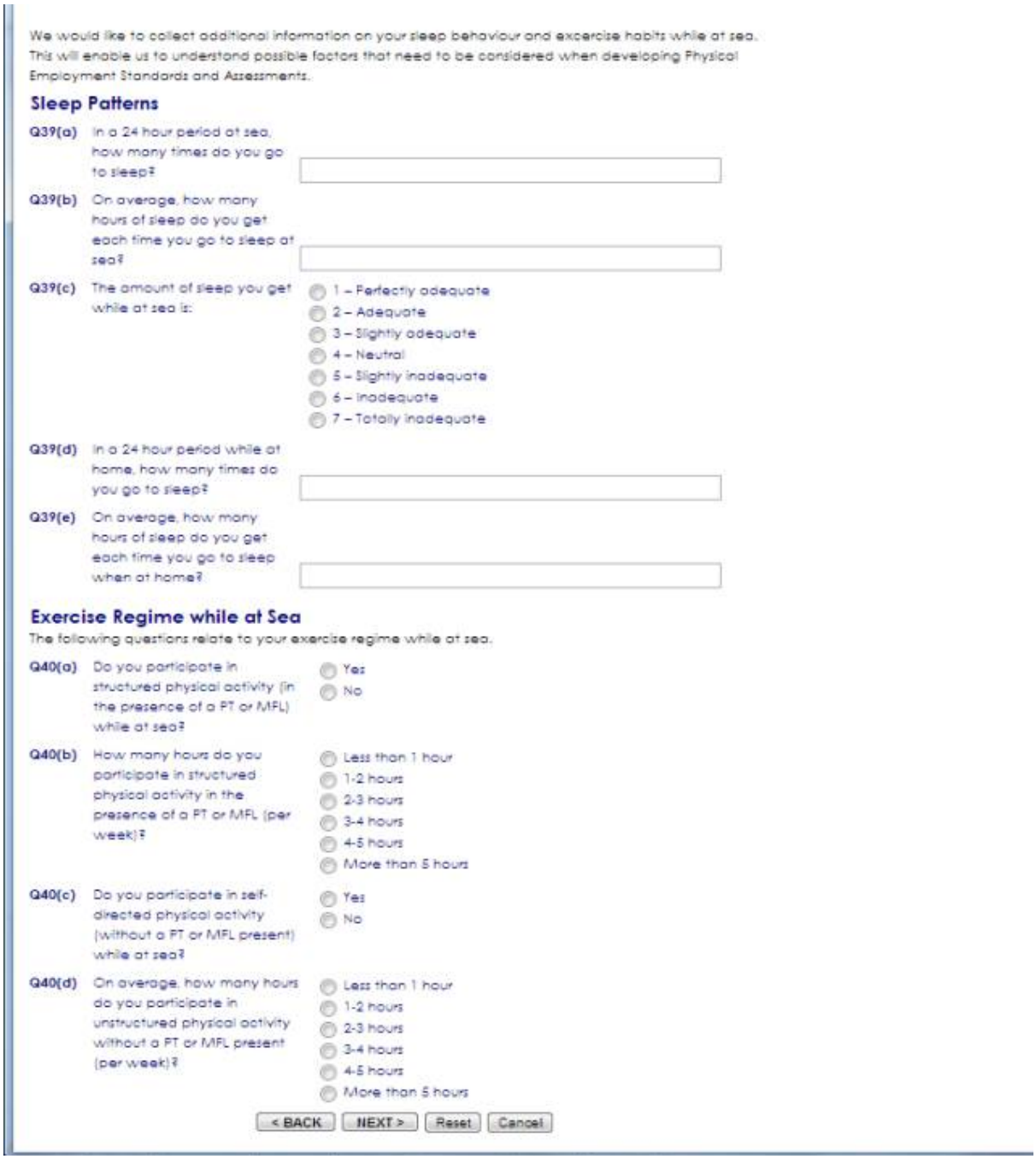
Q36(a)	Have you ever performed this task?	○ Yes ○ No
Q36(b)	Frequency (times per month)	<Not Answered>
Q36(c)	Actual Duration (minutes)	<Not Answered>
Q36(d)	Vertical Distance (decks)	<Not Answered>
Q36(e)	Horizontal Distance (metres)	<Not Answered>
Q36(f)	Importance	<Not Answered>
Q36(g)	Physical Effort	<Not Answered>
Q36(h)	If any of the tasks are performed differently to how they are decribed, please provide comment here:	0/4000

injury x metres to first aid post/sick bay.

Q37(a)	Have you ever performed this task?	○ Yes ○ No
Q37(b)	Frequency (times per month)	<Not Answered>
Q37(c)	Actual Duration (minutes)	<Not Answered>
Q37(d)	Vertical Distance (decks)	<Not Answered>
Q37(e)	Horizontal Distance (metres)	<Not Answered>
Q37(f)	Importance	<Not Answered>
Q37(g)	Physical Effort	<Not Answered>
Q37(h)	If any of the tasks are performed differently to how they are decribed, please provide comment here:	0/4000

While wearing OCCABA and in a team of two, lift and carry a casualty using a fore-aft carry from site of injury x metres to first aid post/sick bay

Q38(a)	Have you ever performed this task?	○ Yes ○ No
Q38(b)	Frequency (times per month)	<Not Answered>
Q38(c)	Actual Duration (minutes)	<Not Answered>
Q38(d)	Vertical Distance (decks)	<Not Answered>
Q38(e)	Horizontal Distance (metres)	<Not Answered>
Q38(f)	Importance	<Not Answered>
Q38(g)	Physical Effort	<Not Answered>
Q38(h)	If any of the tasks are performed differently to how	



We would like to collect additional information on your sleep behaviour and excercise habits while at sea. This will enable us to understand possible factors that need to be considered when developing Physical Employment Standards and Assessments.

Sleep Patterns

Q39(a) In a 24 hour period at sea, how many times do you go to sleep?

Q39(b) On average, how many hours of sleep do you get each time you go to sleep at sea?

Q39(c) The amount of sleep you get while at sea is:

- 1 – Perfectly adequate
- 2 – Adequate
- 3 – Slightly adequate
- 4 – Neutral
- 5 – Slightly inadequate
- 6 – Inadequate
- 7 – Totally inadequate

Q39(d) In a 24 hour period while at home, how many times do you go to sleep?

Q39(e) On average, how many hours of sleep do you get each time you go to sleep when at home?

Exercise Regime while at Sea

The following questions relate to your exercise regime while at sea.

Q40(a) Do you participate in structured physical activity (in the presence of a PT or MFL) while at sea?

- Yes
- No

Q40(b) How many hours do you participate in structured physical activity in the presence of a PT or MFL (per week)?

- Less than 1 hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- 4-5 hours
- More than 5 hours

Q40(c) Do you participate in self-directed physical activity (without a PT or MFL present) while at sea?

- Yes
- No

Q40(d) On average, how many hours do you participate in unstructured physical activity without a PT or MFL present (per week)?

- Less than 1 hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- 4-5 hours
- More than 5 hours

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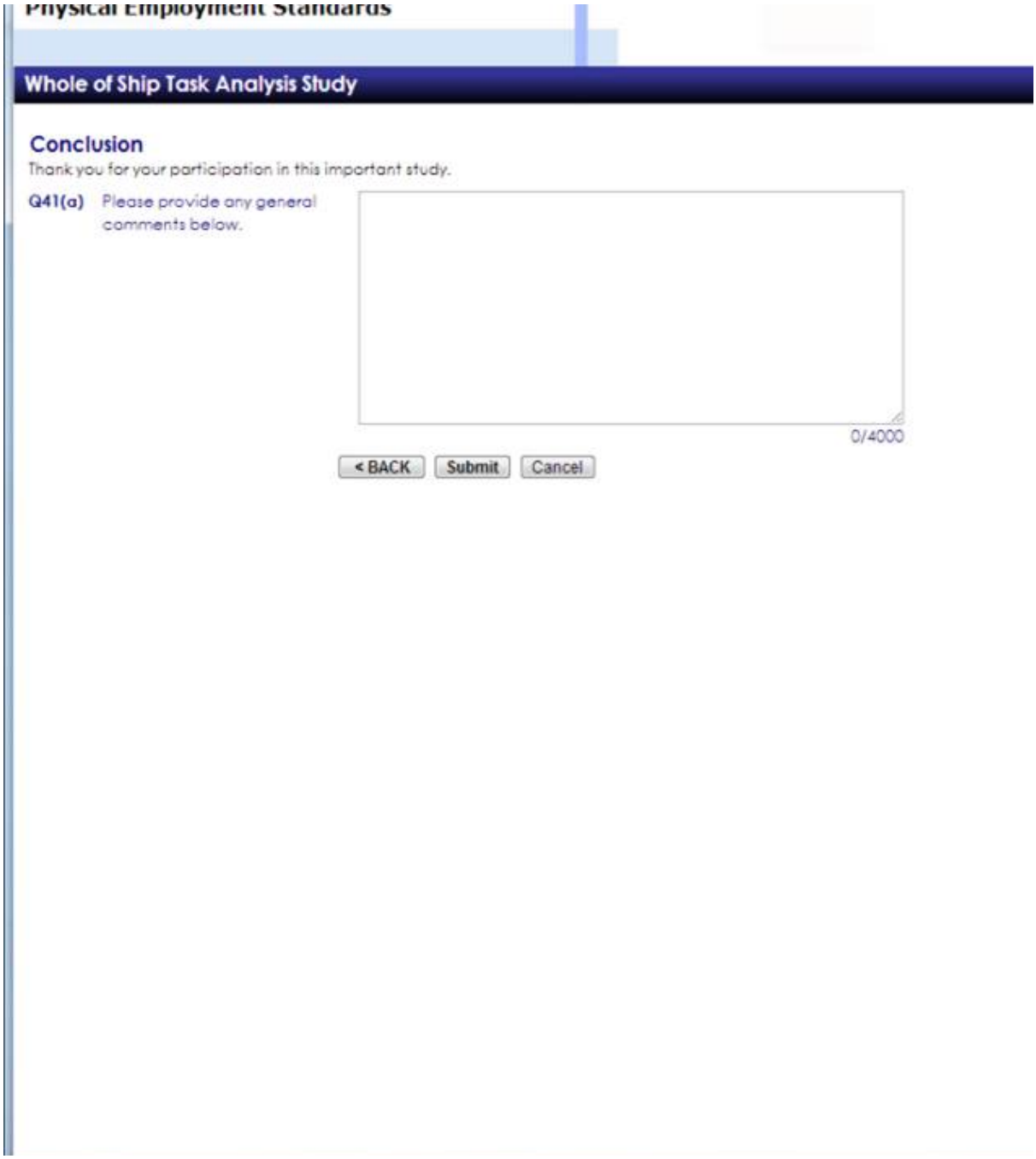
Physical Employment Standards
Whole of Ship Task Analysis Study
Conclusion
Thank you for your participation in this important study.
Q41(a) Please provide any general comments below.
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19. ABSTRACT

The Royal Australian Navy's Advanced Combat Survivability Course was observed to inform the construction of a combat survivability job task analysis survey. From observations, 29 tasks were identified and subsequently incorporated into a pilot survey that was adminsistered to combat survivability subject matter experts. A focus group was then held with those experts to obtain feedback on survey design and content. The pilot survey resulted in a more detailed task list, a restructuring of answer options and a refined introductory script. The refined survey will be administered to a large number of personnel across a range of platforms, rates, ranks and experience levels to gain subjective ratings on key task parameters. The outcomes of the survey will inform the development of comprehensive field observations and simulations of whole-of-ship tasks.