



Lloyd's Register
Marine

Working together
for a safer world

Risk Assessment of Vessel Survey

MV Kathryn Spirit: Safe Access Survey, Environmental Survey & Recommendations
Task 001

Report for:
Canadian Coast Guard

Revision:
0

Reporting date:
03 March 2017

Report by:
Lloyd's Register Canada Limited



Table of Contents

| | | |
|----------|--|----------|
| 1 | Introduction | 1 |
| 1.1 | Summary | 1 |
| 1.2 | Scope | 1 |
| 2 | Background | 2 |
| 2.1 | Initial Risk Evaluation (October 2016) | 2 |
| 2.2 | Further Consideration (Winter 2017) | 2 |
| 3 | Assessment | 3 |
| 3.1 | Process | 3 |
| 3.2 | Most Significant Risks Identified | 4 |
| 3.3 | Suggested Mitigating Controls | 6 |
| 3.4 | Residual Risks | 7 |
| 3.5 | Access for Purpose Other than Survey | 7 |
| 4 | Conclusions | 8 |
| 5 | Recommendations | 9 |

Revision Control

| No. | Date | Description |
|-----|---------------|-------------|
| 1 | 03 March 2017 | |
| | | |
| | | |

List of Acronyms and Abbreviations

| | |
|-----|----------------------|
| CCG | Canadian Coast Guard |
| TC | Transport Canada |
| LR | Lloyd's Register |

1 INTRODUCTION

Lloyd's Register Canada Limited (LRCL) has been contracted by the Canadian Coast Guard (CCG) to assess the condition of the M/V Kathryn Spirit by carrying out safe access and environmental surveys as well as providing recommendations for maintaining (and where possible improving) vessel condition for contractor access in preparation for disposal of the vessel.

This report provides an overview of the results from the recent assessment of the potential hazards and risks associated with carrying out safe access survey and environmental survey of the M/V Kathryn Spirit.

1.1 Summary

M/V Kathryn Spirit has been in laid up condition since 2011 and was abandoned January 2016. The vessel has been docked at Beauharnois, Quebec for the duration. In Spring 2016, the vessel began to experience significant deterioration in its condition: the aft draft increased by approximately 8 feet and then the angle of list increased to approximately 20 degrees port. The vessel grounded. Water has infiltrated the hull at multiple locations, with a number of tanks flooded. It had been reported that the vessel was stabilized in July 2016 but due to the excessive list, a full vessel survey has not been carried out by LR to date.

In January 2017 construction of a berm alongside the port side of the vessel commenced, to be completed before the anticipated rise in lake water level in late February. This change in vessel condition has initiated further consideration of a vessel survey being carried out by LR. To this end, a risk assessment has been completed. Based on risks and required controls identified during the assessment, it is determined that it is unsafe to access the vessel in its current state.

However, it is believed that in the absence of snow and ice with sufficient controls in place, the main deck, accommodation, and tween deck areas may be accessed safely. Given the higher risk and extensive controls required for the holds, tanks, and machinery space the survey of these spaces may require further (special) consideration.

1.2 Scope

The scope of work for this contract, as amended in December 2016, is described as three discrete tasks. This particular aspect of the statement of work is included under Task 001:

Recommended action(s) in order to complete the Safe Access Survey and Environmental Survey.

Furthermore, this risk assessment was carried out to determine whether LR surveyors could safely carry out a survey of the vessel in its current state.

2 BACKGROUND

2.1 Initial Risk Evaluation (October 2016)

In October 2016 Safe Access and Environmental Survey was to be carried out by LR Surveyors. It had been reported that the vessel was stabilized but concerns were raised over the excessive angle of list of the vessel as well as the conditions on board the vessel (including known environmental hazards). Based primarily on these concerns it was determined that LR surveyors could not carry out the safe access and environmental survey vessel at that time.

2.2 Further Consideration (Winter 2017)

In January 2017 construction of a berm alongside the port side of the vessel commenced, to be completed before the anticipated rise in lake water level in late February. This change in vessel condition has initiated further consideration of a vessel survey being carried out by LR. Therefore it was decided to carry out a structured risk assessment to accurately assess the risks in surveying the vessel in the current state.

3 ASSESSMENT

3.1 Process

For this assessment, the vessel was divided into smaller areas of consideration as there were hazards identified that may not be applicable to the entire vessel. The five main areas are:

- Main Deck,
- Accommodation,
- Forepeak and Tween Deck,
- Holds and Tanks, and
- Machinery space.

The risk assessment followed a structured process.

First hazards were identified for each area and developed independent of associated consequences or probabilities.

From the list of hazards, the most extreme credible consequence was identified due to exposure to each hazard.

The probability of occurrence was then identified to give an overall picture of risk. Risks were categorized into one of four groups:

Tolerable – Risk is at an acceptable level, no controls are needed.

Reduce to ALARP – Risk may be acceptable as long as risks are reduced as low as reasonably practicable.

Special Consideration – Risk may be accepted following consideration of the nature of the risk and sufficient controls.

Intolerable – Risk is at an unacceptable level.

The most significant risks were identified, that is, where the risk associated with the hazard was above tolerable levels.

For each of the significant risks, control measures were identified that may help to reduce the risk.

The risks were then reassessed with these controls to determine what residual risks exist. These residual risks form the basis of determining the overall safety of carrying out the survey of the vessel.

3.2 Most Significant Risks Identified

| Area | Most Significant Risks |
|---------------------|---|
| Main Deck | <ul style="list-style-type: none"> - Angle of Heel - Snow/Ice - Lack of Harness Points - Dropped Objects - Falls (During Access) - Taught Mooring Lines - Working over Water - Lack of Access to Medical Assistance |
| Accommodation | <ul style="list-style-type: none"> - Overpressure of space due to CO₂ - Deterioration of CO₂ Cylinders - Incorrectly Located CO₂ Bottles - Door Slamming - Air Quality - Poor Lighting - Fire - Lack of Access to Medical Assistance - Slips and Trips - Sharp Objects - Confined Space |
| Tween Deck/Forepeak | <ul style="list-style-type: none"> - Angle of the Vessel - Poor Lighting - Air Quality - Open Manholes - Oily Decks - Confined Space - Ice/Frost - Lack of Access to Medical Assistance |

| | |
|-----------------|--|
| Holds/Tanks | <ul style="list-style-type: none">- Difficulty Accessing Space- Working Over Water- Air Quality- Angle of the Vessel- Poor Lighting- Potential CO₂ Accidental Release- Confined Space- Ice/Frost- Lack of Access to Medical Assistance- Deterioration of Decks, Ladders, Access Points, etc. |
| Machinery Space | <ul style="list-style-type: none">- Asbestos- Mercury- PCBs- Accidentally Release of CO₂- Working Over Water- Difficulty of Access- Oily decks- Poor Lighting- Air quality- Tripping over loose objects- Dropped objects- Confined spaces- Lack of access to medical assistance- Fire- Angle of the vessel- Flooding |

3.3 Suggested Mitigating Controls

Based on the significant risks listed in Section 3.2, mitigations were identified which may help to alleviate the risks and make survey of the vessel safer. Suggested mitigating controls include, but are not limited to, the following:

Environmental Considerations:

- Wait until the spring season to board the vessel to allow snow and ice to melt
- Perform work in daylight only

Survey Planning:

- Provide emergency services at site
- Identify fire escape routes

Preparations (to be carried out by suitable contractor in advance of vessel survey):

- Installation of a gangway to allow access to the vessel from the berm
- CO2 System to be deactivated
- Testing of air quality in all spaces before entry

Common practices employed by all LR Surveyors:

- Appropriate Personal Protective Equipment,
- Maintain 3 Points of Contact at all times,
- Assess the surroundings before proceeding, and use S.T.O.P (Stop, Think, Observe, Plan) cards to assess the risks of individual activities

Extra/Appropriate Personal Protective Equipment:

- Hard hat lights and backup flashlights
- Fall arrest if entering areas where falls over 6 feet (2 m) are possible
- Dust masks in enclosed spaces
- Gas monitors for all personnel

Survey Considerations and/or Limitations:

- Use the buddy system in all areas and all work on the vessel must be guided by CCG personnel familiar with the vessel
- Assess the swing direction of all doors and develop a survey plan
- Close Manholes (confirm if there are any open)
- Do not disturb potential sources of asbestos
- Do not disturb mercury or PCBS, where found
- Do not go below upper levels in the machinery space
- Do not go below the exterior water level.
- Avoid working in areas where harnesses are required
- Avoid working under cranes and areas where objects could drop
- Avoid working in the areas where mooring lines are able to strike if they snap
- Avoid entering spaces which have significant water

3.4 Residual Risks

Even with the use of controls, some residual risks exist above the tolerable level on board the vessel. These include:

| Area | Residual Risk |
|---------------------|--|
| Main Deck | Working over water: Reduce this risk as low as reasonably possible |
| Accommodation Block | Door Slamming: Reduce the risk as low as reasonably possible before proceeding Air Quality: Specially consider the risks before making decision to proceed |
| Fore and Tween Deck | Air Quality: Specially consider the risks before making decision to proceed Oily Deck: Reduce the risk as low as reasonably possible before proceeding |
| Hold and Tanks | Air Quality: Specially consider the risks before making decision to proceed Angle of the Vessel: Reduce the risk as low as reasonably possible before proceeding Difficulty of getting medical assistance: Specially consider the risks before making decision to proceed Deterioration of the deck, ladders, etc.: Reduce the risk as low as reasonably possible before proceeding |
| Machinery Space | Asbestos: Specially consider the risks before making decision to proceed Mercury: Reduce the risk as low as reasonably possible before proceeding PCBs: Reduce the risk as low as reasonably possible before proceeding Working Over Water: Specially consider the risks before making decision to proceed Air Quality: Specially consider the risks before making decision to proceed |

3.5 Access for Purpose Other than Survey

It is important to note that this risk assessment has been developed for LR surveyors accessing the vessel in order to carry out a survey.

Access to the vessel to conduct activities other than survey, for example pumping tanks, cutting steel, welding or other activities of that nature, may require modified and/or additional mitigating controls. A risk assessment should be carried out for any extensive work to be carried out onboard the vessel.

4 CONCLUSIONS

The risk assessment for conducting a survey of the M/V Kathryn Spirit has highlighted several key risks. Proposed mitigations to reduce the risks have been identified. Additionally, the residual risks, which remain even if controls are implemented, are also considered. In order to carry out a survey of the vessel, the following minimum controls are needed for each area:

| Area | Minimum Controls For Survey |
|----------------------------|--|
| Main Deck | Use PPE, Maintain 3 Points of Contact at all times, Assess the surroundings before proceeding, and use S.T.O.P cards to assess the risks of individual activities Wait Until Spring Season to Board Vessel Avoid working in areas harnesses are required Avoid working under cranes Install gangway with netting for safe access from berm Avoid working in areas mooring lines can strike Perform work in daylight only Provide emergency services at site |
| Accommodation Block | In addition to controls needed to access main deck, the following is required: Deactivation of the CO2 System Assess door swing directions and prepare a survey plan Test air quality of spaces before entering and provide personal gas monitors for surveyors Provide hard hat lights and backup flashlights Identify fire escape routes Use the buddy system and provide a CCG representative familiar with the vessel to guide the survey through enclosed areas |
| Fore and Tween Deck | In addition to controls listed above, to access the forepeak and tween decks, the following is required: Close manholes securely / confirm all are closed before access |
| Hold and Tanks | In addition to controls listed above, to access hold and tanks, the following is required: Provide fall arrest if accessing areas with potential for falls over 6 feet Avoid entering spaces with significant water |
| Machinery Space | In addition to controls listed above, to access machinery space, the following is required: Wear dust masks and do not disturb asbestos Do not disturb mercury or PCBs Do not go below upper levels of machinery space Do not go below exterior water level |

5 RECOMMENDATIONS

Based on risks and required controls identified during the assessment, it is determined that it is unsafe to access the vessel in its current state. However, it is believed that in the absence of snow and ice and with sufficient controls in place, the main deck, accommodation, and tween deck areas may be accessed safely. Given the higher risk and extensive controls required for the holds, tanks, and machinery space the survey of these spaces may require further (special) consideration.

Also, it is important to recognize that even with the use of controls some residual risks exist above the tolerable level on board the vessel. In any instance that this is found to be the case, and concerns of employees are noted, further consideration should be given before carrying out a survey of the area in question.



Lloyd's Register
Marine

Lloyd's Register Canada Limited
5420 North Service Road, Suite 506
Burlington, Ontario, L7L 6C7 Canada

T (+1) 905 631-9420

W: www.lr.org

www.lr.org

Lloyd's Register Group Limited, its subsidiaries and affiliates and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

Lloyd's Register and variants of it are trading names of Lloyd's Register Group Limited, its subsidiaries and affiliates.

Copyright ©Lloyd's Register Canada Limited 2016

A member of the Lloyd's Register group.