PROJECT SUMMARY

Marina Risk Reduction
26 January 2017

Background: Electric Shock Drowning (ESD) can directly electrocute a swimmer in the water or cause a level of paralysis that ultimately results in drowning. Reports in the mainstream media indicate this is a concern in the vicinity of public and private marinas, boatyards and floating buildings. This has been addressed in the FPRF Proceedings of the “Marina Shock Hazard Research Planning Workshop” held in August 2015, among other activities and earlier works. This problem has not been resolved and needs to be further addressed.

This project is intended to address ESD in public and private marinas and related facilities from all common and plausible sources. The Marina Shock Hazard Research Planning Workshop held in August 2015 suggested possible sources of ESD hazards from both shore based and non-shore based sources, and this latest effort hopes to provide focused guidance on the optimum solution(s) using a risk based approach. The intent is to consider and assess ALL realistic solutions whether they are technical, awareness (including human behavior) or regulatory focused. Further, relief is sought for this hazard using a comprehensive risk focus rather than a focus on only technical or other narrow singular solutions. ESD is obviously a serious concern to the safety community, and there is a strong desire to identify and prioritize steps that will provide meaningful impact towards its mitigation. It is hoped that the deliverables from this proposed project will provide a roadmap to promote substantive solutions.

Research Goal: The overall goal of this project is to provide a comprehensive risk assessment and associated action plan to prevent, mitigate and/or eliminate the harmful effects of ESD in the vicinity of marinas, boatyards and floating buildings. Utilizing the concepts described in “Guidance Document for Incorporating Risk Concepts into NFPA Codes and Standards” (FPRF, March 2007), the objectives of this project are to:

- Summarize previous applicable literature, projects and activities in support of the goal of this project;
- Define the risk assessment elements for this application, including risk metrics and acceptability criteria;
- Identify, summarize and categorize the hazards and hazardous scenarios of impact;
- Evaluate the risks through estimation of frequency and consequence;
- Recommend an action plan to manage the risk, including measures to eliminate, prevent, and/or mitigate the risks;
- Recommend a methodology for evaluating the potential effectiveness of the action plan that addresses the effectiveness of the plan elements versus the cost to implement them.

Applicable Codes and Standards: The following model regulatory documents, among others, directly relate to this project:

- ABYC E-11, AC & DC Electrical Systems on Boats
- IEEE National Electrical Safety Code® (NESC®)
- ICC International Fire Code®
- NFPA 1, Fire Code
Project Tasks: The contractor for this project is WPI located in Worcester, MA. This project involves the following tasks:

1) **Literature Review**: Provide a comprehensive summary of the applicable literature, projects and activities on this issue that relates to the strategies to eliminate, prevent and/or mitigate the risk relating to ESD at marina oriented applications. Address all information that relates to technical solutions, awareness solutions, and regulatory solutions.

2) **Define Risk Assessment Elements**: Define the risk assessment elements for this application, including risk metrics, benchmarks, and acceptability criteria (e.g., likelihood metric = frequent, probable, occasional, remote, improbable).

3) **Hazard Identification**: Identify, summarize and categorize the hazards and hazardous scenarios of impact. A hazard is understood to be a condition or physical situation with a potential for harm. Provide an interim report to the project advisory panel on tasks 1, 2 and 3, in preparation of implementation of the remaining project tasks.

4) **Risk Evaluation**: Evaluate the risks for each identified hazard through estimation of frequency and consequence. Frequency is understood to be the number of times an event occurs within a specified time interval. Consequence is understood to be the outcome or outcomes of an event, expressed positively or negatively, quantitatively or qualitatively. The estimates should be specific to scenarios or scenario groups (clusters), not simply a combined overall frequency and a combined overall average consequence. The data sources for frequency estimation should be consistent and compatible with those for consequence estimation.

5) **Action Plan**: Recommend a detailed action plan to manage the risk, including measures to eliminate, prevent, and/or mitigate the risks. This is intended to be applied to all sizes and types of marinas, boatyards and floating buildings (e.g., small, large, fresh water, salt water, new, old, private, public, etc.). For each component of the plan, clarify who within the stakeholder community will be responsible for implementation, the anticipated level of effort required, and target time frames. The action plan should be in a format to facilitate application in all applicable arenas (e.g., end-users, regulators, manufacturers, insurers, etc.) and should include recommendations for technical solutions, education awareness campaigns, model code and legislative adoption strategies, enforcement infrastructure re-alignments, and other strategies, both broadly focused and narrowly focused, for eliminating, preventing and/or mitigating the risk.

6) **Evaluation Measures**: Recommend a methodology for evaluating the potential effectiveness of the action plan that addresses the effectiveness of the plan elements versus the cost to implement them. For each measure clarify responsibility for implementation, the anticipated level of effort required, and target time frames.

7) **Final Report**: Generate a final project report that documents the overall effort and includes the detailed elements of each project tasks, including a definitive plan for action and evaluation (to be implemented by others).

Implementation: This research program will be conducted under the auspices of the Fire Protection Research Foundation in accordance with Foundation Policies and will be guided by a Project Technical Panel. The final report is scheduled for June 2017 and will be provided to the project Panel, the appropriate NFPA Technical Committees and NEC Code Making Panels, and other appropriate venues.