Grantec Engineering Consultants Inc.

Ocean Resources Magazine

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Date: June 2003

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Offshore Structural Standards: The Road to Reliability

BY ROBIN ENGLAND

Offshore Structural Standards have been a long-time work in progress here in Canada. In the late 1980's, the country first developed standards for fixed offshore structures through the Canadian Standards Association (CSA), supported by the federal government and industry. By 1997, however, several Nova Scotia engineers recognized they were not being maintained and that Canada was far behind international offshore standards development, including critical areas such as fire and explosion safety. During the Terra Nova Project, interest was renewed in the CSA Offshore Structure Standards, prompting widespread discussions as to what direction Canada should take to improve the situation.

All Photos Credit: Cullen, Hon. Lord. The Public Inquiry into the Piper Alpha Disaster. London: HMSO, 1990.

The 1988 Piper Alpha tragedy forced huge changes in the North Sea inspection and saftey regime.

Richard Grant, M.Eng., P.Eng., Principal Structural Analyst for Accent Engineering Consultants and CBCL Limited in Halifax, NS, has been fervent in his involvement filling the deficiencies found in outdated Canadian offshore regulations. In 2002, he was heralded at the International Workshop in Houston as the "champion of the Canadian initiatives in Fire and Explosion safety for offshore structures" by David Galbraith, Deputy Convenor of the International Organization for Standardization (ISO) Working Group for Fixed Offshore Structures. As a Canadian Working Group expert on ISO Offshore Structures and Accidental Actions technical panels, Grant works with the CSA, the American Petroleum Institute (API), and the United Kingdom Offshore Operators Association/Health & Safety Executive (UKOOA/HSE) Technical Committees on Fire and Explosions for Offshore Structures and, to-date, is the only Canadian member of the Fire and Blast Information Group (FABIG) based in the UK.

For the CSA project, Grant's leadership and enterprise in the area of fire and explosion safety for offshore structures have led toward much needed change to offshore standards, and hence regulations, pushing towards improved safety in the Canadian offshore. Further, his research into North Sea and American requirements from regulatory and technical safety perspectives have formed an important basis for new guidance on Accidental Loads standards, providing direction and requirements relating to offshore structural integrity, the control and mitigation of accidents, and protection of safety critical systems.

Throughout the years, Grant has sought to ensure Canadian offshore safety reflects the appropriate standards and guidance available from the international offshore community. "The North Sea in particular," says Grant, "has made significant advancements in the area of Fire and Explosion safety, influencing both Canada and United States."

Offshore Structures

But why look to international standards? For one, Canadian standards were focused on the fixed structure type only, yet of the five offshore structures types commonly used worldwide—fixed, jack-up, semi-submersible, mono-hull, and tension leg platforms (TLP's)—all but one, TLP's, are used here.

Jack-up: predominately used for short-term applications, including drilling and accommodation platforms, e.g. Rowan Gorilla III & V;

Fixed: typically used for long-term production applications, e.g. Sable Project and Hibernia structures;

Semi-submersible: primarily for short-term applications, such as drilling platforms, e.g. Eirik Raude drilling vessel;

Mono-hull: special-purpose ships used for drilling or production, commonly referred to as FPSO's (Floating Production Storage and Offloading), e.g. Terra Nova FPSO, drill ships and MOU's in drilling applications, e.g. the West Navion.

In reality, what can happen to structures worldwide could happen here. The North Sea's Piper Alpha was one such fixed steel-jacket structure that went wrong: 167 lives were lost in 1988. Considered by many to be the worst offshore oil accident in history, the Piper Alpha disaster quickly revolutionized the offshore oil industry. The sinking of the Ocean Ranger offshore Newfoundland in 1982 and Nova Scotia's Westray mine explosion in 1992 are clear reminders of the need to ensure best practices are reflected and implemented within Canada.

CSA S471

Following the Piper Alpha tragedy, the North Sea undertook a tremendous effort to introduce new and to-date leading regulations, management, and guidance. "Canada is now revising our own CSA S471 standard up to this model, including new guidance for control and mitigation of events and a more rigorous treatment of Accidental Loads, ensuring events such as fires and explosions are adequately addressed," says Grant.

For example, control measures in North Sea regulations and new ISO standards on fire and explosion safety include requirements for safety critical elements—structures, emergency shut-down systems,

active and passive fire protection systems, etc.—to remain effective during an emergency and not be impaired during explosions, fires, strong vibrations or other relevant accidental actions. North Sea guidance, consistent with the current ISO and ensuing CSA direction, is filling this once void-critical area here in Canada.

Why Standardization?

Grant stresses the enormous benefits of international-level standardization: best industry practices born out of the result of past mistakes help ensure we learn from international experiences, as well as our own, and therein past mistakes are not repeated. "It's appropriate that Canada look internationally where technological and safety advances have been made."

The preferred position for Canada is to participate in the development of the standards at the international level (ISO); otherwise, we would be continually trying to catch-up with the advances made by the international community within our own standards (CSA). Additionally, advancements made by Canada could then be more readily reflected in the international stadards as well. For example, Canada's strength globally in the area of ice loading and concrete construction requirements for offshore structures.

Canadian Initiatives

Since its start in 1999, initiatives to update our CSA Offshore Structures Standards have significantly progressed to the point of near harmonization in the area of Accidental Loading (fire, explosions, etc.) with the ISO standards. According to Grant, the CSA and the Strategic Steering Committee on Offshore Structures (SSCOS), chaired by Greg Lever of Petro-Canada, have been tremendously supportive of the initiatives.

At present, the overall Canadian initiative is focusing on finalizing the updated CSA S47x series of standards and advancing the new ISO Offshore Structures Standards. For the better part, the CSA work is complete with the exception of balloting and publishing the standards. The CSA S475 standard, the first to be balloted, was published during Q2 of 2003. The publication of the remaining CSA standards is scheduled for completion come April 2004. "With this accomplishment, the existing Technical Committees under these CSA initiatives will merge with the current Canadian Advisory Committee for Offshore Structures (CAC), which is chaired by Graham Bagnell of Rowan Companies," reveals Grant.

Following this, the focus of the initiatives will shift towards broader technical input into the new ISO standards from Canada and on the development of the Canadian Regional Annexes for these new standards. This transition will continue to be administratively managed through CSA as the Standards Development Organization (SDO). "An additional development," continues Grant, "is initiation of FABIG within Canada to further advance the dissemination of Fire and Explosion safety guidance for offshore installations."

Grant assuredly will be involved all the way, continuing to advance these standards through his leadership and technical positions on the SSCOS, CAC, and at the ISO level, in addition to his continued efforts on the Accidental Action initiatives under ISO, API, UKOOA/HSE and FABIG. Of special note, Grant was recently selected as a recipient of the CSA Award of Merit 2003 being presented this June as part of their Annual Conference.