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CSA Publishes Updated Offshore Structures Standards

BY RICK GRANT

In April, an important milestone was reached in regards to the efforts to harmonize Canada's offshore structures standards with the new standards being developed under the International Standards Organization (ISO). This milestone, the publishing of the updated Canadian Standards Association (CSA) standards S471 "General Requirements, Design Criteria, the Environment and Loads" and S473 "Steel Structures," represents the countless hours of many over the past four years.

To date, three of the five standards that make up the CSA Offshore Structures Standards have now been revised and published. The revised CSA S475 "Sea Operations" standard was the first to be published in 2003. The remaining two standards, S472 "Foundations" and S474 "Concrete Structures" are anticipated to be available in the early summer of 2004.

The update of the CSA standards was performed under the direction of the Strategic Steering Committee on Offshore Structures (SSCOS) established by CSA in 2000. Two Technical Committees, formed under the SSCOS, were charged with the review, update and approval of the standards. The standards now published represent the consensus of the voting members on the respective two Technical Committees, comprised of balanced representation from the operators, suppliers & fabricators, regulatory authorities and general interest groups.

As reported in the October 2003 edition of *Ocean Resources* ("Offshore Structures Standards: Canadian Initiatives Accelerate to ISO"), the updating of the CSA Offshore Structures Standards was deemed by the SSCOS and the Technical Committees as a necessary step in the

process of moving towards the new ISO standards currently being developed. The update serves to make necessary improvements in the standards as realized by advancements in the industry and also to make improvements from "lessons learned" from the application of these standards in Canada and elsewhere in the world.

The updated standards will also serve as a baseline for reflecting Canada's requirements during the harmonization of the standards with the new ISO standards. Although some



Rick Grant (Canada), David Galbraith (UK) and Graham Morrison (UK) during a meeting of the ISO Technical Core Group on Accidental Actions at Total/Elfina, La Defense, Paris.

approaches to safety may be different between the CSA and ISO standards, it is important that appropriate safety levels are reflected in the ISO standards that will be finally adopted as the new National Standards for Canada.

The significant changes in CSA S471-04 include: refined definition of operational loads; additions to load combinations; revisions to the load factors; new requirements and guidance for accidental loads (fires, explosions, ship collisions, etc.), control and mitigation; new guidance on ice loads and ice accretion; and the licensing of professionals.

The new CSA Offshore Structures standards are available at www.csa.ca.

FIRE AND EXPLOSION SAFETY

One of the areas that the CSA S471

standard has been substantially improved is in the treatment of accidental loads (i.e. fires, explosions, ship collisions, dropped objects, etc.). Requirements for prevention of accidental events have been added to mitigation and control of their consequences. Annex H has been added to the standard to provide additional guidance for the determination of accidental loads and the response of the structure to these loads.

The accidental loads revisions have drawn upon guidance from the North Sea community developed primarily as a result of learnings from the Piper Alpha disaster of 1988. Following Piper Alpha, the North Sea community undertook numerous initiatives to improve the guidance for accidental loads and, in particular, for fires and explosions. These efforts are on-going, although significant advancements have been reflected in guidance, including that from the Steel Construction Institute (SCI), NORSOK and ISO. The update to the S471 standard

incorporates these advancements, bringing the CSA S471 requirements more in-line with those of the North Sea.

Among the new advancements in the standard is the requirement for the protection of structure, safety critical systems, pipework, and communications from the effects of accidental loads including, but not limited to, explosions, fire, projectiles, and strong vibrations.

With respect to projectiles and strong vibrations, these are effects that can follow the initial accidental event, such as an explosion or ship collision, and it is important to appropriately address these effects to prevent escalation of the event. For example, equipment exposed to an explosion may possibly become a projectile if the mounting arrangement cannot with-

stand the loads generated from an explosion. The projectile may then possibly cause escalation of the event by damaging other equipment, safety critical systems, piping, etc. For the case of strong vibration, this effect may be generated by explosions or ship collisions and may cause damage to critical components such as control systems and communications away from the vicinity of the event.

The new guidance in S471 includes reference to standards such as NORSOK for assessment of loads and resistance, respectively. As well, the guidance on fire and explosions published by the Steel Construction Institute (1993) under the Fire and Blast Information Group (FABIG) is also cited. The reference to the FABIG documents includes reference to the original Interim Guidance Notes (IGN's) and also the Technical Notes (TN's) that update the IGN's.

Numerous TN's have been published since the IGN's were first published in 1992 and provide additional guidance in areas such as the response of structure against fires and explosions and the design of joints to resist explosions. For the control and mitigation of the topsides to fires and explosions, the recently published ISO 13702 standard is also referenced.

The work performed under CSA to update the standard pertaining to accidental loads has been used as input in recent initiatives in the area of fire and explosion loading, including initiatives under the American Petroleum Institute (API), the United Kingdom Offshore Operators Association (UKOOA) and the Health & Safety Executive (the UK offshore regulator). The S471 guidance has also been an important input into the new ISO standards through Canada's direct participation on the ISO Accidental Actions Technical Panel responsible for drafting the provisions in the new ISO Offshore Structures Standards.

Annex H is informative, however, part of it is written in normative language. This has been done to facilitate its adoption by users of the Standard or regulatory authorities as an additional requirement of the Standard.

CANADIAN ISO INITIATIVES

Over the past year the Canadian focus has shifted such that standards efforts are now more fully directed towards contributing to the development and approval of the ISO offshore structures standards. I would suggest that it is appropriate to state that Canada is now moving toward the "home stretch" in adopting the ISO standards.

The two CSA Technical Committees were successfully merged during the Fall of 2003 with the existing Canadian Advisory Committee (CAC) on Offshore Structures. (This CAC was formed in 1997 under the Standards Council of Canada to monitor and provide input into the new ISO offshore structures standards.) The new CAC, with Ahmed Ewida of Petro-Canada as Chair and Bob Frederking of the National Research Council as Vice-Chair, is responsible under the SSCOS for providing

Canada's input into the new ISO standards, as well as co-ordinating Canada's vote on each of the standards.



Ahmed Ewida, Chair of the Canadian Advisory Committee, and Greg Lever, Chair of the Strategic Steering Committee on Offshore Structures.

Another important milestone recently achieved was the development of the first Canadian Annex for an ISO offshore structures standards. This Annex is for ISO 19901-1 "Metocean" and provides information on the metocean parameters (wind, waves, current, ice, etc.) for the Atlantic Canadian offshore region. The intent of this Annex is to provide indicative information for preliminary design.

Of worthy note, we are pleased that Greg Lever (NEB/Petro-Canada) has been re-appointed for another term as the Chair of the SSCOS to continue as an instrumental leader in these endeavours.

Richard Grant, M.Eng., P.Eng., a senior analyst with CBCL Limited in Halifax, is the Vice-Chair of the Strategic Steering Committee on Offshore Structures (SSCOS). In 2003, Grant was a recipient of the CSA Award of Merit for his leadership and guidance in the advancement of both the CSA and ISO standards.

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