

News about corrosion and the corrosion industry produced quarterly for members of NACE International in the Calgary area

## Managing Integrity on Aging Infrastructure

### NACE Satellite Seminar in Rocky Mountain House



*Attendees enjoy a wandering lunch at the Rocky Mountain House Museum, as part of the Satellite Seminar held on October 22<sup>nd</sup>.*

The seminar was both well attended and well-received. Participants had many positive comments on the venue, the variety of the presentations and the speakers themselves. Thanks to all who attended, sponsored, and presented at worthwhile event – and to the companies for whom the presenters work!

### Seminar Presenters:

Tim Hetu - **Baker Hughes** -  
Tethered Inspection

Joe Boivin - **Cormetrics** -  
Corrosion in Aging Sour Systems

Bob Lotwin - **Pipetech Corporation** - Aggressive  
Pigging of Oil and Gas  
Production and Gathering  
Systems

Dave Grzyb - **ERCB** - Review of  
the Recent Performance of  
Composite Pipelines in Alberta

Travis McDonald - **Weatherford** -  
Building an Internal Corrosion  
Control Program

Jeannine Wahl - **Champion Technologies** - Treatment of an  
Aged, Unpiggingable Sour System  
with a Conventional Corrosion  
Inhibitor

Dr. Jeff Hurd - **Multi-Chem** -  
Hydrate Control in Canadian Oil  
and Gas Operations

## Message from the Chair - Thane Schaffer



### We want your ideas!!

On September 22, the NACE Executive Committee met for a day to review the past year and make plans for this year. Executive members responsible for specific portfolios had great ideas and you can look forward to a number of great learning and networking opportunities in 2012.

Speaking of learning opportunities, we would like to hear from you what you would like us to offer in terms of courses, seminars, trade shows, and other types of events.

When we did our biannual survey in 2010, more than 75% of respondents said they joined NACE for professional development. Some of you offered ideas for the kinds of things you would like to see and we paid attention to those as we planned events last year. Now we would like to know what you would like us to consider over the next couple of years.

Please let me know what you would like to see more of...

- Workshops
- Seminars
- Tradeshows
- Dinner meetings with a speaker
- Networking events
- Courses
- Something else??

We have also created a new Communications Committee within the Calgary Section which will be responsible for creating an Archive of NACE Papers and Presentations as well as supporting the growing digital registration demands for our NACE functions. With the addition of this committee and a growing workload, the Executive Committee is soliciting for various volunteer positions. If you are interested, please contact me.

[Click here](#) to email me with your suggestions. I will bring your ideas to our next Executive meeting, and will respond directly to everyone who emails me with information on what we are planning as a result.

Thanks!

*Thane D. Schaffer*

## Of Courses...

### November Non-Metallics Mini Symposium

NACE Calgary will be holding a one day mini-symposium on non-metallics on Friday, November 25 at the Calgary Chamber of Commerce from 8:30 a.m. to 4 p.m. The symposium will focus on the application of non-metallics in asset integrity management.

Registration will be available online soon. At this time, we have spots open for sponsors and speakers. If you or your company would be interested in presenting or sponsoring, please contact Matt Stroh at [program@nacecalgary.ca](mailto:program@nacecalgary.ca).

## Events

### [Northern Area Western Conference 2012](#)

Anchorage, AK, USA  
February 5-7, 2012

### [CORROSION 2012](#)

Salt Lake City, UT, USA  
March 11-15, 2012

Visit [NACE International](#) website and the [CATS](#) website for more technical events.

**Next golf tournament** is scheduled for August 17, 2012.

## We have refreshed our website...



## Features with users in mind...

- Easy to find information on courses, events, and the latest NACE news
- Interactive Social Media links to be added soon – to enable local discussion groups
- Direct links to key locations on the NACE International site
- Direct contact phone numbers and emails for all Executive Committee Chairs





## Corrosion Web Sites you may like to know about...

### Corrosion Doctors! – [www.corrosion-doctors.org](http://www.corrosion-doctors.org)

The Corrosion Doctors website is a treasure trove of information and ideas about Corrosion. It was launched in August 1999 [in order to](#) improve the general awareness of corrosion causes and solutions. The site has more than 1000 pages of information about that include a glossary of terms, books, learning modules, quizzes, research, links, and more, all related to corrosion. As of October 15, this site has had more than 13 million visitors since its startup.

### Ohio Institute for Corrosion and Multiphase Technology - [www.corrosioncenter.ohiou.edu](http://www.corrosioncenter.ohiou.edu)

For more than a decade, researchers here have worked with a consortium of the world's 12 leading oil companies and chemical companies to come up with new ways to deal with the corrosion of pipelines that carry crude oil to the refineries, often across hundreds of miles of land and ocean floor.

### Euro Inox-The European Stainless Steel Development Association - [www.euro-inox.org](http://www.euro-inox.org)

This site provides an online library related to the properties and applications of stainless steel and portal to information on stainless steel worldwide.

### Let us know about your favorite sites...

If you have a site related to Corrosion that you recommend be bookmarked by colleagues, please forward the information to [naceneews@nacecalgary.ca](mailto:naceneews@nacecalgary.ca).

## Corrosion News

### Remote corrosion monitoring systems gain traction

The Merlin system is widely used across England to keep tabs on the cathodic protection systems of vital natural gas pipelines... [>>>learn more](#)

### Concerns mount about integrity of pipelines

The early July oil spill in Eastern Montana is endangering the prospects of a crude oil pipeline from Canada to the U.S.... [>>>learn more](#)

### Engineer touts weak bridge warning system

An electrical engineering researcher at the University of Maryland has invented an early warning system to alert officials about the possible failures of bridges' integrity... [>>>learn more](#)

## For Your Information...

Featuring some of the worst corrosion related failures recorded around the world, along with historical references and lessons learned.

*Assembled by Thaier Al-Issa, M.Eng. P.Eng.*

### Case 5: Natural Gas Pipeline Rupture – Operator: West Coast Energy Inc., 07 August 2000

“At approximately 02:50 PST, a rupture occurred on the 762-millimetre T-South Mainline at Mile Post 569.9 near the Zopkios rest stop at Exit 217 on the Coquihalla Highway, British Columbia. The rupture location is approximately nine kilometres south of the Coquihalla Highway toll booth.

The toll booth clerk had received a report from a motorist that there had been a possible explosion near the Zopkios rest stop and that there was debris on the highway. The toll booth clerk had limited knowledge of the Westcoast system and its proximity to the Coquihalla Highway near the rest stop.

Because of pressure drops at Compressor Stations 8A and 8B, the gas controller determined that the rupture had occurred on the mainline. RCMP was informed to take action & isolate the highway until safe conditions are established.

The line break site was further isolated 1 ½ hours after the rupture had occurred when the sectionalizing valve at MP 556.5 was closed. Twenty-three minutes later, flow was resumed in the mainline loop between Compressor Stations 8A and 8B. Approximately 3½ hours after the rupture had occurred, the Coquihalla Highway was re-opened to traffic.”



### **“Incident failure analysis**

The TSB Engineering Branch determined that shallow surface pitting corrosion had occurred at the four o'clock position coincident with a localized area of higher hardness, or hard spot, on the exterior surface of the pipe (report LP 081/00). A crack, which had initiated in the hard spot, had been present for some time but was not actively growing at the time of the rupture. The TSB Engineering Branch determined that the pipe finally failed as a result of the extension in overstress of this pre-cracked region.

The section of the mainline in which the rupture occurred had been manufactured in 1957 by A.O. Smith Corporation of Milwaukee, Wisconsin, United States, according to pipe standard API-5LX52. This section of line had been installed and hydrostatically tested in 1957 to a minimum pressure of 8067 kPa (MAOP for this section of line was 6453 kPa). The pipe had been coated with an asphalt enamel and an inner and outer glass wrap. No coating remained on the section of pipe in which the fracture originated. However, the coating on the pipe sections both upstream and downstream of the rupture location appeared to be intact and adherent to the pipe.

This section of the mainline had been inspected for metal loss in 1981, 1991 and 1998 using a magnetic flux leakage internal inspection tool. Following each inspection, all major anomalies and a sampling of minor anomalies were inspected and either re-coated or replaced. In the vicinity of the rupture location, the inspections had revealed two dents and some minor corrosion.”

### **“Analysis**

Although a rupture should have resulted in a rate of pressure change equal to or greater than 207 kPa per minute, the rate of pressure change at Compressor Station 8B never reached this alarm situation. This was probably due to a combination of the pipeline configuration between Compressor Stations 8A and B, spare horsepower at Compressor Station 8A, Compressor Station 8B being bypassed, and the location of the rupture. The first two factors probably created a large flow reversal on the mainline at Compressor Station 8B and a large flow increase on the mainline loop. Currently, Westcoast’s line break detection system has not been configured to signal a rupture based on changes in flow rate.

The most common cause of failures associated with hard spots on operating pipelines has been hydrogen stress cracking. For hydrogen stress cracking to occur, the following three conditions must be met:

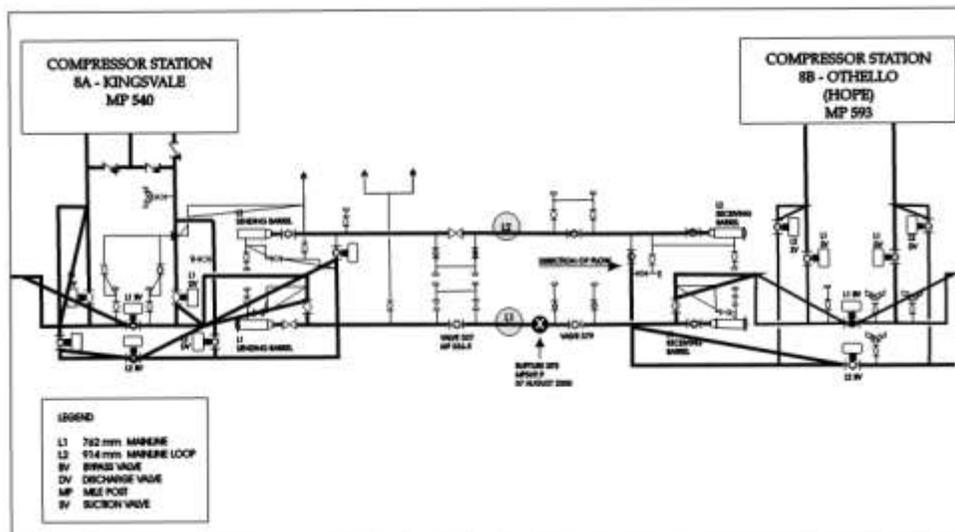
1. A steel of high hardness, and
2. High strength, sufficient sustained tensile stresses, and
3. A source of atomic hydrogen.

In this occurrence, cracking probably initiated due to the combination of the high strength and high hardness of the hard spot on the pipe, the presence of atomic hydrogen, probably from the CP reaction, and a sustained tensile stress due to the internal operating pressure of the pipeline. The shallow external corrosion which occurred coincident with the hard spot would have increased the stress in the pipe at that location and probably facilitated the initiation of surface cracks."

### "Findings as to Causes and Contributing Factors

- The combination of high strength and high hardness of the hard spot on the pipe; the; presence of atomic hydrogen; probably from the cathodic protection reaction; and a; sustained tensile stress due to the internal operating pressure of the pipeline allowed; cracking to initiate.;
- Corrosion pitting; which occurred during periods of insufficient cathodic protection; and was coincident with the hard spot; probably facilitated the initiation of cracking;
- The pipeline ruptured as a result of the extension in overstress of this pre-cracked; region.;
- The hard spot was not large enough to have caused local flattening which could have; been visually detected during the rolling process;
- An in-line inspection tool to detect hard spot anomalies on the pipeline had not been; run between Compressor Stations 8A and 8B;
- Westcoast's in-line inspection program of the mainline was designed to detect metal; loss and not hard spot anomalies; "

For more details, please refer to TSB Pipeline Investigation Report - Report Number P00H0037.



### References:

- (<http://www.tsb.gc.ca/eng/rapports-reports/pipeline/2000/p00h0037/p00h0037.asp>)
- ([http://www.tsb.gc.ca/eng/publications/reflexions/pipeline/2002/numero-issue\\_3/pipeline-numero-issue-3-sec1.asp](http://www.tsb.gc.ca/eng/publications/reflexions/pipeline/2002/numero-issue_3/pipeline-numero-issue-3-sec1.asp))



*NACE News is produced four times a year  
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*To provide feedback, or to submit an article or story  
idea, email: [nacenews@nacecalgary.ca](mailto:nacenews@nacecalgary.ca).*