

Submission
To
Alberta Royalty Review Panel

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Representing :
NACE International
Corrpro Canada Inc.

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PROPOSAL

“Consideration is requested for oil/gas royalty credit incentives to encourage increased use of corrosion control measures”

AFFILIATION

I, Pierre Crevolin, P.Eng., reside in Edmonton, and have owned and worked in various Edmonton-based service companies involved with corrosion prevention, mainly in the oil/gas/pipeline industries, from 1973 – 2002.

NACE International

From 1975 to the present, I have been an active member of NACE International, the largest world-wide corrosion non-profit engineering/technical society, with a membership of 17,000+, and based in Houston, Texas. In 2003-04, I served as President of NACE International, and now serve on the NACE Foundation Board, dedicated to increasing the knowledge and awareness of corrosion in the public school system and post secondary education institutions.

Corrpro Canada Inc.

In 1999, CSI Coating Systems Inc. of which I was a partner and President, was purchased by Corrpro Canada Inc., a subsidiary of Corrpro Companies Inc., the world’s largest supplier of corrosion-related engineering and installations services. I remained with Corrpro until 2002, when I retired.

BACKGROUND

“Corrosion” is not seen as any big issue to the outside world. In fact, the only time it ever gets into the media is when there is a catastrophic failure, usually leading to either damage to the environment or issues involving public safety.

Recall the 2006 BP pipeline failure in Alaska. Suddenly, the consequences of “corrosion” hit the mainstream media. Daily losses to BP, and to the State of Alaska, were multi-millions of dollars per day. This has caught the attention of oil/gas executives.

For those working in the corrosion industry, we know corrosion costs a lot of money and can do a lot of damage. In referring to “corrosion”, we are usually referring to metals, as metals, most often steel as refined from iron ore deposits, are most often the materials of construction. Energy, usually in the form of heat, is put into the raw ore, eliminating the contaminating elements and compounds, leaving metallic iron, the basic building block of steel pipelines, tanks, vessels, etc.

For the owners of assets used in the production or transportation of chemical or petrochemical products, corrosion and corrosion control are well known as “costs of doing business”. Because the metallic (eg. steel) container is made from a material (eg. iron) that has been raised to a higher energy level in it’s refining process, that same metallic iron wants to return to its native (ie contaminated, oxide) state. This is what corrosion is – the metal returning to its native state. As such, corrosion is a natural process, which follows the natural laws of chemistry and physics.

There are many methods of controlling and monitoring this corrosion, which is not the purpose of this submission. Rather, the purpose is to demonstrate how corrosion is a significant economic factor in the production and transportation of petrochemical products, which we do a lot of here in Alberta.

Just how costly is this thing called “corrosion”?

There have been many studies done worldwide on this subject :

ANNUAL COST OF CORROSION TO ECONOMY

YEAR	STUDY	COST OF CORROSION
1950	Uhlig	2.1% of GDP of USA
1970	UK Study	3.5% of GDP of UK
1974	Japanese Study	2.0% of GDP
1975	Battelle	4.0% of GDP (USA)
1995	Battelle (Update)	~\$300 Billion

The most comprehensive study ever done on this subject was one commissioned by the United States Congress, a \$1,000,000US study called “The Cost of Corrosion”, funded by the US Federal Highway

Administration, under the supervision and administration of NACE International, and contracted to CC Technologies Laboratories Inc. This study was conducted over the period 1999-2001, and released in 2002.

This research concluded that the **annual corrosion cost** of corrosion to the US economy was \$276 Billion, about 3.1% of the US gross domestic product. This includes the costs of corrosion prevention programs and the cost of replacement, but not lost production costs, which are admittedly very significant, but very difficult to quantify. This annual \$276 Billion corrosion cost to the US economy is **15 times more** than the average annual costs of all the natural disasters (hurricanes, tornadoes, floods, fires, etc) combined. The study also concluded that approximately 25%-30% of these costs could be saved using existing corrosion control science and technology.

So is corrosion a big deal? It appears to be a very big deal!

PROPOSED LEGISLATION IN THE UNITED STATES CONGRESS

Working with NACE International in Washington, legislation was introduced in Congress on March 29th, 2007 :

H.R. 1770

The Corrosion Prevention Act of 2007

“To amend the Internal Revenue Code of 1986 to encourage the use of corrosion prevention and mitigation measures in the construction and maintenance of business properties”.

This legislation would give owners of industrial assets federal tax credits for certain types expenditures on procedures for controlling corrosion of their assets.

This proposed legislation is now in the “committee” stage, where the logistics of “how would this work” are being debated.

HOW COULD THIS RELATE TO ALBERTA OIL/GAS PRODUCTION IN ALBERTA?

There are many standards and/or regulations dealing with the safe operation of pipelines. A small sample includes :

- Canadian Gas Association, “Recommended Practice OCC-1-2005, Control of External Corrosion on Buried or Submerged Metallic Piping Systems”, December 1, 2005
- Alberta Energy Utilities Board, “Pipeline Inspection Manual”, November 2001
- NACE International Standard RP0169-2002, “Control of External Corrosion on Underground or Submerged Metallic Pipeline Systems”, 2002
- Many Others

From the Energy Utilities Board Report “2007A - Pipeline Performance in Alberta 1990-2005” the statistics on production/gathering pipelines are :

PRODUCT	No. of Lines	Total Length (km)
Crude Oil	4,812	18,019
Natural Gas	136,023	235,592
Sour Gas	8,244	20,168
Salt/Produced Water	13,212	14,403
Oil Well Effluent	57,790	50,977
Fuel Gas	7,493	12,839
Other	3,736	18,807
TOTALS	231,310	370,805

Since 2000, the leaks due to corrosion are :

Pipeline Failures Due to Corrosion

	2000	2001	2002	2003	2004	2005
Internal Corrosion	534	454	405	347	352	392
External Corrosion	81	78	109	86	124	108
Total Failures	615	532	514	433	476	500

Some of these pipelines go back 50+ years, and are still operated safely.

Taking as an example, the year 2005, there were a total of 500 corrosion failures in 370,805 kilometers of pipelines. That's one failure per 741 kilometers of pipeline. This is an excellent track record, and is due to, in general, effective corrosion control measures being taken by the owners. Of course the ideal is to have no corrosion failures, but that's what it would be : an ideal, unrealistic, and unaffordable operating regime for oil and gas producers.

In oil and/or gas production wells, there are approximately 279,000 operating oil/gas wells in Alberta. From a corrosion control perspective, a well casing is simply a vertical pipeline, extending up to thousands of meters into the ground.

Over the past five (5) years, according to EUB records, there has been an average of less than 275 corrosion failures per year in production wells. Put another way, this means that 99.90% of these wells operate trouble-free, from a corrosion perspective, each year.

Different corrosion control methods are employed in oil/gas production wells, as the corrosive conditions both internally and externally, change. Internally, corrosion inhibitors are utilized, and externally, where there is a corrosive zone, cathodic protection is effective. Down-hole inspection tools can be used to detect whether corrosion, either internal or external, is occurring.

When a well casing failure does occur, it is an extremely expensive proposition for the owner of the well, usually rehabilitated with a "cement squeeze".

In the storage of liquid oilfield products, tankage is subjected to internal corrosion (usually in water zone), and external corrosion where the tank contacts the ground. Internal corrosion is controlled usually with the application of a protective coating, and external corrosion is controlled by the application of cathodic protection.

In summary, in these three areas of oil/gas production (pipelines, production wells, and liquid storage), each year, more sophisticated corrosion monitoring and corrosion mitigation processes and procedures are being developed in the industry.

SO HOW CAN THIS RELATE TO ALBERTA OIL/GAS ROYALTIES?

In Alberta, the existing legislation and standard practice are consistent with, and in many instances exceed, legislation and standard practice in other jurisdictions worldwide.

More restrictive corrosion control legislation is not required nor recommended in this submission.

The track record of oil and gas producers in terms of corrosion control is excellent. However, it is reality that in oil/gas production, to operate totally risk-free from a corrosion perspective is impossible.

What is proposed here is an incentive for oil/gas producers to raise the bar on corrosion control even higher. If the bar on decreasing corrosion failures is raised even higher, then the bar on protection to the environment and public safety is raised even higher as well.

The proposed legislation in the US Congress is based upon the premise that in all aspects of industry in the US, such an incentive is in the best interest of both the facility owners and the public.

Oil/gas royalty credits could provide a formula for similar incentives to oil/gas producers in Alberta.

What is proposed here is a concept, the formula to be finalized after significant study. Obviously, oil/gas producers would not, and should not, be rewarded for abiding by existing legislation. This concept is about "raising the bar". The significant task is in the definition of "What constitutes raising the bar?". Work on this aspect is currently being carried out by committee study in the US, the principles of which could be applied here.

THIS WOULD NOT BE A FREE RIDE FOR OIL/GAS PRODUCERS. Where an oil/gas producer chooses to "raise their own bar", there are definitely increased costs. Part of these increased costs could be recovered through the proposed oil/gas royalty credits.

This a win-win situation for both the oil/gas producers in Alberta and the people of Alberta. Over the long term, the oil/gas producer decreases operating costs due to corrosion issues, and over the long term, protection of the environment and public safety are increased.

Respectfully Submitted,

Pierre Crevolin, P.Eng.,
On Behalf of
NACE International
Corrpro Canada Inc.