NO DATA – NO MARKET!

The EU New Chemicals Policy …and the impact it will have on the worldwide Molybdenum industry.

This is not a Directive which concerns only EU countries: it concerns all companies anywhere in the world which manufacture in, export to, or import from, the EU. And chemicals include metals and alloys. The best way to ensure that a company is prepared for implementation in 2005 is through a trade association to avoid duplication of efforts and resources and, with a similar view in mind, IMOA is co-operating with other metal trade associations.

The impact of the Directive will result in a work-load on companies to provide the necessary data and in the need for budget provisions to conduct the required tests on which to base the data. All companies in the moly industry will have to participate and any company which believes that it can benefit from data compiled without contributing to the exercise will be in for a shock as the issue of ‘free-riders’ is already being addressed.

Here is the basic picture to-date of the far-reaching implications of the NCP.

◆ In its present form, the EU New Chemicals Policy will require manufacturers within, exporters to and importers from the EU, to register comprehensive data about the properties of their product, and its impact upon human health and the environment.

◆ Within this policy, the EU aims to implement its new chemical control system, REACH, for existing chemical substances under the EINECS register, by 2004. (EINECS is the European Inventory of Existing Commercial Chemical Substances. It is a closed list of over 100,000 ‘existing’ chemicals, governed by EU Regulation no. 793/93 on the evaluation and control of the risks of existing substances).

◆ REACH is the acronym for the Registration, Evaluation and Authorisation of Chemicals. There are set tonnages and dates for each heading.

◆ ‘Chemicals’ include metals and alloys. Why? Because EINECS defines ‘Substances’ as: ‘Chemical elements and their compounds in the natural state or obtained by any production process …….’

◆ This EU NCP will be enforced by a system of Registration. Companies failing to present satisfactory data will be breaking the law by continuing to trade, so effectively this means ‘No Data – No Market’.

◆ Draft EU NCP legislation is expected to be published by October 2002, and is scheduled to come into force as a European Regulation by 2004. At the moment, it is in the form of a White Paper (published in February 2001), which can be downloaded from the Internet on: http://europa.eu.int/comm/environment/chemicals/whitepaper.htm

◆ Registration will include the requirement for comprehensive data about toxicity and ecotoxicity, exposure levels throughout the supply chain, risk assessment and risk management information. The EU NCP puts the burden of proof squarely upon the shoulders of industry.

Take note, do not hide the company head in the sand, and be prepared to co-operate with, and contribute to, the work of your relevant trade association. If your company is involved in the moly industry and does not already belong to IMOA, think about joining – membership could save you a lot of money and effort.
Summary

A rendering plant has been using a Type 304L stainless steel (SS) heat exchanger to condense the rendering cooker gases and heat plant water. After two years the unit experienced leaks in both the shell - mostly at the welds - and the tubes. Metallurgical evaluation of the shell plate failure area revealed both pitting and chloride stress corrosion cracking (CSCC). Microbiologically influenced corrosion (MIC) was suspected, but could not be confirmed.

A recommendation was made to replace the Type 304L heat exchanger with a new unit constructed from molybdenum containing 2205 duplex stainless steel (DSS). Because of its significantly increased corrosion resistance, the new unit’s life is expected to be many years longer than that of the original unit.

The Process

The vertical, single-pass heat exchanger uses steam/vapor from the rendering cooker inside the tubes to heat plant water on the shell side. The rendering steam enters the exchanger at 300°F [149°C] and cools to 260°F [127°C]. The water supply is softened and chlorinated potable water, entering the unit at around 60°F [16°C], and exiting it at around 200°F [93°C]. The water contains no more than 50 ppm chloride and 1.5 ppm residual chlorine. The unit operates about 18 hours per weekday. During downtime the shell side remains filled with plant water.

The Corrosion

The Type 304L SS heat exchanger developed leaks at weld seams in the shell and in the tubes. The molybdenum free Type 304L SS has inadequate resistance to pitting corrosion in chloride-containing waters above 150°F [66°C], especially at welds and in the heat affected zone. CSCC also is possible at temperatures above 160°F [71°C], even with chloride levels of only a few ppm. While 2% molybdenum-containing Type 316L SS is more resistant to pitting corrosion than 304L SS, it is not much more resistant to CSCC at temperatures above 160°F [71°C].

Inadequate post-weld cleaning and rough grinding marks on the surface accelerated localized corrosion of the shell. However, pitting corrosion also occurred on the hot end of the solution-annealed Type 304L SS tubes. Figures 1 through 3 show the corrosion defects.

The Solution

The corrosion problems are being addressed by upgrading the material to a stainless steel with significantly higher resistance to both pitting and CSCC than Type 304L. The selected 2205 DSS resists chloride pitting and CSCC at temperatures up to 220°F [104°C] in waters with chloride levels up to 2,000 ppm. Figures 4 and 5 give pitting and CSCC resistance data for the discussed stainless steels. They show the vastly superior resistance of the 3.1 %

Figure 1.
View of the horizontal weld piece, showing pitting in the base plate (A) and the weld (B). The surface has a brown stain/deposit. The dark color band right next to the weld bead indicates inadequate post-weld cleaning. The coarse grinding marks also lower the pitting resistance.

Figure 2.
Cross-section through the deepest cavity in a vertical weld sample: deep pitting corrosion damage and lack of fusion (LOF) in the weld.
molybdenum-containing, duplex alloy 2205 compared to both Type 304 and 316 austenitic SS. The nominal chemical compositions for 2205 DSS and Types 304L and 316L SS are shown in Table 1.

**The Cost Savings**

Table 2. provides the relative costs of the materials and the fabricated heat exchanger in three different stainless steels, Types 304L, 316L and 2205 if no design changes are made. The moderately higher material and fabrication costs for 2205 DSS could be partially offset by redesigning the unit, using its two times higher yield strength to decrease the wall thickness and therefore the weight of the shell and the tubes. As the 2205 DSS should provide at least times longer service life than the 304L SS
Moly does the job

unit, the life cycle cost savings become significant. The rough life cycle cost calculations shown in Table 2 do not even include inflation adjustments, cost of labor to install a replacement unit, or cost of downtime because of an unexpected leak. The estimations only include the direct cost of purchasing a new Type 304L unit every two years or a Type 316L unit every four years at today’s prices.

<table>
<thead>
<tr>
<th>Grade</th>
<th>UNS Number</th>
<th>Molybdenum</th>
<th>Chromium</th>
<th>Nickel</th>
<th>Nitrogen</th>
<th>Carbon Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>304L</td>
<td>S30403</td>
<td>-</td>
<td>18</td>
<td>9</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>316L</td>
<td>S31603</td>
<td>2</td>
<td>17</td>
<td>11</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>2205</td>
<td>S32205</td>
<td>3.1</td>
<td>22.1</td>
<td>5.6</td>
<td>0.16</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 1. Typical chemical compositions of stainless steel grades.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Relative Material Cost</th>
<th>Relative Fabricated Unit Cost</th>
<th>Relative Life Cycle Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>304L</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>316L</td>
<td>1.25</td>
<td>1.22</td>
<td>0.61</td>
</tr>
<tr>
<td>2205</td>
<td>1.33</td>
<td>1.30</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Table 2. Relative material cost, fabricated unit cost and life cycle costs under the assumption that Type 316L would last twice as long and 2205 five times as long as Type 304L. Significant cost savings can be achieved over the assumed minimum life cycle of ten years with a 2205 heat exchanger as compared to a Type 304L or 316L exchanger.

The Indian Stainless Steel Development Association is organising the


This conference is being called at a time when a distinct change in the end-use applications of stainless steel is emerging in India.

The objective of the conference is to up-date the audience about the new developments and trends in the markets and applications for stainless steel in India and in different parts of the world. The conference will lay special emphasis on two areas, Architecture, Building and Construction and the Transportation sectors with presentations aimed at the end-use sector personnel. Through these presentations and exposure to new products and applications, the conference hopes to give additional momentum to the developments taking place in India.

Online registration for Stainless 2002 is available at the ISSDA website www.stainlessindia.org
This conference and exhibition was held in Paris, 10-13 June, 2002. For the first time, IMOA shared an exhibition booth with the other major stainless steel alloying element trade associations, the International Chromium Development Association (ICDA) and the Nickel Development Institute (NiDI). Our stand was placed between the stands of Euro Inox and the International Stainless Steel Forum (ISSF). This front of stands by the non-profit stainless steel development associations was a demonstration for our commitment to combining forces and conducting projects together in "Team Stainless".

The conference attracted almost 400 delegates. There were about 120 presentations and 30 posters given at the conference. The papers were presented in three parallel sessions, grouped by the following topics: Auto and Transport, Building and Architecture, Energy and Process Industries, Food and Health, Health and Environment, Innovative Routes for Working with Stainless Steel, Innovative Production Routes, Surface Treatment and Surface Properties of Stainless Steels, Guidelines and Standards, Austenitic, Duplex, Ferritic and Martensitic Stainless Steels.

Because of IMOA’s past work in the area of duplex stainless steel, Nicole Kinsman chaired a session on the topic. The presentations focused on scientific research results from the stainless steel industry, independent research laboratories and universities, but covered also some market development aspects. Overall, the conference was aimed at visitors from within the stainless steel industry and this was the audience it attracted.

The organisers of similar conferences in the future might perhaps consider programmes which offer greater interest to end-users and encourage their participation.
IMOASA’S MARKET DEVELOPMENT PROGRAMME

This programme (MDP in short) is designed with the primary objective of promoting the usage of Mo-containing stainless steels for select high potential applications. The principal advantage of these stainless steels is that their corrosion resistance in aggressive environments is better than that of molybdenum free stainless steel.

In implementing the MDP, IMOA is co-operating and coordinating efforts informally as much as possible with stainless steel producers, NiDi, ICDA, Euro-Inox, ISSF and SSDAs around the world. All companies with the same concerns are invited to contact IMOA.

"Team Stainless" is a slightly more formal group, comprising representatives of Euro Inox, ICDA, NiDi, ISSF and IMOA. It was founded at the initiative of ICDA and is holding meetings once or twice a year to coordinate joint market development efforts and industry responses to problems and questions facing the stainless steel industry.

The focus of IMOA’s strategic initiatives is the promotion of Mo-containing stainless steel in the following applications:

- **Architecture, building and construction (ABC): aggressive outdoor applications.**

- **Potable water distribution: large diameter piping.**

- **Automotive: exhaust systems, trim, fuel tanks, fuel cells, etc.**

ABC materials decision makers are suffering from a lack of knowledge about the properties of different stainless steels. A moly-free grade is often selected by architects when a moly-containing stainless is necessary to avoid corrosion. Catherine Houska of TMR Stainless has been hired by IMOA to carry out this project in the US. She has worked in this market for NiDi for eight years. The main thrust is to provide materials decision makers with information so they may select the "right" stainless steel for a given situation. Case histories will be compiled and distributed in the USA and Europe to architects; articles written for specific trade journals; and presentations made to architecture and fabrication firms.

Secondly, Water. Today very little, if any, stainless steel is used in large diameter potable water distribution lines in the US. However, these systems have extensive corrosion problems, leading to water loss and water contamination in traditional systems. Over 200,000 miles of piping are replaced every year.

IMOASA has hired John Grocki of Advantage Resources Consulting, L.L.C. for this project to identify and develop good contacts in this field and define the exact value proposition of moly-containing stainless steels. While stainless is not used much in the US for this application, it has been used in Italy, Sweden, Switzerland, Germany and Japan and experience will be drawn from these countries.

Thirdly, Automotive. The automotive market requires more work to define the potential. There are some applications which are already using moly-containing stainless steels such as automotive exhaust systems and trim, but other applications are about to emerge which could use moly-containing stainless steels such as fuel tanks and fuel cells. IMOA plans to talk to auto makers and suppliers of sub-systems to identify opportunities to promote the use of moly-containing stainless steels.

These three areas may provide the key focus for IMOA’s future MDP but the Association is active in many other fields, notably the preparation of a brochure on guidelines to the fabrication of austenitic stainless steels in conjunction with NiDi and ICDA.
# IMOAO's 14th Annual General Meeting

**Monday 21 to Thursday 24 October, 2002**  
**Hotel Fiesta Americana, Hermosillo, Mexico**  
**Hosted by Molymet and Grupo Mexico**

## Provisional Programme

| Monday 21 October | 12:30-14:00 Lunch  
| 14:00-17:00 Meeting of the HSE Committee | 14:00-14:30 Measurement and Impact of Promotional Projects (Jürgen Liebbrandt, Codelco)  
| Tuesday 22 October | 14:30-15:30 Market Development Programme (Nicole Kinsman, IMOA)  
| 13:30-18:00 Meeting of the Executive Committee | 19:30 Dinner at Quinta Napoles, hosted by Molymex  
| 19:00-20:30 Opening of Mining Seminar Sonora 2002 | Special Guest: Sonora State Governor  
| 21:00 Cocktails and dinner |  
| Wednesday 23 October | Thursday 24 October  
| Annual General Meeting | Field Trip  
| 09:00-09:45 Welcome and Administration | 08:30 Bus departure to airport  
| 09:45-10:00 Report on work of the Assaying Committee (Sandra Carey, IMOA) | Flight to La Caridad  
| 10:00-10:30 Report on work of the HSE Committee (Carmen Venezia, Osram Sylvania Products and Sandra Carey, IMOA) | Visit to La Caridad mine  
| 10:30-11:00 Economy of South America (speaker to be confirmed) | Flight to Molymex  
| 11:00-11:30 Coffee break | Visit to Molymex  
| 11:30-12:00 Molybdenum Market Update (Terry Adams, Adams Metals) | 13:00 Lunch at Molymex facilities  
| 12:00-12:30 Potential for Stainless Steel Usage in China (Peter Kaumanns, Senior Manager of Market Research, Thyssen Krupp Stainless) | 16:00 Return flight to Hermosillo (arrive at hotel 17:30)  

**Given the venue and Chilean and Mexican hospitality, the event is expected to be lively!**

**Companies which are not members of IMOA may apply to the Secretariat for details and conditions of attendance.**