



Integrity Operating Windows (IOWs)

Corrosion Prevention Solutions - IOW's

Presented by Ammonite Corrosion Engineering Inc.

Preventing corrosion is vital in every step in the production of Oil & Gas. Corrosion Engineers identify corrosive conditions and set operating limits for monitoring process conditions.

Integrity Operating Windows (IOWs), API 584, are incredibly important for a facility; having set limits for equipment operation can prevent excessive equipment degradation and unnecessary failures.

Ammonite Corrosion Engineering provides Facility owners with the information they need to identify what specific equipment/piping might require an IOW and how best to create and implement a proactive corrosion monitoring program.

Corrosion can be a very costly affair. Alberta has some of the largest sour gas reserves in the world. Strict regulations and guidelines have proven effective with Alberta having some of the best proven corrosion monitoring systems in the world. Ammonite has worked with clients in Alberta and around the globe supporting corrosion monitoring programs to suit regulatory guidelines.

Ammonite can remotely access Owner facilities using a Distributed Control System (DCS) to monitor IOW's strategically pinpointed to each point of corrosion/degradation mechanisms within the facility design. We can also monitor these set points in order to further enhance our client's integrity management programs. We work closely with our clients to assess their facilities and create detailed, proactive reporting.

Our reporting is completed monthly and quarterly depending on the Clients needs. Our recommendations will identify appropriate corrosion reducing methods to ensure the longevity and efficiency of each operation.



Criticality and Consequence of Integrity Operating Windows by level (Source API RP 584).

TYPES OF IOW'S

Chemical IOW's include water content, pH, acid gas loading, inhibitor concentration, chloride levels and oxygen content.

Physical IOW's include pressure, temperature, corrosion rates, flow rates, dew points and dry points.

FAST FACTS

\$41bil estimated annual direct cost of corrosion in Canada

Corrosion prevention is vital in every step of the upgrading and refining of oil, oil sands and heavy bitumen plants. Our experience and knowledge in these plants allows us to precisely identify corrosive conditions. From these corrosive conditions, we identify the associated risks and Integrity Operating Windows (IOWs) are generated.

Working closely with our clients during the development of the IOW's, we provide on-going metallurgical support through regularly scheduled reporting of the data and troubleshooting any areas of concern.

Implementing an IOW program significantly reduces the risks associated with the following unfavorable conditions:

- Unscheduled Shutdown**
- Unacceptable Financial Risk**
- Release of Hydrocarbon or Hazardous Fluids**
- Loss of Containment**

Our firm has extensive knowledge applying API RP 584 (IOW) in oil refineries, heavy oil upgrading and SAGD processing. Our experience has brought us work in the following areas:

- **Fluid coking and delayed coking**
- **H-oil (residuum hydrocracking)**
- **Conventional hydrocracking**
- **Hydrotreating**
- **Hydrogen manufacture**
- **Crude and residuum fractionation**
- **Vacuum distillation**
- **Amine treatment**
- **Sulphur production**
- **Tail gas clean-up**
- **Steam and utilities**
- **SAGD processing**

2018 IOW Software Package

Creation of a software system that allows our clients immediate access to IOW status is underway. Testing of the alpha version is almost complete and the trial version will be available in early 2018.

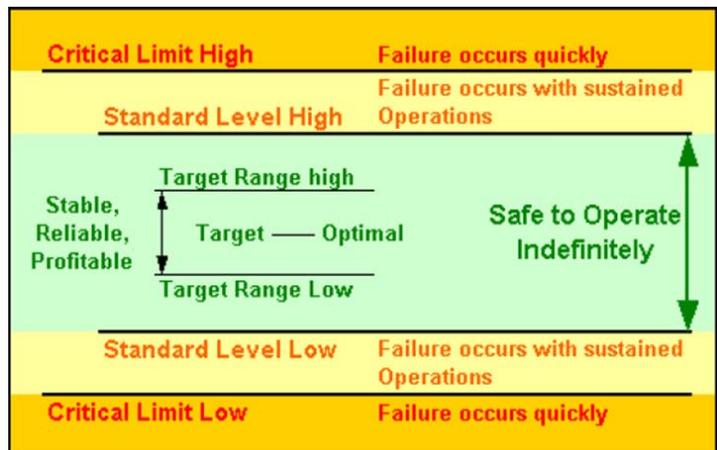


Figure 1 - API RP 584