THE CARMAGEN Engineering, Inc. 20th Anniversary REPORT©

Partnering in Engineering Excellence

February 2006

CONTENTS

Editor
Lori Carucci

Text Editor
Pat Terry

Writers
Carmagen Engineering, Inc. Staff

The Carmagen Engineering Report® is published periodically by our staff and presents information and viewpoints on engineering topics relevant to the hydrocarbon processing industry. While the contents of The Carmagen Engineering Report® have been carefully reviewed, Carmagen Engineering, Inc. does not warrant it to be free of errors or omissions. Some back issues are available and may be requested while supplies last.

Corporate Office
4 West Main Street, Rockaway, NJ 07866
Tel: 973-627-4455 Fax: 973-627-3133

Website: www.carmagen.com

E-mail: carmagen@carmagen.com

Guidelines Will Enable Determination of Unknown Loss in Refineries and Terminals Promoting Closure of Mass/Volume Balances

By Srini Sivaraman

Refineries and terminals undertake mass (volume) balances every month. After accounting for all known losses, adjustments for bias errors, and other known procedural errors, they report a net loss under the name of "Unknown" loss or "Unaccounted for" loss, as the net loss could no longer be explained. This Unknown loss is no longer a mystery.

The concepts summarized herein provide a tool and a methodology to account for most of the currently reported Unknown loss in most locations. This would enable the local management to bring a closure (or almost a closure) to their monthly mass (volume) balances.

In essence, the concept calls for the use of a systematic error component of a measuring device to explain the unknown loss, while the random errors in themselves will be used for total System Capability determination. This is a deviation from the conventional approach of combining both random and systematic errors.

Inclusion of systematic errors with the random components (that has been the industry practice thus far) has masked the impact of the systematic component in the net loss or gain. This phenomenon could aptly be classified as the Systematic Syndrome (SS) factor, resulting in a net unknown loss or gain.

The Systematic Syndrome (SS) factor of the measurement systems thus identified should be used as a reconciliation of monthly net loss or gain. In theory, once this concept is applied properly, and all other measurement systems carry just residual errors, with physical losses fully accounted, for a system free from bias errors, refineries and terminals alike should be able to close their books to near zero balance every month.

Note: This article is a summary of one that will appear in Hydrocarbon Processing that was co-authored with Ariel Bertotto.

Srini Sivaraman is a recognized industry expert with over 35 years experience in the fields of process engineering and oil loss/custody transfer, having worked for a number of major upstream and downstream integrated petroleum companies. He has been actively involved with the development of industry standards and published a number of technical papers in the field of oil loss/custody transfer. Please contact Jerry Lacatena if you'd like more information on Carmagen's expertise in this area.

Managing Boiler Water Treatment Steps is Critical

By Edward Wolfe

Managing the interfaces between water treatment steps is critical to assuring a reliable steam supply. The old saying "You are as strong as your weakest link" applies to the chain of water treatment steps that are needed to generate a reliable steam supply. The risks associated with taking inappropriate water treatment steps are present from feasibility studies, through the development of the project, on through startup, and then to current day-to-day operations. For system integration, it is important to know the real and reliable technical parameters regarding the design and performance of each treatment step, and their operating flexibility, to determine if the treatment performance required for the reliability of the plant's steam supply is available under controlled conditions. To eliminate problems resulting from available technology falling through the cracks, the plant owner must avoid potential pitfalls by having a thorough understanding of all water treatment steps that may be used to generate steam for the system, and the appropriate technology to be applied at each step.

There are challenges in operating these systems, and appropriate strategies must be developed and used to lessen the risk of problems resulting from the water treatment component interfaces. One of the most challenging tasks is to manage the interface between boilers and the turbines with respect to the integration of boiler water quality and steam purity.

Step-by-step procedures are required, starting with the water treatment needs to achieve the steam purity required and then working backwards to the boiler water, boiler feedwater (deaerator), condensate, makeup water, and raw water. Lowering of risk starts at the conceptual design phase and continues through contract execution, commissioning, and on-going day-to-day operations. It is essential for the plant owner to know the function of each water treatment step during all phases of the steam generating system's life in order to provide a continuous quality steam supply to the plant.

Each steam generating facility has different water quality requirements and different equipment suppliers. Therefore, to maintain a reliable steam system, it is important for the plant owner to be able to evaluate the vendors' expertise and experience.

Understanding today's state of the art in water treatment technology for each step is essential to making properly informed decisions. This is required to determine if the influent water quality for each step is being met in order for the next step to be able to meet its effluent performance specification.

It is important to focus on the components' interfaces and the challenges in operating each to their full potential to minimize risks and have smooth on-going operations. A key to this success is the plant owner's strategy to smooth out these interfaces without incurring excessive extra costs and causing long delays in needed corrective implementations.

Carmagen Engineering, Inc.'s Course No. 1215, *Boiler Water Treatment Practice*, discusses appropriate water treatment steps, the interfaces between them, and how to avoid the pitfalls associated with them. A complete course description can be found on our web site at http://www.carmagen.com/training/1215.htm. Please contact us should you wish to schedule a course presentation or need other technical assistance with your water treatment needs.

Ed Wolfe has over 35 years experience as a water treatment specialist. His background includes broad-based project engineering experience in all aspects of the planning, implementation and start-up of computer-controlled water and wastewater treatment plants. Please contact Jerry Lacatena if you'd like more information on Carmagen's expertise in this area.

The Choice is Yours …
Protecting Proprietary Technology

By F. Donald Paris

F. Donald Paris is a Patent Attorney associated with the Intellectual Property firm of Lerner & Greenberg, P.A., Hollywood, Florida, USA. He can be reached at 954-925-1100. For more information, their website is www.patentusa.com.

Deciding how to protect proprietary information can be a difficult decision without having the knowledge to help select the appropriate protection for your technology. The choice can be even more challenging if the person making the decision is not aware or familiar with the advantages and disadvantages of the protection methods available. As with most aspects of life, personal and business … choices must be made. And that choice is best made only when the decision maker has knowledge of the implications of his or her decision. Following in tabular form is a comparison of the pros and cons of protecting proprietary information by patents or trade secrets (often referred to as confidential know-how or information). The guidelines identify major items to consider in deciding whether to protect proprietary information by trade secrets or U.S. patents. This material will assist in making decisions with regard to the method of choice for protecting technology.

Protection of Proprietary Information Methods and
Advantages and Disadvantages of Each Method

I. Protection of Proprietary Information by Maintaining Information as a Trade Secret

Advantages	Disadvantages
1. Protection extends for an indefinite period of time, i.e., until subject matter is in the public domain.	1. Requires security measures to insure maintenance of the proprietary information as a secret.
2. Protection is relatively easy and inexpensive to obtain (e.g., no government fees).	2. Does not prevent the patenting of the trade secret by another party.
3. The proprietary information need not be patentable.	3. The trade secret may not be used if it infringes a valid patent of a third party who subsequently discovers it by fair means.
4. Protection is not dependent on disclosure to the public.	4. Maintenance of proprietary information as a trade secret destroys all possibility of ever patenting any aspect of the trade secret.
5. Protection is not limited in its scope, but extends to all aspects of the proprietary information (in case of patents the claims define the scope of protection).	5. Protection is destroyed/lost when the subject matter of the trade secret appears in the public domain (even if this occurs by unauthorized disclosure or theft).
6. Protection is generally enforceable throughout the world (although each jurisdiction's laws are determinative).	6. Rights in a trade secret are enforceable only against those who breach a confidential relationship with the holder of the trade secret (i.e., the rights are enforceable against the trade secret owner's employees and licensees).
7. The trade secret is licensable (and royalties can be collected for authorizing use of the trade secret).	7. Rights in a trade secret are not enforceable against those who discover the trade secret by fair, independent means (e.g., a competitor of the owner of the trade secret).

Continued on Page 4

Continued from Page 3

Protection of Proprietary Information Methods and
Advantages and Disadvantages of Each Method, *Cont'd*

II. Patent Procurement in the United States

Advantages	Disadvantages
1. Protection is enforceable throughout the United States against all infringers, even those who have previously invented the same subject matter but have maintained such subject matter as a trade secret. 2. Issuance of the patent acts as a bar, as of the filing date of the patent, against anyone attempting to obtain a U.S. patent on the same invention or an obvious variant thereof. 3. Issuance of the patent acts as a bar, as of the issue date, against anyone attempting to obtain a patent in any country other than the United States on the same invention. 4. The patent is licensable (potential for licensing income). 5. Patent provides competitive advantages: may cause competitors to design around; prevents competitors from practicing in certain fields; provides trading asset in exchange for rights (e.g., patents) of others.	1. Protection is relatively expensive and time-consuming to obtain. Periodic maintenance fees are required. 2. Protection expires 20 years from the earliest filing date. 3. Protection may not be coextensive with disclosure (i.e., protection is defined only by the claims of the patent which may be narrower than the scope of the invention contained in the specification of the patent). 4. Protection commences with the issue date; the patent is not enforceable prior to the issue date. 5. Protection is limited to the United States. 6. The United States Patent Office will publish the application prior to determination of patentability of the invention (18 months after actual filing date or filing date of a provisional application if based thereon). 7. Upon issuance of the patent, the file wrapper of the patent and all parent patent applications are available for public inspection. 8. Disclosure of the invention to the public, upon issuance of the patent, may cause patentee's competitors to generate improvement inventions. 9. Process patents are difficult to enforce.

HIGHLIGHTS

- Providing refractory consulting assistance for a Canadian client in support of turnaround planning activities.
- Assisted a European client with troubleshooting several furnace operating problems.
- Continued to provide a US client full-time mechanical engineering assistance in performing Finite Element Analyses.
- Continued to provide a US client extensive heat transfer support.
- Providing expert witness assistance to four US based clients.
- Assisting a US client in the development of valve purchase specifications.
- Providing machinery inspection/test witnessing assistance to several US clients.
- Providing refractory consulting assistance to a US client in reviewing the FCC riser lines for multiple refineries.
- Providing marine terminal engineering expert witness support to a Far East client.
- Provided fired heater design support for a US client.
- Updated technical and design practices for a US client.
- Continued to provide electrical engineering support to a US client.
- Provided metallurgical expert advice to a US client for fixed equipment repairs.
- Provided project management planning support to a US client for an upstream project.
- Participated with a US client on an energy management assessment of two refineries.
- Conducted a Reliability Training Course for a European client.
- Continued providing extensive process design services to a major technology developer/licensor.
- Performing process design follow-up of vacuum unit overhead system upgrade for a European refinery.
- Continued providing support on LNG project being executed in the Far East.
- Performing pilot plant scale-up development for domestic refiner.
- Providing plot layout support for domestic and international refiners.
- Providing continuous support of a major Middle Eastern LNG project via engineering services at the contractor and the sub-contractor's offices in Europe and the Far East.
- Provided hydrogen plant startup and technical support services to Gulf Coast refiner.
- Provided consultation and vendor screening assistance regarding modification options to meet H_2S emission requirements via vent gas caustic scrubbing.
- Provided catalyst loading and unit startup support to licensor for clean fuels project.
- Performing hydrotreater Cold Eyes Review and Distillate HTU revamp screening for licensor.
- Performed UDEX troubleshooting and technical support.
- Provided various Hazop support services to European refiner.
- Provided vessel revamp modifications for licensor's foreign project.
- Providing extended lube hydrotreating pilot plant support services.
- Continued to supply specialized, high-value added services to several novel process developments pursued by major technology companies.
- Provided LP planning support.
- Provided hydrogen manual support.
- Performing calcium naphthenate research and desalter chemical additive screening.
- Provided support to major refiner's corporate strategic research, intellectual property development, and carbon fiber workshop.
- Provided long range planning, catalyst/licensor evaluation, and strategic pilot plant support to an international refiner.

Continued on Page 6

- Provided a screening study to evaluate reuse of methanol spheres in butane service.
- Evaluated new catalyst packing/hydraulics in benzene saturation unit.
- Performing preliminary flare network hydraulic analysis.
- Established relief system helpdesk support for major refiner.
- Performing long-term onsite coordination/support at international refiner's facility during development of their strategic refinery reliability and improvement program.
- Performing process design, including option studies, and selected cost estimates for fluid coker coke transport and cooling system. Optimization consultation also being provided.
- Providing on-going fractionation specialist support to a major refiner.
- Providing on-going lubes consultation to a major refiner.
- Performing FCC PSV/safety evaluations for a domestic refiner.
- Developing a hydroprocessing seminar for a major refiner's training workshop, and assisting licensor develop hydroprocessing yield and product property predictions.
- Completed initial phase of a major R&M Project Implementation program during a three-month onsite assignment at a European refinery. Customized procedures were developed covering the following items:
  - Area Teams
  - Work Request Justification
  - Budget and Cost Control

  Major recommendations also included:
  - Establishment and composition of an R&M Project Steering Committee
  - Appointment of a Full Time Project Coordinator
  - Developing a plan and schedule for the next high priority implementation steps

  We also developed the bases for finalizing the refinery's Strategic Objectives, Key Performance Indicators, and Organizational Roles and Responsibilities.