



THE MARINE CHEMIST NEWS

JANUARY, 2001

DEVOTED TO THE DEVELOPMENT AND DISSEMINATION OF
METHODS FOR EVALUATING AND ELIMINATING HEALTH AND
FIRE HAZARDS IN THE MARINE INDUSTRY.

MARINE CHEMIST ASSOCIATION, P.O. BOX 773, PLYMOUTH, MA 02362

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Gulf/Inland Section Representatives – Eric Moore and Alan Bonds

Pacific Section Representatives – Martin Finkel and Bobby Lee

Secretary-Treasurer & Newsletter Editor – Edward Willwerth

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Memories of New Orleans: A Great Time! – Hangin' out and giving the balcony of the Bourbon Street Royal Sonesta Hotel the 4.4 ton Marine Chemist Association family stress test! (More pictures of this happy time inside – see pages 11 & 12.)

PHOTO/Les 'Ansel Adams' Blaize

CHAIRMAN'S CORNER - A FUNNY THING HAPPENED IN THE SHIPYARD

I was checking a tanker the other day, one that I have inspected numerous times over the past 15 plus years. Making the rounds, I felt something was wrong. After a little thought, it came to me: it must be that the target date for the sweeping Coast Guard MANDATORY MAJOR MODIFICATION 2000 had come and gone, and was in place on this and all other vessels:

1. The tanks were deeper - *much deeper*.
2. The space between the ladder rungs is greater - *much greater*

3. The size of the expansion trunks, manholes and accesses was smaller - *much smaller*.

At about this time I heard a voice from below, following me up the ladder. "Wake up, fool – it's not the Coast Guard!" The voice was not unfamiliar to me but was usually heard at a whisper. This time it was quite loud and impatient.

It was my body talking to me. The conversation went something like this: "Hey, Les, for someone who considers himself a good chemist, you are sure falling down on the job." Arrogantly, I answered, "Explain yourself!" My body retorted, "OK, Iron Man, if I were a ship, and you

were the attending chemist, you would note in your survey that although I am aging and a little over-ballasted, I am still seaworthy. You would then go on to find out that the power plant needs an overhaul, the internals are a little brittle and the universals need lubrication. In general, the maintenance is not up to what you would require of others. You would not certify me "SAFE FOR HOT WORK" unless these problems were addressed. The only way to do this..."

My body paused for it knew, like a lot of marine chemists, it would have a hard time grasping what it was about to say. Finally he continued, "I have tried to tell you this before, little man (he was getting ticked). Cardiovascular health is the power plant, upper and lower body strength are the internals, and universals are your joints and flexibility - all these can only be corrected with an ongoing diet and exercise program!"

"Diet and exercise program..." I repeat to myself over and over again. Finally, after three or four times (pretty good for a chemist), I get the message.

In the past few years I have taken the roll of relief pitcher, helping the starters finish the game or pinch-hitting the double header. The combination of not being a starter and not being in full rotation, coupled with too much time on the bench and in the bullpen, has caused my fitness to slip. A substitute, like a starter, has to be able to go all nine innings at the drop of a hat, and all this while dealing with aging and gravity. My body is right: this has to be a priority.

The moral is:

Your body is always talking to you. Don't wait until it is yelling - act on the whippers.

From the training camp, **Les Blaize, MCA Chairman**

RELATED MESSAGE FROM TROY CORBIN - (Note: **Troy CMC 644** is recovering from some rather serious injuries suffered in a car collision on September 23. Troy states he found two facts out in very short order: A Miada sports car will not, indeed, fit under an eighteen-wheeler, and the advantages of ducking while unavoidably trying to do so are complicated by the steering wheel and stick shift - both of which make painful wounds during a collision. Troy was lucky, and has made nearly a full recovery.)

Troy is evidently as concerned as Les is about the difficulties of maintaining acceptable physical condition, he sent the following religious dissertation that clearly explains the origins of much of our plight:

"In the beginning God created the heavens and the Earth. And the Earth was without form, and void, and darkness was upon the face of the deep.

And Satan said, "It doesn't get any better than this."

And God said, "Let there be light," and there was light.

And God said, "Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit."

And God saw that it was good.

And Satan said, "There goes the neighborhood."

And God said, "Let us make Man in our image, after our likeness, and let them have dominion over the fish of the sea, and over the fowl of the air and over the cattle, and over all the Earth, and over every creeping thing that crawleth upon the Earth."

And so God created Man in his own image; male and female created He them.

And God looked upon Man and Woman and saw that they were lean and fit.

And God populated the earth with broccoli and cauliflower and spinach, green and yellow vegetables of all kinds, so Man and Woman would live long and healthy lives.

And Satan pondered, "How can I get back in this game?"

And, Lo, Satan created McDonald's.

And McDonald's brought forth the 99-cent double cheese-burger with special sauce.

And Satan said to Man, "You want fries with that?"

And Man mumbled, "Yeh, super-size 'em."

And Man gained 5 pounds.

And God created the healthful yogurt, that woman might keep her figure that man found so fair.

And Satan brought forth upon the earth chocolate.

And Woman gained 5 pounds.

And God said, "Try my crispy fresh salad."

And Satan brought forth Ben and Jerry's.

And Woman gained 10 pounds.

And God said, "I have sent thee heart-healthy vegetables and olive oil with which to cook them."

And Satan brought forth chicken-fried steak so big it needed its own platter.

And Man gained 10 pounds, and, alas, his bad cholesterol went through the roof.

And God brought forth running shoes and Man resolved to lose those extra pounds.

And Satan brought forth cable TV with remote control so Man would not have to toil to change channels between ESPN and ESPN2.

And Man gained another 20 pounds.

And God noted, "You're running up the score, Satan."

And God responded by bringing forth the potato, a vegetable naturally low in fat and brimming with nutrition.

And Satan peeled off the healthful skin and sliced the starchy center into chips and deep fat fried them and covered them with salt.

And he created sour cream dip, also.

And Man clutched his remote control and ate of the potato chips and swaddled in cholesterol.

And Satan said, "Man, this was easier than I thought."

And Man went into cardiac arrest.

And God sighed and created quadruple bypass surgery.

And Satan created HMOs..."

(Thanks Troy - this makes it a lot clearer as to how we got here. But where do we go from here?)

NFPA 306 COMPLETES FINAL HURDLE ON ITS WAY TO THE 2001 EDITION - At its Report on Comments meeting in Kissimmee, Florida on December 13 and 14, the 306 Committee finished its review of comments received on the pending 2001 edition of Control of Gas Hazards on Vessels. Several very significant changes survived this nearly final review. Among the more important changes are the following:

- Change of the standard safety designation "Safe for Workers" to "Atmosphere Safe for Workers" (but with no change to the criteria).
- Introduction of the OSHA-required Shipyard Competent Person into 306 with clear reference to duties required to maintain a marine chemist's certificate as valid.
- Definition of "facility" as a shore-side location with a continuous waterfront (resulting in very important limitations to shifting vessels under a marine chemist's certificate).
- Clarification of the requirement for opening, entering and assessing adjacent spaces for toxic materials when certifying a space as "Atmosphere Safe for Workers" only.
- A change in acceptable oxygen levels for inerting from 8% to 6%, (or 50% of the amount needed to support combustion, whichever is less).

In addition, many minor changes were made to the detailed language that, in the committee's opinion, improved the document and clarified its intent.

Very important for this issue, however, is an overall change in format NFPA is imposing on the entire document. This is to ensure that all NFPA standards make required uniform changes in arrangement and style. Dave Trebisacci states that anyone who has memorized NFPA 306 "chapter and verse" will find the location of their favorite memorized clause or concept probably relocated. NFPA editors have ensured all standard committees, however, that the changes will not change the way the standards are used, applied or interpreted.

The date for issuance of the Report on Comments is February 9, 2001. The changes to the standard will then be voted on at the NFPA's annual meeting in Anaheim, California, during the second week in May. The new issues of the standard should be available and distributed to chemists sometime in August, 2001.

Clearly this edition will be one of the more significantly revised and controversial. Sectional Training Seminars will be devoting the major portion of their time to discussing and interpreting the impact of the changes on the way we do our inspections and write our certificates.

2001 SECTIONAL SEMINAR TRAINING SEMINAR SCHEDULE AND LOCATIONS (Hint: Before you put this newsletter down, if you are planning to attend this year's sectional seminars, call and make your reservations!) Starting time: 08:00. Continental breakfast and lunch are included. Fee: \$35.00 **CHEMISTS ARE RESPONSIBLE FOR MAKING THEIR OWN ROOM RESERVATIONS!** (See MCA Seminar Registration Form - Newsletter Back Page.)

Pacific Section

MAXIM Hotel, 160 Flamingo Rd., Las Vegas, NV 89109
Date: Saturday, 10 Feb., 2001 **Reservation Cut-Off Date:** 26 Jan 2001 **Reservations:** 800/634-6987, under "Marine Chemist Association" or "MAR0209" (Note: MCA Executive Committee Meeting, Sunday, 11 Feb/Same Location)

Atlantic Section

Hilton Atlanta Airport, 1031 Virginia Ave., Atlanta, GA 30354 **Date:** **Sunday**, 25 Feb. 2001 (Yes, **Sunday**) **Reservation Cut-Off Date:** Feb 3 under "Marine Chemist Association" **Reservations:** 404/559-6821

Gulf-Central Section

Hilton New Orleans Airport, 910 Airline Dr., New Orleans, LA 70062

Date: Saturday March 3, **Reservation Cut-Off Date:** Feb 9 under "Marine Chemist Association" **Reservations:** 504/584-3999

SECRETARY'S DESK - Word came from Seattle on Saturday, June 17, that after a nearly two year battle with cancer, **Ken Oistad, CMC 622**, passed away. Ken was known by all his friends for his quite intellect, careful demeanor and sharp sense of humor. Those who worked with and trained under him knew him as a very experienced and thorough chemist. Ken had an especially wide range of experiences, was very active as a chemist, and the loss hits on all levels. Ken spent time in his career on all three coasts, starting in Jacksonville and Ft. Lauderdale, spending time with Marshall Worsham's group in Houston, and finally moving to Seattle where he and wife Susan had seemed to find a happy niche with Sound Testing. Ken and Susan loved nature in general and the Rocky Mountains in particular. Ken's ashes were spread there at his request in July. A memorial service was held for Ken on August 11 in Seattle. We are all saddened by this loss and he will be sorely missed.

Another giant passed away recently, again from Seattle. The following note came from Don Sly to NFPA and MCA about his trainer and friend, **Rodney Allen, CMC 473, LM.**

"Dave and Ed,

I am sorry to report that my good friend Rod Allen died November 8, 2000 from an apparent heart attack. Rod was 82 years old.

Rod was among the last of the group of Marine Chemists trained and employed by Jack Kniseley. Others included Frank Roberts, Ernie Street, Wei Wu Yuan, and David Barnard.

Rod, a Life-member of the Marine Chemist Association, had an exquisite sense of ethics and had such vast experience that I was calling him for advice every month or so for all the 8 years he has been retired. I last spoke with Rod about a month ago when Cheryl and I took him out for breakfast. Though he was tired from a battle with throat cancer, all his passions were in evidence and we talked for several hours. Knowing Rod and having been trained by him would be gifts to any chemist, and I feel very grateful to have had Rod in my life.

Life was not fair to Rod. Family problems kept Rod working well into his 70's to make sure they would be taken care of. Yet for all that, Rod was a sweet and intelligent man with remarkable integrity. For many years he was the chemist for Todd Shipyard. But with the crafts he had such standing that he represented Todd in safety and regulatory dealings with the Metal Trades Union.

As a Marine Chemist, for 40 years Rod had people's lives and property in his hands and never to my knowledge brought anything but credit to our profession. He and Jack Kniseley were in the forefront of the "personally determine" battle of the 60's and 70's. It may not be common knowledge now, but there was a time when "technicians,"

often poorly paid, were commonly sent into tanks to do the brute-force work, while the boss wrote the certificate and collected the money. Jack, Rod and Frank Roberts thought this a legally precarious practice, and demonstrated as much when the summer seminar was held in Seattle in the late 60's.

As the years went on, Rod was not happy with the tendency of NFPA 306 to spell out details of a Chemist's life and restrict his freedom to use his professional judgement. He considered that half of the certificates he wrote in his last decade as a Chemist violated some stricture of NFPA 306. "Damn it Don," he would say, "the customer isn't paying me to go down there and read 306 to him!"

That last story is quintessential Rod Allen. Along with the passing of Eric Allen and Ken Oistad, Rod Allen's death is another loss to the profession. Don Sly"

Two other losses have touched our profession, though not as directly as Ken and Rod's. The weekend following the MCA Annual Seminar in New Orleans **Mr. Doug Lambert**, an active and dynamic member of both the 306 Committee and the MCQB, died shortly after returning to his home in Houston. Doug represented Sea River Maritime on both committees and was an intelligent and clear voice for balance and reason to 306 and MCQB. He was a certified safety professional who, in 35 years of service with Exxon/SeaRiver had done much to shape its present marine safety policies. His death came as a shock to all who knew and worked with him, and his loss is a setback to both committees.

The US Navy has also lost one of its key confined space experts when **Mr. Bernard Stapor** died suddenly last summer at work in Washington, DC. Bernie "owned" the Navy's key CS documents guiding safety in Navy shipyards ("SAF-10") and on Navy ships afloat ("Chapter 074/Ships Afloat Manual"). Bernie represented the Navy on many committees that involved US shipyard CS safety, and interfaced with marine chemists at many common points. Bernie seemed to have great respect for our profession, and had helped guide the Navy's Gas Free Engineers into a training, certification and regulatory structure that is similar to that for CMCs. Yet he still maintained the unique needs of gas-freeing procedures in Navy Shipyards for Navy vessels and Navy personnel. Bernie worked for **Dan Reinhart**, Assistant Secretary for the US Navy, and long time member of MCQB.

The Navy held a memorial service for Bernie on September 7, with his wife, children, grandchildren and many friends and colleagues in attendance. The Navy founded a safety award in Bernie's name that will remind future recipients of his 26 years of service to Code 106, the Navy's Gas Free Service department, and marine confined space safety in general.

Welcome Aboard! - Several new chemists have joined our ranks. Former USCG LT CDR. **John Edgar, CMC 686** and **Robert Dean, CMC 687** were certified by MCQB in New Orleans in July. John trained in the New Orleans area with Chris Scott, in Mobile with Johnny Phillippi and Tom Littlepage, and with John Flynn in Portland, OR. John has joined TT Barge, Bridge City, LA. Robert was trained by Pernel Huey, and also in Mobile with Johnny Phillippi and

Tom. Littlepage, with Chris Scott and with Ken Mercer and Bill Hataway in Beaumont, TX. Robert is with Ingalls in Pascagoula. **Craig Trettevik, CMC 688** was given his certificate effective December 1, 2000, and is with Sound Testing. Craig trained with Don Sly's group in Seattle, with John Bell and Jim Bishop in Houston TX and in Mobile with Johnny Phillippi and Tom. Littlepage.

Congratulations to **Alfred H. Watson, Jr., CMC 658LM**. Al was nominated and elected to the status of Life Member at the annual seminar in New Orleans.

And congratulations to former MCQB member and New Orleans Keynote Speaker **Captain Kevin J. Eldrich**. He has been recommended for promotion, pending Senate approval, to **Rear Admiral** from his position of Chief of Staff of USCG Eighth District.

MCA CELEBRATES DON AND EVELYN'S CONTRIBUTIONS - On July 11, 2000, the Marine Chemist Association showed its appreciation to **Don and Evelyn Smith** at the breakfast meeting of the Forty-second Annual Marine Chemist Association Seminar at the Royal Sonesta in New Orleans. Over one hundred friends, family and guests heard Chairman **Les Blaize** praise the couple that has served the Association for decades as a team, ensuring its meetings, seminars and the business went ahead in pace with its evolving mission.

Don and Evelyn have seen the MCA through a period of great change. In their five decades of service, it evolved from a loose-knit social organization to a key part of a profession with one of the best training and oversight systems of any organization of safety professionals. Its training mission has gone from an occasional informal weekend technical meeting to a system of regional and national meetings that help train and maintain its professionals and make uniform its services. In addition, an increasing portion of the work of the Association over the past decade has included support of participation of chemists in a number of technical and regulatory missions the profession is tied to or should support.

The Association recognizes or supports work and communication by its members in several areas. In addition to the NFPA 306, we have contributed to and keep abreast of other important standards' development. These have included above ground storage tanks (NFPA 326 and API-2015), and hot work safety (NFPA 51). In addition we hold membership positions on the AIHA's confined space committee, contribute to the US Navy's SSRAC Committee, and have had significant participation in advising the federal government in the evolution of OSHA regulations for shipyard work on the Shipyard Employment Standards Advisory Council (SESAC). Don and Evelyn Smith have acted as guides for the Association through all this growth and evolution. Nevertheless, the Association has also maintained its focus of keeping a sense of friendship and family among its members, as witnessed by a wonderful-time-had-by-all in New Orleans.

In thanks for their years of service the MCA presented Don with a gold watch and Evelyn with a crystal vase - both of commensurate proportions. Don's Rollex was inscribed with "To Don Smith, from your MCA Family",

while Evelyn's special French leaded crystal vase, filled with a dozen yellow roses, had to be shipped home separately because of its weight.

In addition, in honor of their spirit of generosity and service, the MCA established the **Don and Evelyn Smith Service Award**, and gave a plaque to them as its first recipients. It was engraved,

"Established in Honor of and Presented to Don and Evelyn Smith, in Recognition of Decades of Selfless Service to our Professional Community, from Their Grateful Friends and Family in the Marine Chemist Association."

The Association will make future presentations to members and friends that have made proven contributions in support of our professional mission, and it will always bear Don and Evelyn's names as the spirit of that service. (Many thanks to Lisa and John Bell for their help in heading up the enormously successful Don and Evelyn gift project.)

NOTE FROM DON AND EVELYN - WHAT A PARTY! -

The Smith Family; Evelyn, Jean, Don, Buddy and I, were overwhelmed by the favors extended our way in New Orleans. Evelyn and I were so pleased that our immediate clan was on hand. We have continually reminded them that our second and much larger family was scattered all over the continental waterfronts and even Canada and the Caribbean. It was quite obvious why we wanted our sons on hand. They were impressed. Please accept our sincere thanks for your thoughtfulness. Fortunately this was my first PINK SLIP!! It sure helped me unwind. Then I finally knew what it was like to graduate cum laude. For me to have been awarded Magna Cum Rolex and Evelyn Magna Cum Bacarat will never be forgotten. The watch and crystal vase will be proudly shown to all my fellow residents here at Heron Point. The establishment of the MCA's Don and Evelyn Smith Service Award, however, really floored me. It was especially gratifying to see Guy Colonna be its second recipient, and the fact that our names will continue to be associated with the recognition of service to the MCA means so much to us both. Then came the 'Whereas' plaque presentation by Joe Cox announcing that the NFPA Board of Directors had appointed me MEMBER EMERITUS of the Marine Field Service Committee, "with all duties, rights and obligations pertaining thereto". (Joe assured me that I would be able to handle the obligations.) Next, Guy presented me with a Mine Safety Lamp. This will be a great conversation piece allowing me to proudly tell visitors how I served the marine industry. (Doing so, I can attest that I actually used a mine safety lamp - and canaries too!) Highlighting the social events was the unique dinner dance held at the New Orleans Aquarium. Seems the place could perfectly accommodate what everyone wanted to do: dine, mingle, joke, dance, celebrate - everything except fish. Guess what? Joe Cox, front and center, presented Evelyn with a large pewter serving platter while the old man cut a rug. This party was finally over, but not forgotten. Thanks to everyone involved. WE LOVE Y'ALL. Evelyn and Don

ACCIDENTS - Chairman-elect Chris Scott, CMC 621 submitted coverage of a spectacular fire that destroyed the 614 ton research R/V BALMORAL SEA Monday, June 27 in New Orleans.

In what was reported as a fire started by a welder igniting insulation "sometime in the afternoon", the crew initially tried to bring the fire under control by themselves. They failed and finally called for assistance from the New Orleans Fire Department at 17:20. After a nine-hour struggle, the one-hundred-or-so firefighters were amazed when the vessel suddenly snapped all lines and capsized near the Industrial Channel connecting the Inner Harbor Industrial Navigation Channel, and the Mississippi to Lake Pontchartrain.



NEW ORLEANS PICAYUNE-TIMES STAFF PHOTO/Ted Jackson

R/V BALMORAL SEA burning and about to capsize at the Cal Dive International facility near New Orleans, LA, June 27, 2000.



NEW ORLEANS PICAYUNE-TIMES STAFF PHOTO/Bryan S. Berteaux

Capsized close to (but not blocking) the Industrial Channel connecting Lake Pontchartrain and the Mississippi, the former R/V awaits removal and scrapping.

(This incident is reminiscent of the fire that destroyed the great French luxury ocean liner NORMANDIE in New York City in 1942. Firefighters, used to "putting lots of wet stuff on the red stuff" weren't able to counter (or perhaps weren't even cognizant of) what was happening to the water they were pouring into the vessel. Instead of

being transformed into a much-needed troop carrier for the allies, the capsized burned-out hulk had to be scrapped.)

The BALMORAL SEA, built in 1974, had been upgraded in 1997. It is not known what condition the facility's SCP program was in, but a marine chemist's certificate was not involved. As is usual for such fires, the loss of the vessel, though catastrophic, was not feared as much as was the loss of business caused by blockage of the Industrial Channel transportation waterway. Fortunately, the USCG opened the channel to one-way traffic within a few hours of the vessel's capsizing. Righting, removal and scrapping of the wreck by BISSO Marine was underway by mid-August.



PHOTO/WATERWAYS JOURNAL

The BALMORAL SEA was raised and scrapped from the Industrial Channel in August by BISSO Marine.

Obviously, this catastrophic and senseless loss was easily preventable. If anyone ever asks you why shipyard competent persons, marine chemists and gas-free engineers were invented, this one bears mentioning. Add this one to your list of case studies.

Frank Monaghan, CMC 656 noted something in the California press that should be of interest to chemists. Northern California has a natural thermal soda spring on a small island some 200 feet off the shore of Clear Lake near Kel-

seyville. The site had been frequented by many people over the years, enjoying the 90°F soda water bath without much notice. The July 28 death of a 31 year-old Napa, California man in the pool started people in the area recounting that as many as a dozen bathers have been found dead in it over the years, however. Authorities now speculate that the spring, modified in the past with an additional two foot lip-wall around its edge, may have trapped and asphyxiated the unsuspecting. The low wall probably served to restrict air movement, making the bathers a bit more comfortable. But testing revealed that unspecified "dangerous levels" of CO₂, released by the spring water, were far more likely to accumulate with the low wall in place. The wall has been torn down and the spring placed off-limits, but the site is still said to be packed during the summer by boaters waiting their turn to soak.

OSHA issued a fine of \$81,600.00 in conjunction a fatality on the USS PELELIU last February 27 in San Diego (reported in the last newsletter). The vessel was under contracted repair services at a naval facility when the accident occurred. OSHA cited the victim's employer, a sub-contracted tank cleaner, a total of \$69,100.00 for failing, among other things, to provide its employees with proper training needed to recognize confined space hazards, as well as failing to provide their workers with proper equipment. OSHA also cited and fined a local shipyard, the prime contractor on the vessel, for not providing a shipyard competent person to evaluate the space as it was opened by the cleaners. Discussions with those familiar with the accident stated that the Navy required a marine chemist's certificate for the work, but the contractor routinely treated that as a "deliverable" to be provided after the tank was cleaned. OSHA held the shipyard responsible as prime contractor (reportedly much to their surprise and anger) for evaluating the space before the work began, regardless of the requirement for the marine chemist in the tank cleaner's contract. The shipyard was fined \$12,500.00. Of course, we all recall that before the 1994 changes to 29CFR1915, a marine chemist, not an SCP, would have been required to assess the space before the work began. (Thanks to **Mike Schmidt, CMC 642** and **Tom Beacham, CMC 635** for this information.)

ELECTROCHEMICAL CELL INTERFERENCES - Several stories of embarrassing misinterpretations have come in word-of-mouth from chemists and others in the IH field about interferences giving false positive results on electrochemical cells, especially carbon monoxide sensors. Two prominent manufactures, MSA, Inc., and City Technology, Ltd., have literature that is all-too-often not read, or at least not recalled by those using the instruments in the field. MSA includes useful charts in the manuals for its instruments showing its false-positive responses for many common industrial compounds at levels that might be of IH concern. The one below is associated with their model 360 H₂S and CO cells. Several things are apparent:

- 1) There are many more interferences with the CO sensor than with the H₂S sensor.

2) Sulfur compounds cause the primary interferences with the H₂S sensor, but these generally have distinctive warning properties, like methyl and ethyl mercaptans, and sulfur dioxide.

3) Alcohols give a strong positive interference with the CO cell, and the warning properties at these levels are very poor - leaving the uninitiated open to embarrassing misinterpretations.

Many instrument manufacturers, rather than manufacture their own cells use City Technology devices (CiTiceLs®), however, and the following is based on a summary, forwarded by Marty Finkel, CMC 640, of interferences seen with their commonly used CO units.

Relative Responses of the MSA CO and H ₂ S Electrochemical Sensors to Common Industrial Chemicals			
Interferent	Interferent Level (ppm)	H ₂ S Reading	CO Reading
Ammonia	100	0	-4
Benzene	17.1	0	0
Carbon Dioxide	5000	0	-4
Carbon Disulfide	14.5	0	2
Carbon Monoxide	100	0	100
Chlorine	5	0	0
Dimethyl Sulfide	4.5	0	2
Ethylene	50	0	100
Freon 12	1000	0	-2
Hexane	500	0	-2
Hydrogen	500	0	70
Hydrogen Cyanide	42	0	30
Hydrogen Sulfide	40	40	170
Isopropanol	50	0	40
Methyl Mercaptan	5	0	7
Ethyl Mercaptan	4.4	44	6
Methane	50,000	0	-3
Methanol	50	0	130
Nitric oxide	100	0	260
Nitrogen Dioxide	100	-8	80
Sulfur Dioxide	150	5	30

1. Hydrogen - CiTiceLs and MSA CO cells respond strongly to hydrogen. For MSA, published response is about 14%, but for City Technology cells the response is approximately 60%. For example, a CO calibrated CiTiceLs cell subsequently exposed to 100 ppm hydrogen would indicate a (false) 60 ppm reading as 60 ppm CO. (Recall the reference to hydrogen's false positive readings from John Fernandez, mentioned in the last newsletter.) Since battery charging, sacrificial anodes and (as reported by John) even USMC REMs will give off hydrogen, its obvious that there are ample opportunities for false alarms on this score.

2. Unsaturated Hydrocarbon Gases: Ethylene and Acetylene - CiTiceLs also respond strongly to both these gases: a 200% response factor for acetylene, and approximately 75% response factor for ethylene. The garlic-like smell of acetylene (along with the acetone it is often pressurized and dissolved in) is recognized at moderate levels. (AIHA lists

acetylene's odor detection levels from 226 to 2584 ppm, depending on how the test was made, while Ruth lists it at 657 ppm.) Of course, acetylene finds its way into many work spaces aboard vessels. Ethylene is evolved from ripening fruit and is intentionally used commercially to accelerate ripening of fruit ready for market. Therefore, both these gases can cause CO false alarms below odor detection limits. A good check for false positive indications would typically be a CO detector tube, but acetylene is also listed as an interference for the commonly used Draeger CO tube, though with unquantified "different" sensitivity than CO.

3. Petroleum Distillates (Gasoline), Substituted Aromatics and Unsaturated Polymer Resin Monomers - CiTiceLs CO cells will also give false positives at about 80% response factor to toluene and xylene, common cyclic hydrocarbons in gasoline. Styrene, used in fiber glassing/plastic boat building operations will also give a response at about the same level. City Technology also states that lighter molecular weight distillates give false positives at greater response factors than heavier ones, but the heavier ones will migrate more slowly into and out of the sensor, prolonging the problems they do cause.

4. Alcohols and Formaldehyde - Methanol, ethanol and isopropanol get strong responses from CO cells, again about 80% for CiTiceLs cells. Therefore, they can easily give a CO false alarm below the level of odor detection of these alcohols. Since ethanol and isopropanol are both commonly used in everything from paint systems to cleaning solutions, this class has been the cause of much embarrassment. City Technology notes that chronic exposure of the cells to high levels of alcohols (in the range of positive LEL readings) will damage the hydrophobic nature of the CO (and presumably other) cell membranes. Since ethanol is a solvent for many zinc-based paint systems, your competent persons may need to be aware of this as a problem for their multiple-celled instruments. As for formaldehyde, it's a double problem: the CO sensor will give a false response factor at about 80%, but it is not sensitive enough to use as a monitoring tool for formaldehyde's health concerns (TLV=0.3 ppm(C), and PEL=0.75 ppm. Formaldehyde, as you probably know, has its own OSHA exposure guidance standard - see 29CFR1910.1048, general industry, and 29CFR1915.1048, marine.

5. Sulfur Containing Gases - The response factor for SO₂, H₂S and mercaptans for CiTiceLs is about 10%, and since these compounds really stink (at first, anyway), they are not as much of a false-positive concern - but it can happen if one is not aware of the interference.

6. Nitric Oxide and Nitrogen Dioxide - For NO the response factor is about 30%, while for NO₂, it's about half that. Due to the irritating nature and low odor detection limits, and since NO is usually quickly oxidized to NO₂, these compounds are not usually missed by those who are aware.

City Technology cells take care of the NO, NO₂ and interfering sulfur compounds to a large extent by using pre-filter/scrubbers to intercept them before they get into the cells. Under consistently heavy use, the pre-

filter/scrubbers may not last their approximate two-year life span.

Overall, H₂S cells are evidently much less prone to interferences. Furthermore, the substances that give false-positive responses (such as methyl and ethyl mercaptan) are so toxic and smell so badly at such low levels that the tester can't make a mistake in calling for the increased ventilation of the spaces no matter what made the alarm go off!

IRRITANT SMOKE AND RESPIRATORY FIT TESTING -

In qualitative respiratory fit testing, allowed in several OSHA standards, there are three test chemicals allowed: saccharin, iso-amyl acetate (banana oil) and irritant smoke. Those encouraging the use of quantitative fit-testing point out problems with each of these. First, saccharin is a suspect (but probably innocuous) animal carcinogen. (The animal testing that made saccharin suspect was not done in studies that can extrapolate a realistic risk to humans, and no epidemiology has surfaced to cause the Food and Drug Administration to ban it despite years of high volume public use.) Isoamyl acetate, though generally considered pleasant-smelling, has some toxicity (TLV=150 ppm, PEL=100 ppm).

Irritating smoke, however, is an interesting and special case. For its part, it got such a bad (and evidently undeserved) reputation a few years ago that the largest providers of smoke tubes stopped marketing them for RFT. Regardless of how the argument between quantitative v. qualitative fit-testing may eventually turn out, a recent bulletin from Sensidyne has announced that they were resuming manufacturing and supply of both the irritant smoke tubes and the kit designed to use them in respiratory fit testing. They gave some interesting history on the tubes, their use and their problems.

The fundamental establishment of the use of smoke tubes for respiratory fit testing was evidently part of ANSI Z88.2-1969 respirator standard. As such, their use was incorporated into OSHA's respirator standard, 29CFR1910.134 shortly after OSHA got on its feet in 1970-71. When the benzene and lead standards came out in the 1980's, irritant smoke, banana oil and saccharin, were also allowed for qualitative RFT, along with the (then) much more expensive and awkward (but non-subjective) quantitative RFT. Unfortunately, very few IH-support personnel seem to follow the relatively strict protocols required by the qualitative fit testing procedures, and as such, it is often ineffectively and inaccurately done. That, evidently, is what got smoke tubes in trouble.

The tubes work by forcing moist air through a stannic chloride-filled exposed glass tube, producing the highly irritating mix of stannic hydrochloride and HCl mist. The easily visible and relatively durable "smoke" is excellent at providing a visual track of air currents, but a solid whiff will set the breather back on their haunches. Furthermore, if you get it in your eyes, they will quickly close due to the irritation caused. The original fit testing protocol called for the subject (with eyes closed if wearing a half-faced respirator), to stand in a well-ventilated place, while the tester wafted the smoke at the breathing zone of the subject. Unlike saccharin and banana oil, it's much more difficult for the subject to fake a successful fit; once the irritating smoke hits the

subject's eyes or gets by a poor seal, the tester knows it by watching the subject's (often stunned) response.

In May 1993, NIOSH issued a report (HETA 93-040-3125) on testing conducted by the Anchorage Fire Department. The Fire Department, anxious to demonstrate that its SCBAs fit properly, modified the irritating smoke test and used a hood with the subject inside wearing the full-faced respirator, and then nuked the hood with the smoke. NIOSH tested such high levels of irritating chemical under those conditions that they judged that the test should be considered a health hazard! What they didn't mention, however, was that the hood was not part of the OSHA protocol, and that the tubes were being misused. (It would be a bit like testing with banana oil except that the subject was asked to dunk their head in a bucket of it rather than just inhale vapors accumulated under a test hood.) As often happens, the false bad news was off in the saddle and over the horizon before the truth got its feet in the stirrups. MSA warned customers of the (incomplete) NIOSH test report in 1995, and not to use smoke tubes in RFT, and Sensidyne followed suit in 1996. Though tubes were still used for ventilation testing, warnings not to use tem for RFT started appearing on the boxes.

Finally, everyone woke up to the details of the original NIOSH/Anchorage study, and calm returned. As proof of their continued faith in smoke tubes, when OSHA reissued its respirator standard 29CFR1910.134 in January 1998, irritant fume protocol was still part of the revised standard. This time the protocol (otherwise essentially unchanged) carries clear warnings not to use hoods in connection with smoke tubes. (I didn't see anything about not sticking your head in a bucket of isoamyl acetate, however.) Sensidyne is also back in the business of marketing two different smoke RFT test kits.

MTBE FACES UNCERTAIN FUTURE -

America's continuing struggle to resolve its great love for the automobile with its love for the nation and planet's environment continues with a new twist. Over the last fifteen years or so the petroleum industry was forced to improve its effect on air quality in many ways. In addition to the tightening of releases of fugitive emissions from refineries and storage terminals, and the elimination of leaded antiknock compounds, a move was made to introduce an oxygenate into gasoline to improve the completeness of combustion in automobile engines.

Of course, this was not an altruistic move on the part of the oil companies. The Clean Air Amendments of 1990 and the California Air Resources Board made it mandatory, even though any such partially-oxygenated additives would directly reduce the energy content of any fuel they were blended into, thereby reducing performance and fuel economy. Many regulators, farm-state legislators and industrial stake-holders favored alcohols (prominently methanol and especially ethanol), but the favorite of the refiners emerged as methyl-tertiary butyl ether.

With significant investment, MTBE began to show up as a prominent additive in the mid-1980's. It had many advantages for the petroleum refiners. It is only a five-carbon molecule, contains 18% oxygen by weight, has a

blended octane rating of 110, and a modest Reid vapor pressure of only 8 psi. It could be used instead of cyclic aromatic octane-enhancers, such as xylene, toluene, and (especially) benzene, which are of concern to the health of consumers, and which had very profitable alternative destinations in chemical manufacturing. And, of course, it could be synthesized right at the refinery from crude stocks - no corn, fermentation, distillation, farmers, farm lobby, farm senators or congressmen needed! Production methods were also patentable. Blending it at the rate of about 11% by volume in gasoline produced an effective 2% oxygen by weight in the fuel, and markedly decreased the level of CO in the exhaust. By reducing the other toxic octane enhancers and diluting any sulfur in the gasoline still further, it seemed to be doing just what the regulators demanded.

But MTBE ran into problems almost immediately. The decreased energy content was not lost on consumers. They noted that MTBE hit them doubly - the new gasoline cost more per gallon, and you had to use more of it to go the same distance. There were complaints against the unpleasant odor, and Alaska had some reported adverse health effects among some workers, especially at low temperatures, that lead to its being banned in the 50th state.

In addition, several years ago, reports began to emerge that the effect of MTBE on overall emissions was disappointing. Though MTBE did reduce carbon monoxide levels, little if anything happened to nitrous oxide emissions.

More significantly and of higher profile, however, as environmental releases from underground and above ground gasoline storage tanks continued to occur, MTBE began to emerge as an environmental pollutant in groundwater, lakes and streams. Much more water-soluble than non-polar hydrocarbons (MTBE is 6% soluble by weight in water, vs. 0.07% for benzene, and 0.00007% for n-octane), it could be carried rapidly away from an underground release by groundwater. Reported in an increasing number of underground storage tank releases as a "messenger" compound, the messenger became so common as to become the culprit. Again, it was California that lead concern as to the balance of MTBE's positive and negative attributes. Present California regulations will phase it out by January 1, 2001, and recent articles in the *Oil and Gas Journal* indicate the industry is speculating about the possibility of a complete MTBE ban in the US, possibly by 2005. Many expect European governments and refiners to follow the same general path.

There is already talk in the journals of what to do about the new formulation of reformulated gasoline. The *Oil & Gas Journal* (August 28, 2000) mentions that for octane enhancement, catalytic formation of highly branched saturated hydrocarbons from isobutane is moving ahead. Unfortunately, though there is some promise of developing solid catalysts for the process, this probably means a great increase in the use of sulfuric and hydrofluoric acids in refineries, as the reformation technology using these substances is established and proven. When MTBE is gone, refineries will have to produce about 100,000 barrels/day of highly branched paraffins as replacement to keep octane ratings at present levels.

As for oxygenate requirements, ethanol is still a politically supported alternative, but will be costly and controversial.

Despite the green-sounding ring of plant-derived alcohol (from fermentation of grains followed by distillation), an article in *Scientific American* recently pointed out that an agricultural source of the enormous amounts of ethanol required will cost more in energy and money than MTBE for the same effect. This may also create a string of engine and production-related environmental concerns.

It will also certainly be a point of contention among environmentalists that grain used to produce alcohol is productive land that could be used to grow food for a hungry planet. (Look at the controversy surrounding growing grain for food animals for human consumption as opposed to being vegetarians.)

Significantly, these substantial changes will occur at the same time refining will have to contend with requirements for significant reduction in gasoline sulfur and at a time when gasoline demand is high and future supplies of reasonably priced crude are in question.

Though time will tell, the oil industry is in a critical transition phase that may leave MTBE as a historical chemical footnote while changing key elements of gasoline's formulation. Of real interest to this chemist, however, is that this compound, which seemed to appear from nowhere and with little or no epidemiological or toxicological history, became among the most common consumer chemicals in the US, virtually overnight. A review of four references published before 1979, (*The Merck Index*, *The Chemical Dictionary*, *CRC Handbook of Chemistry & Physics* and *The Materials Handbook*) failed to show mention of the compound! By 1995, however, it was among the top ten compounds produced in the US. And now, it evidently seems destined to disappear from the scene.

SOME MARITIME TRIVIA - In the days of sailing vessels many ships opted to have a cannon onboard for protection. Every master, of course, wanted a store of iron cannon balls that would be readily available, yet not roll around the deck. A solution was to stack them in a square-based pyramid next to the cannon. The top level of the stack had 1 ball, the next level had 4, the next had 9, the next had 16, and so on. Four levels would provide a stack of 30 cannonballs. The problem was how to keep the bottom level from spilling out under the weight of the those above.

A handy solution was a brass plate (a "monkey") made the area of the bottom layer of cannon balls, with a rounded dent for each cannonball of the bottom layer in just the right spot. Brass was used because cannonballs wouldn't rust to the "brass monkey", as they would to an iron one.

When it gets cold, brass contracts faster than iron. As it this happened, the dents in the brass monkey would get closer together than the iron cannonballs they were holding. If the temperature got cold enough, the bottom layer would pop out of the dents, spilling the entire pyramid.

Thus, under these extreme conditions, it was quite literally, "cold enough to freeze the balls off a brass monkey." Thought you might like to know... (Thanks to **John Flynn**, CMC 623)

PV VALVES AS TRAPS FOR PRODUCT



Typical PV Valve Installation

PHOTO/Ken Mercer



Horizontal PV Valve Installation found with trapped gasoline.

PHOTO/Ken Mercer

Ken Mercer, CMC 577, reports a potential problem for chemists resulting from “unusual installation” of relief valves on a barge inspected near Beaumont, Texas.

The unusual horizontal installation lead to the trapping of gasoline in the valve. Mechanics, ready to perform hot work on the related valve and piping, missed entirely the possibility of the gasoline. During the CMC inspection however, several gallons were discovered trapped in the PV valve, and drained out – a close call. (Thanks, Ken)

SHELL GAME SOLUTION/THE LAST NEWSLETTER'S PUZZLE - It was the way the old chemist directed the lieutenant to sample the shells that allowed a one-weighing solution to the problem. He had the lieutenant collect one shell from the first pile, two from the second pile, three from the third, and so on. Since the defective shells were exactly 0.1 kilogram heavier than the stable shells, the total weight would give a signature of the bin with the bad shells in it. If the shells all weighed the same, the lieutenant would have

collected (1+2+3+4+5+6+7+8), or 36 shells, and they would weigh exactly 36 kilograms. With the PDQ filled shells in the mix, however, they will have to be heavier than that. If, for example the defective shells were in the fifth bin, the total would have to be heavier by (5 x 0.1) kilograms, or 0.5 kg. If the sample was 0.3 kg over, they would have to have come from the third bin, and so on. I just hope they left the sampled ones on the scale in a way they could identify those sampled from the PDQ bin. (Oh, the hell with it, old chemist - throw 'em overboard while we still can!) Though a retired engineer from Heron Point gave Don Smith the correct solution, there was no winner submitted the MCA News readers. The new Cadillac prize went unclaimed and, unfortunately, had to be returned to the dealership.

Interestingly, the method of “signature collection” can, in a modified way, be used to solve a more general and seemingly more difficult problem. Suppose the problem had been that there were, again, defective shells in eight stockpiles in the ammunition storage area of the warship. In this case, however, though it was known that all the defective shells are grouped together in a stockpile, it is not known whether there are one, or two, or even more piles of defective shells. The problem then becomes to collect a sampling of the shells, and in a single weighing, identify the location of all stockpiles of defective piles. How can this be done?

The sampling for the signature collection here hinges on recognizing that every positive integer can be expressed as a unique sum of numbers expressed as powers of two. Take any number (306, for example). Starting more easily from its largest possible power-of-two component, 306 can be written only one way as the sum of components expressed as powers of two ($306 = 2^8 + 2^5 + 2^4 + 2^1$, or, $256 + 32 + 16 + 2$). By combining this fact with binary sampling, (i.e., 1 shell from the 1st stockpile (2^0), 2 shells from the 2nd (2^1), 4 from the 3rd (2^2), 8 from the 4th (2^3), 16 from the 5th (2^4), 32 from the 6th (2^5) 64 from the 7th (2^6), and 128 from the 8th (2^7)), you will unambiguously label each stockpile during the sampling. During the single weighing, if there were no defective shells, the collection would weigh (1+2+4+8+16+32+64+128), or 255 kilograms. Because of the way you did the sampling, the amount over this number gives the exact locations of all defective stockpiles. Suppose the final weight was, for example, 258.4 kilograms. This means an excessive weight (from the defective shells) of (258.4 – 255), or 3.4 kilograms, or, since each defective shell is 0.1 kilograms heavier than the good ones, 34 defective shells. Thirty-four can be expressed as the sum of binary components only one way: (2^5) + (2^1), i.e., (32 + 2). Because you sampled the stockpiles in binary form, the excess weight could only have come from the sixth and second bins – they, and only they, contain the defective shells.

Of course, any practical chemist would point out the serious limitations of this method. Even at eight bins, you are going to have to collect a very rapidly increasing number of shells. You will soon certainly reach the weighing capacity of your scale, will have to spend too much time collecting them, or the differences may not be discernable

due to the scale's precision limitations. But it makes a good exercise when applied to a few collections. In reality, it may be wiser to just run like hell.

THIS NEWSLETTER'S PROBLEM (Prize to be awarded by the first correct solution submitted to **Marine Chemist Emeritus Maximus Donald W. Smith, LM** (410/778-7934/tel. Call for fax connection).

After some significant difficulty, a young man in a boat dropped a mooring buoy anchor off a safe distance from a pier. As he tied his boat off, the harbor master was heard to yell out to him, "Hey kid, how many feet of water is that buoy anchored in? We've got limits here, you know."

Having neither measured the length of his cable nor the depth of the water, and mildly embarrassed about the oversight, the young man assumed he could figure it out without performing the arduous task of pulling the entire set up ashore and measuring it.

He noticed that if he pulled the chain in as much as he could, he pulled twelve feet of slack out of the water. He assumed, at that point, he was directly over the anchor. Letting the slack back into the water and drifting with the tide, he noted that he moved twenty-five feet from the point over the anchor until the chain stopped his movement.

Once ashore, he ran into the old chemist who had witnessed the happenings while waiting at the pier for a launch. "I guess I'd better brush up on my geometry for this one, eh? I'll bet the best approach is to use the Pythagorean theorem," he said to the chemist.

"Well, you can" replied the chemist, "but this is an example of a famous problem that can be solved without bothering with the Pythagorean theorem. Using the Pythagorean theorem will actually take you much longer."

After trying the Pythagorean approach, and running into an increasingly complicated position, the chemist showed him a very direct method based on a key hint: What is the property of the sections of two intersecting cords in a circle?

Find the depth of the water in which the mooring buoy is anchored without using the Pythagorean theorem. The winner must submit his/her solution, not just the answer.



...well, actually Mom, alligators don't just hop up on your finger and sing...and notice the muzzle...?



"...and I say not enough can be said for the uses, value and effect of serious jawboning..." (Chairman Blaize)



Marty Finkel, LT Laura Weems, Guy Colonna and Troy Corbin at the New Orleans Aquarium MGHCF/MCA Dinner/Dance, July 12, 2000.



Eric and Jenny Moore ponder the inevitable and contagious effect of being so close to Bourbon Street.

**2001 SECTIONAL SEMINAR TRAINING SEMINAR
REGISTRATION FORM**

Please fill out and Fax to Ed Willwerth: 508/747-6969 to register for the location of your choice. Fee: \$35.00 – mail check following registration, or bring fee with you and pay at the meeting. This form is only to let the MCA know you plan to attend so that we will have teaching materials and meals ready for you. Cont. Breakfast-07:30/Sessions-08:00.

**THIS FORM IS NOT FOR HOTEL REGISTRATION.
CHEMISTS ARE RESPONSIBLE FOR MAKING THEIR
OWN HOTEL ROOM RESERVATIONS!**

NAME (Print) _____
CMC# _____ (Check Box)

PACIFIC SECTION

MAXIM Hotel, 160 Flamingo Rd., Las Vegas, NV 89109
Date: Saturday, 10 Feb., 2001 Rate: \$72.00+ 9% tax,
Reservation Cut-Off Date: 26 January 2001
Reservations: 800/634-6987, under "MAR0209"

ATLANTIC SECTION

Hilton Atlanta Airport, 1031 Virginia Ave., Atlanta, GA 30354
Date: Sunday, 25 Feb. 2001 Rate: \$79.00 + 10% tax,
Reservation Cut-Off Date: Feb 3 under "Marine Chemist Association"
Reservations: 404/559-6821

GULF-CENTRAL SECTION

Hilton New Orleans Airport, 910 Airline Dr., N.O., LA 70062
Date: **Saturday March 3, 2001** Rate: \$109.00 + 11.75% tax,
Reservation Cut-Off Date: Feb 9 under "Marine Chemist Association"
Reservations: 504/584-3999



Don Smith receives engraved Mine Safety Lamp from NFPA's Guy Colonna.



Guy Colonna presented With MCA's "Don & Evelyn Smith Service Award" as its second recipient.



Buddy, Don & Evelyn Smith, New Orleans, July 2000.



The Marine Gas Hazards Control Program and Marine Chemist Association co-sponsored a very successful dinner/dance at the New Orleans Aquarium. Phil and Debbie Giles and Joe and Rose Dadorra were among the more than 120 celebrants.



Joe Cox presents award and citation from MGHCP to Don & Evelyn Smith at the New Orleans Aquarium.