

Message from the Chair

by Jill McCook, CPCU, AIS



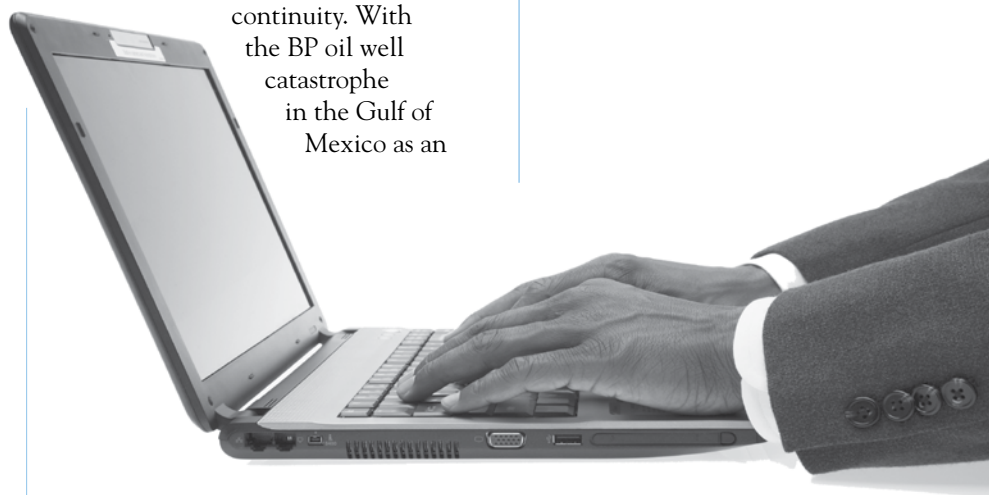
Jill McCook, CPCU, AIS, is a leadership development associate in the financial services department with State Farm in Bakersfield, Calif.; she has worked for State Farm for 18 years. McCook received her bachelor's degree in business administration and a master's degree in human resource and development from the University of Nebraska-Lincoln. She earned her CPCU designation in 1998 and AIS designation in 2005. McCook has served on the Loss Control Interest Group Committee for four years and is an active member of the CPCU Society's Golden Empire Chapter, with prior service as secretary, president-elect, president and director.

A support network of key relationships ensures that the Loss Control Interest Group (LCIG) can best serve CPCU Society members. At the end of April, LCIG committee members attended the CPCU Society Leadership Summit in Phoenix, Ariz., to learn the best ways to build on past successes, move our work forward, develop and grow leaders, and prepare for the Annual Meeting and Seminars in Orlando, Fla.

David M. Hall, CPCU, ALCM, a member of the LCIG Committee, presented a webinar on April 15 on the topic of business continuity. With the BP oil well catastrophe in the Gulf of Mexico as an

example, we must continue to share this message with others in our industry, partners and customers in anticipation of potentially drastic events occurring.

We want to continue offering seminars and webinars so that you are able to leverage educational opportunities to increase your business knowledge and professional experience through the CPCU Society network. We look forward to offering more educational classes in the future. If you have suggestions, please send them to me or another member of the LCIG team. ■



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Handling Employee HR Complaints — How Not to Drop the Ball

by Robert Bambino, CPCU, ARM



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Abstract

Despite corporate policies and procedures, complaints from employees who believe they have experienced harassment, discrimination or retaliation often get mishandled. This leads to unnecessary administrative complaints to the Equal Employment Opportunity Commission (EEOC) or a state human rights agency. Ignored or disgruntled employees often resort to the court system to right a perceived wrong — resulting in costly and time-consuming litigation. Proper complaint-handling by managers and supervisors can reduce the likelihood of complaints and help support a harassment-free workplace.

Employers can control the liability exposure arising from illegal harassment from hostile work environment claims when there is no tangible employment action, such as discharge, demotion or undesirable reassignment. Control can be achieved by taking proactive measures to prevent harassment and by effectively dealing with harassment when there is a complaint. At a minimum, an employer must create and disseminate effective anti-harassment policies, and provide workable, uncomplicated procedures to handle complaints. If an employer has a viable system and the complainant fails to utilize it, the employer is in a better position to avoid liability. An employer is always responsible for harassment by a supervisor that culminates in a tangible employment action. An individual qualifies as an employee's "supervisor" if the individual has the authority to recommend tangible employment decisions affecting the employee or if the individual has the authority to direct the employee's daily work activities.¹

What Triggers an Investigation?

The following actions call for an immediate investigation:

- A formal complaint.
- An informal complaint (written or unwritten).
- An Equal Employment Opportunity Commission (EEOC), state or local charge.
- Reasonable suspicion of harassment.

Consider investigating complaints of conduct that might not rise to the level of actionable harassment, but perhaps violate policy or is otherwise unacceptable. This may present an opportunity to control the situation before it escalates. Having a progressive response based on the infraction is warranted.

Investigation must be prompt and thorough and should be conducted, even if the behavior has ceased by the time the complaint is made. Consider interim preventative measures while the investigation is conducted (i.e., temporary reassignment or leave). Such measures, however, should not penalize the complainant.

Create a Functional Reporting System for Complaints

Before creating a complaint-handling system, employers must check collective bargaining agreements and all applicable laws to see if there are specific time frames and procedures that must be followed. Although there is no one system suitable for all companies, a viable system should include, at a minimum, the features listed below:

- An understandable complaint procedure, with *at least* two avenues for reporting improper conduct. Limiting reporting to the complainant's supervisor, manager or one company officer does not work. Consider at least two avenues for reporting (perhaps

one male and one female) as well as a separate officer.

- Train complaint-intake persons so they know what is expected.
- When a complaint is made, strive to assure the confidentiality of all parties involved — but do not guarantee it.
- Encourage complainants to put their complaints in writing.
- Document the investigation. Record the nature of the harassment, dates, times, places it occurred, name of the harasser, witnesses and the complainant's response to the harassment.
- Involve general or labor counsel when creating the procedures.

Take Action When a Complaint Is Made!

When a person makes a complaint to a designated intake person, that person should explain the company's grievance procedures, the provisions of any collective bargaining agreements, and the steps he or she will take to investigate the complaint. Involve union representatives, when applicable. Investigations vary, but should include, at a minimum, the following:

- Interviews of the complainant, alleged harasser and witnesses. Document the conversations.
- A knowledgeable, trained, fair and impartial investigator.
- Reasonable time frames in which personnel are required to commence and complete the investigations.
- Involvement of counsel.
- Mediation as an alternative way to resolve the complaint.



Respond When There Is Illegal Harassment

If illegal harassment has occurred, the employer must take immediate and appropriate corrective action. Examples include separating the parties (without taking action against the complainant), counseling, and warnings or disciplinary actions against the harasser based on the severity of the situation. Advise the complainant that retaliation will not be tolerated. In addition, false or malicious complaints of illegal harassment should not be tolerated. Put steps into place to prevent further acts of harassment. Training for employees that explains company policies, federal and local laws, actions that constitute illegal harassment, and team building may be in order as well as diversity and sensitivity training.

In addition, there should be an internal appeals process if the complainant is not satisfied with the remedial efforts taken by the district.

Problematic Policy Language

There are certain provisions that should be avoided in anti-harassment policies. They include:

- Promising responses or investigations within an unobtainable time period.
- Requiring complainants to submit their complaints in writing or by completing a form before their complaint is recognized.
- Guaranteeing confidentiality. This is difficult when witnesses or other parties need to be contacted for legitimate reasons relating to the investigation.
- Unclear, inconsistent, illegal or ambiguous language or terms.
- A "zero tolerance" policy that mandates termination or specific discipline if a complaint is deemed to be valid. It removes the opportunity for settlements, compromise between the parties or a less stringent response if there are mitigating circumstances or if the offense was an isolated incident.

Employment liability is a major loss exposure for employers. In addition to financial ramifications, defending employment liability lawsuits and handling complaints require staff time away from the company's usual business pursuits, and it can have a negative effect on morale, productivity and reputation. Along with sound policies, employee training and proactive management, proper complaint handling will help the organization in its efforts to create a workplace free of harassment and discrimination. ■

Reference

1. "Questions & Answers for Small Employers on Employer Liability for Harassment by Supervisors." U.S. Equal Employment Opportunity Commission (EEOC) website: <http://www.eeoc.gov/policy/docs/harassment-facts.html>.

Product Safety Management — Its Time Has Come

by Kenneth Ross, J.D.



Kenneth Ross, J.D., is of counsel to Bowman and Brooke LLP in Minneapolis, Minn., and is one of the world's most experienced and well-known lawyers practicing in the areas of product safety, product liability prevention and regulatory compliance. He has helped companies develop and implement product safety management programs for more than 30 years. Ross is active in DRI, the national organization of more than 22,500 defense trial lawyers and corporate counsel, and is co-chair of the Manufacturer's Risk Prevention Specialized Litigation Group (SLG) of DRI's Product Liability Committee.

Editor's note: This article appeared in the spring 2010 edition of *Strictly Speaking*, the newsletter of DRI's Products Liability Committee. It is reprinted with permission. Copyright © 2010 DRI. All rights reserved. Portions of this article appeared in "Establishing an Effective Product Safety Management Program," which was published in the January 2003 issue of *For the Defense*, DRI's national monthly magazine.

An effective product safety management program can help to reduce accidents, reduce recalls, reduce insurance premiums, increase the safety and quality of products, provide a more defensible product and company in the event of litigation, and minimize the chance of punitive damages. And the techniques have been well-developed for decades.

With that said, why are so many manufacturers being sued and fined by government safety agencies? Why are so many products being recalled, many times by well-known and respected manufacturers? Why are legislative bodies here and around the world enacting sometimes oppressive legislation to force manufacturers to do a better job of providing a safe product? And, why are retailers creating a global safety standard that will be imposed on those who sell to them? Obviously, companies must not be devoting enough resources to these efforts. Why is that?

As someone who has counseled manufacturers on product safety, regulatory compliance and product liability prevention for more than 30 years, I have seen many answers and excuses: "We haven't had too many problems yet;" "It's the cost of doing business;" "Everyone's job is product safety;" "That's why I have insurance;" "My foreign supplier will take care of the problem if anything happens;" "It costs too much, and I can't cover the cost in my prices;" and "My competitors aren't doing these things, so how can I justify the effort and expense?"

I have written previously about the elements and benefits of such programs. See "PLP: Even More Important in Tough Economic Times" in the January 2009 issue of *Strictly Speaking* and "Establishing an Effective Product Safety Management Program" in the January 2003 issue of *For the Defense*. (These articles are available on www.productliabilityprevention.com.)

While I won't repeat what is in these articles, I wanted to report to you on some recent developments concerning consumer products and industrial products which help solidify my earlier thinking and recommendations concerning the necessity of such a program and its important elements.

RILA/BRC Global Standard for Consumer Products

In 2003, the British Retail Consortium (BRC) published a standard for consumer product manufacturers that were selling private label products to British retailers. Since then, this standard has been extensively revised and updated to reflect the latest thinking in the production of safe and legal consumer products. Its third edition has been released, and BRC is now working with members of the Retail Industry Leaders Association (RILA) to finalize and implement the standard.

RILA members include Walmart, Costco, Lowe's, Home Depot, Target, Sears, Walgreens and Best Buy. BRC members are the leading British retailers.

In the current draft, the standard is described as follows:

The text of the Standard specifies the safety, quality and operational criteria required to be in place within a manufacturing organisation to fulfill obligations with regard to legal compliance and protection of the consumer. It forms a core to the Global Standard for Consumer Products scheme which encompasses a network of approved and accredited certification bodies, employing qualified auditors who audit companies and provide a detailed report assessing the company's compliance with the requirements of the Standard. If successful, the audited company becomes certificated to the Standard and is listed on the BRC Directory of suppliers.

The final draft will be published soon with implementation to take place through 2011.

The standard applies to both private labeled products (branded with the name of the retailer or the retailers' brand name) and branded products (branded with the name of the manufacturer). Each retailer will have to decide which of its suppliers will be subject to the requirements of the new standard. I'm sure most will concentrate first on smaller manufacturers whose manufacturing facilities are in foreign countries.

Of course, this standard, to the extent it exemplifies the best current thinking on product safety procedures, can be used by anyone, including component part and raw material suppliers to consumer product manufacturers, as well as manufacturers of nonconsumer products.

Some of the key elements of the standard are as follows:

- Supplier's senior management shall develop and implement a product safety policy that is communicated to personnel.
- The supplier shall perform a systematic, comprehensive and thorough risk assessment that is fully implemented and maintained. This will include reference to legislation, product standards, codes of practice and developments in science and technology.
- All documents, records and data critical to the management of product safety, legal compliance and quality must be in place and effectively controlled.
- The supplier shall have a clearly defined and documented organizational structure with responsibility for product safety, legal compliance, product quality and management systems. This organization shall have a named individual with relevant experience and qualifications be responsible for



its management. In addition, the company shall audit the management system to ensure that it is being complied with and is appropriate under the circumstances.

- The supplier shall control all purchasing processes which are critical to product safety, legal compliance and quality. This includes an ongoing assessment which monitors performance of suppliers such as subcontractors and component part suppliers.
- Procedures must be in place to record, investigate, analyze and correct the causes of nonconforming products or the failure to meet standards, specifications and procedures which are critical to product safety, legal compliance and product quality.
- The standard requires an extensive traceability system starting with the identification of components and raw materials and ending with finished products and materials. The company must test the traceability system to ensure that products can

be traced. This test must be done at least annually. It is also required that subcontractors and component part suppliers must be able to trace their products to a level appropriate for the risk.

- The supplier must have a plan in place to effectively manage product withdrawal and product recall procedures. These procedures shall be regularly tested, at least annually, and results of the tests retained.

The key additional requirement is that suppliers must have their compliance with the standard confirmed by an accredited third-party auditor. These auditors will most likely be the same third-party testing laboratories that currently are accredited to certify compliance with the standards issued pursuant to the Consumer Product Safety Improvement Act and with requirements of the EU Machinery Directive to justify a CE mark.

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This standard raises for me a few preliminary conclusions:

- These requirements are an extensive and comprehensive interpretation of the product safety management procedures that have been around for decades.
- The inclusion of these requirements in such an important document will increase the validity and acceptability of these procedures for manufacturers of all kinds of products. This will raise the state of the art in product safety as more and more companies adopt these kinds of procedures and documentation controls.
- Those manufacturers who are not required by retailers to comply with this standard may still need to explain why they don't comply with the state of the art and may suffer the consequences of noncompliance.

There will be much more documentation available that will be subject to discovery. The standard will typically increase documentation on safety and

quality between the supplier, the retailer and the third-party auditor before and after sale as well as between the original equipment product manufacturer (OEM) and the OEM's suppliers. Some of these documents may prove challenging to explain if an incident occurs and litigation results.

This process will play itself out this year and next. Manufacturers are still commenting on and learning about this standard, and retailers are considering the contents and which of their suppliers will be required to comply. RILA and BRC are preparing training programs for potential auditors, retailers and manufacturers to educate everyone about the new standard. In a year, we will know a lot more. However, at this point, it is safe to say that more organized and comprehensive product safety management procedures of some sort will be the norm in the future for consumer product manufacturers.

U.S. Consumer Product Safety Commission (CPSC)

The CPSC has always encouraged companies to implement active product safety management programs. It has had available a *Handbook for Manufacturing Safer Consumer Products* for many years. For the current edition of this handbook, see <http://www.cpsc.gov/businfo/intl/handbookenglishaug05.pdf>.

However, recently, this has become a bit more official. On March 16, 2010, the CPSC Commissioners approved a final rule of factors that their staff will consider in connection with potential civil penalties. While the final rule has not yet been published in the Federal Register, the last draft (interim final interpretative rule — Federal Register, Sept. 1, 2009) stated clearly that product safety programs would be considered by the staff. The rule states:

Safety/Compliance Program and/or System: The Commission may consider, for example, whether a violator had at the time of the

violation, a reasonable program/or system for collecting and analyzing information related to safety issues, including incident reports, lawsuits, warranty claims, and safety-related issues related to repairs or returns; and whether a violator conducted adequate and relevant premarket and production testing of the product(s) at issue.

In addition, the Chair of the Commission released a statement dated March 16, 2010, concerning these new factors, which said in part:

The safety/compliance program factor takes into account the extent to which a person (including an importer of goods) has sound, effective programs/systems in place to ensure that the products he makes, sells or distributes are safe. Having effective safety programs dramatically lessens the likelihood that a person will have to worry about the application of this civil penalty rule. Any good program will make sure that there is continuing compliance with all relevant mandatory and voluntary safety standards.

This approach is analogous to the 1992 Federal Corporate Sentencing Guidelines, where the existence of comprehensive compliance programs can help mitigate criminal fines imposed by the government against corporations.

Lastly, the establishment of a product safety management program was included in a recent consent decree for civil penalties. In a March 2, 2010, agreement, Daiso Holding, a U.S. subsidiary of a Japanese company, agreed to pay a little more than \$2 million in fines for violating various laws and regulations concerning the sale of toys and children's products. The consent decree requires Daiso to hire a product safety coordinator to do, in part, the following:



- Create a comprehensive product safety program.
- Conduct a product audit to determine which of defendants' merchandise requires testing and certification of compliance with the FHSA, the CPSA and any other Act enforced by the CPSC.
- Establish and implement an effective and reasonable product safety testing program in compliance with the FHSA, the CPSA and any other Act enforced by the CPSC.

There are many more specific requirements in the consent decree which lead me to believe that this program was instituted at the request of the CPSC. Given the level of the fine and the description of the violations, it is apparent that the CPSC viewed this as egregious. In future penalty cases where the violation is not so significant and the manufacturer already has some safety program in place, it remains to be seen whether such a detailed program would be required.

Despite that, manufacturers and retailers should take these events as evidence that the CPSC will be less likely to impose heavy penalties if the company can show that it had a system in place which evidenced a real commitment to prevention and compliance.

Machinery Safety

There have been some developments in the machinery safety area which also expand requirements for some of the safety procedures we are seeing being mandated for consumer product manufacturers. In 2006, the European Machinery Directive was modified and applies to all machines sold in Europe after Dec. 29, 2009. The EU issued in December 2009 a 337-page guide to the new directive. While this directive does not specifically require many of the management procedures in the RILA/BRC standard, such as a product safety policy, it does include some of them. To

see the December 2009 guide, go to http://ec.europa.eu/enterprise/sectors/mechanical/files/machinery/guide_application_directive_2006-42-ec-1st_edit_12-2009_en.pdf.

Risk assessment is a key requirement in this directive. It was not a requirement in the earlier version of the directive which came out in 1998. There are a number of new provisions where the manufacturer must make important design decisions based on a risk assessment. These can't be educated guesses. The procedures must comply with EN ISO 14121-1:2007 — *Safety of machinery — Risk assessment — Part 1: Principles*. And the risk assessment must be kept as part of the technical construction file.

In addition, the new directive makes it clear that the machinery, especially safety devices, must be designed for reasonably foreseeable and intended use as well as abnormal or unintended uses. And, the requirements for instructions have been expanded. Last, this new directive contains market surveillance requirements mandating that member countries work together to locate noncomplying machinery with a goal of taking them out of service or getting them fixed, and preventing their sale. The Guide makes it clear that manufacturers and government authorities are to use risk assessment to determine if machinery violates the essential health and safety requirements of the Directive and needs to be repaired or replaced. In addition, the authorities can take the machinery out of service by issuing a notice in RAPEX, the safety notification system used for consumer products.

Machinery sold in Europe will need to be redesigned in accordance with new risk assessment procedures, and instruction manuals will need to be revised to comply. In addition, manufacturers will have to institute their own market surveillance programs where risk assessment is applied to adverse field

experiences. These changes could also impact machines sold in the U.S. To the extent that manufacturers want to sell machinery in the U.S. that is the same as in Europe, they will need to consider this directive as well as U.S.-based machinery standards.

Risk assessment is a concept that has been in U.S. machinery safety standards since 2000. However, these standards are being revised right now to make risk assessment mandatory for compliance. (See the ANSI B11 series of standards.)

Now you might think that requiring risk assessment is not a big deal. However, many manufacturers do not do a formal risk assessment. They design the product to comply with the standards in effect where the product is sold, and that's it. Their assumption is that the standards group did a risk assessment and they don't need to. But this Guide to the new Machinery Directive raises lots of options in design that need to be resolved by the manufacturer. Therefore, doing a formal risk assessment becomes a necessity.

I have written before about risk assessment and the legal implications of creating those documents. See "*Risk Assessment and Product Liability*," (with [Bruce Main](#)), *For the Defense*, April 2001 (also available at www.productliabilityprevention.com). The more risk assessments that are performed, the more explaining a manufacturer may have to do as to what they mean, how risk was evaluated and how final decisions were made.

Product Safety Survey

In 2009, a product safety engineer who works in the plastics equipment industry was awarded a Ph.D. in safety engineering. In connection with that effort, he published a dissertation that included a survey of more than 30 product safety professionals in the plastics industry.

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The engineer, **Doug Sten**, first reviewed the safety literature and identified the key elements of a safety program as described by those who have worked in the area for many years. He identified 40 key elements of any product safety program and asked these professionals to grade them as Critical, Very Important or Important. Seventeen elements were described as critical. A review of these 17 items (as well as all 40) shows that product safety management systems and procedures for consumer products and machinery are pretty similar.

Below are the 17 elements viewed as critical:

- Ensure that there is a written corporate product safety policy.
- Provide appropriate communications to all employees.
- Perform design reviews, assessing intended use versus misuse.
- Perform formal risk assessment as part of design review.
- Apply current, industry safety-related design standards.
- Produce a prototype of a product before going into production.
- Develop a manual that is easy to follow, apply and understand.
- Test product for reliability, quality and safety prior to shipment.
- Provide clear, emphatic warnings where there remain residual risks.
- Design product safety labels that are in compliance with safety standards.
- Provide labels and instructions in the language of users where the product is to be used.
- Assess and communicate to engineering feedback from customers received from sales and technical service personnel regarding any product safety issue.
- Send certified letters to customers whose machines were found not to be using safety guards as originally designed.
- Sales and technical service personnel must report accidents they are aware of that occurred at a customer's site.
- Perform on-site investigation once informed of an accident.
- Develop a formalized product recall or retrofit program.
- Participate on national safety standards committees, developing requirements in design safety for specific machines or products.

The importance of the above list is that it is consistent with what has been done for decades and what is being included in standards and guidelines issued by various entities for all kinds of products. In addition, the respondents to this survey currently work in the product safety function and, when their individual levels of experience are added up, have many hundreds of years of experience. Therefore, their vote as to critical elements of a safety program should carry some weight.

Conclusion

No matter what a manufacturer does, it is always possible that its product safety program is lacking in some respect and could arguably constitute evidence of a disregard for safety. To combat that possibility, any program must be able to show a high regard for safety, both on paper and in actions. If this showing is made, even if the jury believes that the manufacturer could have done more, it should also believe that the manufacturer tried to do the right thing and may not be inclined to award punitive damages.

As companies better organize themselves for the world-wide challenges of providing safe products, the bar will be raised. Companies who do not follow the lead will be at great risk of further product safety, product liability and regulatory problems, in the United States and in Europe and in other foreign countries.

The techniques are well-known; the difficult part is to analyze what is appropriate for a particular company and then incorporate it into the company's organization, culture and processes. Doing so should pay for itself, either by preventing future problems that could arise or giving the manufacturer a much better defense if accidents do occur. ■

Mods — Fuzzy Math?

by Christopher D. Conti, CPCU, CSP, ALCM, ARM

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It is the season when the National Council on Compensation Insurance (NCCI) begins to release the Experience Modification Factors for 2010. A quick background follows.

NCCI is the governing body of the workers compensation (WC) system, and it produces the actual rates used by most states to form the basis of the premium calculation for workers compensation insurance. The rates, like any actuarially developed rate for insurance premium calculation purposes, consist of the historical cost of accidents/losses, the expenses needed to run the insurance company and a load for profit. Now, it is commonly understood that a carrier pays out only 65 percent of the premium dollar for claims, which leaves 30 percent of the premium dollar for carrier expenses (rents, utilities, reinsurance, etc.) and 5 percent for profit. Understand that all carriers are for-profit, even if they say they are not-for-profit, as they have to have excess money above losses to remain a viable entity. That is the fundamental mathematical equation that NCCI seeks to "back in" to determine what is a true and fair proper rate to charge employers to insure the risk of loss from workplace injuries.

The main number we need to analyze here is the 65 percent to cover the losses of the carrier. As mentioned, these rates, called "Manual Rates," are the starting point of the premium calculation. Manual Rates are the purest baseline cost that should be charged, in theory, for a carrier to cover its loss and operating expenses and earn a profit. As well, you may be aware that underwriters can manipulate the premium quoted in additional ways, such as providing a schedule rating (allowed in most states where the underwriter can quote plus 25 percent more or minus 25 percent less based on the risk characteristics). In addition, there is an allowance to reduce premium called the "premium discount," which allows larger policyholders to pay less because a larger premium does



not necessarily mean an increase in administrative costs for the carrier.

In addition to providing rates to the NCCI affiliate states for use by NCCI affiliate carriers, NCCI calculates and distributes Experience Modification Factors. Recall that the Manual Rate mentioned above is the starting point for premium calculation. As the Manual Rate is a commingling of all loss cost (accident cost) in a given class code, the Experience Mod (hereafter called "Mod") adjusts the premium level for each employer based on that employer's individual specific loss experience.

So, we go from the macro to the micro as we start with an actuarially-sound Manual Rate, and then the underwriters apply the NCCI promulgated Mod for each employer for every policy year. Now we finally get to the point of this article.

It seems that the Mod formula has changed to be much more conservative (that is, to allow carriers to collect more premiums) than should be needed based on the historical accident cost of each employer. Let me clarify and then produce some facts.

Insurance carriers can earn an underwriting profit if they keep their losses below 65 percent. This is called a loss ratio — losses divided by premium. Therefore, that 65-percent figure becomes central to this article to support the statements that the NCCI has become more conservative in the formula to give carriers the tools to charge more for premium.

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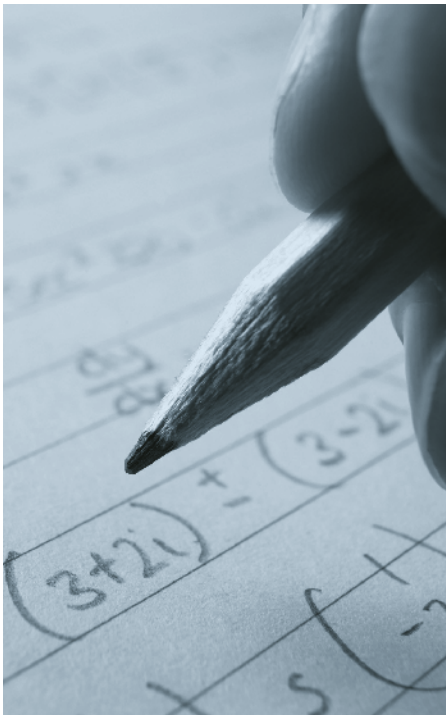
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Two terms to keep in mind:

- **Subject Premium** — the premium used by NCCI in the calculation of the Mod; it *only* consists of rate times payroll. There are no carrier credits, debits or discounts of any form in this number. This number is at the bottom of each year's data on the Mod worksheet.
- **Incurred Losses** — the total of claims amounts paid and reserved. The term Incurred Losses is used because carriers actually allocate this money to be paid in the case of reserves. It is a claims expense to the carrier that is projected to be paid and must be accounted for on the books of the carrier. Recall the Mod uses three of the past four years of policy-year loss data, skipping the most currently completed year as claims are still being adjusted to find the true actual cost.

Here are some facts. Four of my accounts sent me the prospective Mod due to be effective in late 2009 or early 2010. I use their data with their permission but protect the name of the account.



Case No. 1: Ole McDonald — Mod Effective 12-31-09

Year	Subject Premium	Incurred Losses	Loss Ratio
12-31-08	Mod Skips	This year	NA
12-31-07	259,716	171,145	66%
12-31-06	230,059	2,476	1%
12-31-05	256,565	22,465	9%
Totals	746,340	196,086	26%

Ole McDonald had a three-year average loss ratio of 26 percent, which is a full 39 points below the needed 65 percent for a carrier to break even. In fact, the carrier (assume the same carrier for all data years) made a 39 percent profit on this account ($65 - 39$). So you would think that the Mod would be a credit Mod (less than 1.00), as the three-year loss ratio is below 65 percent. Not the case, as this Mod is 1.11. This account will pay an 11 percent surcharge in spite of profitable losses.

Case No. 2: The City — Mod Effective 1-1-10

Year	Subject Premium	Incurred Losses	Loss Ratio
1-1-09	Mod Skips	This year	NA
1-1-08	457,578	557,603	121%
1-1-07	423,229	265,935	63%
1-1-06	365,183	241,149	66%
Totals	1,245,990	1,064,687	85%

The City has had losses in the Mod data years of 85 percent, which is 20 points over the required 65 percent, but the Mod jumped to 1.49. That allows the carrier to charge 49 cents for every dollar, effectively increasing the premium by 50 percent, but losses were only 20 percentage points beyond the carrier breakeven point of 65 percent loss ratio.

Case No. 3 — Burger World — Mod Effective 1-1-10

Year	Subject Premium	Incurred Losses	Loss Ratio
1-1-09	Mod Skips	This year	NA
1-1-08	376,000	80,000	21%
1-1-07	519,000	310,000	60%
1-1-06	590,000	219,000	37%
Totals	1,485,000	609,000	41%

(Numbers are rounded.)

On this account, the employer had a three-year loss ratio of 41 percent — a very good and profitable account for a carrier, as it is a full 24 points below 65 percent. It would stand to reason that this account would earn a credit on its Mod, but that's not the case, as the 2010 Mod is 1.25. So, the baseline premium begins with a full 25 percent surcharge (called a debit) against the employer in spite of an excellent loss performance.

Case No. 4: The Governor — Mod Effective 12-7-09

Year	Subject Premium	Incurred Losses	Loss Ratio
12-7-08	Mod Skips	This year	NA
12-7-07	173,086	1,852	1%
12-7-06	189,394	61,379	32%
12-7-05	178,025	10,574	6%
Totals	540,505	73,805	14%

This account is the poster child for profitability, where the Subject Premium calculated spends 14 percent of the premium dollar on losses over a three-year average. If you subtract the carrier expenses of 30 percent and a load for profit for the carrier of 5 percent, then the combined ratio (loss ratio plus operating expense ratio) is 49 percent, leaving a 51 percent profit (assuming the carrier charged the subject premium with no discounts). So, at this profit margin, one may expect a deep cut in the Mod to provide the employer a well-earned credit due to a stellar historical loss performance. The 12-7-09 Mod on this account is .99, granting the employer only a measly 1 percent credit off the Manual Rates. The carrier/industry had a 51 percent profit, but future quotes (without adjustment) start with a baseline 1 percent credit.

Conclusion

It is my contention that the Mod formula has been tinkered with to provide a more conservative, if not protected, financial underwriting posture for WC carriers to the financial detriment of employers. This article does not, nor does the NCCI, take into account that carriers earn investment income in invested surplus premiums and unspent reserves. That adds to profit called investment income. So the combination of underwriting profit and investment income determine the true profitability of a carrier.

As a former WC underwriter, I believe that the Mod formula logic has changed to the detriment of employers in an effort to provide a more conservative, but less realistic, projection of the need to collect more premiums. I say realistic because the formula “is” based on historical loss performance. Past losses are the few indicators that predict what the loss picture of an employer will be in the future, which is what the WC policy is covering, and the possibility and the probability of losses in the future.

Now there is great buzz about medical inflation, where the cost of medical care is increasing, and this may have an impact on future rates. Well, the Mod data is all historical data; in other words, the claim event and associated cost have already occurred. If that is the wisdom, it seems that NCCI would add projected, needed money for medical inflation in the ratemaking (Manual Rates) side of the formula and not the Mod side of the premium calculation. Rates project the amount needed to cover future costs, and the Mod rewards or penalizes employers based on their individual loss performance.

Another theory is that the WC market is “soft” and that many carriers are granting credit (premium reductions) to get accounts, and we all know that competition suppresses price — in this case premiums. So, perhaps NCCI is attempting to protect carriers from themselves in the decreasing revenues department by adjusting Mod upward in spite of an employer posting losses that have made the carrier money.

You may not know that while NCCI does use Subject Premium — rate times payroll — in the Mod data calculation, it also gets the actual premium charged the employer. NCCI gets a copy of every policy that is issued by an affiliate company (one that subscribes to its services). So, NCCI can see the actual premium ultimately charged the employer, which differs from the Subject Premium used on the Mod worksheet. I can only surmise that it collects, sorts and analyzes the actual premiums charged and then makes Mod logic formula adjustments in an effort to offset aggressive underwriter pricing.

Whatever the case, the NCCI is the governing body of the workers compensation system in the U.S. It is relied on to produce valuable and credible data so that underwriters can make informed and warranted pricing decisions on risk selection and premium quotation. ■



Thinking Holistically and Adaptively to Solve Environmental Problems

by Thomas J. Glancey, P.G.

Thomas J. Glancey, P.G., has over 20 years' experience in the environmental remediation and compliance market. He founded TG Environmental Decisions Ltd. (TGED) to provide superior professional, regulatory and technical consulting and comprehensive environmental remediation and compliance services that consistently result in positive outcomes for clients and reduce overall life-cycle costs for their environmental programs. TGED uses a decision-based framework developed by Glancey to resolve environmental site/remedial investigation, feasibility study/remedial action selection, and remediation problems, such that an optimal remedial action, site closure or compliance strategy can be tailored to achieve an outcome that meets or exceeds a particular client's business need(s).

Most environmental consultants and engineers are adept at negotiating the technical and regulatory landscape, and even developing a decent remediation plan that is approved by the federal or state agency regulating the work. However, in many instances, important environmental site remediation and closure decisions are based on a remedial action work plan culled *ad hoc* from a number of technical reports and documents prepared by various environmental contractors. Even though there are file boxes full of information disposal and possibly a remedy approved by the lead regulatory agency, there remains concern that the remediation may take longer or cost more than expected. Why? Believe it or not — *uncertainty!*

Still, there is a singular certainty in the environmental remediation and compliance field — **one size does not fit all**. A sound technical and regulatory approach that is appropriate for one client's situation may be disastrous for another client, which is why it is essential for the environmental practitioner to:

- Understand the client's core business need(s) prior to developing a strategy for site remediation and/or regulatory compliance.
- Think holistically when developing and implementing a site environmental program.
- Be flexible and continually re-evaluate site conditions to optimize the program in terms of meeting the client's fundamental objective(s).

The remainder of this paper describes a contemporary, functional method for achieving these objectives in a cost-beneficial manner.

Description of the Problem

Why does so much uncertainty exist when volumes of data and information are available? One major problem is that some consultants and engineers simply are not creative in applying the tools available to them; others cannot see the world outside of their technical discipline. These practitioners become fixated on what they are comfortable with because they are either not willing or able to do the heavy lifting and hard work required to arrive at an innovative solution. As a result, the client winds up with an expensive excavation remedy or an annuity approach to site remediation: either an undefined long-term groundwater monitoring program or an expensive engineering solution with long-term monitoring. Nothing is wrong with these approaches in concept. Their flippant application, however, without any real thought to a forward-thinking site closure solution that meets the client's business goal, ends up costing

these same consumers of environmental services untold millions each year.

Solution to the Problem

In order to reduce the inherent uncertainty surrounding environmental liabilities and remediation costs, it is important to consider the end point (i.e., site closure) through all project phases, and focus site remediation work on achieving this ultimate objective. It is also necessary to take a proactive and flexible approach, and make adjustments along the way to achieve site regulatory closure for a reasonable cost and within the desired timeframe. The following three methods describe a process that can accomplish these goals:

- Comprehensive holistic approach.
- Focused application of decision analysis.
- Flexible/adaptive site closure strategy.

Each of these complementary processes is described in greater detail and the value of combining all three components into an overall regulatory site closure strategy is further illustrated.

Comprehensive Holistic Approach

Successful environmental investigation and remediation programs are typically founded on a comprehensive, concise Conceptual Site Model (CSM) that identifies and evaluates the interrelationships between:

- Primary and secondary contaminant sources.
- Physical properties of the chemicals of concern (COCs).
- Site hydrogeologic setting (including geochemical and biological conditions).
- Site-specific COC fate and transport mechanisms.
- Nature of and distance to potential sensitive receptors.
- Potential exposure pathways.

If an exposure pathway is not complete, based on the CSM and accompanying site-specific analysis, there is no potential for human and ecological exposure, and no further action is warranted because no material risk exists to either human or ecological receptors. Establishing the CSM early in the site remediation process facilitates a more holistic approach by providing an ever-present reminder of the big picture for the practitioner and client to rely on when discussing and making important decisions.

Case Study

An industrial client had a legacy site with a large groundwater plume containing recalcitrant chlorinated solvent compounds. A municipal supply well field supplying potable water contaminated with the same chlorinated solvents (among other chemicals) was situated downgradient of the former facility. Using the state's generic Natural Resource Damage (NRD) calculator and the predicted extent of the chlorinated solvent plume, the client's NRD liability stood at over \$5 million.

The first step was to review and analyze site-specific data and other information from regulatory agency file reviews and available literature, but just being familiar with the dataset was not enough. Using these data and information, a detailed CSM was developed to depict the complicated geologic and hydrologic setting, the distribution of contamination and help identify other potential contaminant sources. Establishing a strong platform for more detailed data analysis was essential in supporting wide-ranging technical conclusions regarding other potential contaminant sources.

In combination with the CSM, detailed statistical analysis of periodic groundwater quality data was utilized to establish spatial and temporal trends to identify potential contaminant sources (other than the client's site) that could be reasonably expected to impact the downgradient municipal supply well field.

Scenarios that could lead to commingling between these other potential sources and the client's groundwater plume were also presented. As a result, the regulatory agency was compelled to look in more detail at these other potential sources.

Establishing a concise, easily understood Conceptual Site Model using site-specific data and other pertinent information is germane to successfully implementing any site remediation program over both the near- and long-terms, sort of like a home-run hitter works tirelessly on fundamental batting mechanics so that he can hit the long ball more consistently during the game. Thinking holistically was critical in solving this client's problem; numerous other potential contaminant sources, whose plumes likely intermingled with the client's plume, were readily identified and presented to the lead regulatory agency to significantly reduce the client's potential multi-million dollar NRD liability. The importance of this step cannot be overemphasized.

Focused Application of Decision Analysis

How can decision analysis, which is typically used to evaluate complicated business decisions, be applied effectively to help answer environmental compliance and site remediation questions? Decision analysis takes many forms, and can be adjusted in complexity and formality to meet project and client needs. Given the right information, a moderately robust decision analysis for a Superfund remediation can literally be performed on the back of a paper napkin at a lunch meeting!

By understanding the client's underlying business issues, processes and economics that drive decision making, the decision analysis can identify and evaluate all potential remedial and environmental risk management options and can be specifically tailored to the client's overall business objectives. Decision analysis should be one of the primary devices in every consultant's environmental remediation and compliance toolbox.

So much so that the American Society of Testing and Materials (ASTM), the same organization that developed the industry standard for Phase 1 Environmental Site Assessments (ESA), issued and updated ASTM Standard No. E2137 — 06 *Standard Guide for Estimating Monetary Costs and Liabilities for Environmental Matters*, specifically recommending the use of decision analysis to quantify environmental liabilities. Yet, surprisingly, many environmental practitioners would not even be able to describe the process of decision analysis in general terms, let alone apply it to optimize your site remediation/compliance program.

Case Study

A small environmental consulting firm landed a quick burn project with a major insurance company. Everything was copacetic until the consulting firm showed up on the first day with only two people (albeit senior professionals) to review/analyze information in 100 file boxes, and quantify site remediation costs for a portfolio of 65 international pharmaceutical sites within the next week. Enter decision analysis ...

If this project was going to be successful, you need two seasoned professionals to quickly review the reports and weed out the less complex remediation programs that could be more readily and efficiently quantified (i.e., engineering controls, institutional controls and monitoring only programs). Depending on site-specific conditions and availability of information, decision analysis was applied with varying degrees of complexity to quickly evaluate potential site remediation scenarios and quantify environmental liabilities accordingly.

In situations where sufficient information was available to identify and quantify several remediation scenarios, decision analysis was applied in a comprehensive manner to calculate the

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Thinking Holistically and Adaptively to Solve Environmental Problems

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Expected Value (EV) of the remediation program and a range of potential cost deviations from the EV. However, even if inadequate information was readily available to calculate a true EV for site remediation, a Most Likely Value (MLV), based on professional judgment, was used to provide a reasonable and supportable valuation of potential environmental liabilities, as necessary.

The creative application of decision analysis was crucial in providing quick, supportable and quantifiable answers to complicated questions, and more importantly, in solving the client's problem within the highly aggressive project timeframe. Deals can be done quickly when the environmental consultant works closely with the client in identifying priorities, takes advantage of the wide-ranging tools available and takes actions that are in line with the client's overall business need.

Flexible/Adaptive Site Closure Strategy

It is critical for the consultant to not only establish a solid technical and regulatory foundation but also to adapt to an ever-changing technical and regulatory setting. Therefore, the site remediation approach must have the capacity to change to ensure that the program continually improves and maintains alignment with the client's overall business objectives. Generally, to retain this kind of flexibility, the consultant must be:

- An expert in completing the site remediation program within the site-specific technical and regulatory environment.
- Adaptive in using new/innovative remedial technologies and site closure approaches.
- Collaborative with the client and other stakeholders to ensure goal alignment from the beginning until the end of the site remediation program.

While these attributes may appear commonplace, the underlying forces that drive all three are by nature continuously changing and evolving, and if unaddressed on an ongoing basis will inevitably and ultimately lead to sub-par site remediation and closure programs. This softer concept may be best illustrated with an example.

Case Study

A commercial site was formerly a solvent recycling center that operated pursuant to applicable federal Resource Conservation and Recovery Act (RCRA) and state regulations. The client decided to cease operations, implement RCRA closure, liquidate the underperforming asset, and further comply with state industrial site cleanup regulations for real estate transfer to commercial and residential redevelopment concerns. The site was RCRA closed in 2000 and the property was sold in 2001, as the further remediation continued in compliance with applicable state site remediation and closure regulations.

Initially, the client was mostly interested in optimally using all relevant data from previous work performed pursuant to RCRA and other federal/state programs to limit the amount of additional work pursuant to state site remediation closure regulations. This initial goal was achieved in a sense that greater than half (about 60 percent) of the more than 20 areas of concern (AOC) were closed without poking another hole in the ground; however, it literally took the state regulators almost eight years to come to the same conclusions evident to the consultant and client from the beginning.

Fast forward to 2010 ... the regulatory climate has changed, and it is now beneficial for the client to close the site as soon as practicable and remove the continuing liability from the books. This can be accomplished by leveraging the innovative investigation and remediation

technologies that have emerged since 2001, and make a priority of closing the remainder of the soil AOCs and addressing groundwater through an aggressive *in situ* remediation program and/or a Monitored Natural Attenuation (MNA) program, as warranted, to achieve the regulatory site closure in a timely and cost-benefit manner.

The National Research Council (NRC) developed the term Adaptive Site Management (ASM) to describe this integration of adaptive practices into site remediation in its publication *Environmental Cleanup at Navy Facilities: Adaptive Site Management* (NRC, 2003). The relevant regulations and technical information pertaining to environmental site remediation and closure are constantly changing and are also increasingly available in real time to anyone interested in formulating novel site closure concepts. More than ever, it is incumbent upon environmental consultants and engineers to keep abreast of all pertinent technical and regulatory decision-making factors and apply them in a collaborative and adaptive way to meet or exceed client expectations.

Power of Three

Imagine the power of collaboratively implementing a long-term program that coordinates all three methods into a flexible, continuously-improving site remediation and closure process that seeks to optimize the amount of site remediation achieved per dollar spent at every decision point throughout the site closure process. As further illustrated in the case study below, the most value is created through applying all three components in a unified effort to reduce life-cycle site remediation and closure costs.

Case Study

This case study summarizes a large Superfund site remediation utilizing a holistic, comprehensive and integrated site remedial paradigm, in concert with an

Adaptive Site Management strategy, to reduce remedial life-cycle costs that were estimated at over \$100 million — and for all practical matters are equal to the remaining funding for the project — by more than half.

First, the soil, wetlands sediment, petroleum product, shallow groundwater, deep groundwater, surface water data and other decision-relevant information was reviewed, organized and analyzed. Next, to confirm the remaining source area(s) and those areas amenable to cost-beneficial *in situ* remediation, it was critical to develop comprehensive hydrogeologic cross sections depicting the various aquifer zones and confining layers, supplemented with vertical profile maps for both contaminants and geochemical parameters of interest. All of this information was buttoned up into a concise CSM that was further leveraged to make additional technical evaluations (i.e., evaluation of applicable remedial alternatives) more robust in supporting U.S. Environmental Protection Agency (USEPA) approval of a flexible and holistic site remedy.

The remediation program was focused on addressing contaminated site media, including:

- Soil; shallow/deep groundwater (depths to 150 feet below ground surface impacted with chlorinated solvents).
- Up to seven feet of free petroleum product and substantial residual petroleum mass at the perimeter of the former lagoon area.
- Sediment and surface water within a 10-acre area of impacted wetlands immediately adjacent to the former process area.

The remedial cost estimates were about equal to the site's escrow fund. That is, there was no room for exceeding the budget without having to make a cash call to the responsible parties, most of which hadn't thought about this site since the

consent decree was signed 15 years ago. Obviously, to request more capital now, in the next five years, or worse yet, 20 or 30 years from now, would not be looked on favorably by the responsible parties.

By combining a holistic/innovative site remediation and closure strategy with an ASM approach and recognizing the increasing role of long-term stewardship, the remedy will be optimized on an ongoing basis to ensure that ineffective remedy components are modified or eliminated and the conceptual site model continually reflects current conditions. Site-specific application of the ASM method will formalize the routine examination of performance data and promote change, based on the data, to maintain optimum remedial performance. By working adaptively and collaboratively, remedial performance uncertainty will be inherently recognized, embraced and addressed proactively during all stages of the site remediation and restoration effort.

For this site, the integrated, sequenced remedial action program provides numerous decision points that maximize the opportunity to use cost-beneficial innovations on a trial-and-error basis and continually improve site remediation performance. The first priority is to reduce contaminant mass and mobility through discrete remedial actions, such as: improved cover and drainage; free petroleum product recovery; sediment removal and surface water treatment; and contaminant mass removal in the principal threat zone.

The second priority is to implement the more expansive and long-term remedy elements, such as phyto-remediation and deep groundwater remediation downgradient of the principal threat zone. To maintain flexibility, the design of the more expansive and long-term second-priority remediation components is contingent upon completion of the first-priority discrete removal actions. The first-priority discrete actions were

procured for an estimated \$40 million (or about 30 percent of the remaining funding). For that 30 percent, the site conditions contributing most significantly to potential human/ecological risk (and overall uncertainty) are addressed first and foremost, and the remaining 70 percent can be applied in a collaborative and adaptive manner to cost beneficially remediate the site within a reasonable timeframe.

Epilogue

Applying these processes consistently is not easy. Strong client advocacy must be supported by integrated, weight-of-evidence methods and decision-based strategies to facilitate timely approval by stakeholders maintaining divergent positions. Effective, appropriate and consistent communication among the various project stakeholders (including the regulatory agency or agencies, the surrounding community, and/or the public at large) is germane to the success of any site remediation and/or compliance program. The environmental consultant must work smart on a consistent basis, and maintain the desire to collaborate and innovate with interdisciplinary teams, the client and other stakeholders to achieve client objective(s) in a complex and fluid regulatory/technical environment. ■



Loss Control through Predictive Maintenance

by AI Uronis, CMRP

AI Uronis, CMRP, has earned the Certified Maintenance and Reliability Professional (CMRP) designation and is a member of the Society for Maintenance & Reliability Professionals (SMRP). He received an executive master's of business administration degree and a bachelor's in international business and a bachelor's in engineering degrees.

Predictive maintenance (PdM) technologies can help reduce risks and potential losses. They are nondestructive technologies and may include use of infrared thermography inspections, vibration analysis, oil analysis, motor current analysis and ultrasonic inspections. This article will focus on only one PdM technology, infrared (IR) thermography.

Infrared thermography is used for many different applications, including medical, environmental, military and law enforcement. It also can help identify facility electrical and mechanical thermal problems and determine roof moisture problems. IR also is used for building envelopes. Additionally, it can identify structural moisture that causes mold growth, insulation issues and wasted energy.

According to the insurer Zurich, between 25 to 30 percent of all large fire losses are caused by electrical faults. An electrical short in a power strip cord and three electrical panels resulted in fire losses at four businesses totaling more than \$3.6 million. There was extensive damage to the buildings, inventory and equipment, business was disrupted, customers inconvenienced and profits lost forever.

Many businesses close their doors for good following a serious fire. Insurance will generally reimburse for the building, equipment and stock lost in a fire. The one critical loss they cannot replace — customers. There might be a period of time when a business cannot provide the services or products clients want. The best way to keep a business and a customer base intact is to invest time and effort in fire prevention. Infrared thermography inspections of electrical systems can assist.

The History of Infrared

Sir **William Herschel**, an astronomer, discovered infrared in 1800. He built his own telescopes and therefore was very familiar with lenses and mirrors. Knowing that sunlight was made up of

all the colors of the spectrum, and that it was also a source of heat, Herschel wanted to find out which color(s) were responsible for heating objects. He devised an experiment using a prism, paperboard and thermometers with blackened bulbs to measure the temperatures of the different colors. Herschel observed an increase in temperature as he moved the thermometer from violet to red in the rainbow created by sunlight passing through the prism. He found that the hottest temperature was actually beyond red light. The radiation causing this heating was not visible; Herschel termed this invisible radiation “calorific rays.” Today, we know it as infrared.

About Thermography

Thermography is the use of an infrared imaging and measurement camera to “see” and “measure” thermal energy emitted from an object. Thermal, or infrared energy, is light that is not visible because its wavelength is too long to be detected by the human eye; it's the part of the electromagnetic spectrum that we perceive as heat. Unlike visible light, in the infrared world, everything with a temperature above absolute zero emits heat. Even very cold objects, such as ice cubes, emit infrared. The higher the object's temperature, the greater the IR radiation emitted. Infrared allows us to see what our eyes cannot.

IR thermography detects and displays normally invisible IR emitted by an object. Infrared thermography cameras produce images of invisible infrared, or “heat” radiation, and provide precise noncontact temperature measurement capabilities. Nearly everything gets hot before it fails. Infrared inspections are extremely cost-effective, valuable diagnostic tools for many diverse applications. Infrared inspection programs help industry improve manufacturing efficiencies, manage energy, improve product quality and enhance worker safety.

How the Infrared Camera Works

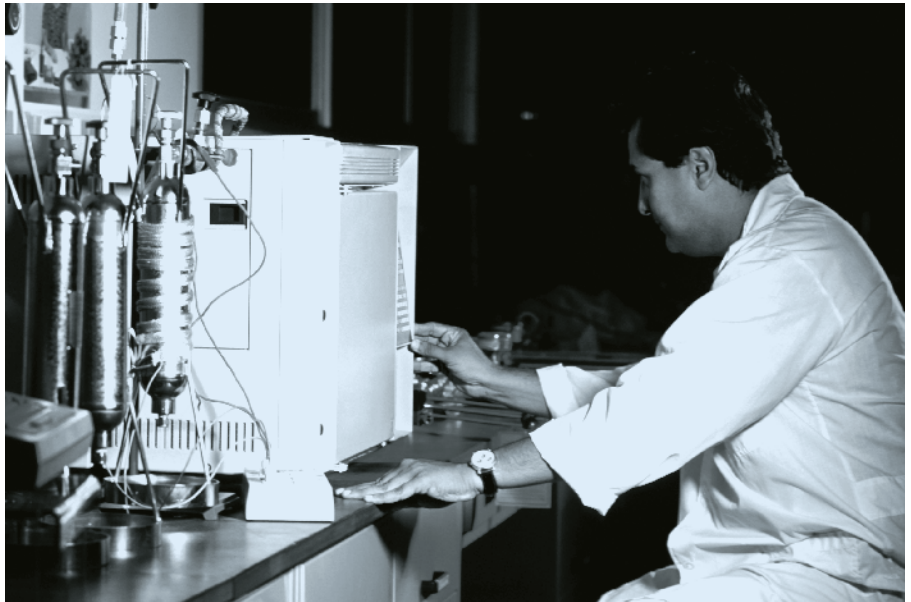
According to FLIR Systems Inc., an IR camera manufacturer, an infrared camera is a noncontact device that detects infrared energy (heat) and converts it into an electronic signal. It is then processed to produce a thermal image on a video monitor and performs temperature calculations. Heat sensed by an infrared camera can be precisely quantified, or measured, allowing you to not only monitor thermal performance, but also identify and evaluate the relative severity of heat-related problems. Recent innovations, particularly detector technology, the incorporation of built-in visual imaging, automatic functionality and infrared software development, deliver more cost-effective thermal analysis solutions than ever before.

Why Conduct Infrared Inspections?

Infrared inspections are utilized for early detection of electrical, mechanical, building envelope and roof moisture problems.

Aerial infrared inspections are utilized for early detection of roof insulation saturation and leaks. According to military facility engineering maintenance manuals, the failure to find and correct minor defects and deterioration in its earliest stages is probably the greatest cause of premature roof failures. This is particularly true of built-up roofing applied on relatively low sloped roofs. According to the U.S. Army Corps of Engineers, wet roofing also increases energy losses up to 70 percent due to wet insulation losing its thermal resistance.

Infrared thermography is the only diagnostic technology that lets you instantly visualize and verify thermal performance. Cost-effective power management is critical to maintaining



the reliability of electrical and mechanical systems. Today, few would argue the proven predictive maintenance benefits of infrared thermography and its effectiveness. PdM technology quickly, accurately and safely locates problems prior to failure. Finding and fixing a poor electrical connection before a component fails can save the much greater costs associated with manufacturing downtime, production losses, power outages, fires and catastrophic failures. Infrared thermography inspections are highly recommended by insurance risk engineers around the world.

Production processes, goods in storage, even the routine day-to-day administrative functions of a normal business, all require a dependable source of electric power. According to industry statistics, electrical failure is the leading cause of industrial dollar losses. Depending on the specific electrical equipment involved, its usage and the severity of the event, losses may range from a few thousand dollars to millions of dollars in property damage, lost production capacity and/or loss of products in storage. Further, an electrical

failure may trigger a fire that destroys the entire facility.

The likelihood of electrical failure can be greatly reduced by performing infrared thermographic inspections to detect problems before they result in failure. Infrared thermography can detect such conditions as loose or corroded connections, faulty contacts, or overloaded or unbalanced circuits. These conditions often cannot be detected by the naked eye prior to failure. They do, however, result in elevated temperatures that can be detected by infrared thermographic testing. Corrective action can then be taken before failure results.

The electrical system in a plant or business is often taken for granted, but it does require periodic maintenance and inspection. Infrared imaging enables the user to discover hidden defects such as loose wires and overloaded circuits as well as malfunctioning mechanical equipment.

Rectifying the problems found using infrared testing can result in more

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Loss Control through Predictive Maintenance

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efficient energy usage, reduction in potential damage to equipment, less emergency maintenance and reduced downtime. According to FLIR, finding a problem with an infrared camera is sometimes not enough. In fact, an infrared camera image alone without accurate temperature measurements says very little about the condition of an electrical connection or worn mechanical part. Many electrical targets are operating properly at temperatures that are significantly above ambient (room temperature). An infrared image without measurement can be misleading because it may visually suggest a problem that does not exist. Analysis should be conducted by highly trained and skilled thermographers.

Historically, many facilities have relied on scheduled outages to visually inspect, clean and tighten connections in major switchgear to protect against failure. A typical shutdown of a large site could involve an entire weekend and require significant manpower to accomplish. The problem with this approach is not only the logistics and expense, but that many problems cannot be detected by visual inspection. It has also been shown that frequent tightening of connections can lead to over-torquing, which in itself may result in failure. These issues can be alleviated by performing infrared thermographic inspections before scheduled outages to help pinpoint the electrical connections requiring attention. By doing so, corrective action can be focused on only those items that need to be addressed. Infrared inspections should be performed on a regular frequency as an integral part of the electrical maintenance program.

Summary

Utilizing predictive maintenance technologies not only reduces risks of loss and improves reliability, it also adds to an operation's overall profitability. Infrared inspections of electrical systems should only be performed by properly trained and certified thermographers following all appropriate safety precautions. ■

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Moderator:

Jill D. McCook, CPCU, AIS
State Farm

Presenters:

Debra T. Ballen, CPCU, J.D.
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Charles M. Nyce, CPCU, Ph.D., ARM
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