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Control Technology Center NEWS

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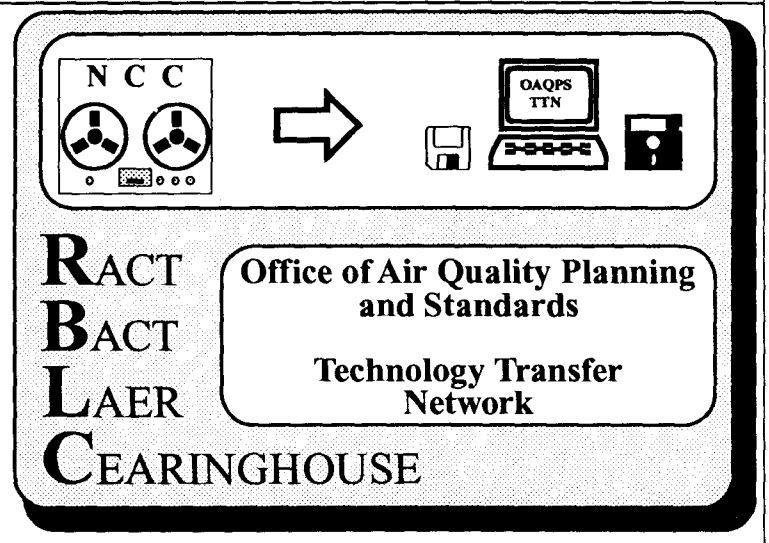
BLIS OPENS DOORS FOR BUSINESS ON THE OAQPS TTN!

By Joe Steigerwald
CTC/OAQPS

The RACT/BACT/LAER Clearinghouse Information System, commonly known by the acronym BLIS, has completed it's move from the National Computer Center (NCC) to the OAQPS Technology Transfer Network (TTN) Bulletin Board System (BBS). The new BLIS BBS offers many new features. These include: text search capabilities; new report formats; new data elements; an extensive HELP function; agency editing/updating; and all of the functions intrinsic to a BBS. I will briefly describe each of the new features below.

HELP Function: The BLIS Database portion of the BLIS BBS contains a screen sensitive HELP function. Just hit the F1 function key on your computer from anywhere in the BLIS database and a HELP screen will pop up specific to the screen that you are currently viewing. The HELP screens include lists of data such as the pollutants included in the database or the process codes used and explanations of the functions listed on the screen.



Agency Edit/Update: This is one of the most exciting features of the new BLIS BBS. It allows the authorized State, local, or regional agency BLIS contact to enter new data or revise existing data entered by their agency. The data is put into a Transient BLIS

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AIRWAVES

By Charles H. Darvin
CTC Co-chair

During the last year, the CTC has added a number of new users to its rolls both nationally and internationally. So, I thought it would be a good time to reintroduce our older friends and introduce our new friends to the CTC. Many of you are familiar with Robert J. Blaszczak, the CTC Co-Chair representing the air regulatory side of EPA. He's the one with the gift of gab who writes many of the Airwaves articles. I am the other Co-Chair representing the air research and development side of EPA. This division of responsibility is important for the resolution of many of your CTC requests. Although most questions involve regulatory issues, some require a more detailed scientific and technical response. Thus, the CTC is sponsored and staffed by two EPA offices: The Office of Air Quality Planning and Standards (OAQPS), the air regulations development office of EPA, and the Air and Energy Engineering Research Laboratory (AEERL), the primary air research laboratory of the EPA Office of Research and Development.

Each Co-Chair has a resident staff responding to questions in the respective areas of responsibility. Most staff members are nationally recognized experts in some area of air pollution research or control. Questions that cannot be answered by the CTC staff are referred to one or both of the sponsoring organizations for further study and resolution. Their staffs include more than 200 technical experts in air pollution regulation development and air pollution research and development. In most cases someone knows the answer or how to get the answer. The CTC has also established informal agreements to solicit the assistance of other EPA laboratories and government technology transfer centers on questions outside its areas of expertise.

The CTC program is unique, setting it apart from most other technical assistance and technology transfer programs. The CTC conducts technical studies to develop information for resolutions of many of your questions. These projects fall outside the scope of pure research and development: they are scientific inquiries to answer more practical questions using the best scientific procedures. They give the supporting

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BLIS OPENS

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Database. This database may be used as a working file by the issuing agency and can help the agency track their permits. When an entry is complete, the agency contact marks it as 'complete' and we take over. We review the data and, if it's complete, insert it into the permanent BLIS database. If not, it is marked as 'incomplete' and the issuing agency is notified. It's hoped that all air pollution control agencies will use this method of inputting and revising data submittals to BLIS, and in the future, we can move towards a purely electronic system.

Text Search Feature: The BLIS BBS will allow users to do word searches on some data items. For example, if a user was interested in electric arc furnaces, he or she could search for the word 'arc' in the process name. BLIS would retrieve the determination whether the process was listed as 'electric arc furnace' or 'furnace, elect. arc'. This feature may be used on many of the data fields in BLIS.

New Report Formats: BLIS allows the user to download data selected under the Query option in a variety of formats. Several are similar to the formats found in the Clearinghouse documents. These include a detailed listing (Clearinghouse Appendix H format) and an index listing of the facility name and other basic information (Clearinghouse Appendix F format). The new formats are a Scheduling report and a dBase/Lotus report. The Scheduling report allows the user to search single or multiple reporting dates and print out those entries that are late. The dBase/Lotus report formats certain data elements into a format that may be directly input or manipulated by dBase or Lotus.

New Data Elements: We've added many new data elements to the BLIS database. These new data elements include extensive scheduling information, AIRS ID and EPA ID numbers, SCC and SIC codes, compliance verification data, control equipment manufacturer data, and more cost data for the control equipment and pollution removal. All of the new data elements will remain blank for the existing entries unless the issuing agency chooses to submit the data.

Other BLIS BBS Functions: In addition to the database, the BLIS BBS has many other functions such as document ordering, downloading of documents and software programs, electronic mail, and leaving BLIS HOTLINE requests. Anyone may use any of these features except the document ordering function: *the CTC can only honor document orders from government agencies.* The list of downloadable items includes a BLIS Users Manual and a list of the new process codes being used in the database. The BLIS HOTLINE requests may be used to notify us of a problem you are having with the system, to request some special information, or just to let us know what you think of the new system.

There are a few limitations included in the BLIS BBS: only 3 users may access the BLIS database portion of the BBS at any one time (i.e., doing searches, viewing, downloading, or editing data) and only 50 determinations may be formatted and downloaded at any one time. This was done to make sure that users could conduct searches in a reasonable amount of time. If 3 users are currently in the database, you will not be allowed access to this portion of BLIS. Please try to access the database again later.

Please be aware that the database portion of BLIS is a very complex program and that, even though it has gone through extensive testing/debugging, problems are still going to crop up. If you have a problem with the system PLEASE LET US KNOW ABOUT IT! Try to remember exactly what you did that produced the problem and, if a message popped up on the bottom of your screen before you were thrown out to the BBS portion of BLIS, please let us know verbatim what that message said. Leave me a note on the BBS or call me directly at (919) 541-2736 to let me know of a problem or to give me your opinion of the system.

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AIRWAVES

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scientists and engineers a view of the practical world faced by industry and regulatory agencies. They can address many of your practical technical problems by applying their extensive knowledge of fundamental scientific concepts to practical problems. The CTC therefore encourages requests for technical studies over a broad range of topics. All you have to do is make a request. During the past fiscal year the CTC initiated 19 new field and laboratory studies to support your regulatory needs and to develop information on more efficient control technologies and manufacturing processes. Examples of projects that were initiated at your request include an evaluation of two end-of-pipe technologies that may permit control of styrene emissions from the manufacture of fiberglass products. This study resulted from your concern for a method for controlling styrene emissions from these industrial sources. Another project is the laboratory evaluation of particulate filter system capture efficiencies. This study resulted from your concern for the difference in capture efficiency based on weight of capture versus efficiency based on partial size capture. We also have a number of studies to characterize emissions from asphalt melting, tire burning, and from the combustion of various wood and synthetic products.

In the coming year we hope to expand our technical studies to evaluate and identify a broader range of manufacturing and control technologies. We continue to encourage your participation in our studies by submitting ideas for other potential technology study areas.

Remember, good regulation begins with good science.

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NO_x CONTROLS FOR EXISTING UTILITY BOILERS

By Bill Neuffer
ESD/OAQPS

The Northeast States for Coordinated Air Use Management (NESCAUM) requested assistance from the CTC in the development of a technical support document that would discuss the feasibility, performance and costs of retrofit nitrogen oxides (NO_x) controls for utility boilers operating in the eight Northeast states that comprise the NESCAUM region. Section 182 of the Clean Air Act Amendments of 1990 (CAAA) requires the NESCAUM States to develop reasonably available control technology (RACT) standards for utility boilers and other NO_x sources. This document will also assist OAQPS in developing alternative control techniques (ACT) documents for NO_x controls for utility boilers. The ACT documents are required under Section 183(c) of the CAAA for stationary source categories that emit or have the potential to emit 25 tons per year of NO_x. The report titled "Evaluation and Costing of NO_x Controls for Existing Utility Boilers in the NESCAUM Region", (EPA-453/R-92-010) is now available.

This document discusses:

- Utility boiler population profile in the NESCAUM region.
- Uncontrolled NO_x emissions as a function of boiler designs, fuels, and age and current estimates of total NO_x emissions.
- Available NO_x control technologies and their performance for coal- and oil/gas fired boilers.
- Cost methodology for determining the costs of 21 scenarios for NO_x controls.
- Costs and cost effectiveness of controls as a function of several design and operating characteristics of boilers.
- Impacts of NO_x controls on combustible emissions (CO, HC, and carbon in flyash).

Because the applicability, ease of retrofit, NO_x reduction performance, and costs are very much influenced by site-specific factors that cannot be taken fully into account without a site-by-site retrofit analysis, results and conclusions presented in this report should be interpreted on the basis of the limited NO_x retrofit experience reported to date. Site-specific analyses are recommended to ascertain whether the emission levels, percent NO_x reductions, and costs cited in this report can be achieved on a long term basis by a given site.

Boiler Type	NOx Control	NOx Control Levels (lb/MMbtu)	% NOx Control Efficiency	Cost Effectiveness ($/ton)
PC-Wall	OFA	0.70 - 0.80	15 - 30	410 - 1100
PC-Wall	LNB	0.45 - 0.60	35 - 55	160 - 450
PC-Wall	LNB+OFA	0.35 - 0.55	40 - 60	270 - 800
PC-Tang	LNB+CCOFA	0.40 - 0.45	25 - 50	500 - 1300
PC-Tang	LNB+SOFA	0.30 - 0.45	25 - 50	420 - 1600
PC-Wall	SNCR	0.50 - 0.65	30 - 50	590 - 1100
PC-Wall	SCR	0.15 - 0.25	75 - 85	1700 - 3200
PC-Tang	SNCR	0.30 - 0.40	30 - 50	630 - 1300
PC-Tang	SCR	0.10 - 0.15	75 - 85	2600 - 5000
Cyclone	NGR	0.50 - 0.70	45 - 65	500 - 800
O/G Wall	BOOS	0.30 - 0.35	15 - 50	230 - 510
O/G Wall	FGR	0.25 - 0.35	30 - 50	320 - 1000
O/G Wall	LNB	0.25 - 0.30	25 - 50	750 - 1700
O/G Wall	LNB+OFA+FGR	0.10 - 0.20	30 - 80	900 - 2600
O/G Tang	BOOS	0.20 - 0.25	15 - 35	340 - 740
O/G Tang	LNB	0.15 - 0.25	15 - 50	1000 - 5100
O/G Wall	SNCR	0.25 - 0.30	35 - 50	670 - 1100
O/G Wall	SCR	0.10 - 0.15	70 - 80	2600 - 4900
O/G Tang	SNCR	0.15 - 0.20	35 - 50	800 - 2200
O/G Tang	SCR	0.05 - 0.10	65 - 85	3600 - 7400

Tang - Tangential PC - Pulverized Coal O/G - Oil/Gas
CCOFA - Close Coupled OFA SOFA - Separated OFA

Table 1. Summary of NOx Controls - Performance and Cost Effectiveness

NO_x emissions from utility boilers are a function of fuel properties and many boiler design and operating variables. Among the most important variables are the fuel nitrogen content, the excess air, the heat release rate per unit of waterwall area in the burner zone, the amount of air preheat and the burner spacing and stoichiometry.

NO_x combustion modification technologies such as low NO_x burners (LNB), overfire air (OFA), burners out of service (BOOS) and flue gas recirculation (FGR) are the principal methods for controlling NO_x from existing and new utility boilers. Flue gas treatment controls including selective catalytic reduction (SCR) and selective noncatalytic reduction (SNCR) can provide additional NO_x reductions from combustion controlled levels or can be used without combustion modifications. Both of these processes have seen very limited application in the United States for utility boilers, but SCR is being used extensively in Japan and Germany with reported successes on all fuels.

Table 1 summarizes the NO_x emission levels and cost effectiveness for various control technologies for 200 MW units. For PC- wall fired boilers the bulk of the retrofit experience is limited to low NO_x burners. Overfire air (OFA) is generally not installed because of additional expenses and possible adverse impacts on the operation and efficiency of the boiler. For tangential fired boilers LNB always has close coupled OFA or, in more advance systems, separate OFA. The range in control efficiency for LNB and/or OFA is 15-60%. Cost effectiveness is typically in the range of $ 200-1,000 per ton of NO_x removed.

Natural gas reburning (NGR) for coal-firing boilers can achieve 45 to 65% NO_x reductions. The technical and economic feasibility of NGR are currently under study. Cost effectiveness is under $800/ton NO_x removed when

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NOx CONTROLS

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applied to high NO_x emitting cyclone units.

For coal fired utility boilers, SNCR can achieve similar emission reductions at slightly higher cost effectiveness as combustion modifications ($590 - 1300/ton). SCR can achieved 80 percent NO_x reductions from uncontrolled boilers at a cost effectiveness of $1700 - 5000/ton. However due to limited full scale experience, the cost estimates for SNCR and SCR have a high degree of uncertainty.

Combustion modification controls for oil/gas fired utility boilers have been used since the early 1970s primarily in California. Estimated emission levels for these controls are 0.1 to 0.35 lb/MMBtu or a NO_x reduction of 15-80%. The cost effectiveness varies from $100 to $5100/ton. SNCR is estimated to achieve a 35 to 50 percent NO_x reduction at a cost effectiveness of $670 - 2200/ ton. SCR is estimated to achieve 65-85% reduction at cost effectiveness of $2600 - 7400/ton.

Call the CTC HOTLINE to order your copy!

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CONTROL OF VOC EMISSIONS FROM NONFERROUS METAL ROLLING PROCESSES

By Joe Myers
ISB/ESD/OAQPS

The Industrial Studies Branch (ISB) has completed its study for the CTC of the nonferrous metal rolling industry. This study provides information on the overview of the nonferrous metal rolling industry market structure, process descriptions, volatile organic compound (VOC) emission sources, various emission control techniques, and estimated costs associated with VOC control techniques for nonferrous metal rolling mills.

In general, a "nonferrous metal rolling mill" is defined as a process machine for the gauge reduction or forming of nonferrous metals by exerting pressure between rotating rolls. The nonferrous metal rolling industry consists of rolling facilities producing nonferrous plate, sheet, strip, and/or foil. This report focuses on the two most prominent types of nonferrous metal rolling operations in the U.S. today: aluminum and copper. Bureau of the Census data indicate that a total of 55 establishments in the U.S. were engaged in aluminum rolling operations with a combined production rate of approximately 5.12 million tons in 1987. There were also 23 copper rolling facilities in the U.S. producing approximately 0.59 million tons of copper rolled products in 1987.

Two main types of raw materials are employed in the nonferrous rolling process: metal or metal alloy and lubricant. Initially, metal in the form of ingots (manufactured by primary or secondary producers) undergoes hot rolling, using a water-based lubricant, which reduces these ingots to plate and heavy-gauge sheets sizes. These plates and sheets then undergo cold rolling, which typically uses a petroleum-based lubricant for the production of light-gauge sheet, strip, or foil.

The aluminum rolling industry is divided among plants that perform both hot and cold rolling, those that engage in foil (cold) rolling, and those that continuously cast. The copper rolling industry is similar in structure to aluminum given that certain facilities perform both hot and cold rolling, while other facilities perform cold rolling only.

VOC emissions from nonferrous metal rolling facilities are either in the form of a vapor or an aerosol. The VOC emissions are generated from the vaporization of rolling lubricants used with the following mills: tandem mills, cluster mills, Sendzmir mills, and continuous casters. Emissions left uncontrolled can generate high VOC concentrations in the work area compromising health, safety, and productivity. Control of these VOC emissions can be achieved by ventilating the manufacturing area to well designed equipment. Typical capture devices such as enclosures, hoods, and other devices are applicable to the rolling mill to remove the emissions from the manufacturing area and transport them to appropriate control equipment.

The focus of this study is VOC emission control techniques used by

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THE CLEAN AIR ACT AMENDMENTS OF 1990 A GUIDE FOR SMALL BUSINESSES

By Deborah M. Elmore
CTC/SBAP/OAQPS

The Clean Air Act Amendments of 1990 will place new Federal controls on small sources of air pollution that ultimately may affect hundreds of thousands of small American businesses. To assist in understanding these new requirements, the Office of Air Quality Planning and Standards (OAQPS) has prepared "The Clean Air Act Amendments of 1990: A Guide for Small Businesses". Although specific regulations are still evolving, this guide is designed to provide small businesses, small business associations, and other interested persons with a broad overview of the Act's major requirements, and the effects these are likely to have on the small business community.

ANYONE! can receive a copy of this document, free of charge, by calling the CTC HOTLINE.

(Note: If you already ordered a copy, it's in the mail!)

NONFERROUS METAL

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copper and aluminum rolling mills. The following control techniques discussed are: carbon adsorption, absorption, incineration, and lubricant substitution. A control cost analysis is also provided for each of the control techniques previously addressed.

This CTC report includes sections on industry structure and rolling processes; VOC emissions; emission control techniques; and control costs.

Call the CTC HOTLINE to order your copy!

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CARBON DISULFIDE EMISSION CONTROL OPTIONS

By Deborah Elmore
CTC/OAQPS

The CTC has completed its study of control options for carbon disulfide emissions. The report presents a description of methods or techniques to control carbon disulfide emissions from a variety of source categories. The control options discussed include methods using absorption, adsorption, ventilation and condensation, absorption/oxidation, thermal oxidation, catalytic conversion, and biotreatment. The report also contains background information on carbon disulfide, and a discussion of carbon disulfide emission source categories.

The carbon disulfide emission control options presented include existing applications, as well as some that are still in research or experimental stages. Several of these techniques are quite sensitive to the characteristics of the waste stream. Therefore, the nature of these streams must be carefully considered when choosing a potential control option.

The CTC HOTLINE has received many calls seeking information on controlling carbon disulfide emissions. This interest lead to the development of this report. Information on the various control options presented was gathered from computer literature searches, control equipment vendors, plant operators, and the Chemical Manufacturer's Association. To order a copy, call the CTC HOTLINE.

TIRE BURNING MUTAGENICITY STUDY COMPLETED

By Paul M. Lemieux
AEERL

As a follow-up to an earlier CTC study (EPA-600/2-89-054 [NTIS PB90-126004]) examining emissions from a simulated open burning of scrap rubber tires, another study has been completed examining the mutagenicity of the emissions from the simulated tire fire. These additional analyses were performed on the organic extracts derived from the earlier study. This report, entitled "Mutagenicity of Emissions from the Simulated Open Burning of Scrap Rubber Tires," (EPA-600/R-92-127 [NTIS PB92-217009]) is available from the CTC.

In the earlier study, done under the direction of EPA's Air and Energy Engineering Research Laboratory (AEERL), small (approx. 10 kg) quantities of scrap tires were burned in controlled conditions, meant to simulate an open burning situation, and the organic and inorganic emissions were measured, as well as combustion gas products (CO, SO2, hydrocarbons), particulates, and burning rates. These measurements were then used to estimate quantities of identified compounds emitted per kilogram of tire burned. In the earlier study, many organic compounds, including some known carcinogens, were identified. There was, however, a significant amount of unidentified material in the samples, and the health effects of the complex mixture were not known.

The CTC then funded a follow-up study, in which EPA's Health Effects Research Laboratory (HERL) used Salmonella-based bioassays, coupled with bioassay-directed fractionation and chemical analysis to examine 1) the mutagenic emission factor of the emissions and 2) the chemical species and/or classes of species contributing to the biological activity. Bioassay-directed fractionation and chemical analysis is an experimental technique where High Performance Liquid Chromatography (HPLC) is used to analyze and separate organic samples into fractions. These individual fractions can then be applied to Salmonella TA98 bacteria. The number of cell mutations (revertants) can then be counted, the mutagenicity of the sample determined, and a "mutagram" plot created. By utilizing certain metabolic triggers within the Salmonella TA98 strains, HERL is able to determine the classes of compounds resulting in the mutagenicity of the samples. The -S9 and +S9 conditions are an example of such metabolic triggers. Polycyclic aromatic hydrocarbons (PAHs) generally give a +S9 response and no -S9 response. However, if the PAHs are substituted with other chemical con-

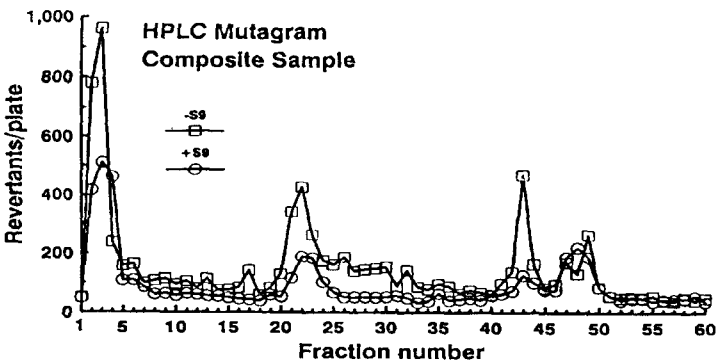

Figure 1. Salmonella TA98 Mutagram, Composite Sample

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TIRE BURNING

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stituents, such as -nitro groups, then an increase in -S9 activity is shown. Therefore if a sample containing an unknown mix of PAHs exhibits little or no -S9 activity, then non-substituted PAHs are indicated.

The results from this study indicate that open burning of scrap tires produced the highest mutagenic emission factor of any combustion source yet measured, approximately one order of magnitude higher than residential wood burning. Selected fractions from the fractionation were then re-analyzed by Gas Chromatography/Mass Spectroscopy (GC/MS) in order to identify the compounds present in the biologically active fractions. Much of the mutagenic activity is due to PAHs, many of which are known carcinogens. However, as much as 60% of the biological activity was due to substituted PAH material. These substituted PAHs contained oxygen (frequently in the form of a ketone group) or nitrogen (either as a dinitro aromatic group or actually bound inside the ring structure). Little activity could be attributed to mono-nitro aromatics. Figure 1 illustrates the mutagram produced during the bioassay-directed fractionation and chemical analysis of the sample, and Table 1 lists the compounds identified in the selected fractions.

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Table 1. Chemical Identified in HPLC Fractions of Particulate Organics from Composite Tire Burn Sample.

Fraction[a]	Chemicals
A	naphthlene, fluorene, phenanthrene, fluoranthene, pyrene, anthracene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)-anthracene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene
B	nonadecane, eicosane, anthraquinone, xanthane, benzanthrone
C	*dioctyl phthalate*
D	E-caprolactam, cyclododecane, acridine, naphthalic anhydride, benzanthrone, benzoisquinoline, perinaphthenone, methylbenzo-cinnoline

[a]Fractions A-D were composed of the following fractions from the mutagram in Figure 1 A (2,3), B (22-25), C (43), and D (47-49).

CTC EXPERT ON EMISSIONS FROM CHEMICAL INDUSTRIES: LESLIE EVANS

By Lisa Florer
Acurex Environmental

CTC calls concerning emissions and control of emissions from the synthetic organic chemical manufacturing industry are directed to one of the U.S. Environmental Protection Agency's National Experts in the field, Leslie Evans. For the past 20 years, Leslie has contributed significantly to EPA's knowledge of the control of emissions from the manufacture of chemicals derived from refineries and natural gas plants.

Leslie earned his B.S. in chemical engineering from North Carolina State in 1952 and went on to receive his M.B.A. from the University of North Carolina at Chapel Hill in 1957. When Leslie joined EPA, he brought with him a knowledge of the chemical manufacturing industry as he had worked for DuPont, Exxon Chemical, and Tenneco Chemical. He had also served in the Chemical Corps for the U.S. Army.

Since 1971, Leslie has worked for EPA's Office of Air Quality and Planning Standards (OAQPS). He is currently responsible for overseeing the work of several contractors working on the emissions and control of emissions from the synthetic organic chemical manufacturing industry and from polymer and resins production. Leslie also has technical responsibility for a number of other contracts. He assists in the preparation of Control Technique Guidelines documents (CTGs), New Source Performance Standards (NSPSs), and National Emission Standards for Hazardous Air Pollutants (NESHAPs). He is also responsible for maintaining a technical expertise on various types of pollution control devices.

Leslie receives calls from around the country about emission control issues. Many of these are calls about whether new technologies are as effective as older technologies demonstrated in the past. Leslie receives more CTC-generated calls now than several years ago, probably because of the Clean Air Act Amendments and the fact that industry is beginning to take a more serious approach to chemical manufacturing emissions.

Leslie feels very positive about his

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LESLIE EVANS

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work for the CTC. He says that the ability to answer technical questions gives him a sense of accomplishment. "You really feel you've done something worthwhile when you hang up from a 45-minute call from someone wanting your advice on a new technology." Answering CTC calls also helps keep Leslie aware of problems people are facing and keeps him up to date on current issues.

When they're not camping out in their sailboat in Oriental, North Carolina, Leslie and his family, reside in Durham. ctc

CTC TESTING DRY MEDIA PAINT ARRESTORS

The CTC is conducting evaluations of selected dry filter systems that are used to capture paint overspray droplets in the air exhausted from some paint spray booths. The testing uses the ASHRAE Standard 52-76 capture efficiency test for filters, but is done with droplets instead of dry particles and for size from 0.3 to 10 microns instead of from 0.1 to 3 microns as defined in the Standard. The results of these evaluations will be correlated with mathematical models and with weight arrestance test results of the same media to provide insights into the relative effectiveness of different media under different spray booth conditions. These media are typically designed to have relatively low capture efficiencies for droplets of such small sizes, because it is a necessary condition to maintaining a low pressure drop across the filter when holding the overspray from one or two shift's painting. However, it is believed that differences in the capture efficiency versus droplet size can be observed under calibrated test conditions. These differences, along with the mathematical models, are expected to predict the effectiveness under given spray booth conditions.

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TECH NOTEBOOK

What's In a Name? Chlorofluorocarbons and Their Replacements.

By Lyndon Cox
AEERL

Several callers to the CTC HOTLINE have requested the method of identifying both chlorofluorocarbons (CFCs -- Freon™ or Halon™) and the hydrochlorofluorocarbons (HCFCs) that, in many cases, will replace CFCs. Numerical codes for the simpler CFCs are given in the American Society of Refrigerating Engineers (ASRE) Standard 34 for Methane, Ethane, and Cycloalkane Refrigerants which has been used for many years. This numerical coding system has been extended to the HCFCs in Standard 34-1992, Number Designation and Safety Classification of Refrigerants, also known as the ANSI-ASHRAE Standard, and obtainable (price $21.00) from Publications Sales, ASHRAE, 1791 Tullie Circle Northeast, Atlanta, GA 30329. This standard has the following rules:

1. Each compound shall have an identifying number which is used in combination with the word "fluorocarbon," sometimes abbreviated to "FC."

2. Starting from the right, the first number is the number of fluorine atoms in the molecule of the compound.

3. The second digit from the right is one more than the number of hydrogen atoms in the molecule of the compound.

4. The third digit from the right is one less than the number of carbon atoms in the molecule of the compound. (Zeroes are usually omitted.)

5. The number of chlorine atoms in the molecule of the compound is found by subtracting the sum of fluorine and hydrogen atoms from the total of atoms that can be connected to the carbon atoms.

6. For cyclic derivatives, the letter "C" is used before the identifying number.

7. In those instances where bromine is present in place of all or part of the chlorine, the same rules apply except that the letter "B" follows the designation, and the number of bromine atoms follows the letter "B". Whenever bromine isomers can exist, the appended Greek letters will denote the position of the bromine atoms in the molecule

8. In the case of isomers having the same numerical designation, the most symmetrical one is indicated by the absence of a lower case letter following it. As the isomers become more unsymmetrical, the letters a, b, c, etc. are appended. Symmetry is determined by adding the atomic weights of the groups attached to each carbon, and subtracting one sum from another. The smaller the difference, the more symmetrical the molecule.

9. In unsaturated compounds, the number of double bonds is shown by the fourth digit from the right.

These rules have been extended to include:

10. When the number for a digit exceeds 9, it is set off by dashes.

11. Linear compounds are lettered starting at one end, cyclic compounds from a side group, or -- if there is none -- from a carbon in the ring.

Note that the new numerical designator gives the same results for simple compounds as the older rules which add 90 to the numerical designator to make the second digit from the right the number of hydrogens, and the third digit from the right the number of carbons.

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Control Technology Center NEWS

The CTC NEWS is a quarterly publication of the U.S.EPA's Control Technology Center (CTC). The CTC is an informal, easy-to-use, no cost, technical assistance service for all State and local (S/l) air pollution control agency and EPA Regional Office staffs. For others, some services may be on a cost reimbursable basis. The CTC offers quick access to EPA experts and expertise via the CTC HOTLINE and the CTC Bulletin Board, and in-depth technical support through source specific Engineering Assistance Projects or more generic Technical Guidance Projects. The CTC is operated by the Air and Energy Engineering Research Laboratory, Office of Research and Development, and the Emission Standards Division, Office of Air Quality Planning and Standards in Research Triangle Park, North Carolina.

If you have any air pollution emission or control questions, or would like more information about the CTC and the types of technical assistance available, CALL THE CTC HOTLINE!

(919) 541-0800

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CTC ASSISTANCE

No cost assistance to staff of State and Local agencies and EPA Regional Offices on air pollution control technology issues.

CTC HOTLINE: CALL (919) 541-0800 to access EPA expert staff for consultations, references to pertinent literature, or access to EPA technical data and analyses. No question is too simple!

ENGINEERING ASSISTANCE PROJECTS: If you need in-depth assistance concerning a specific control technology problem, call the HOTLINE or write the CTC. EPA staff and contractors are available for short-term projects such as review of proposed or existing control technology applications. Projects are subject to CTC Steering Committee approval.

TECHNICAL GUIDANCE PROJECTS: If the CTC receives a number of similar HOTLINE calls or a joint request from a group of agencies, the CTC Steering Committee may undertake broad, long-term projects of national or regional interest. The result may be a control technology document for a particular type of source, microcomputer software, or seminars and workshops.

CTC BBS: Call (919) 541-5742 for 1200/2400/9600 baud modem, to access the CTC Bulletin Board. Set communications parameters to 8 data bits, N parity, and 1 stop bit. You may leave HOTLINE requests, order documents, suggest projects, and download software. The BBS is part of the OAQPS Technology Transfer Network.

FEDERAL SMALL BUSINESS ASSISTANCE PROGRAM (FSBAP): Call the CTC HOTLINE to access the FSBAP. The CTC is the focal point for coordination of efforts among the four EPA centers participating in the program. The Federal program is intended to support State Small Business Assistance Programs, as required by the Clean Air Act.

RACT/BACT/LAER CLEARINGHOUSE (RBLC): The Clearinghouse provides summary information for control technology determinations made by permitting agencies. BLIS, the database portion of the Clearinghouse, is available on the OAQPS TTN. (See CTC BBS for more information.)

GLOBAL GREENHOUSE GASES TECHNOLOGY TRANSFER CENTER (GGGTTC):
Call the CTC HOTLINE to access GGGTTC information on greenhouse gas emissions, prevention, mitigation, and control strategies.

CTC, ESD (MD-13)
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