WORKSHOP 9

DATABASE DESIGNS FOR COMPLIANCE WITH RECORDKEEPING AND REPORTING REQUIREMENTS OF AIR PERMITS

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INTRODUCTION

The current air permits issued by state regulatory agencies contain extensive recordkeeping and reporting requirements. The records are necessary to monitor the compliance of sources with the applicable permit limits and operating conditions. The powerful computer systems and matured software technology available in today's market can alleviate some of the pain associated with the recordkeeping and reporting activities of air permits by providing control over these activities. This workshop discusses Microsoft Access and Excel-based applications that are being used to facilitate the recordkeeping and reporting requirements of air permits.[1]

WORKSHOP SCOPE AND FORMAT

Based on four real-world case histories, this workshop demonstrates alternative tools available for managing recordkeeping and reporting requirements of air permits. The scope includes the discussion of typical permit recordkeeping and reporting requirements and the associated data collection needs, followed by the details of the software applications that facilitate the recordkeeping and reporting activities. The case histories included in the workshop are:

1. THERMOC
   Organic compound emission permitting database for Thermoseal Inc. Sidney, Ohio facility
2. EDB
   Comprehensive air emission and production database for a foundry. Ford Motor Company, Cleveland Casting Plant
3. Access Database for a Coating Facility
   Database for compiling daily coating usage data and generating daily, quar-

[1] Access and Excel are registered trademarks of Microsoft Corporation.

terly, and annual VOC and HAP emission data as required by the PTIs.

4. Excel RMP Offsite Consequence Analysis Database
   This Excel workbook provides preprogrammed modules for calculating offsite worst-case consequence analysis parameters. The calculation procedures are based on EPA's RMP Offsite Consequence Analysis Guidance-May 24, 1996 document and covers Sections 3, 4, and 5.

The workshop presentation will consist of the discussions of the case histories by respective environmental managers followed by demonstration of the key features and overview of the databases.

RECORDKEEPING AND REPORTING ISSUES

The recordkeeping and reporting requirements of air permits are either source specific or facilitywide. The source-specific requirements are initiated when a permit to install or construct is issued for the specific source. The facilities containing multiple similar sources, generally also contain group emission limits and compliance conditions. The Clean Air Act regulatory thresholds that apply on a facilitywide basis are also included in the recordkeeping and reporting requirements of the air permits.

The terms and conditions of the current air permits require recordkeeping of permitting parameters on a shortest practicable period basis. Many permits have limits that require records of daily usage and composition data. Averaging of monthly or annual usage data do not accurately indicate the short-term compliance status of the emission sources with the permit conditions, and therefore, they are not appropriate for monitoring compliance.

The use of monthly or other longer-term data are also not useful in monitoring conditions that require a facility to report deviations from applicable limits within a specified period. For example, a paint booth permit generally requires reporting of daily usage rate or as-applied coating composition deviations within 45 days. A facility relying on monthly usage records may not catch such deviations in a timely manner and sometimes may miss reporting of such deviations altogether because the data are not collected on a daily basis.

Table 1 summarizes the recordkeeping and recordkeeping requirements for a typical manufacturing facility.

TABLE 1. AIR PERMIT/EMISSION REPORTS

Report	Parameters	Due date
Excursion reports	Exceedance of permit limits and conditions	Within 45 days of occurrence
Quarterly reports required by permit conditions	Material throughputs and emissions	Within 30 days after end of quarter
Indiana Emission Statement	Annual NOX, OC, PM, SOX emissions Production data Operating hours	July 1
Kentucky Emissions Inventory System (KY EIS)	Annual NOX, OC, PM, SOX emissions Production data Operating hours	Title V sources- 30 days from receipt of KY EIS from KDAQ Minor sources- 45 days from receipt of KY EIS from KDAQ
Ohio Fee Emission Report (FER) Annual pollutant emission report (Title V/FESOP)	Annual NOX, OC, PM, SOX emissions Production data Operating hours	April 15 January 31
Indiana Emission Statement	Potential NOX and VOC emissions > 10 tons/yr in nonattainment areas	April 15
Ohio Annual Emission Statement	Actual NOX and VOC emissions > 25 tons/yr in ozone nonattainment areas	November 15
SARA 313 Form R	Threshold evaluation and release estimates for listed toxic chemicals	July 1

RECORDKEEPING SYSTEM REQUIREMENTS

The systems for management of air permit information at many facilities currently consist of several unconnected spreadsheets, databases, or manual records. Also, many times the data required for air permit reporting are extracted from databases at the facility that include large amounts of data unrelated to air permits. These fragmented data sources generally do not provide all information necessary for completing the air permit reports. The reports generated from such data sources entail significant effort on the part of the environmental staff every time the reports are required.

The above approach can also lead to permit data that cannot be properly reconciled with other related data at the facility. For example, material purchase quantities may not agree with the material usage data derived from the number of production units during the reporting period.

The increased recordkeeping and reporting burden of the current air permits and the their increased scrutiny by the regulatory agencies require database systems designed exclusively for tracking air permit terms and conditions. The database systems must be designed with the specific recordkeeping and reporting requirements of the air permits in mind. The air permit database must meet the following criteria:

- Allow maintenance of records in terms required by the permit conditions--Air permits require maintenance of records in specific terms. For example, a typical permit for a paint booth requires daily records indicating quantity and types of coatings used as well as calculation of as applied VOC content. The database for such an application should record the data on a per shift basis and then aggregate it over the daily period.

- Spot data entry errors--
  The database should be designed to interactively identify any data entry errors. For example, for a paint booth, the database should alert the user of any daily coating limits excursions during the data loading process.
- Report excursions/deviations--
  When required by terms of the permit, the database should be able to generate a report of any excursions or deviations from the applicable limits.
- Generate required reports--
  The database should be able to generate reports and summary tables as required by the permits. It should be able to generate data for the specified rolling period and should also be able to provide maximums or averages, as appropriate.
- Allow archiving of permit data--
  Air permit regulations require maintenance of records for up to 5 years. The database system must allow archiving of the collected data in a sound manner.

In addition to the above-discussed permit-specific requirements, the database designs must also be reviewed for software/hardware compatibility and user acceptability issues. These may include:

- User interface--
  For increased accuracy, whenever possible, the database design should provide the user a way of selecting input from predefined lists. This can eliminate typing errors and loading of unacceptable data. For example, the database should auto fill items such as dates and source IDs and provide a pick list for data such as operator names, material names, etc.
- Data import/export capabilities--
  The database should allow interface with other databases at the facility. To minimize data entry errors among differ-

ent databases, the permit database should be able to accept data from other sources in electronic form. It should also be able to create files that can be read by other databases.

- Database security and maintenance--The database security issues should be decided during the database design phase. Accessibility of database components can vary among the user groups at the facility. Two methods of securing a database are generally available: setting a password for opening a database, or user-level security, which can be used to limit what parts of the database the user can access or change.

DATABASE SOFTWARE TOOLS

Various software applications are available on the market that can be used for developing air permit databases. The available software applications offer the combination of built-in functions for routine data analysis as well as programming capabilities for customizing the application for specific database needs. Microsoft Excel and Access are two software applications that can handle the database requirements of air permit recordkeeping and reporting requirements. There are other similar competing products on the market that are also capable of serving as base applications for designing the air permit databases. The case histories presented in this workshop are based on Microsoft Excel and Access applications.

Microsoft Excel

Microsoft Excel is used extensively in the office environment for management and analysis of numerical data and it has become a universal standard for conducting “what-if” analysis. The software offers extensive built-in functions including and customizing features to suit user needs. It allows linking of data among individual worksheets as well

as external data sources. These capabilities exceed the day-to-day data analysis needs of most users.

Excel spreadsheets are extensively used for conducting emission calculations and generating monthly, quarterly, and annual summaries of emission data and underlying production data and material compositions.

Microsoft Access

Microsoft Access is a relational database management system. Like other database systems, Access stores and retrieves data, presents information, and automates repetitive tasks. Access provides end-user tools for database management including application development capabilities. The primary elements of Access are: tables, queries, forms, reports, macros, and modules. Tables hold the data that are entered in the database. Multiple tables can be created depending upon the data types. Queries provide a means for extracting required information from tables and combining the information to meet user criteria. Forms are primarily used as user interface tool. Simple or complex forms can be designed to allow the user to interact with the database.

Based on the tables and queries, reports summarize data to meet user needs. Access report capabilities include grouping and summarizing data by logical groups and calendar periods. Macros and modules automate repetitive tasks of generating reports and other database functions.

Excel and Access Based Applications

Both Excel and Access offer custom application development capabilities based on a Visual Basic programming environment. This adds an additional dimension to the already powerful software capabilities of Excel and Access. Applications as powerful as those created with programming lan-

guages—complete with buttons, menus, and dialog boxes can be created using the Visual Basic programming capabilities.

Excel and Access are also potent Windows applications; for the first time, the productivity of database management meets the usability of Microsoft Windows. Because all these products are from Microsoft, they work well together. Data exchange capabilities between Excel, Access, and other Windows-based applications offers the user the capability of using the best features of all applications.

Excel and Access offer great potential for creating customized applications to meet the recordkeeping and reporting requirements of air permits. Environmental staff is generally familiar with Excel and routinely use it for data management purposes. However, development of customized applications generally remains an unexplored feature at most facilities. By utilizing the advanced capabilities offered by database applications, environmental managers can automate the process of air permit recordkeeping and reporting requirements. The applications can minimize the on-going recordkeeping and reporting effort while enhancing the data quality.

The selection of the base application for developing the air permit database management system will depend upon the specific data needs. Although there is some overlap in the capabilities of Excel and Access, each is designed for specific data processing applications. Excel is suited for applications where extensive and complex calculations are a primary requirement. Access is more suited for managing large amounts of data that require basic calculations. More advanced applications can be developed that combine the capabilities of both applications for a high degree of automation.

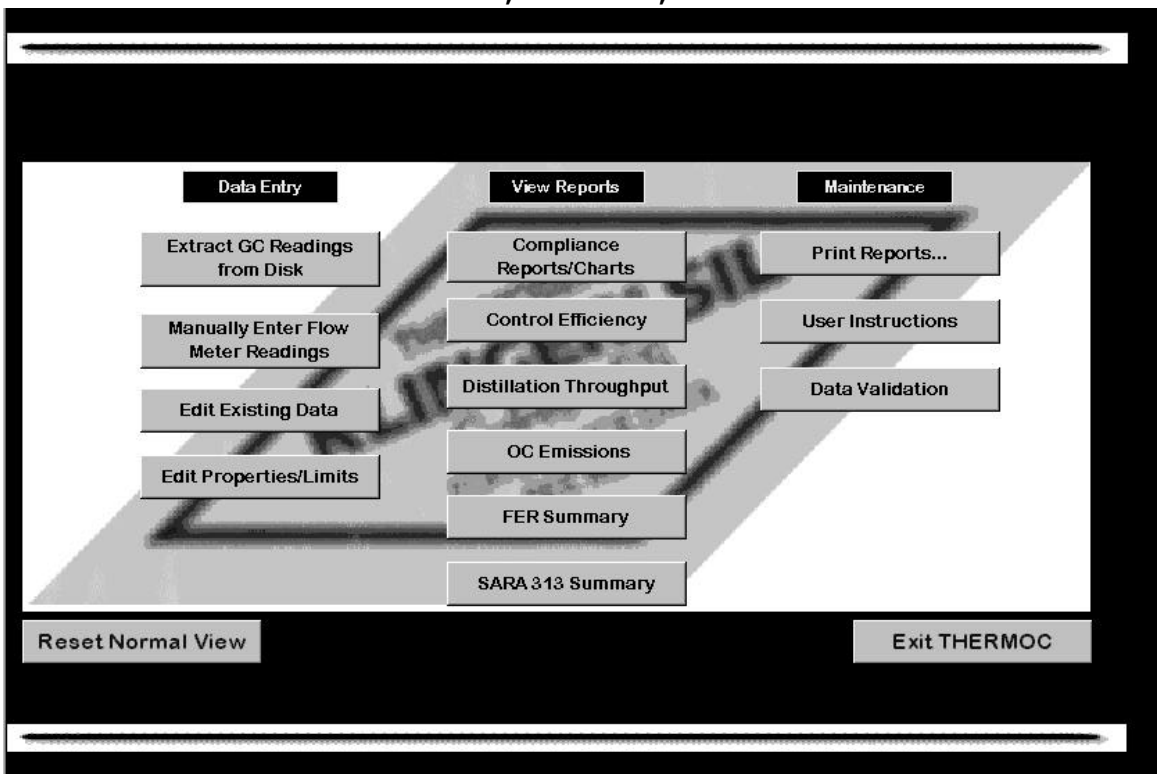
CASE HISTORIES

Four case histories illustrating the alternative database systems for management of air permit data are presented in the following pages. Each case history identifies the primary recordkeeping and reporting requirements, the database objectives and design features, and discusses example queries and reports.

CONCLUSION

The current air permits contain extensive recordkeeping and monitoring requirements that require constant attention. Custom database systems based on software applications available on the market can be developed to provide control over the recordkeeping and reporting requirements of air permits. The database systems provide tools that are tailored to the recordkeeping and reporting needs of the individual facilities. In addition to management of the data in an efficient manner, the systems enhance the consistency and accuracy of the recordkeeping and reporting requirements.

THERMOC
ORGANIC EMISSION PERMITTING DATABASE
THERMOSEAL INC., SIDNEY, OHIO FACILITY



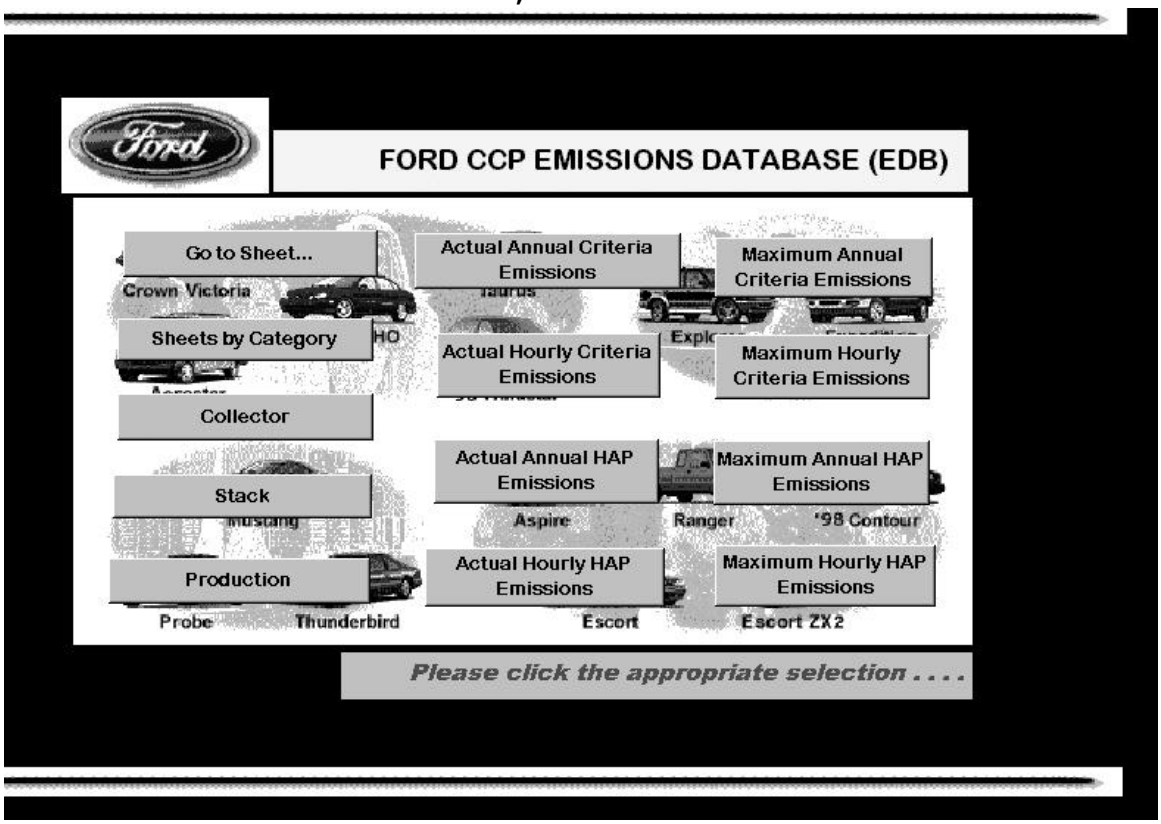
Database Operating Status	In use since August 1998. THERMOC is used as a primary database for loading daily operating data and for monitoring compliance and generating required quarterly and annual reports.
Facility Operation	The facility is a Title V major source due to its emissions of toluene, which is a hazardous air pollutant (HAP). Thermoseal is a rubber gasket manufacturer located in Sidney, Ohio. The facility uses toluene and ethanol in its mixing and calendering operations. Five mixers and four calenders are exhausted to a common control system consisting of 3 carbon adsorption units. Toluene is recovered for on-site reuse via regeneration of the carbon beds. Ethanol is recovered for on-site reuse via an alcohol distillation unit. The facility is required to track the amounts of solvents processed and recovered in order to estimate facility-wide total organic compound emissions and overall control efficiency for compliance demonstration purposes.

<table>
<tr><td>Recordkeeping and Reporting Requirements</td><td colspan="3"><table>
<tr><th>Parameter</th><th>Permit Limit</th><th>Record-keeping</th><th>Reporting</th></tr>
<tr><td>OC emissions rolling 30-day period</td><td>58.3 tons</td><td rowspan="4">Daily</td><td rowspan="4">Excursion within 45 days</td></tr>
<tr><td>OC emissions rolling 365-day period</td><td>180 tons</td></tr>
<tr><td>Overall OC recovery efficiency rolling 30 day period</td><td>90.60%</td></tr>
<tr><td>Liquid organic material processed through ethanol distillation unit on a rolling 365-day basis</td><td>1000 tons</td></tr>
</table></td></tr>
<tr><td>Database Design Features</td><td colspan="3">THERMOC is based on Excel application and includes Visual Basic macros for data entry, editing, and compliance reports.

Database allows import of electronic daily GC readings data from external database.

Provides dynamic compliance flags, charting capabilities, and data archiving capabilities.</td></tr>
<tr><td>Queries and Reports</td><td colspan="3">Compliance reports and plots
Rolling control efficiency reports
Distillation throughput report
OC emissions report
FER emission data
SARA 313 report</td></tr>
</table>

EDB
EMISSIONS DATABASE
FORD MOTOR COMPANY, CLEVELAND CASTING PLANT



Database Operating Status	In use since 1995. EDB is used as a primary database in tracking hourly and annual production and emissions data. EDB is used in preparation of the annual Fee Emission Reports, Annual Emission Statements, and SARA 313 toxic chemical releases. The database maintains stack parameter data, which are used in dispersion modeling analyses for compliance with the PM-10 National Ambient Air Quality Standards (NAAQS). EDB is also used for preparation of Title V application and subsequent updates. EDB calculates maximum annual emissions to determine whether the facility is a Title V major source for specific pollutants. EDB calculates maximum hourly and annual production rates, as well as maximum hourly raw material throughputs that are necessary for completion of Title V Emission Activity (EAC) Forms.
Facility Operation	The Ford Cleveland Casting Plant (CCP) is the second largest gray iron foundry in North America. The facility is a Title V major source for all six criteria pollutants and 14 HAPs. CCP is a complex

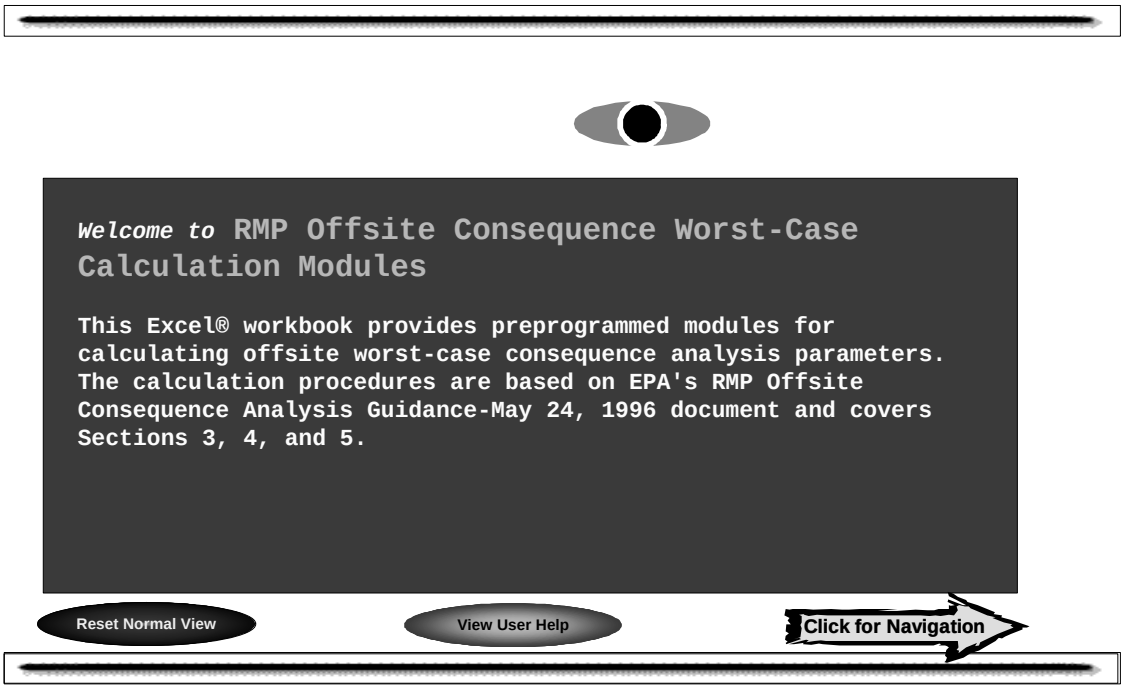
	facility with approximately 400 stacks, over 100 control devices consisting primarily of cyclones, baghouses, and scrubbers, and over 150 permitted emission sources. The facility has 7 main process areas: Melt, Mold, Core Cleaning, Knockout House, Power Plant, and Miscellaneous. The various emission source types include cupolas, holding furnaces, mold and core production, casting pouring, cooling, and shakeout operations, casting cleaning and painting operations, coal and natural gas combustion, storage tanks, cold cleaners and parts washers, fugitive dust sources including roadways and material handling.
Recordkeeping and Reporting Requirements	As discussed under Database Operating Status section above, EDB is designed for management of various production and emission data. The database generates emission data for compliance tracking and reporting purposes.
Database Design Features	This Excel-based database consists of approximately 90 worksheets that linked to estimate emissions based on raw material and production data. The database also maintains a complete inventory of emission sources and emission points and their characteristics. The database is updated continually to reflect any physical changes in source and stack parameters.
Queries and Reports	The database contains macros for user navigation through the database and various reporting functions. The macros allow a review and update of specific sources and stacks.

PAINT BOOTH FACILITY
EMISSION DATABASE
ABC COATERS, INC.

Database Operating Status	In use since July 1998. The emission database is used to track daily coating and cleanup material usage for multiple paint booths. The database calculates VOC and HAP emissions on a daily and annual basis for comparison with permit emission limits. The database also calculates the VOC content of the coatings as applied for comparison with VOC content limits. The database is used in preparation of quarterly excursion reports and facility total annual emission reports.
Facility Operation	ABC Coaters is a confidential facility that uses over 60 different coatings, thinners, and cleanup materials in multiple paint spray booths and process operations. The facility is a synthetic

	minor source and has a federally enforceable state operating permit (FESOP) that limits its VOC and HAP emissions below major source thresholds.
Recordkeeping and Reporting Requirements	Required records include daily coating and cleanup material usage, VOC content as applied, and calculated VOC and HAP emissions. Reporting requirements include 45-day notice of any permit limit excursions, quarterly excursion report summaries, and annual VOC and HAP emissions for each source and the entire facility.
Database Design Features	This is a Microsoft Access-based database with high-level of data input and reporting automation. The database facilitates user input via built-in editable pick lists.
Queries and Reports	Reporting capabilities include compliance reports, material usage reports, and reference data reports listing coating material properties. The database also allows running of ad-hoc queries based on user needs.

RMP OFFSITE CONSEQUENCE ANALYSIS DATABASE



Database Operating Status	In use by various Optim clients for conducting offsite consequence release analysis calculations.
Database Design Features	This Excel-based software automates the calculation procedures outlined by EPA in its RMP Offsite Consequence Analysis guidance.
Queries and Reports	Calculates worst-case offsite consequence analysis parameters for all listed toxic and chemical substances.

KURT E. BRAUN

Mr. Braun has been employed by the Ford Motor Company since the Spring of 1994. His primary responsibilities are working with air permitting and air issues for Cleveland Casting Plant and the Cleveland Aluminum Plant (currently under construction). Mr. Braun also led the implementation of ISO14001 at the Cleveland Casting Plant. He is a member of the Ohio Cast Metals Association Environmental Affairs Committee and the American Foundrymen's Society Air Quality Committee.

THOMAS A. RATERMAN

Mr. Raterman has been employed by Thermoseal Inc. as Technical Director since 1994. His responsibilities include management of: environmental systems, solvent recovery systems, ISO quality program, testing laboratory, plant engineering and maintenance, and technical application program for gaskets. His environmental responsibilities cover all air compliance activities, SARA reporting, and hazardous waste management activities. Mr. Raterman is active in various professional societies including ASME, ASTM, FSA, and PVRC.

CHRISTOPHER J. MEYER

Mr. Meyer is employed by Optim Environmental Resources, Inc., an air quality-consulting firm based in Cincinnati, Ohio. He has in-depth knowledge of state and federal air compliance regulations. He has managed air quality compliance projects for a large spectrum of industrial and government facilities.

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Mr. Shah is employed by Optim Environmental Resources, Inc. based in Cincinnati, Ohio. He specializes in air emissions control and regulatory issues and has over 25 years of experience in the environmental field. He has assisted over 100 clients in successfully managing environmental issues.