

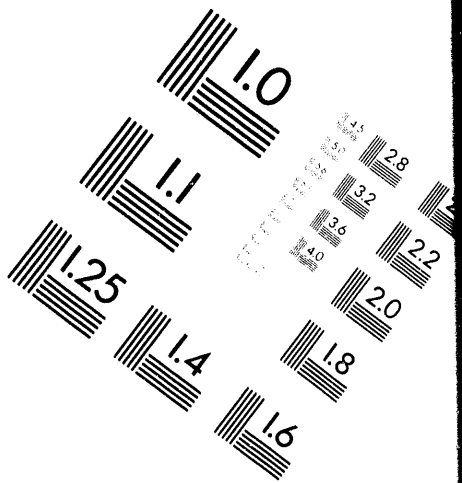
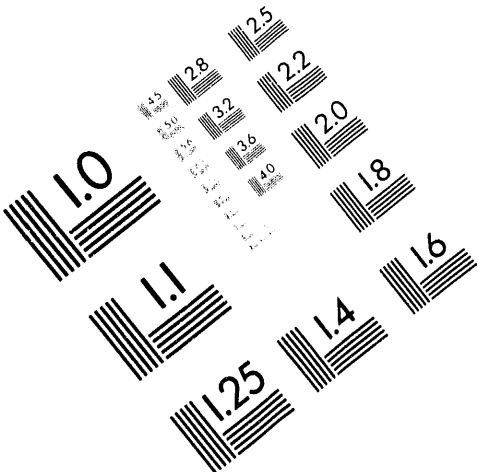


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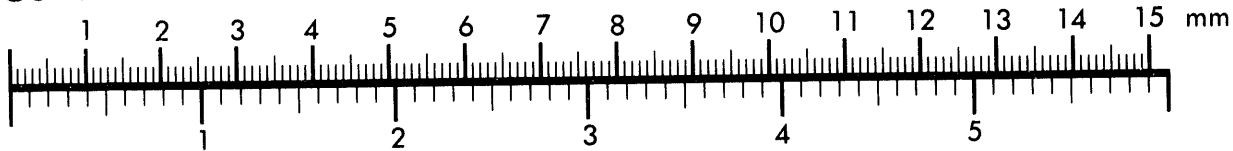
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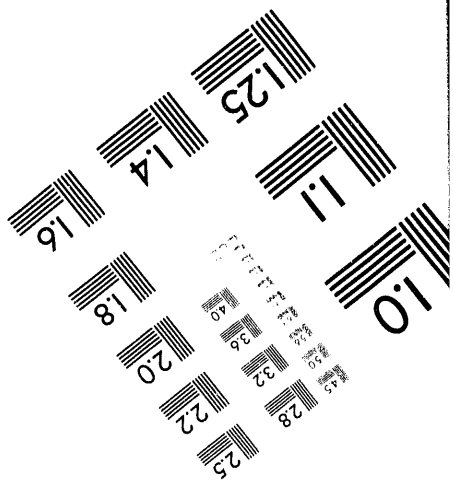
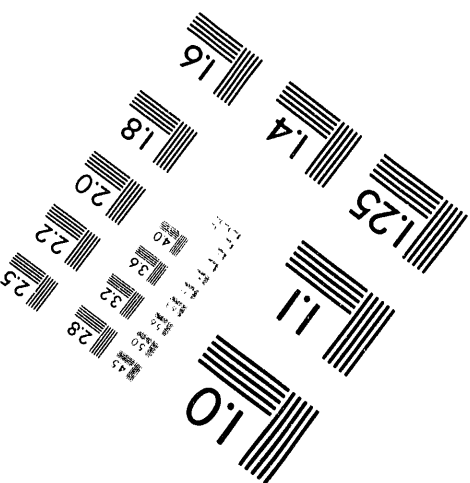
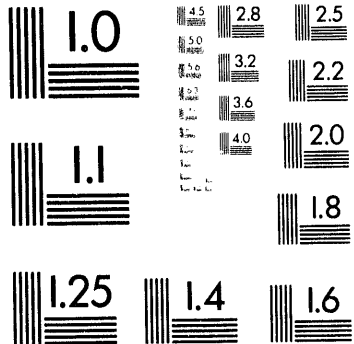
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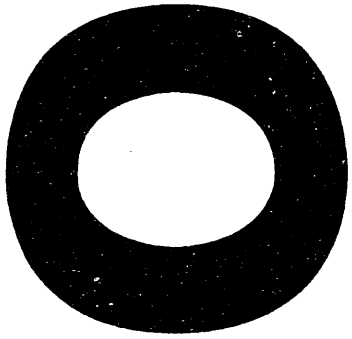
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**Development of a Clean Air Act Title V Permit Application for Argonne National Laboratory**

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## INTRODUCTION

The Clean Air Act Amendments (CAAA) of 1990 instituted major changes in the way that air emission sources are regulated and permitted. Along with being a major research and development laboratory owned by the U. S. Department of Energy, Argonne National Laboratory (ANL) is also classified as a major source of oxides of nitrogen ( $\text{NO}_x$ ) in the Chicago metropolitan area which has been designated by the U. S. Environmental Protection Agency (USEPA) as severe (17) for ozone. As a major source ANL is therefore required under Title V of CAAA to apply for a federally enforceable permit for all sources of air emissions at the facility. While the ANL Boiler House represents the most significant emission source at the Laboratory, there are, nevertheless, a large number of other emission sources, some of which are currently permitted by the State of Illinois and others of which are exempt from state permitting requirements. A large number of R & D related sources are of relatively small magnitude. The ability to identify, inventory, characterize and classify all sources under the various titles of CAAA constitutes a major challenge for R & D laboratories of this size.

## INITIAL ANALYSIS

### Existing Databases

ANL is currently operated under approximately thirty point source air permits issued and regulated by the Illinois Environmental Protection Agency (IEPA). These permits cover a variety of activities which generate (or have the potential to generate) emissions of regulated air pollutants. The major emission source at ANL is the Central Boiler House which consists of one coal-fired and four gas-fired boilers. Besides  $\text{NO}_x$ , these boilers are also significant sources of carbon monoxide, particulates, and sulfur dioxide (from high sulfur coal). Other permitted combustion sources include oil-fired boilers and some large emergency generators.

Emissions of volatile organic compounds (VOC) are primarily due to a number of gasoline dispensing facilities at the Laboratory as well as some small scale solvent degreasing operations. A number of permitted sources of particulate emissions include grinding and woodshop operations which use various types of dust collection systems to minimize environmental releases.

The other major regulated pollutant at ANL is in the area of radionuclides. While these emissions are subject to regulations in 40 CFR Part 61 Subpart H, IEPA does issue National Emission Standards Hazardous Air Pollutant (NESHAP) permits on the various point sources at the Laboratory where small amounts of radionuclides can be released. An extensive monitoring program required by both federal regulations and the Department of Energy (DOE) ensure that annual releases result in an effective dose to the public that is well below the maximum level of 10 mrem/yr for DOE facilities.

Beginning in 1993 new state regulations required facilities like ANL to file Annual Emission Reports for the previous calendar year on sources of VOC and  $\text{NO}_x$  which verified or updated the IEPA database. Along with these emissions, updates on parameters such as particulates and sulfur dioxide were also requested. The information required for state air permit applications as well as that needed to provide verification of the Annual Emission Report served as the initial database for compiling all of the information needed to complete the Title V permit application.

### **Other Emission Inventory Sources and Regulatory Impacts**

Argonne National Laboratory occupies a 1700 acre site approximately 25 miles from downtown Chicago. Consisting of approximately 200 buildings, as a research and development laboratory employing about 4000 scientists and support personnel in over thirty different departments and programs, the task of evaluating all actual and potential sources of emissions of regulated air pollutants was a formidable one.

As an R & D facility much of the activity consists of "bench scale" work in a variety of research in the basic energy and related sciences (physical, chemical, material, computer, nuclear, biomedical, and environmental). Since much of this type of activity is currently exempt from state air permitting and consists of research that can generate small air emissions in hundreds of locations around the facility, a preliminary effort was made in January, 1993 to begin to characterize these sources. A Title V air emissions survey was distributed at a meeting of the environmental compliance representatives at the site. These are programmatic and support department staff personnel who act as contacts within their respective departments on environmental issues. The survey addressed all the relevant titles of CAAA and through the use of various threshold amounts helped to characterize the usage of chemicals and materials in R & D usage that would result in air emissions.

The survey results were compiled in the spring of 1993, and confirmed that a large number of small emission sources due to R & D activity involved the releases of VOCs and hazardous air pollutants, as well as some emissions of criteria pollutants (oxides of nitrogen, sulfur dioxide). The characterization and quantification (if necessary) of these sources would prove exceedingly difficult as they would involve having to estimate emissions on an experiment-by-experiment basis.

On July 2, 1992, the Illinois legislature had passed a bill authorizing IEPA to establish the Clean Air Act Permit Program (CAAPP) based upon USEPA's final minimum requirements for state operating permit programs. This program became effective on September 26, 1992 and established the requirements for the Title V permit application procedure via a "fast track" approach by incorporating the major requirements in a statutory (as a revision of the Illinois Environmental Protection Act) rather than a regulatory format.

One section of the CAAPP requirements addressed the area of insignificant emission sources, but IEPA was given until March 26, 1994 to define the actual activities to fall under this designation. Based upon informal communication it appeared that bench scale R & D activities would be classified as insignificant sources of emissions.

On October 8, 1993, IEPA published a set of proposed rules on procedures to comply with CAAPP. In the proposed rules it was stated that a quantitative characterization of insignificant emission sources would not be required; however, a list of such activities would need to be developed and submitted in the permit application. IEPA did not define insignificant emission source at this time. For planning purposes it was therefore assumed that bench scale R & D activities would constitute insignificant emission sources, but that a listing of some sort would need to be developed for the Title V application.

One source which was known to require quantitative characterization was the Argonne Central Boiler House which provides steam for most of the buildings on site. Under terms of the current state

operating permit there were no emission limits for NO<sub>x</sub> due to the size of the boilers. For the coal-fired boiler the state permit designated limits on particulates (measured as opacity) and sulfur dioxide (when burning high sulfur coal). Pollution control equipment consisted of a baghouse and a sulfur dioxide scrubber utilizing lime to remove these pollutants to below the regulatory limit.

In reviewing historical data from the Boiler House (which was approximately 40 years old) a number of studies had been conducted on the coal-fired boiler. However, these had primarily concentrated on the issue of sulfur in coal burning or the economics of gas-fired versus coal-fired boiler use. There was no actual NO<sub>x</sub> emission data on either this boiler or the four gas-fired boilers. Approximately one year earlier a NO<sub>x</sub> monitor had been installed on the coal-fired boiler to operate in conjunction with the opacity and SO<sub>2</sub> monitors required under the current operating permit. This provided some preliminary NO<sub>x</sub> information for purposes of evaluating boiler performance with respect to upcoming Reasonably Available Control Technology (RACT) rules anticipated to impact future operations.

On August 26, 1993, IEPA released a draft copy of the proposed state NO<sub>x</sub> RACT rules. Based upon the proposed limits and with no previous information on actual NO<sub>x</sub> emissions, a project to characterize the Boiler House for emissions of all regulated air pollutants subject to inventorying for determination of emission fees was developed. The emissions testing was scheduled for early 1994 to measure the specific levels of emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO, and PM-10 (for the latter no data were available from the coal-fired boiler).

On November 15, 1993, Illinois submitted their CAAPP to the USEPA as required by statute. The permit program is currently under review-awaiting final approval.

## **PERMIT APPLICATION PREPARATIONS**

### **Preliminary Study**

Once the state CAAPP requirements had been reviewed in conjunction with pre-existing databases and the results of the sitewide air emission survey, a draft Statement of Work was written to provide a preliminary list of tasks to be executed for completing a Title V permit application. The size of the facility and the extent of effort required would necessitate the use of outside contractors to provide the needed manpower and also serve as an oversight function to ensure that all requirements under CAAA had been adequately evaluated and addressed in the permit application.

The Statement of Work broke the permit application process into ten major sections:

- 1) Identification of each emission source;
- 2) Determination of actual emissions (where necessary);
- 3) Verification of major source status for the facility as a whole;
- 4) Determination of practical emission limits for the length of the permit;
- 5) Determination of compliance status for all requirements of CAAA;
- 6) Proposal of schedules to achieve compliance for the facility;
- 7) Development of recordkeeping and reporting procedures;
- 8) Calculation of permit fees;

- 9) Review of the permit application prior to submission; and
- 10) Development of a proposed draft permit (as an option).

A number of environmental consulting firms had been contacted in the summer of 1993 to ascertain the approximate cost of preparing a Title V permit application for ANL. Due to the large size of the facility, the numerous small R & D emission sources, and the fact that many of the regulations which could have an impact had yet to be finalized, the cost estimates widely varied. From five nationally known consultants estimates ranged from \$50,000 to \$1,800,000. Much variation also arose depending upon the amount of hands-on work (i.e., data gathering, interviewing with departments, etc.) to be done by the consulting staff.

#### **Schedule of Work**

As the Title V permit application was a new program, and many of the regulatory requirements that could impact ANL had not been finalized by the preliminary planning stage, it was estimated that the duration of the project would take approximately one year. During this time any new provisions in the regulations would be evaluated and incorporated into the application.

Initial work on the project was scheduled to begin in early 1994. The request for proposals, their subsequent review and final selection of the contractor would take about three months. It was anticipated that while the first phase consisting of inventorying and characterizing of current emission sources would be time consuming, the overall scheme provided by the survey and current point source permits would account for this aspect with few unexpected problems.

#### **Operational Flexibility**

The major difficulty in the Title V process would be in determining the operational flexibility provisions that would be required to cover a wide variety of operating scenarios. Among the potential areas where major impacts could be expected were:

- 1) ANL Boiler House. As a DOE laboratory conducting a broad spectrum of research on fossil fuels, the boiler house had been and was expected to continue as a facility for studying new and developing technology as well as acting as the major source for heat and steam for the Laboratory. During the characterization of the boiler house emissions a number of proposed projects were being considered for implementation:

- a) Cogeneration. This proposal would result in the installation of an additional gas-fired boiler and turbine at ANL to provide onsite electricity as well as study recent developments in cogeneration technology. Since the system would not provide for excess electricity being available for sale, none of the provisions under Title IV (acid rain) were expected to impact the project. However there would be substantial impacts on coal usage (hence  $\text{NO}_x$  and  $\text{SO}_2$  emissions) if this project were to be conducted.

- b) A proposal to conduct gas cofiring in the coal-fired boiler was also under consideration. This would provide a study of technology to decrease  $\text{NO}_x$  emissions as well as permit the boiler to be operated in a dual fuel mode (and therefore run in low demand

periods which was currently not possible).

c) As part of the ANL waste minimization program a project to use tire/refuse derived fuel (TDF/RDF) was being evaluated. The current operating permit for the coal-fired boiler allowed TDF to be used at levels up to 10%. This had been developed with the encouragement of IEPA. The RDF aspect would evaluate the use of fuel pellets made from ANL waste by an outside company. Besides the research value of these projects would also be an expected decrease in  $\text{NO}_x$  emissions from utilizing these alternative fuels.

d) Additional proposals for upgrading the coal-fired boilers for cost savings versus gas burning were also under consideration.

The implementation of all of these projects was not expected since some projects, if undertaken, would make others redundant or superfluous. Since the timing of these projects was to coincide with the submission of the Title V permit application, sufficient evaluation of each of them and their impacts on air emissions was needed to be incorporated.

2) Other R & D Projects. While most projects had been at least initially identified in the sitewide survey, there were new proposals including the installation of a pilot-scale catalytic cracking plant which could have an impact on emissions.

3) Other Support Activities. Included in this would be a current project to upgrade the ANL wastewater treatment plant which was to include air stripping of volatile organics. There were also a variety of site remediation activities which were expected to be underway during the duration of the permit which needed to be evaluated for their air emissions.

## ANTICIPATED FUTURE ACTIVITIES

### Future regulations

The major regulations with significant future impacts on the Title V permit application are expected to be in the issuance of final  $\text{NO}_x$  RACT rules and a definition of what will constitute an insignificant emission source in Illinois. Preliminary information suggests that the state  $\text{NO}_x$  RACT rules will be almost identical to the federal ones while most if not all R & D activities will be covered by some type of insignificant emission source designation requiring a less rigorous characterization than for example manufacturing or service generating types of industries. In addition such pending issues as  $\text{NO}_x$  impacts on photochemical modeling, enhanced monitoring, and risk management programs for accidental chemical release (under Section 112(r) of the Act) may all have possible impacts in the future.

Nevertheless it is anticipated that the Title V permit application will take approximately one year to complete. Besides compiling the emission inventory, the description of the various operating scenarios of both major R & D and support activities (such as the Central Boiler House) will be thoroughly examined to account for all known or potential modes of operation for the next several years.



### Activity Schedule for CY 1994

Using an anticipated submittal date of early 1995, the following is the proposed schedule for the permit application:

<u>Activity</u>	<u>Week</u>
Award contract	0
Begin formal site emissions inventory	1
Identification of emission sources	6-19
Verification of major source status	
Determination of facility emissions	19-37
Determination of practical emission limits	32-45
Determination of compliance status	
Proposal of schedule to achieve compliance	
Development of recordkeeping and reporting	
Calculation of permit fees	
Final application/draft permit review	45-48
Begin permit application sign-off	48-49
Submission to IEPA	51
Respond to IEPA with additional information	60-?

### CONCLUSION

The 1990 Amendments to the Clean Air Act have instituted a fundamental change in how a large R & D facility can plan and operate in the future when such activities result in the emission of regulated air pollutants. Prior to the amendments, air permitting was handled by single point sources and usually involved a permit application with preparation and review taking a matter of weeks, and the issuance of a permit taking normally no longer than one or two months. The Title V application must not only address all current emission sources but also characterize and account for all future (during the five year lifetime of the permit) activities. The ability to successfully construct a living document that complies with all of the requirements of the Clean Air Act as well as allow for sufficient flexibility to maintain current and future research programs and support activities will present a challenge not only to Argonne National Laboratory, but similar types of institutions nationwide.

**DATE**

**FILMED**

**7 / 13 / 94**

**END**

