PERMITTING PROCESS FOR THE COLUMBUS RESOURCE RECOVERY PLANT

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ABSTRACT
The cooperative effort between government, citizenry, and industry to obtain a permit to install the City of Columbus Refuse and Coal Fired Municipal Electric Plant is discussed. The results of this effort show what can be accomplished when the parties involved in a permitting and air emission offset situation are willing to work together for the benefit of a community.

INTRODUCTION
The permit obtained to allow the construction of the Columbus Refuse and Coal Fired Municipal Electric Plant, currently being built in Franklin County, Ohio, was the result of a cooperative effort between the City of Columbus Municipal Government, the Citizens of Columbus, the State of Ohio, the U. S. Government, and local industry.

A formal hearing is required to allow public input as part of the permit process. The issuance of a Permit to Install this plant without significant opposition during the public hearing is a tribute to the cooperative effort made to implement the spirit of the Clean Air Act while at the same time recognizing the ever present economic constraints and the need to implement a resource recovery program.

BACKGROUND
In 1898 the City of Columbus built its first generating station to provide electricity primarily for street lighting. During the year 1910, the station’s excess capacity was made available for the sale of electricity to private customers. Over the intervening years, the generating station’s capacity was increased and improved with coal and gas fired boilers, and a gas-oil gas turbine generator with a waste heat boiler. The transmission-distribution system was expanded to provide street lighting throughout Columbus and electric service to about 7,300 private customers.

With the advent of more stringent emission regulations, the City’s Division of Electricity was forced to make the decision to either:
1. make major improvements to the emission controls on the coal fired boilers, or
2. discontinue the use of the coal fired boilers.

The latter was chosen in view of the favorable progress on the planning of a new refuse and coal fired plant to replace the older plant. A new substation and additional tie lines were built so that the City could continue to supply its electric customers with power purchased from a private utility.

A report [1] was submitted to the City in August, 1974 with the following recommendations:
1. That the City enter into contract with an appropriate engineering firm to develop hard technical feasibility statements and cost estimates for a 90 MW refuse-burning power plant. This would solve the City’s refuse disposal problem and allow it to continue selling electricity.
2. That the Department of Finance immediately explore available financing methods to raise the
approximately $60 million needed for the proposed project. Special effort should be made to secure assistance from The Ohio Water Development Authority.

3. That short-term financing mechanisms be explored because a positive decision would entail as much as $3 million for early architectural and engineering work prior to construction.

Subsequently the City retained the firm of Alden E. Stilson & Associates to provide a comprehensive study of the feasibility of a refuse and coal fired power plant. The report showed the technical and economic feasibility of the plant. When more information was developed during this more detailed study, the initial capital cost of $60 million was revised upward to $108 million. This type of resource recovery plant was especially suited to the situation in Columbus because:

1. The problem of the use of sanitary landfills for solid waste disposal will continue to increase with more stringent regulations and because land for such a use is scarce to nonexistent in the Columbus metropolitan area.

2. The City collects and hauls a major portion of the refuse. The City constructed three trash shredding transfer stations in order to extend landfill capabilities and the shredded trash would provide a stable source of fuel.

3. The City has a Division of Electricity which owns and operates an electrical distribution system to serve both the City service facilities and a large number of residential, commercial and industrial users.

4. The City has a staff experienced in the operation of fossil fuel fired power generating plants.

5. The City has a site for the plant which is near its transmission and distribution lines.

The first feasibility study was supplemented approximately one year later to update the costs and to show the economic impact of burning low sulfur coal in conjunction with the shredded refuse.

The issue was on the ballot in the election on November, 1976. The City’s effort to inform the voters of the plant’s features and costs was limited to presentations made by its staff and a small quantity of handout literature which was made available through private donations. By law, the City could not use any of its funds for promotional activities. Even with this relatively small effort, the bond issue failed by only a small margin.

After this election local residents who supported the plant to recover energy and dispose of refuse continued its promotion and obtained signatures on petitions to encourage the City Council to place the issue on the ballot again. During the election in November, 1977, with the amount of the bond issue increased from $108 to $118 million dollars to account for escalation, the issue was overwhelmingly approved by a 65 to 35 margin.

The firm of Alden E. Stilson & Associates was retained to design the power plant and to assist the City in obtaining the permits required for its construction.

ENVIRONMENTAL CONSIDERATIONS

Throughout the work on the feasibility studies, the City and the consultant conferred with the Ohio Environmental Protection Agency regarding the control of emissions from the refuse and coal fired plant. Among concerns discussed were the expected emissions, the methods which are available for the control of the emissions, and other existing sources of emission, all of which affect ambient air quality. As a result of these discussions, it was assumed that all regulations would be satisfied provided that the particulate emissions were controlled by high efficiency electrostatic precipitators, and the sulfur dioxide emission would be regulated by burning the proper proportion of refuse and coal. The flue gas would be discharged through 250 ft stacks.

After the project received voter approval of general obligation bonds to finance the plant, the detailed work of applying for a permit to install was begun. Starting in January of 1978, the City and its consultant worked with the OEPA and the U.S. EPA to satisfy the environmental considerations.

The procedure to obtain a permit to install a new source such as the Columbus Refuse and Coal Fired Municipal Electric Plant required that the environmental situation at the time of plant startup be determined.
When the work on the permit application began, the U.S. EPA had already classified the area where the plant was to be located as a non-attainment area for particulates and sulfur dioxide air pollutants. This meant that concentrations of pollutants were expected to be in excess of acceptable limits set by U.S. EPA.

Provisions were found within the regulations which allowed the use of computer modeling to show that the impact area of our new source was an exception to these general classifications.

At this time Ohio did not have an approved State Implementation Plan (SIP). Also, the State did not have the latest version of the computer models which the U.S. EPA had developed to estimate ambient air quality. By being a major source and requesting the use of these models, OEPA and U.S. EPA were required to work out an acceptable scheme for evaluation of this project. This was helpful in starting the process toward the eventual approval of the Ohio SIP.

Having decided to use the modeling approach, the City was unable to move forward because the information on existing point sources within Franklin County was not ready for computer input. An arrangement with OEPA was made in which the agency chose to model Franklin County, the first of its 88 counties, as a part of its plan to review the State Implementation Plan.

In order to expedite the permitting process and in return for rapid access to the results of the computer runs, the City agreed to help prepare information on existing point sources and background pollutant levels for computer input.

Initial results predicted that the National Ambient Air Quality Standards (NAAQS) for particulates and sulfur dioxide would be violated with the existing sources alone.

If the nonattainment status had been accepted at this point, the City would have had to secure offsets, (pound for pound reduction in emissions) and would have been forced to use Least Achievable Emission Rate (LAER) technology to control its emissions. LAER for this plant most likely would have involved the use of scrubbers.

Even if the City could have found these offsets, the approach would have been costly, most likely would have antagonized industry and resulted in spending about $18 million (1977 dollars) for scrubbers to control sulfur dioxide.

As an alternative to increasing the level of pollution control on the facility, further analysis of the modeling output was done to identify which sources were causing problems and what likely solutions might be.

It was found that four industrial sources, a municipal sewage treatment plant, a state prison, and a state mental hospital were involved.

Review of the computer output and discussions with the sources, showed that there were a variety of causes for the predicted problems and possible methods to relieve them were identified. In one case, the stack elevation initially used to estimate ground level pollutant concentrations was much less than its actual height. This meant that the estimated impact of that source was much higher than it should have been. In others, future changes in operations which were already being implemented would reduce the ground level concentrations. The two most interesting results of this analysis were that: (1) some sources were being modeled with allowable emission rates which were many times their actual rates; and (2) some sources were emitting pollutants from short stacks which naturally produced high ground level concentrations in the immediate vicinity of the plant sites.

After discussions with the sources involved and visits to the plant sites, the computer inputs were modified to reflect emission rates consistent with actual and future business needs and the use of stack heights sufficient to eliminate downwash problems from surrounding structures.

The modified inputs we were able to show that the plant impact area no longer contained predicted violations of NAAQS.

The U.S. EPA, Region IV was willing to agree with the analysis of the sulfur dioxide emissions. However, they were not willing to agree to the particulate analysis. They argued that no proof of attainment status was possible because of the uncontrolled nature of fugitive dust emissions. The City and OEPA disagreed, arguing that comprehensive information on fugitive emissions had been included in the particulate modeling input.

This point was finally resolved when: (1) the City accepted the nonattainment status for particulates; (2) U.S. EPA agreed that the high efficiency mechanical collectors and oversized electrostatic precipitators were LAER technology for this kind of plant; and (3) Ohio EPA was willing to allow exemptions for this plant as a resource recovery facility.

As part of the resource recovery facility exemption granted by OEPA, the City of Columbus was required to make a “good faith” effort to secure
particulate offsets. This was done by requesting the source previously identified by OEPA to look for offsets within their plants and report the results back to the City.

Next, final negotiations with each of the affected existing sources were completed. In all cases, each source voluntarily requested in advance of any public hearing that its own permits be modified. For two asphalt plants, the City paid for the extension of 20 ft (6.1 m) stub stacks to 100 ft (30 m) heights consistent with good engineering practice. In one case, arrangements were made to help an industrial source gain access to natural gas. The total cost of these modifications was about $300,000.

Based on the regulations existing at the time the specifications were prepared, the contract required the boiler vendor to meet the NO\textsubscript{x} emission limitations of 0.7 lb/million Btu (303 ng/J) heat input.

When the preliminary Permit conditions were defined, the U.S. EPA wanted to impose a NO\textsubscript{x} emission limit of 0.5 lb/million Btu (217 ng/J) heat input. This created a problem because the City could no longer count on guaranteed performance.

Because both coal and refuse would be fired simultaneously, the NO\textsubscript{x} limit set needed to reflect the results of the combined firing and the technological limitations. There were no data available which were acceptable to all parties involved to predict the NO\textsubscript{x} emission from the boilers.

The U.S. EPA agreed to tentatively set the NO\textsubscript{x} limit at 0.7 LB/million BTU (303 ng/J) but to set final limits based on the outcome of tests during early operation of the facility. These and the remaining permits conditions are summarized in Table 1.

Finally a public hearing was held to allow any objections to this plant to be put into the record. Only one party, the Ohio Lung Association, gave testimony. Review of their material by OEPA and U.S. EPA showed that no substantial issues had been raised.

The permit to install was granted. By working within the law and securing advance cooperation

### TABLE 1 MAJOR PERMIT CONDITIONS

<table>
<thead>
<tr>
<th>SIP revisions for existing sources</th>
<th>Particulate emission less than 0.10 lb/million Btu (43 ng/J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO\textsubscript{x} emissions</td>
<td></td>
</tr>
<tr>
<td>0.5 lb/million Btu (217 ng/J) or less when firing refuse</td>
<td>0.7 lb/million Btu (303 ng/J) or less when firing 100 percent coal on an emergency basis.</td>
</tr>
<tr>
<td>Testing to determine final limit</td>
<td></td>
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<tr>
<td>Sulfur Dioxide</td>
<td></td>
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<tr>
<td>0.93 lb/million Btu (403 ng/J) or less when burning refuse-coal mixtures</td>
<td>1.44 lb/million Btu (624 ng/J) or less when burning coal with maximum steam generating of 660,000 steam lb/hr</td>
</tr>
<tr>
<td>Control of fugitive dust emissions</td>
<td></td>
</tr>
<tr>
<td>Four continuous ambient sulfur dioxide monitors</td>
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</tbody>
</table>

### TABLE 2 COOPERATIVE EFFORT REQUIRED TO SECURE A PERMIT TO INSTALL

<table>
<thead>
<tr>
<th>City of Columbus</th>
<th>State of Ohio</th>
<th>U.S. Gov't</th>
<th>Industry</th>
<th>Citizens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared source inventory</td>
<td>Expedited Analysis of Franklin Co.</td>
<td>Advised on requirements</td>
<td>Agreed to voluntarily reduce allowable SO\textsubscript{2} emissions</td>
<td>Voted for bond issue</td>
</tr>
<tr>
<td>Analysed background Data</td>
<td>Analysed Estimate of plant impact</td>
<td>Agreed to NO\textsubscript{x} limits to be set by final test</td>
<td>Obtained stack extensions and gas line</td>
<td>Accepted the emission control plan</td>
</tr>
<tr>
<td>Negotiated with industrial sources</td>
<td>Ready access to personnel</td>
<td>Gave clearance to initial site work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made good faith effort to find offsets</td>
<td>Department of Corrections &amp; Mental Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made sure own sources in compliance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid to increase stack heights</td>
<td></td>
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</tbody>
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* Alden E. Stilson & Associates performed portions of the work and coordinated the interaction among the parties involved.
with various members of the Columbus community, unnecessary delays were avoided. The City was able to proceed with the project without the increased financial burden of the installation and operation of scrubbers. Table 2 summarizes the cooperative effort required to finally secure the permit to install.

The action described above extended over a time period of approximately 21 months and cost about $150,000. The time period required was largely dictated by the ability and willingness of the various parties involved to schedule and implement their participation in the permitting process. Since the plant was to be located on an existing quarry site and the installation would actually improve the site, the earth work was begun prior to issuance of the permits. While this period could have been shorter with a more intense effort the objective was achieved and the facility's construction was not delayed because of the time required to obtain the Permit to Install.

REFERENCE

(1) Ohio State University School of Public Administration and City of Columbus, "City of Columbus Municipal Power System, Alternatives and Analysis to the year 2000," August 30, 1974.

KEY WORDS
Columbus
Environment
Planning
Pollution
Refuse
Regulations
Resource